



Task Force on Climate-related Financial Disclosures

2023 Status Report

TCFD

TASK FORCE ON
CLIMATE-RELATED
FINANCIAL
DISCLOSURES

October 2023

September 13, 2023

Mr. Klaas Knot
Chair
Financial Stability Board
Bank for International Settlements
Centralbahnplatz 2
CH-4002 Basel
Switzerland

Dear Chair Knot,

On behalf of the Task Force on Climate-related Financial Disclosures, it is my pleasure to present our sixth status report. As you know, this is our final report before the International Sustainability Standards Board assumes responsibility for monitoring companies' progress on climate-related disclosure as of next year. It reflects not only on progress made over the last year, but also on experiences and insights gained over the eight years since the Task Force was formed.

The final TCFD recommendations published in June 2017 were designed to provide a framework for companies to disclose critical climate-related financial information to help increase consistency and comparability around the world. Six years later, the recommendations have become the foundation for national and international climate-related disclosure requirements — including as the global baseline set by the International Sustainability Standards Board's general sustainability-related and climate-related disclosure standards — and have driven far greater consistency in companies' climate-related reporting. In short, the Task Force's work has been an unequivocal success.

The success of the TCFD's recommendations can be demonstrated by the 19 jurisdictions, accounting for close to 60% of global 2022 GDP, with final or proposed TCFD-aligned disclosure requirements. Additionally, the Task Force has seen over 4,800 organizations indicate their support for the TCFD's recommendations, ranging from companies and civil society to governments.

However, more needs to be done. As this report describes, although companies continue to make progress in their disclosures, significant gaps in data remain. In particular, reporting the impact of climate change on companies' businesses, strategies, and financial planning is still lagging behind.

To help address those gaps, the Climate Data Steering Committee recommended the development of a global, open repository for climate transition-related data: the Net-Zero Data Public Utility. It will provide free, public access to a central source of emissions and targets information, in line with the TCFD recommended disclosures on metrics and targets — a major step forward in the comparability and availability of data, building on work that the Task Force has led.

I've been honored to Chair the TCFD for these eight years and am grateful to the Task Force members who have dedicated themselves to its success. On behalf of us all, I want to thank you and the Financial Stability Board, its Chairs, and its Secretariat for recognizing the need for this work and for their steadfast support to make it possible.

Sincerely,

A handwritten signature in black ink, reading "Michael R. Bloomberg". The signature is fluid and cursive, with the first name "Michael" and last name "Bloomberg" clearly legible.

Michael R. Bloomberg

Executive Summary

In June 2017, the Financial Stability Board’s Task Force on Climate-related Financial Disclosures (Task Force or TCFD) released its final recommendations (2017 report), which provide a framework for companies and other organizations to develop more effective climate-related financial disclosures through their existing reporting processes.¹ In its 2017 report, the Task Force emphasized the importance of transparency in pricing risk — including risk related to climate change — to support informed, efficient capital-allocation decisions.

With the release of the Task Force’s recommendations and supporting implementation guidance in 2017 and each year thereafter, the FSB asked the Task Force to continue its work — promoting adoption of the TCFD framework; providing further guidance; supporting educational efforts; monitoring climate-related financial disclosure practices in terms of their alignment with the TCFD recommendations; and preparing annual status reports. During this time, the Task Force has issued five status reports — with this being its sixth and final report. In the months between this status report and the 2022 status report, the Task Force has continued to see significant momentum around adoption of and support for its recommendations, including the International Sustainability Standards Board’s (ISSB’s) release of its climate-related and general sustainability-related disclosure standards — which are based on the TCFD recommendations.

Shortly after the release of the standards, the FSB indicated that the ISSB standards represent a culmination of the Task Force’s work and that the TCFD would be disbanded upon release of its 2023 status report.

This report describes companies’ progress in making climate-related financial disclosures and highlights some of the challenges they face in making such disclosures, including challenges with incorporating climate-related risks into their financial statements. The report also provides an update on significant actions by governments, regulators, and standard

setters to use the TCFD recommendations in developing climate-related disclosure requirements and concludes with the Task Force’s view of insights gained over the past eight years and areas that warrant continued focus or further work by others.

Greater Alignment of Climate-Related Financial Disclosure Regimes

In developing its recommendations, the Task Force sought to balance the needs of the users of disclosures with the challenges faced by the preparers and was keenly aware of 1) companies’ concerns that multiple climate-related disclosure frameworks increase the administrative burden and cost of their disclosure efforts and 2) investors and other users’ identification of non-comparable reporting by companies as a major obstacle to incorporating climate-related issues into their financial decisions. In light of these concerns, the Task Force drew on existing climate-related disclosure regimes to *develop a singular, accessible framework for climate-related financial disclosure* that it believed would help existing disclosure regimes come into closer alignment over time.

*The Task Force believes its recommendations, which provide a **singular, accessible framework for climate-related financial disclosure**, have helped existing disclosure regimes come into closer alignment over time.*

The Task Force believes its recommendations have been a key driver of greater consistency among major climate-related disclosure regimes that existed when the Task Force was created as well as climate-related disclosure requirements and standards that have been developed more recently. For example, by 2019, several major climate-related disclosure regimes had incorporated the TCFD recommendations into their requirements and guidance.² In addition, as described later in this report, several governments, regulators, and standard setters have incorporated or drawn from the TCFD recommendations in developing climate-related reporting requirements and standards,

¹ In this report, the Task Force uses the term “companies” to refer to entities with public debt or equity as well as asset managers and asset owners, including public- and private-sector pension plans, endowments, and foundations.

² See Principles for Responsible Investment, “Meeting the TCFD Recommendations in the 2018 PRI Reporting Framework,” December 18, 2017; Climate Disclosure Standards Board (now part of the IFRS Foundation), *Framework for Reporting Environmental and Social Information*, January 2022; CDP, “How CDP is aligned to the TCFD,” Accessed June 21, 2023; and Sustainability Accounting Standards Board (now part of the IFRS Foundation), *TCFD Implementation Guide*, May 1, 2019.

including the U.S. Securities and Exchange Commission (SEC), the U.K. Parliament, the European Commission, and the ISSB.³ Furthermore, the International Organization of Securities Commissions endorsed the ISSB standards and called on its 130 member jurisdictions “to consider ways in which they might adopt, apply or otherwise be informed by the ISSB standards within the context of their jurisdictional arrangements, in a way that promotes consistent and comparable climate-related and other sustainability-related disclosures for investors.”⁴

Increased Focus on Climate-Related Risks in Financial Filings

Over the past several months, the Task Force has noticed an increased focus on companies’ inclusion of climate-related financial information in their financial filings, including in the financial statements. For example, the U.S. SEC created a task force to identify potential violations including material gaps or misstatements in companies’ disclosure of climate-related risks under existing rules.⁵ In addition, the European Securities and Markets Authority included climate-related matters as one of its priorities for monitoring and assessing public companies’ compliance with relevant reporting requirements in 2022

financial filings.⁶ Finally, the U.K. Financial Reporting Council conducted a review of how well companies explained the link between their net-zero targets and transition plans and their financial statements when there was a reasonable expectation that there could be a material impact on the financial statements.⁷

The Task Force is encouraged by this focus as it aligns with its 2017 recommendation that companies provide climate-related financial disclosures in their annual financial filings. With recent warnings from the Intergovernmental Panel on Climate Change that many climate-related risks are higher than previously assessed and losses and damages will increase with each increment of warming (see [Figure ES1](#)), the Task Force believes an increasing number of companies will need to incorporate climate-related issues into their financial filings.⁸

A tangible example of the way in which rising global temperatures contribute to significant losses is through extreme weather events. In 2022, natural disasters resulted in global economic losses of \$284 billion, of which less than half — \$125 billion — were covered by insurance.⁹ Since 2017, average annual insured losses from natural disasters have been over \$110 billion, more than double the average of \$52 billion over the previous five-year

Figure ES1
Intergovernmental Panel on Climate Change: Select Findings from Recent Report



- 📌 Global warming will continue to increase in the near term.
- 📌 Many changes in the climate system, including extreme events, will become larger in the near term with increasing global warming.
- 📌 Multiple climatic and non-climatic risks will interact, resulting in increased compounding and cascading impacts becoming more difficult to manage.
- 📌 Losses and damages will increase with increasing global warming.

Source: Intergovernmental Panel on Climate Change, *Synthesis Report of the IPCC Sixth Assessment Report*, March 20, 2023.

³ U.S. Securities and Exchange Commission, “Press Release: SEC Proposes Rules to Enhance and Standardize Climate-Related Disclosures for Investors,” March 21, 2022; U.K. Parliament, “Companies Act 2006 s414(CA),” (as amended), Accessed June 21, 2023; European Parliament and European Council, *Directive 2022/2464 as Regards Corporate Sustainability Reporting*, December 14, 2022; IFRS Foundation, “ISSB Issues Inaugural Global Sustainability Disclosure Standards,” June 26, 2023.

⁴ International Organization of Securities Commissions, “IOSCO Endorses the ISSB’s Sustainability-Related Financial Disclosures Standards,” July 25, 2023.

⁵ U.S. SEC, “Enforcement Task Force Focused on Climate and ESG Issues,” April 11, 2023.

⁶ European Securities and Markets Authority, *European Common Enforcement Priorities for 2022 Annual Financial Reports*, October 28, 2022.

⁷ Financial Reporting Council, *CRR Thematic Review of Climate-Related Metrics and Targets*, July 26, 2023.

⁸ Intergovernmental Panel on Climate Change, *Synthesis Report of the IPCC Sixth Assessment Report*, March 20, 2023.

⁹ Swiss Re Institute, “Natural Catastrophes and Inflation in 2022: A Perfect Storm,” March 29, 2023.

period.¹⁰ With global temperatures continuing to rise in the near term — leading to larger extreme events, the Task Force emphasizes the importance of companies considering the impact of climate change and associated mitigation and adaptation efforts on their strategies and operations and disclosing related material information, including in their financial statements as appropriate. Such information is critical for investors, lenders, and insurance underwriters to appropriately assess and price climate-related risks and opportunities and allocate capital.

Climate-Related Financial Disclosure Practices

Similar to previous status reports, this report provides an overview of current climate-related financial disclosure practices in terms of their alignment with the Task Force's recommendations. To better understand

current disclosure practices and how they have evolved, the Task Force reviewed — using artificial intelligence (AI) technology — publicly available reports for more than 1,350 large companies in specific sectors around the world over a three-year period. In addition, to gain insight on asset managers and asset owners' TCFD-aligned reporting practices, the Task Force reviewed publicly available reports of the top 50 asset managers and top 50 asset owners globally based on their assets under management and conducted a survey. The Task Force found the results of its reviews and survey encouraging but believes 1) more progress is needed to improve transparency on the actual and potential impact of climate change on companies and 2) more companies need to consider the effects of climate-related issues on their financial statements. [Table ES1](#) summarizes the key themes and findings described in this year's report.

Table ES1

Key Takeaways and Findings



The percentage of public companies disclosing TCFD-aligned information continues to grow, but more progress is needed. For fiscal year 2022 reporting, 58% of companies disclosed in line with at least five of the 11 recommended disclosures — up from 18% in 2020; however, only 4% disclosed in line with all 11.



The percentage of companies reporting on climate-related risks or opportunities, board oversight, and climate-related targets increased significantly — by 26, 25, and 24 percentage points, respectively — between fiscal years 2020 and 2022.



Disclosure of climate-related financial information in financial filings is limited. On average for fiscal year 2022, information aligned with the 11 recommended disclosures was four times more likely to be disclosed in sustainability and annual reports than in financial filings.



The majority of jurisdictions with final or proposed climate-related disclosure requirements specify that such disclosures be reported in financial filings or annual reports.



Over 80% of the largest asset managers and 50% of the largest asset owners reported in line with at least one of the 11 recommended disclosures. Based on a review of publicly available reports, nearly 70% of the top 50 asset managers and 36% of the top 50 asset owners disclosed in line with at least five of the recommended disclosures.



Based on a 2022 TCFD survey, asset managers and asset owners indicated the top challenge to climate-related reporting is insufficient information from investee companies. Asset managers highlighted information from public companies as most challenging (62%), while asset owners identified information on private investments (84%).¹¹

¹⁰ Ibid.

¹¹ Importantly, 93% of survey respondents indicated they had implemented the TCFD recommendations or planned to in the future. As a result, the Task Force recognizes the survey results should not be extrapolated to a broader population of asset managers and asset owners.

Conclusion

Overall, the Task Force is encouraged by companies' progress in disclosing climate-related financial information aligned with the TCFD recommendations and by the support of governments, regulators, and other authorities in using the recommendations as a basis to develop laws, rules, and standards on climate-related financial disclosure. Nevertheless, the Task Force remains concerned that too few companies are disclosing decision-useful climate-related financial information — especially as it relates to the impact of climate change on their businesses, strategies, and financial planning, which may hinder investors, lenders, and insurance underwriters' efforts to appropriately assess and price climate-related risks. This is supported by the analysis summarized in this report and previous status reports as well as broader assessments on the state of climate change, including those in the Intergovernmental Panel on Climate Change's March 2023 report.

With its work coming to a close with the release of this status report, the Task Force wishes to commend the FSB on its leadership in establishing the TCFD as an industry-led task force to develop voluntary recommendations on climate-related financial disclosure and for supporting its work to promote and monitor adoption of the recommendations for the past several years. In addition, the Task Force is pleased that the ISSB has agreed to the FSB's request to assume responsibility for monitoring progress on the state of climate-related financial disclosures by companies as of next year and support effective implementation of its standards, including developing guidance

and other capacity building efforts.^{12,13} As the ISSB and other appropriate bodies continue to drive improvements in climate-related financial disclosure and support companies' efforts to make such disclosures, the Task Force believes it is especially important to recognize the dynamic nature of climate-related (as well as broader sustainability) issues and the need for ongoing assessment and adjustment, as appropriate, as practices continue to evolve.

Finally, the Task Force reflected on its experiences and insights gained over the past eight years as well as areas that it believes warrant continued focus or further work, which are described in the last section of the report and summarized in [Box ES1](#) (p. vi). It also considered the reasons why its voluntary climate-related financial disclosure recommendations and overall framework were well received by both the private sector and the public sector, ultimately serving as the foundation upon which several jurisdictional and international climate-related reporting requirements and standards were built. The Task Force attributes the global spread of the TCFD recommendations to the support and willingness of thousands of companies to implement the recommendations on a voluntary basis; the tremendous support from investors and others in asking companies to disclose information in line with the recommendations; and the FSB's work to promote use of the TCFD recommendations by governments, regulators, and standard setters as a basis for climate-related financial disclosure requirements. Furthermore, the Task Force believes the insights gained from its work could be useful for similar types of initiatives in the future.



¹² FSB, *FSB Roadmap for Addressing Financial Risks from Climate Change: 2023 Progress Report*, July 13, 2023.

¹³ IFRS Foundation, "IFRS Foundation Welcomes Culmination of TCFD Work and Transfer of TCFD Monitoring Responsibilities to ISSB from 2024," July 10, 2023.

Box ES1

TCFD Major Milestones 2016–2023 and View on Future Work

TCFD Major Milestones 2016–2023

<p>2016</p> <ul style="list-style-type: none"> Public Consultation Phase 1 Report Public Consultation TCFD Recommendations <p>2017 100+ TCFD Supporters</p> <ul style="list-style-type: none"> Final TCFD Recommendations TCFD Recommendations Supported by 100+ CEOs 390 Investors Called on G20 Leaders to Support TCFD Recommendations <p>2018 ~500 TCFD Supporters</p> <ul style="list-style-type: none"> TCFD Knowledge Hub WBCSD TCFD Preparer Forum Report First TCFD Status Report CDP, CDSB, and PRI Aligned with TCFD <p>2019 ~800 TCFD Supporters</p> <ul style="list-style-type: none"> Japan TCFD Consortium Second TCFD Status Report European Commission Guidelines in Line with TCFD Recommendations WBCSD TCFD Preparer Forum Reports <p>2020 1,500+ TCFD Supporters</p> <ul style="list-style-type: none"> WBCSD TCFD Preparer Forum Report Risk Management Guidance Scenario Analysis Guidance Third TCFD Status Report Public Consultation: Forward-Looking Financial Sector Metrics <p>2021 2,600+ TCFD Supporters</p> <ul style="list-style-type: none"> WBCSD TCFD Preparer Forum Report Public Consultation: Metrics, Targets, and Transition Plans Metrics, Targets, and Transition Plans Guidance Updated Implementation Guidance Fourth TCFD Status Report FSB Report Encouraging Use of the TCFD Framework ISSB to Develop Standards Based on TCFD Mexico TCFD Consortium 	<ul style="list-style-type: none"> March 2016: Consultation on Phase I Report Sought feedback on the scope and objectives of the Task Force’s work to develop recommendations on climate-related financial disclosures.  December 2016: Consultation on TCFD Recommendations Sought feedback on the draft TCFD recommendations and engaged with users, preparers, and other stakeholders in relevant industries and sectors around the world. 2016–2017: Engagement with Over 2,700 Individuals in 43 Countries <ul style="list-style-type: none"> <li style="width: 50%;">  <p>128 Industry Interviews and 5 Focus Groups in 20 countries</p> <li style="width: 50%;">  <p>10 Webinars and 793 Attendees in 30 countries</p> <li style="width: 50%;">  <p>523 Responses on Public Consultations from 34 countries</p> <li style="width: 50%;">  <p>Outreach Events in 13 countries</p> June 2017: Final TCFD Recommendations Published final recommendations on climate-related financial disclosures along with implementation guidance and a technical supplement on scenario analysis.  2017–2018: Conferences and Workshops Held to Drive Adoption Held two scenario analysis conferences in Europe and North America. Hosted three implementation workshops in Europe and Asia Pacific. May 2018: TCFD Knowledge Hub Launched the TCFD Knowledge Hub to help companies implement the TCFD recommendations. September 2018: The Task Force’s First Status Report Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ user case studies describing how TCFD-aligned information is used.  2018–2019: TCFD Implementation and Use Survey Surveyed preparers on implementing the TCFD recommendations and related challenges and users on the usefulness, availability, and quality of TCFD-aligned disclosures. June 2019: 2019 Status Report Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ user case studies ■ survey results ■ insights on disclosing strategy resilience.  March 2020: User Survey on Decision-Useful Information Surveyed expert users on most useful climate-related information for financial decision-making. Expert users rated 60+ disclosure elements drawn from the TCFD framework. October 2020: Guidance on Risk Management and Scenario Analysis Issued guidance on 1) integrating climate-related issues into existing risk management processes and disclosing relevant information and 2) conducting climate-related scenario analysis for non-financial companies.  October 2020: 2020 Status Report Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ insights on most useful TCFD-aligned information for financial decision-making ■ case studies by preparers ■ regulatory developments.  2020–2021: Consultations on Metrics, Targets, and Transition Plans Sought feedback on various forward-looking, climate-related metrics for the financial sector in October 2020. Sought feedback on proposed guidance on metrics, targets, and transition plans in June 2021. October 2021: 2021 Status Report Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ insights on disclosing financial impact of climate-related issues ■ regulatory developments.  October 2021: Guidance on Metrics, Targets, and Transition Plans and Updated Implementation Guidance Issued guidance on seven, core cross-industry metrics and transition plans and updated implementation guidance to reflect industry developments. 
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Legend: ■ TCFD Reports and Other Resources ■ Support from Preparers, Users, and Official Bodies ■ External Engagement

Box ES1

TCFD Major Milestones 2016–2023 and View on Future Work *(continued)*

<p>2022 3,900+ TCFD Supporters</p> <ul style="list-style-type: none"> ■ U.S. SEC Proposed Rules Leveraging TCFD ■ ISSB Draft Standards Based on TCFD ■ EFRAG Draft Standards in Line with TCFD ■ Fifth TCFD Status Report <p>2023 4,850+ TCFD Supporters</p> <ul style="list-style-type: none"> ■ ISSB Final Standards ■ First Set of Final EFRAG Standards ■ Last TCFD Status Report ■ TCFD Disbanded 	<ul style="list-style-type: none"> ■ February 2022: TCFD Workshop Presentation Series Released a set of five presentations to support TCFD implementation. ■ February and March 2022: Surveys on Reporting Trends and Challenges Sought input from asset managers and asset owners on reporting of climate-related information to clients and beneficiaries, respectively. Sought input from preparers on TCFD implementation over five-year period and from users on using TCFD-aligned information for decision-making. ■ October 2022: 2022 Status Report Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ progress and challenges with TCFD implementation over past five years ■ users' views of the usefulness of TCFD-aligned disclosures ■ regulatory developments. ■ October 2023: The Task Force's Last Status Report Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ regulatory developments ■ case studies by preparers ■ climate-related issues in financial statements ■ insights gained over the past eight years ■ areas of continued focus and further work.
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Legend: ■ TCFD Reports and Other Resources ■ Support from Preparers, Users, and Official Bodies ■ External Engagement

Areas of Continued Focus and Further Work

As part of reflecting on its work over the past eight years, the Task Force considered areas that it believes warrant continued focus or further work by the ISSB or other appropriate bodies. These areas are summarized below.



Ensuring **interoperability of the ISSB standards with jurisdictional frameworks** to support consistent company reporting across jurisdictions and avoid the need for companies to report through multiple venues.



Developing **implementation guidance** on topics such as climate-related physical risk assessment and adaptation planning, climate-related scenario analysis at a sector or industry level, and Scope 3 GHG emissions measurement at a sector or industry level.



Continuing to focus on companies' disclosure of the **resilience of their strategies under different climate-related scenarios**, including a climate-related scenario aligned with the latest international agreement on climate change.



Continuing to focus on **decision-useful disclosure on other sustainability topics** — such as biodiversity, water, and social issues — and consider the linkages between climate-related and other sustainability issues (for example, in the context of companies' transition plans).



Developing a **consistent climate-related financial disclosure framework for use by countries and other sovereign entities**. Consistent and comparable reporting by sovereigns would support companies in preparing comprehensive TCFD-aligned disclosures and transition plans that appropriately reflect their operating environment.

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A.
State of Climate-Related
Financial Disclosures



A. State of Climate-Related Financial Disclosures

Consistent with previous status reports, the Task Force undertook a review of hundreds of public companies' reports for climate-related financial information using artificial intelligence (AI) technology.¹⁴ The AI technology was used to determine whether the reports include information that appears to align with the Task Force's recommendations. The Task Force has received feedback that the baseline information on climate-related financial disclosures coming out of its AI reviews is helpful for companies implementing the TCFD recommendations in understanding current practices. In addition, users, preparers, and others have expressed interest in understanding changes in climate-related financial disclosures over time.

To assess the current state and evolution of climate-related financial disclosures, the Task Force used AI technology to review reports of more than 1,350 public companies over a three-year period — fiscal years 2020, 2021, and 2022 — as described in [Section A.1. TCFD-Aligned Reporting by Public Companies](#). In addition, given the growing number of jurisdictions around the world using the TCFD recommendations in developing climate-related reporting requirements, the Task Force used the AI technology to review fiscal year 2022 reports for a larger and more geographically diverse set of public companies (around 3,100). The purpose of the review was to provide insights on reporting practices at an industry level for each of five regions — Asia Pacific, Europe, Latin

America, Middle East and Africa, and North America.¹⁵ These insights are described in [Section A.2. TCFD-Aligned Reporting by Public Companies by Region](#).

The Task Force also collected information on reporting by asset managers and asset owners to their clients and beneficiaries, respectively, as well as to a broader range of stakeholders. These organizations were excluded from the AI review because, in some cases, the types of reports needed for analysis are not publicly available. Instead, the Task Force conducted a survey to gain insight into these organizations' climate-related reporting practices to their clients and beneficiaries and reviewed the largest asset managers and asset owners' publicly available reports to better understand their climate-related reporting practices more broadly. The results are described in [Section A.3. TCFD-Aligned Reporting by Asset Managers and Asset Owners](#).

1. TCFD-ALIGNED REPORTING BY PUBLIC COMPANIES

This subsection summarizes the scope and approach used to review the alignment of public companies' reporting for fiscal years 2020, 2021, and 2022 with the Task Force's 11 recommended disclosures as well as the results and key findings from the review.¹⁶

A. State of Climate-Related Financial Disclosures

B. Financial Statement Considerations

C. Case Studies on Scope 3 GHG Emissions

D. TCFD-Aligned Requirements and Related Initiatives

E. Types of Financial Impact and Associated Drivers

F. Insights Gained and View on Future Work

Appendices

Key Takeaways



The percentage of companies disclosing TCFD-aligned information continues to grow, but more progress is needed. For fiscal year 2022 reporting, 58% of companies disclosed information in line with at least five of the 11 recommended disclosures — up from 18% in 2020; however, only 4% disclosed in line with all 11.



The percentage of companies reporting on climate-related risks or opportunities, board oversight, and climate-related targets increased significantly — by 26, 25, and 24 percentage points, respectively — between fiscal years 2020 and 2022.



Disclosure of climate-related financial information in financial filings is limited. On average for fiscal year 2022, information aligned with the 11 recommended disclosures was four times more likely to be disclosed in sustainability and annual reports than in financial filings.

¹⁴ The Task Force gratefully acknowledges the work of Geoffrey Gunow, Weitingting Liu, Chuck-Hou Yee, Jennifer Shih, Shubham Chopra, Ryan Berry, Shira Clement, Elizabeth Attah, Suzanne Szur, Nadia Humphreys, and Edo Schets from Bloomberg, L.P. on the AI technology review.

¹⁵ While Latin America generally includes Mexico, Mexico is included as part of North America for the purposes of this report.

¹⁶ In this report, references to reporting year(s) are to fiscal year(s) reporting, unless the context indicates otherwise.

Key Takeaways *(continued)*



In 2022, the most often disclosed recommended disclosure — at 71% of the companies reviewed — was the metrics they use to assess their climate-related risks or opportunities.



The least disclosed recommended disclosure for all three years reviewed was the resilience of companies' strategies under different climate-related scenarios, with only 11% disclosing this information in 2022.

A. State of Climate-Related Financial Disclosures

B. Financial Statement Considerations

C. Case Studies on Scope 3 GHG Emissions

D. TCFD-Aligned Requirements and Related Initiatives

E. Types of Financial Impact and Associated Drivers

F. Insights Gained and View on Future Work

Appendices

Scope and Approach

The Task Force reviewed financial filings, annual reports, integrated reports, sustainability reports, and other relevant reports of 1,365 public companies from five regions in eight industries (see [Figure A1](#)).¹⁷ Six of the eight industries correspond to groups highlighted in the Task Force's 2017 report, as follows: Banking, Insurance, Energy, Materials and Buildings, Transportation, and Agriculture, Food, and Forest Products.¹⁸ The four non-financial industries were identified as those potentially most affected by climate change and the transition to a low-carbon economy. Beginning with the 2019 status report, the Task Force included two additional industries in its AI reviews to incorporate other large companies that may be exposed to climate-related risks — Technology and Media and Consumer Goods.

For this status report and the previous two, the Task Force sought to maintain as much consistency as possible with the final review population used in the 2020 status report.¹⁹ As such, the Task Force began with an initial review population of 1,434 companies that were included in the AI review for the 2022 status report.²⁰ The final population used for this year's AI review was reduced to 1,365 after accounting for companies that no longer existed or did not have reports available in English for all three years.²¹ The AI technology was used to review more than 19,000 reports from the 1,365 companies and determine whether the reports included information that appeared to align with one or more of the Task Force's 11

Figure A1
AI Review Population Size

Industry	Number
Banking	235
Insurance	117
Energy	205
Materials and Buildings	345
Transportation	126
Agriculture, Food, and Forest Products	115
Technology and Media	91
Consumer Goods	131
Total	1,365

recommended disclosures (see [Table A1](#), p. 4).²² It is important to note that the AI technology used for this year's review is different from the AI technology used for the previous two status reports. As such, direct comparisons between this year's AI review results and previous years' results should not be made. More information on the methodology is provided in [Appendix 2: Company Selection and AI Review Methodology](#).

*Importantly, the AI review was **not designed to assess the quality** of companies' climate-related financial disclosures, **but rather to provide an indication of the alignment** of existing disclosures with the Task Force's 11 recommended disclosures.*

¹⁷ Other relevant reports include those specifically focused on climate change or the TCFD recommendations.

¹⁸ TCFD, *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*, June 29, 2017.

¹⁹ TCFD, *2020 Status Report*, October 29, 2020.

²⁰ TCFD, *2022 Status Report*, October 13, 2022.

²¹ Because the AI technology cannot process reports in languages other than English, the AI review population has a higher representation of international companies and those with large English-speaking populations than it would if non-English reports could be assessed. The regional distribution of companies in the AI review population is provided in [Figure A6](#) (p. 7). In addition, the AI technology reviewed the reports of all companies included in the population for TCFD-aligned information regardless of the materiality of the information.

²² The Task Force used AI technology to perform an automated review of more than 1,350 companies' public reports. Performing such a review "manually" through human reviewers would take thousands of hours, which would not be feasible for the Task Force.

Table A1
TCFD Recommendations and Supporting Recommended Disclosures

Governance	Strategy	Risk Management	Metrics and Targets
Disclose the company's governance around climate-related risks and opportunities.	Disclose the actual and potential impacts of climate-related risks and opportunities on the company's businesses, strategy, and financial planning where such information is material.	Disclose how the company identifies, assesses, and manages climate-related risks.	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.
a) Describe the board's oversight of climate-related risks and opportunities.	a) Describe the climate-related risks and opportunities the company has identified over the short, medium, and long term.	a) Describe the company's processes for identifying and assessing climate-related risks.	a) Disclose the metrics used by the company 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 company's businesses, strategy, and financial planning.	b) Describe the company's processes for managing climate-related risks.	b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.
	c) Describe the resilience of the company'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 company's overall risk management.	c) Describe the targets used by the company to manage climate-related risks and opportunities and performance against targets.

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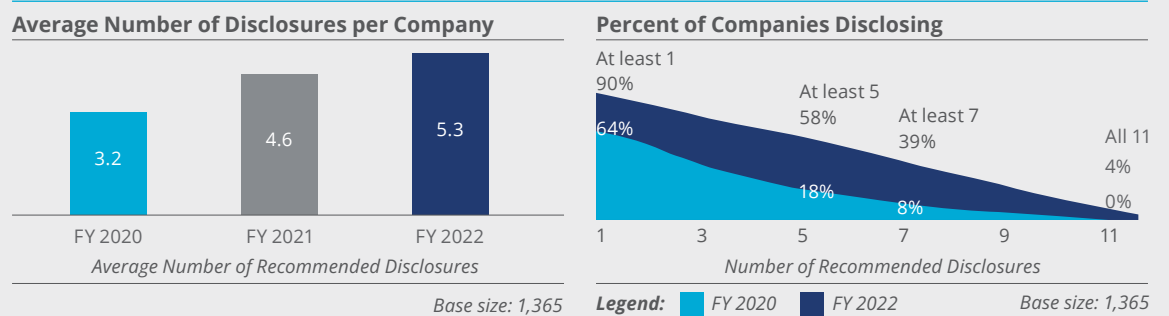
Appendices

Summary of AI Review Results and Findings

This subsection summarizes the results and findings from the AI review of public companies' reports for fiscal years 2020, 2021, and 2022 in terms of alignment with the Task Force's 11 recommended disclosures. Overall, the percentage of companies disclosing information in line with the Task Force's recommendations steadily increased each year, as did the amount of TCFD-aligned information companies disclosed.

Disclosure of climate-related information has increased since 2020, but more progress is needed. As shown on the left in **Box A1**, the average number of recommended disclosures addressed per company in 2020 was 3.2, rising to 5.3 in 2022. In addition, 58% of companies disclosed in line with at least five of the 11 recommended disclosures in 2022 — up from 18% in 2020; however, only 4% disclosed in line with all 11.

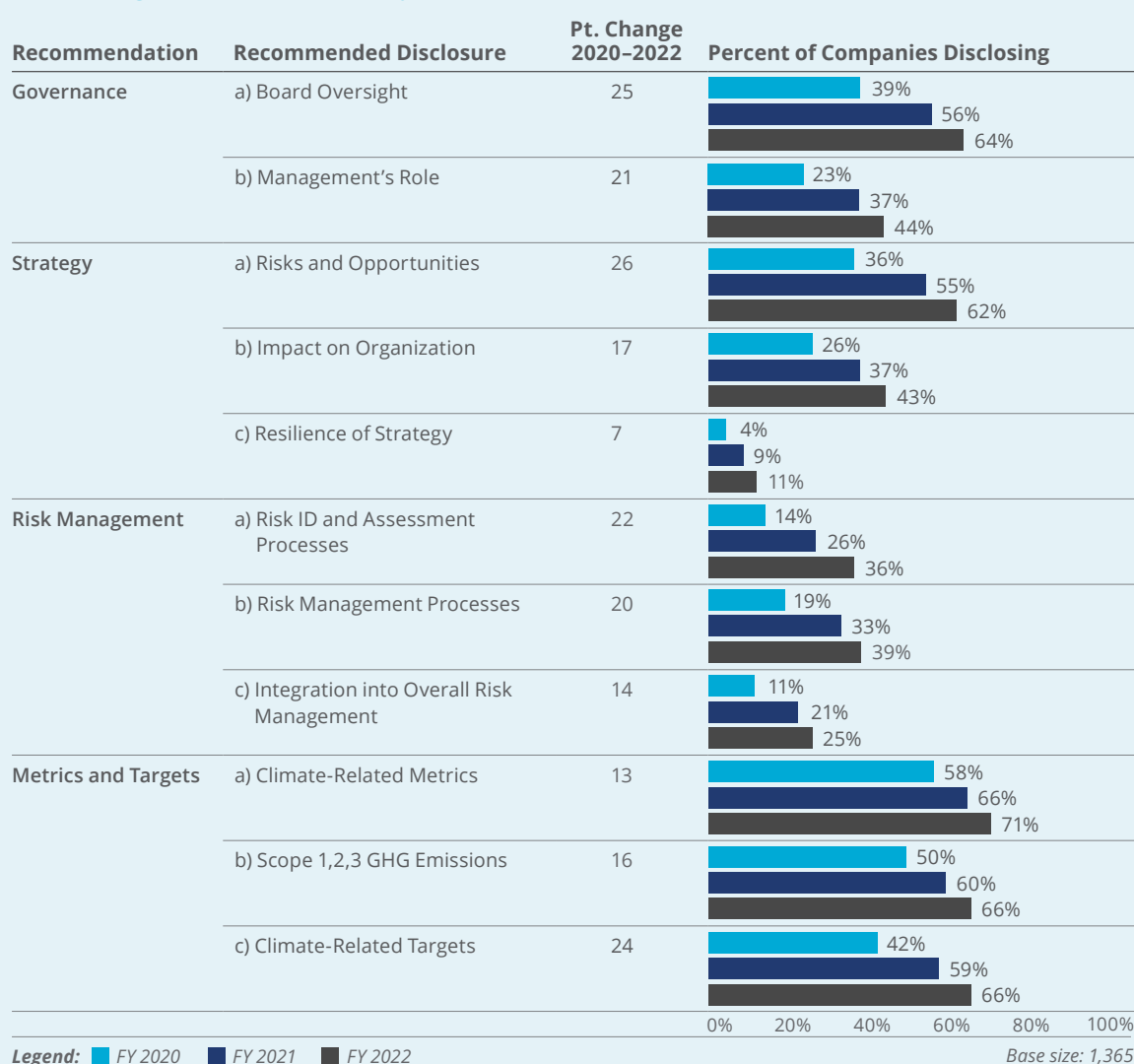
Box A1
AI Review Results for Fiscal Years 2020–2022



Companies’ disclosure of their climate-related risks and opportunities grew more than any other recommended disclosure between 2020 and 2022. While the percentage of disclosure for each of the Task Force’s 11 recommended disclosures increased between 2020 and 2022, as shown in [Figure A2](#), the largest increase in reporting — at 26 percentage points — was on companies’ descriptions of their climate-related risks or opportunities (climate-related issues). This was followed closely by companies’ reporting on their boards’ oversight of climate-related issues at 25 percentage points.

Reporting on climate-related metrics was higher than any other recommended disclosure. Just over 70% of the companies reviewed disclosed the metrics they use to assess their climate-related risks and opportunities (*Metrics and Targets a*), followed by reporting on greenhouse gas (GHG) emissions and climate-related targets — both at 66%. Notably, the percent of companies reporting on their climate-related targets increased by 24 percentage points between 2020 and 2022.

Figure A2
TCFD-Aligned Disclosures by Fiscal Year for 2020–2022



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Companies disclosed TCFD-aligned information primarily in sustainability and annual reports. While companies disclosed information in multiple types of reports (e.g., financial filings, annual reports, integrated reports, and sustainability reports), they were four times more likely to disclose TCFD-aligned

information in sustainability and annual reports based on fiscal year 2022 reporting. Notably, however, there was a significant increase in companies including TCFD-aligned information in their financial filings over the three years reviewed. Specifically, companies on average were eight times more likely to disclose TCFD-

aligned information in their sustainability and annual reports than in their financial filings for fiscal year 2020 reporting. In addition, across the 11 recommended disclosures, companies were more likely to include the metrics they use to assess climate-related risks and opportunities in line with their strategy and risk management process (*Metrics and Targets a*) in sustainability and annual reports than in financial filings.

The resilience of companies' strategies under different climate-related scenarios had the lowest level of disclosure in all three years reviewed. Only 11% of the companies reviewed reported in line with this recommended disclosure (*Strategy c*) for fiscal year 2022. Based on a survey conducted last year of over 200 companies, nearly 90% of them rated this recommended disclosure as somewhat difficult or very difficult to implement, which may help explain why its disclosure is low.²³

Energy companies disclosed more information than companies in the other seven industries. Energy companies, on average, reported on 6.3 of the 11 recommended disclosures in 2022, followed by materials and buildings companies

at 5.8 (see [Figure A3](#)). In addition, companies in the energy industry had the highest levels of disclosure on seven of the 11 recommended disclosures (see [Figure A4](#)).²⁴ The insurance companies and banks reviewed had the highest levels of reporting on the Risk Management recommendation, which may be attributable to financial regulators' general emphasis on risk management processes.

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Figure A3
Average Number of Disclosures per Company

Industry	Number
Energy	6.3
Materials and Buildings	5.8
Insurance	5.2
Agriculture, Food, and Forest Products	5.1
Transportation	5.1
Banking	5.0
Consumer Goods	4.1
Technology and Media	3.7

Figure A4
Disclosure by Industry: 2022 Fiscal Year Reporting

Percent of Companies¹

Recommendation	Recommended Disclosure	Industry							
		Banking (235)	Insurance (117)	Energy (205)	Materials and Buildings (345)	Transportation (126)	Agriculture, Food, and Forest (115)	Technology and Media (91)	Consumer Goods (131)
Governance	a) Board Oversight	57%	65%	76%	71%	70%	57%	43%	58%
	b) Management's Role	40%	44%	57%	46%	44%	39%	32%	32%
Strategy	a) Risk and Opportunities	69%	68%	70%	66%	55%	57%	38%	46%
	b) Impact on Organization	35%	45%	58%	46%	40%	49%	27%	28%
	c) Resilience of Strategy	9%	13%	16%	12%	6%	17%	5%	8%
Risk Management	a) Risk ID and Assessment Proc.	40%	44%	42%	40%	30%	36%	14%	22%
	b) Risk Management Processes	46%	51%	45%	38%	37%	35%	20%	29%
	c) Integration into Risk Mgmt.	38%	36%	32%	22%	21%	18%	7%	11%
Metrics and Targets	a) Climate-Related Metrics	61%	56%	81%	81%	70%	71%	67%	62%
	b) Scope 1,2,3 GHG Emissions	58%	53%	77%	75%	64%	64%	65%	54%
	c) Climate-Related Targets	47%	50%	80%	77%	73%	69%	56%	63%

1. The numbers in parentheses represent the size of the review population.

Legend:  Low to high percentage of reporting

²³ See TCFD, *2022 Status Report*, October 13, 2022 (pp. 57–64).

²⁴ The AI review results for each industry for the past three fiscal years are provided in [Appendix 3: AI Review Results by Industry](#).

Companies in the consumer goods and technology and media industries disclosed less than companies in other industries.

As noted previously, these two industries were added to the AI review to incorporate other large companies that *may be exposed* to climate-related risks whereas the other four non-financial industries were included because they are *most likely to be affected* by climate change. This may explain why companies in these two industries, on average, have the lowest levels of disclosure.

Companies in Europe had the highest level of reporting for each of the 11 recommended disclosures. The European companies reviewed, on average, reported on 7.2 of the 11 recommended disclosures (see [Figure A5](#)). Notably, 92% of European companies disclosed their climate-related targets (*Metrics*

and Targets c) — which is 35 percentage points higher than companies in Asia Pacific and 32 percentage points higher than companies in North America (see [Figure A6](#)). Please see [Section A.2. TCFD-Aligned Reporting by Public Companies by Region](#) for results at an industry level for each region.

Figure A5
Average Number of Disclosures per Company

Region	Number
Europe	7.2
Asia Pacific	5.0
North America	4.6
Latin America	4.2
Middle East and Africa	3.8

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Figure A6
Disclosure by Region: 2022 Fiscal Year Reporting

Percent of Companies¹

Recommendation	Recommended Disclosure	Asia Pacific (279)	Europe (324)	Latin America (38)	Middle East and Africa (65)	North America (659)
Governance	a) Board Oversight	62%	71%	53%	45%	65%
	b) Management’s Role	33%	60%	34%	22%	42%
Strategy	a) Risk and Opportunities	53%	76%	61%	38%	61%
	b) Impact on Organization	41%	59%	39%	29%	37%
	c) Resilience of Strategy	11%	24%	3%	6%	6%
Risk Management	a) Risk ID and Assessment Proc.	31%	65%	24%	22%	26%
	b) Risk Management Processes	41%	56%	34%	28%	32%
	c) Integration into Risk Mgmt.	20%	35%	26%	20%	22%
Metrics and Targets	a) Climate-Related Metrics	80%	92%	55%	63%	58%
	b) Scope 1,2,3 GHG Emissions	73%	88%	50%	58%	54%
	c) Climate-Related Targets	57%	92%	42%	48%	60%

1. The numbers in parentheses represent the size of the review population.

Legend:  Low to high percentage of reporting

Larger companies are more likely to disclose TCFD-aligned information than smaller ones. On average, companies with a market capitalization of at least \$12.3 billion reported on 6.7 of the 11 recommended disclosures in fiscal year 2022 (see [Figure A7](#), p. 8), while smaller companies on average — those with less than \$3.2 billion in market capitalization — reported on 3.9 recommended disclosures. The Task Force notes that this finding has been consistent in all six of its status reports.

The highest level of reporting by larger companies was on climate-related targets — at 85%, followed closely by climate-related metrics at 83% (see [Figure A8](#), p. 8). Notably, medium-sized companies (market capitalization between \$3.2 billion and \$12.3 billion) and smaller companies (market capitalization less than \$3.2 billion) reported most frequently on climate-related metrics — at 72% and 59%, respectively. Their reporting on climate-related targets was at least seven percentage points

lower than the levels of reporting on their climate-related metrics. A possible reason why larger companies reported on climate-related targets as much as they reported on climate-related metrics could be that a greater proportion of larger companies have made net-zero or other GHG emissions reduction commitments.

Figure A7
Average Number of Disclosures per Company

Market Capitalization	Number
>\$12.3B	6.7
\$3.2–12.3B	5.3
<\$3.2B	3.9

Figure A8
Disclosure by Company Size: 2022 Fiscal Year Reporting

Percent of Companies¹

Recommendation	Recommended Disclosure	<\$3.2B Market Capitalization (462)	\$3.2B–12.3B Market Capitalization (448)	>\$12.3B Market Capitalization (455)
Governance	a) Board Oversight	49%	65%	80%
	b) Management's Role	27%	44%	60%
Strategy	a) Risk and Opportunities	50%	63%	74%
	b) Impact on Organization	30%	41%	58%
	c) Resilience of Strategy	5%	12%	16%
Risk Management	a) Risk ID and Assessment Proc.	21%	36%	50%
	b) Risk Management Processes	29%	38%	51%
	c) Integration into Risk Mgmt.	16%	24%	35%
Metrics and Targets	a) Climate-Related Metrics	59%	72%	83%
	b) Scope 1,2,3 GHG Emissions	52%	67%	79%
	c) Climate-Related Targets	48%	65%	85%

1. The numbers in parentheses represent the size of the review population.

Legend:  Low to high percentage of reporting

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2. TCFD-ALIGNED REPORTING BY PUBLIC COMPANIES BY REGION

As noted previously, given the growing number of jurisdictions around the world using the TCFD recommendations in developing climate-related reporting requirements, the Task Force also used the AI technology to review fiscal year 2022 reports for a larger and more geographically diverse set of public companies (around 3,100), referred to as the expanded population.

The purpose of the review was to provide insight on TCFD-aligned reporting practices at an industry level for each region — Asia Pacific, Europe, Latin America, Middle East and Africa, and North America. The scope and approach used for the review is described below, followed by a summary of the AI review results and key findings for the expanded population overall and for each region. At the end of the section, several examples of TCFD-aligned disclosure are included.

Key Takeaways



Companies in Asia Pacific and Europe had higher levels of reporting on climate-related metrics than those in North America. For example, 78% of companies in Europe and 49% in Asia Pacific reported their climate-related metrics, while only 35% did so in North America.



Insurance companies had some of the highest levels of disclosures in Latin America and Europe but some of the lowest levels in Asia Pacific and the Middle East and Africa.

Key Takeaways *(continued)*



Across all five regions, technology and media companies had significantly lower levels of disclosure compared to companies in other industries.



Across all five regions and industries, the resilience of companies' strategies under different climate-related scenarios had the lowest level of disclosure. In all regions except Europe, there was at least one industry in which none of the companies reviewed reported this information.

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Scope and Approach

To review reports of the expanded population of companies, the Task Force used the same AI technology and followed the same general approach described in the previous section. The one difference relates to the scope of public companies included in the review. The Task Force began with the 1,365 companies used in the review of the past three fiscal years of reporting, which was originally identified using specific size thresholds so that only the largest companies were included.²⁵ To achieve statistically significant AI review results at an industry level for each region, the Task Force had to supplement the AI review population with an additional 1,748 companies, which required including companies of all sizes. In addition, because the AI technology cannot process reports in languages other than English, the number of companies that could be included in the reviews for Asia Pacific, Europe, Latin America, and the Middle East and Africa was smaller than it otherwise would be. In fact, there were not enough companies with reports in English to provide statistically significant AI review results for two industries in Latin America.²⁶

Summary of Overall AI Review Results for Expanded Population

For companies in the expanded AI review population, [Figure A9](#), [Figure A10](#) (p. 10), and [Figure A11](#) (p. 10) provide an overview of the overall AI review results and serve as a basis of comparison for the AI review results for each region. [Figure A9](#) provides the average number of recommended disclosures per company for each industry for fiscal year 2022 reporting, while [Figure A10](#) (p. 10) and [Figure A11](#) (p. 10) provide the overall AI review results for each of 11 recommended disclosures by industry and region, respectively, based on fiscal year 2022

Figure A9

Average Number of Disclosures per Company

Industry	Number
Energy	4.9
Materials and Buildings	4.7
Insurance	3.7
Banking	3.7
Transportation	3.3
Agriculture, Food, and Forest Products	3.0
Consumer Goods	2.8
Technology and Media	1.7

reports. Importantly and as noted in this status report and previous ones, larger companies are more likely to disclose climate-related information than smaller ones.²⁷ Consequently, the overall AI review results for the expanded population are lower than the analogous results described in the previous section, with the exception of *Strategy c*) for companies in Latin America where the AI review results are the same in the two populations.

In general, the overall AI review results for the expanded population follow patterns similar to the overall AI review results described in the previous section. For example, companies in the energy and materials and buildings industries, on average, disclosed on more of the 11 recommended disclosures than companies in the other industries; and companies in the consumer goods and technology and media industries, on average, disclosed on the fewest. In addition, companies in Europe had the highest level of reporting for each of the 11 recommended disclosures.

²⁵ See [Appendix 2: Company Selection and AI Review Methodology](#) for more information on the approach for selecting the review population.

²⁶ In Latin America, there were not enough companies with reports in English for the consumer goods and technology and media industries to achieve statistically significant results at an 80% confidence level. This resulted in excluding three companies from Latin America that were part of the 1,365 companies used in the review of the past three fiscal years of reporting and an expanded population of 3,110 companies.

²⁷ See [Figure A7](#) (p. 8) in this report; TCFD, [2022 Status Report](#), October 13, 2022 (p. 18); TCFD, [2021 Status Report](#), October 14, 2021 (p. 37); and TCFD, [2020 Status Report](#), October 29, 2020 (p. 13).

Figure A10
Disclosure by Industry for Expanded Population: 2022 Fiscal Year Reporting

Percent of Companies¹

Recommendation	Recommended Disclosure	Banking (466)		Insurance (237)		Energy (430)		Materials and Buildings (543)		Transportation (323)		Agriculture, Food, and Forest (370)		Technology and Media (382)		Consumer Goods (359)	
Governance	a) Board Oversight	41%	43%	58%	61%	40%	31%	19%	35%								
	b) Management's Role	28%	28%	38%	35%	24%	19%	13%	19%								
Strategy	a) Risk and Opportunities	52%	45%	54%	55%	33%	32%	17%	28%								
	b) Impact on Organization	23%	27%	38%	35%	24%	25%	12%	16%								
	c) Resilience of Strategy	5%	6%	10%	9%	4%	6%	2%	4%								
Risk Management	a) Risk ID and Assessment Proc.	26%	29%	27%	29%	18%	15%	6%	13%								
	b) Risk Management Processes	32%	32%	32%	29%	23%	19%	9%	21%								
	c) Integration into Risk Mgmt.	25%	21%	20%	16%	13%	9%	4%	8%								
Metrics and Targets	a) Climate-Related Metrics	43%	40%	58%	63%	43%	42%	30%	43%								
	b) Scope 1,2,3 GHG Emissions	40%	37%	54%	57%	39%	36%	28%	38%								
	c) Climate-Related Targets	33%	33%	57%	61%	44%	39%	25%	38%								

1. The numbers in parentheses represent the size of the review population.

Legend:  Low to high percentage of reporting

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Figure A11
Disclosure by Region for Expanded Population: 2022 Fiscal Year Reporting

Percent of Companies¹

Recommendation	Recommended Disclosure	Asia Pacific	Europe	Latin America	Middle East and Africa	North America
		(724)	(616)	(111)	(271)	(1,388)
Governance	a) Board Oversight	37%	55%	34%	22%	44%
	b) Management's Role	18%	47%	20%	10%	25%
Strategy	a) Risk and Opportunities	29%	56%	37%	17%	45%
	b) Impact on Organization	24%	44%	18%	12%	22%
	c) Resilience of Strategy	5%	16%	3%	2%	3%
Risk Management	a) Risk ID and Assessment Proc.	15%	47%	12%	10%	14%
	b) Risk Management Processes	24%	43%	25%	15%	20%
	c) Integration into Risk Mgmt.	13%	27%	13%	8%	12%
Metrics and Targets	a) Climate-Related Metrics	49%	78%	34%	31%	35%
	b) Scope 1,2,3 GHG Emissions	45%	73%	31%	27%	31%
	c) Climate-Related Targets	34%	73%	38%	22%	38%

1. The numbers in parentheses represent the size of the review population.

Legend:  Low to high percentage of reporting

Asia Pacific

The AI review of companies headquartered in the Asia Pacific region included 724 companies across 18 jurisdictions. The two jurisdictions with the largest number of companies included in the review were China with 161 companies and Japan with 141 companies as shown in [Box A2](#). This figure also describes the number of

companies included in each of eight industry groups along with an indication of the size of the companies included based on their total assets for financial institutions and total revenue for non-financial companies. Financial institutions ranged in size from about \$600 million to around \$5.7 trillion in assets, and non-financial companies ranged in size from about \$100 million to nearly \$500 billion in revenue.

Box A2

Demographics of Companies Reviewed in Asia Pacific

Number and Size Range by Industry

Financial Institutions	Number	Total Assets (\$US billion)		
		Min	Median	Max
Banking	92	\$5.0	\$166	\$5,742
Insurance	66	\$0.6	\$9	\$2,230

Non-Financial Companies	Number	Revenue (\$US billion)		
		Min	Median	Max
Ag., Food, and Forest Products	94	\$0.3	\$4	\$73
Consumer Goods	96	\$1.2	\$3	\$156
Energy	88	\$0.1	\$9	\$493
Materials and Buildings	99	\$0.3	\$7	\$172
Technology and Media	96	\$0.7	\$5	\$235
Transportation	93	\$0.8	\$8	\$275

Number by Jurisdiction¹

China	161
Japan	141
Taiwan	75
Hong Kong	70
Australia	57
India	55
Thailand	32
Indonesia	30
Malaysia	25
South Korea	20
Singapore	20
Philippines	13
Pakistan	11
New Zealand	7
Vietnam	3

1. In addition, there were two companies from Bangladesh and one company each from Kazakhstan and Sri Lanka.

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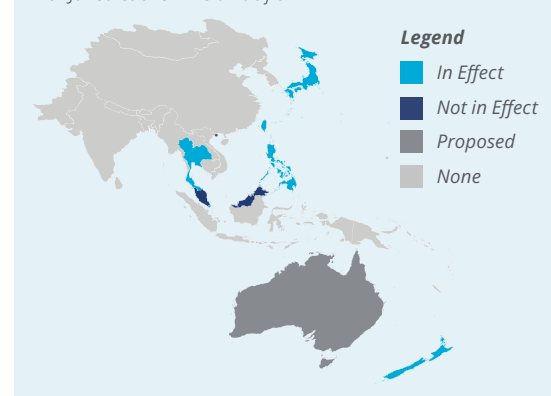
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Figure A12 shows jurisdictions where the government or another authority has issued climate-related disclosure requirements that incorporate or draw from the TCFD recommendations. The governments or other authorities in jurisdictions shaded in light blue or dark blue have issued final climate-related disclosure requirements, while those shaded in dark gray have issued proposed disclosure requirements. The types of climate-related disclosure requirements range from legislation that applies to public companies to guidelines issued by a financial regulator that apply to only select financial institutions. It is important to note that the Task Force's review of documents is limited to those available in English. As a result, [Figure A12](#) may understate the number of jurisdictions that have issued TCFD-aligned disclosure requirements.

The AI review results for companies in Asia Pacific are shown in [Figure A13](#) (p. 12) and [Figure A14](#) (p. 12). Overall, companies in the materials and buildings industry disclosed more TCFD-

Figure A12 TCFD-Aligned Disclosure Requirements

For Jurisdictions in Asia Pacific




aligned information than companies in the other industries, followed by banks and energy companies. In addition, the highest level of reporting was on climate-related metrics (*Metrics and Targets a*) for seven of the eight industries.

Figure A13
TCFD-Aligned Disclosures by Industry for Fiscal Year 2022

Percent of Companies in Asia Pacific¹

Recommendation	Recommended Disclosure	Industry							
		Banking (92)	Insurance (66)	Energy (88)	Materials and Buildings (93)	Transportation (93)	Agriculture, Food, and Forest (94)	Technology and Media (96)	Consumer Goods (96)
Governance	a) Board Oversight	53%	32%	45%	64%	30%	31%	15%	28%
	b) Management's Role	26%	11%	24%	30%	14%	14%	7%	14%
Strategy	a) Risk and Opportunities	35%	26%	42%	52%	20%	18%	15%	23%
	b) Impact on Organization	26%	12%	36%	39%	19%	27%	15%	17%
	c) Resilience of Strategy	3%	3%	7%	12%	3%	4%	0%	5%
Risk Management	a) Risk ID and Assessment Proc.	30%	14%	17%	30%	8%	11%	4%	8%
	b) Risk Management Processes	39%	17%	27%	34%	20%	21%	13%	22%
	c) Integration into Risk Mgmt.	26%	11%	18%	16%	12%	9%	3%	7%
Metrics and Targets	a) Climate-Related Metrics	68%	30%	61%	81%	31%	45%	30%	43%
	b) Scope 1,2,3 GHG Emissions	63%	29%	58%	73%	26%	36%	29%	41%
	c) Climate-Related Targets	35%	21%	41%	57%	28%	38%	21%	29%

1. The numbers in parentheses represent the size of the review population.

Legend:  Low to high percentage of reporting

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Materials and buildings companies, on average, reported in line with 5.1 of the 11 recommended disclosures. They also had the highest levels of reporting on eight of the 11 recommended disclosures, with the highest on climate-related metrics (*Metrics and Targets a*) at 81%, which was 31 percentage points higher than the average for the region as shown in [Figure A11](#) (p. 10).

On average, the banks reviewed reported in line with 4.2 of the 11 recommended disclosures — the second highest of the eight industries but closely followed by energy companies at 4.1. In addition, banks had the highest levels of reporting on the three recommended disclosures under the Risk Management recommendation — identifying and assessing climate-related risks; processes for managing climate-related risks; and how these processes are integrated into overall risk management.

Technology and media companies, on average, reported on the fewest number of recommended disclosures — at only 1.5. This is consistent with the AI review results for the industry overall as shown in [Figure A9](#) (p. 9). Insurance companies also had relatively low levels of reporting — at 2.2 of the 11 recommended disclosures on average. Notably, insurance companies overall — those reviewed across all five regions — had relatively high levels of reporting, as shown in [Figure A9](#) (p. 9). In addition, the insurance companies reviewed had significantly lower levels of reporting

Figure A14
Average Number of Disclosures per Company

Industry	Number
Materials and Buildings	5.1
Banking	4.2
Energy	4.1
Agriculture, Food, and Forest Products	2.8
Consumer Goods	2.4
Transportation	2.3
Insurance	2.2
Technology and Media	1.5

when compared with the banks reviewed. For example, 68% of the banks reported on their climate-related metrics while only 30% of the insurance companies did so.

Europe

The AI review of companies headquartered in Europe included 616 companies across 37 jurisdictions. The three jurisdictions with the largest number of companies were the U.K. with 91 companies, Germany with 65, and Switzerland with 53, as shown in [Box A3](#) (p. 13). This figure also describes the number of companies included based on their total assets

Box A3

Demographics of Companies Reviewed in Europe

Number and Size Range by Industry

Financial Institutions	Total Assets (\$US billion)			
	Number	Min	Median	Max
Banking	87	\$12	\$88	\$2,949
Insurance	46	\$2	\$68	\$1,002

Non-Financial Companies	Revenue (\$US billion)			
	Number	Min	Median	Max
Ag., Food, and Forest Products	80	\$0.7	\$3.0	\$99
Consumer Goods	78	\$0.9	\$5.0	\$92
Energy	78	\$1.4	\$12.0	\$381
Materials and Buildings	95	\$0.4	\$9.0	\$256
Technology and Media	79	\$0.1	\$0.5	\$27
Transportation	73	\$0.8	\$4.0	\$294

Number by Jurisdiction¹

United Kingdom	91
Germany	65
Switzerland	53
France	49
Italy	45
Sweden	41
Norway	29
Finland	26
Spain	23
Netherlands	21
Denmark	21
Russia	18
Poland	18
Austria	16
Turkey	15

1. In addition, there were 14 companies in both Belgium and Ireland; ten companies in Greece; seven in Portugal; six in Romania; five in Luxembourg; four in Croatia; three companies each in the Czech Republic, Cyprus, and Slovenia; two companies in each of the following jurisdictions: Estonia, Hungary, Lichtenstein, and Lithuania; and one company in each of the following jurisdictions: Bulgaria, Faroe Islands, Isle of Man, Jersey, Malta, Monaco, Serbia, and Ukraine.

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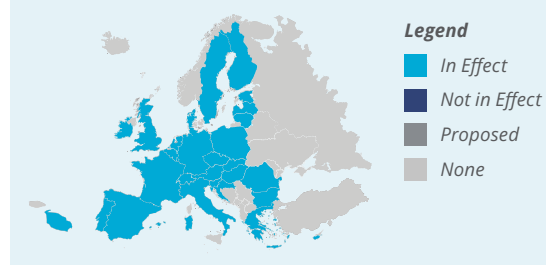
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for financial institutions and total revenue for non-financial companies. Financial institutions ranged in size from about \$2 billion to nearly \$3 trillion in assets, and non-financial companies ranged in size from about \$100 million to nearly \$400 billion in revenue.

As described in this status report and previous ones, European companies on average have higher levels of TCFD-aligned reporting than companies in the other four regions.²⁸ European companies, governments, and regulators have focused on climate-related reporting issues for several years, well before the Task Force published its recommendations, which may explain the higher levels of reporting. Figure A15 shows jurisdictions where the government or another authority has issued climate-related disclosure requirements that incorporate or draw from the TCFD recommendations. The governments or other authorities in jurisdictions shaded in light blue have issued final climate-related disclosure requirements, while those shaded in light gray have not issued either proposed or final disclosure requirements. It is important to note that the Task Force's review of documents is limited to those available in English. As a result, Figure A15 may understate the number

Figure A15
TCFD-Aligned Disclosure Requirements

For Jurisdictions in Europe



of jurisdictions that have issued TCFD-aligned disclosure requirements.

Most jurisdictions in Europe have final requirements that are already in effect. The European Union (EU) issued requirements in late 2014 for large companies to disclose information on environmental (including climate-related) and other matters beginning in their 2017 financial year reports.²⁹ More recently, the EU issued a directive on corporate sustainability reporting that builds on the requirements issued in 2014. The U.K. and Switzerland have also issued climate-related disclosure requirements.

²⁸ See Figure A11 (p. 10) in this report; TCFD, *2022 Status Report*, October 13, 2022 (p. 16); TCFD, *2021 Status Report*, October 14, 2021 (pp. 34–35); and, TCFD *2020 Status Report*, October 29, 2020 (p. 14).

²⁹ See European Parliament and European Council, *Non-Financial Reporting Directive*, October 22, 2014. On June 17, 2019, the European Commission published additional *Guidelines on Reporting Climate-Related Information*, which referenced the TCFD recommendations.

The AI review results for Europe are shown in [Figure A16](#) and [Figure A17](#). Overall, companies in seven of the eight industries reviewed disclosed, on average, in line with at least five of the 11 recommended disclosures. Companies in the technology and media industry, on average, disclosed less than three of the 11 recommended disclosures.

The highest levels of reporting for each of the eight industries were on the three recommended disclosures related to metrics and targets — namely climate-related metrics; Scope 1, Scope 2, and Scope 3 GHG emissions; and climate-related targets. More than 75% of the companies in six of the eight industries reviewed reported their climate-related metrics (*Metrics and Targets a*). The lowest level of reporting in each industry was on the resilience of companies' strategies under different

Figure A16
Average Number of Disclosures per Company

Industry	Number
Materials and Buildings	7.8
Insurance	7.7
Energy	7.7
Banking	6.9
Agriculture, Food, and Forest Products	5.8
Transportation	5.8
Consumer Goods	5.1
Technology and Media	2.7

climate-related scenarios (*Strategy c*), which is consistent with the AI review results for the other regions.

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Figure A17
TCFD-Aligned Disclosures by Industry for Fiscal Year 2022

Percent of Companies in Europe¹

Recommendation	Recommended Disclosure	Industry							
		Banking (87)	Insurance (46)	Energy (78)	Materials and Buildings (95)	Transportation (73)	Agriculture, Food, and Forest (80)	Technology and Media (79)	Consumer Goods (78)
Governance	a) Board Oversight	68%	65%	72%	72%	53%	45%	19%	46%
	b) Management's Role	55%	61%	60%	61%	41%	40%	20%	40%
Strategy	a) Risk and Opportunities	64%	76%	64%	79%	51%	59%	15%	40%
	b) Impact on Organization	47%	54%	64%	58%	37%	50%	15%	24%
	c) Resilience of Strategy	16%	20%	24%	24%	10%	19%	3%	13%
Risk Management	a) Risk ID and Assessment Proc.	63%	72%	56%	67%	45%	35%	14%	31%
	b) Risk Management Processes	53%	63%	65%	42%	38%	40%	11%	40%
	c) Integration into Risk Mgmt.	46%	46%	41%	27%	15%	20%	9%	14%
Metrics and Targets	a) Climate-Related Metrics	80%	87%	86%	94%	77%	79%	49%	72%
	b) Scope 1,2,3 GHG Emissions	77%	83%	81%	88%	71%	70%	46%	68%
	c) Climate-Related Targets	77%	78%	82%	97%	78%	73%	38%	62%

1. The numbers in parentheses represent the size of the review population.

Legend:  Low to high percentage of reporting

Notably, nearly all the companies in the materials and buildings industry reviewed (97%) reported on their climate-related targets, followed closely by reporting on their climate-related metrics (94%). In addition, materials and buildings companies on average reported in line with 7.8 of the 11 recommended disclosures — closely followed by insurance and energy companies, both of which reported on 7.7 of the 11 recommended disclosures on average. Companies in the technology and media industry had the lowest levels of reporting for all 11 recommended disclosures, which is consistent with the AI review results

for technology and media companies overall — those reviewed across all five regions — as shown in [Figure A10](#) (p. 10).

Latin America

The AI review of companies headquartered in Latin America included 111 companies across 11 jurisdictions. The three jurisdictions with the largest number of companies were Brazil with 52 companies, Chile with 18, and Bermuda with 12, as shown in [Box A4](#) (p. 15). As noted previously, there were not enough companies with reports in English in Latin America for the

consumer goods and technology and media industries to achieve statistically significant results. As a result, the analysis covers six industry groups, listed in [Box A4](#) along with an indication of the size of the companies included.

Financial institutions ranged in size from about \$2 billion to more than \$400 billion in assets, and non-financial companies ranged in size from about \$10 million to over \$100 billion in revenue.

Box A4 Demographics of Companies Reviewed in Latin America

Number and Size Range by Industry

Financial Institutions	Total Assets (\$US billion)			
	Number	Min	Median	Max
Banking	20	\$19	\$65	\$439
Insurance	14	\$2	\$12	\$48

Non-Financial Companies	Revenue (\$US billion)			
	Number	Min	Median	Max
Ag., Food, and Forest Products	21	\$0.3	\$2	\$25
Consumer Goods ¹	—	—	—	—
Energy	19	\$1.2	\$5	\$124
Materials and Buildings	23	\$1.0	\$4	\$44
Technology and Media ¹	—	—	—	—
Transportation	14	\$0.01	\$1	\$9

Number by Jurisdiction

Brazil	52
Chile	18
Bermuda	12
Argentina	9
Colombia	7
Peru	5
Trinidad and Tobago	2
Puerto Rico	2
Jamaica	2
Panama	1
Cayman Islands	1

1. There were not enough companies to obtain statistically significant results.

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[Figure A18](#) shows jurisdictions where the government or another authority has issued climate-related disclosure requirements that incorporate or draw from the TCFD recommendations. The governments or other authorities in jurisdictions shaded in light blue have issued final climate-related disclosure requirements. It is important to note that the Task Force's review of documents is limited to those available in English. As a result, [Figure A18](#) may understate the number of jurisdictions that have issued TCFD-aligned disclosure requirements, as it reflects requirements in Brazil and Columbia only.

The AI review results for Latin America are shown in [Figure A19](#) and [Figure A20](#) (p. 16). Insurance companies on average reported on more recommended disclosures than companies in the other industries. Insurance companies also had the highest level of reporting on all the recommended disclosures except two — climate-related targets (*Metrics and Targets c*) and the resilience of companies' strategies under different climate-related scenarios (*Strategy c*). Notably, insurance companies had the lowest level of reporting on *Metrics and Targets c* across the six industries reviewed at 21%.

The Latin American banks reviewed had the highest level of reporting on *Metrics and Targets*

Figure A18 TCFD-Aligned Disclosure Requirements

For Jurisdictions in Latin America

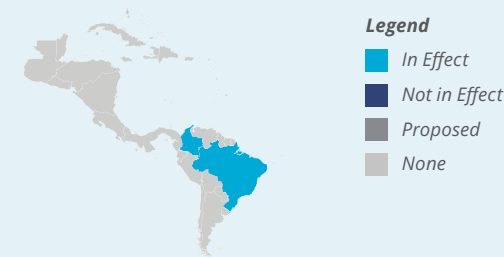


Figure A19 Average Number of Disclosures per Company

Industry	Number
Insurance	6.1
Banking	4.2
Energy	3.0
Materials and Buildings	2.8
Transportation	2.0
Agriculture, Food, and Forest Products	1.0

c) across the six industries reviewed at 55%. In contrast, the AI review results for banks overall — those reviewed across all five regions — had

the second lowest level of reporting on *Metrics and Targets c*), as shown in [Figure A10](#) (p. 10). On average, companies in the agriculture, food, and forest products industry reported in line with

only one of the 11 recommended disclosures — the lowest of the eight industries. These companies also had the lowest level of reporting on nine of the 11 recommended disclosures.

Figure A20
TCFD-Aligned Disclosures by Industry for Fiscal Year 2022

Percent of Companies in Latin America¹

Recommendation	Recommended Disclosure	Banking (20)	Insurance (14)	Energy (19)	Materials and Buildings (23)	Transportation (14)	Agriculture, Food, and Forest (21)
		Governance					
	a) Board Oversight	45%	64%	32%	30%	29%	10%
	b) Management's Role	30%	50%	16%	17%	7%	5%
Strategy							
	a) Risk and Opportunities	55%	64%	26%	30%	29%	19%
	b) Impact on Organization	20%	43%	16%	13%	14%	5%
	c) Resilience of Strategy	0%	0%	11%	4%	0%	0%
Risk Management							
	a) Risk ID and Assessment Proc.	10%	36%	11%	9%	7%	5%
	b) Risk Management Processes	30%	57%	16%	30%	7%	10%
	c) Integration into Risk Mgmt.	10%	50%	5%	17%	0%	0%
Metrics and Targets							
	a) Climate-Related Metrics	45%	50%	32%	30%	36%	14%
	b) Scope 1,2,3 GHG Emissions	35%	43%	32%	30%	36%	14%
	c) Climate-Related Targets	55%	21%	32%	48%	36%	24%

1. The numbers in parentheses represent the size of the review population.

Legend: Low to high percentage of reporting

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Middle East and Africa

The AI review of companies headquartered in the Middle East and Africa included 271 companies across 21 jurisdictions. The three jurisdictions with the largest number of companies were South Africa with 53 companies, Saudi Arabia with 50, and Israel with 40, as shown in [Box A5](#). This figure also describes the

number of companies included in each of eight industry groups along with an indication of the size of the companies included based on their total assets for financial institutions and total revenue for non-financial companies. Financial institutions ranged in size from about \$1 billion to more than \$300 billion in assets, and non-financial companies ranged in size from \$3 million to over \$50 billion in revenue.

Box A5

Demographics of Companies Reviewed in the Middle East and Africa

Number and Size Range by Industry

Financial Institutions	Total Assets (\$US billion)			
	Number	Min	Median	Max
Banking	40	\$25	\$63	\$324
Insurance	36	\$0.7	\$1	\$63
Non-Financial Companies	Revenue (\$US billion)			
	Number	Min	Median	Max
Ag., Food, and Forest Products	37	\$0.3	\$0.6	\$41
Consumer Goods	33	\$0.1	\$0.6	\$12
Energy	32	\$0.4	\$1.4	\$19
Materials and Buildings	42	\$1.0	\$4.4	\$53
Technology and Media	25	\$0.003	\$0.1	\$5
Transportation	26	\$0.01	\$0.5	\$13

Number by Jurisdiction¹

South Africa	53
Saudi Arabia	50
Israel	40
United Arab Emirates	32
Qatar	16
Nigeria	12
Kuwait	12
Egypt	9
Kenya	7
Jordan	7
Oman	6
Bahrain	5
Zimbabwe	4
Zambia	4
Morocco	4

1. In addition, there were three companies from Mauritius; two companies each from Botswana and Ghana; and one company from each of the following jurisdictions Sudan, Togo, and Uganda.

Figure A21 shows jurisdictions where the government or another authority has issued climate-related disclosure requirements that incorporate or draw from the TCFD recommendations. It is important to note that the Task Force’s review of documents is limited to those available in English. As a result, Figure A21 may understate the number of jurisdictions that have issued TCFD-aligned disclosure requirements, as it reflects requirements in Egypt, Kenya, and Mauritius only.

The AI review results for the Middle East and Africa are shown in Figure A22 and Figure A23. Materials and buildings companies, on average, reported on more recommended disclosures than companies in the other industries. These companies also had the highest level of reporting on eight of the 11 recommended disclosures and relatively high reporting on climate-related metrics, GHG emissions, and climate-related targets at 60%, 57%, and 50%, respectively.

Companies in the technology and media and insurance industries, on average, reported in line with less than one of the 11 recommended disclosures. The lowest level of reporting in each of the industries was on resilience of companies’ strategies under different climate-related scenarios (*Strategy c*). In fact, none of the energy, transportation, technology and media, or consumer goods companies reviewed reported in line with *Strategy c*.

Figure A21
TCFD-Aligned Disclosure Requirements

For Jurisdictions in the Middle East and Africa

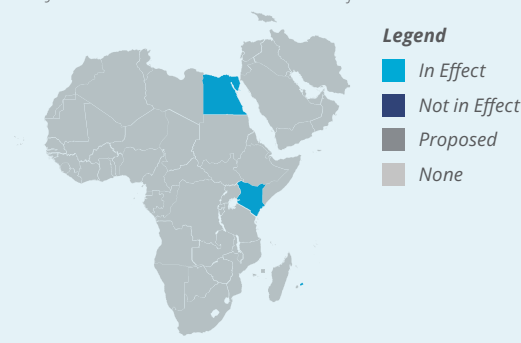


Figure A22
Average Number of Disclosures per Company

Industry	Number
Materials and Buildings	3.9
Banking	2.9
Energy	2.1
Agriculture, Food, and Forest Products	1.3
Consumer Goods	1.1
Transportation	1.0
Insurance	0.9
Technology and Media	0.5

Figure A23
TCFD-Aligned Disclosures by Industry for Fiscal Year 2022

Percent of Companies in the Middle East and Africa¹

Recommendation	Recommended Disclosure	Industry								
		Banking (40)	Insurance (36)	Energy (32)	Materials and Buildings (42)	Transportation (26)	Agriculture, Food, and Forest (37)	Technology and Media (25)	Consumer Goods (33)	
Governance	a) Board Oversight	28%	14%	25%	45%	12%	16%	4%	18%	
	b) Management’s Role	20%	6%	13%	21%	8%	3%	4%	3%	
Strategy	a) Risk and Opportunities	33%	14%	13%	31%	8%	8%	16%	6%	
	b) Impact on Organization	15%	6%	9%	26%	4%	14%	4%	12%	
	c) Resilience of Strategy	3%	3%	0%	5%	0%	3%	0%	0%	
Risk Management	a) Risk ID and Assessment Processes	23%	6%	9%	21%	8%	3%	0%	0%	
	b) Risk Management Processes	23%	8%	9%	31%	8%	8%	4%	18%	
	c) Integration into Overall Risk Mgmt.	20%	3%	6%	12%	12%	3%	0%	3%	
Metrics and Targets	a) Climate-Related Metrics	45%	14%	34%	60%	15%	30%	8%	21%	
	b) Scope 1,2,3 GHG Emissions	40%	11%	31%	57%	12%	24%	8%	12%	
	c) Climate-Related Targets	28%	6%	28%	50%	12%	19%	0%	18%	

1. The numbers in parentheses represent the size of the review population.

Legend: Low to high percentage of reporting

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North America

The AI review of companies headquartered in North America included 1,388 companies, with the majority headquartered in the United States (1,185), as shown in [Box A6](#). This figure also describes the number of companies included in each of eight industry groups

along with an indication of the size of the companies included based on their total assets for financial institutions and total revenue for non-financial companies. Financial institutions ranged in size from about \$800 million to over \$3.5 trillion in assets, and non-financial companies ranged in size from \$5 million to more than \$600 billion in revenue.

Box A6

Demographics of Companies Reviewed in North America

Number and Size Range by Industry

Financial Institutions	Total Assets (\$US billion)			
	Number	Min	Median	Max
Banking	227	\$4.1	\$13	\$3,666
Insurance	75	\$0.8	\$13	\$690

Number by Jurisdiction

United States	1,185
Canada	183
Mexico	20

Non-Financial Companies	Revenue (\$US billion)			
	Number	Min	Median	Max
Ag., Food, and Forest Products	138	\$0.005	\$0.9	\$102
Consumer Goods	152	\$0.03	\$3.0	\$611
Energy	213	\$0.3	\$3.0	\$399
Materials and Buildings	284	\$0.9	\$4.0	\$77
Technology and Media	182	\$0.03	\$0.7	\$394
Transportation	117	\$0.01	\$3.0	\$158

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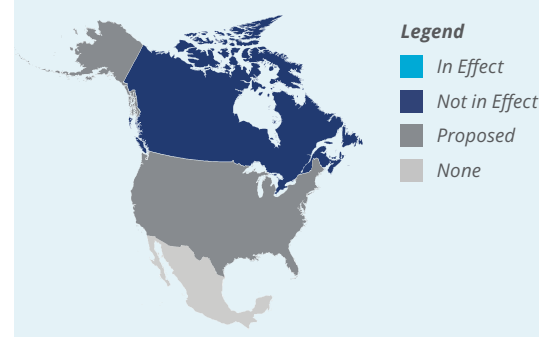
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[Figure A24](#) shows jurisdictions where the government or another authority has issued climate-related disclosure requirements that incorporate or draw from the TCFD recommendations. In Canada — shaded in dark blue, the Office of the Superintendent of Financial Institutions issued guidelines on climate-related risk management for financial institutions that includes minimum mandatory climate-related financial disclosure expectations, which incorporate the Task Force’s 11 recommended disclosures.³⁰ In addition, the Canadian Securities Administration has proposed mandatory climate-related disclosures for public companies; and in the U.S. — shaded in dark gray, the Securities and Exchange Commission has proposed rules to enhance and standardize climate-related disclosures that drew on the TCFD recommendations.

The AI review results for North America are shown in [Figure A25](#) (p. 19) and [Figure A26](#) (p. 19). Overall, the energy companies reviewed reported, on average, in line with 4.8 of the 11 recommended disclosures — the highest of all industries reviewed. They were followed

Figure A24 TCFD-Aligned Disclosure Requirements

For Jurisdictions in North America



by materials and buildings companies, which disclosed 3.9 of the 11 recommended disclosures on average. Energy companies also had the highest levels of reporting — across the industries reviewed — on eight of the 11 recommended disclosures. The exceptions were on the three recommended disclosures related to risk management — processes for identifying and assessing climate-related risks; processes

³⁰ Under the guidelines, “Domestic Systemically Important Banks” and “Internationally Active Insurance Groups” have to report at the end of fiscal year 2024 and other federally regulated financial institutions have to report at the end of fiscal year 2025.

for managing climate-related risks; and how these processes are integrated into overall risk management. For these recommended disclosures, the insurance companies reviewed had the highest levels of reporting.

Technology and media companies reported less climate-related information than companies in the other industries reviewed. On average, these companies reported on 1.6 of the 11 recommended disclosures. Technology and media companies also had the lowest levels of reporting on seven of the 11 recommended disclosures; and banks had the lowest levels of reporting on the three recommended disclosures under the Metrics and Targets recommendation. Only 15% of the North American banks reviewed reported their targets as compared with 77% of the European banks reviewed (see [Figure A17](#), p. 14).

Figure A25

Average Number of Disclosures per Company

Industry	Number
Energy	4.8
Materials and Buildings	3.9
Insurance	3.4
Transportation	3.1
Banking	2.3
Consumer Goods	2.1
Agriculture, Food, and Forest Products	2.1
Technology and Media	1.6

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Figure A26

TCFD-Aligned Disclosures by Industry for Fiscal Year 2022

Percent of Companies in North America¹

Recommendation	Recommended Disclosure	Banking (227)	Insurance (75)	Energy (213)	Materials and Buildings (284)	Transportation (117)	Agriculture, Food, and Forest (138)	Technology and Media (182)	Consumer Goods (152)
Governance	a) Board Oversight	28%	49%	65%	61%	48%	30%	23%	36%
	b) Management's Role	19%	31%	41%	31%	28%	17%	14%	16%
Strategy	a) Risk and Opportunities	56%	53%	64%	54%	38%	33%	20%	30%
	b) Impact on Organization	15%	31%	36%	30%	24%	16%	11%	13%
	c) Resilience of Strategy	2%	4%	8%	4%	3%	3%	2%	0%
Risk Management	a) Risk ID and Assessment Proc.	11%	25%	24%	19%	14%	10%	4%	9%
	b) Risk Management Processes	23%	35%	27%	23%	21%	11%	8%	11%
	c) Integration into Risk Mgmt.	18%	19%	17%	13%	15%	7%	4%	5%
Metrics and Targets	a) Climate-Related Metrics	17%	29%	52%	49%	39%	25%	24%	32%
	b) Scope 1,2,3 GHG Emissions	16%	27%	47%	43%	37%	22%	23%	27%
	c) Climate-Related Targets	15%	31%	62%	53%	43%	28%	26%	35%

1. The numbers in parentheses represent the size of the review population.

Legend:  Low to high percentage of reporting

The highest level of reporting for companies in energy, materials and buildings, transportation, and consumer goods was on their boards' oversight of climate-related issues (*Governance a*), while the highest level of reporting for banks, insurance companies, and agriculture, food, and forest products companies was on their climate-related risks or opportunities (*Strategy a*). In addition, in four of the eight industries, over

50% of the companies reviewed reported on *Strategy a*). For companies in each of the eight industries, the lowest level of reporting was on the resilience of their strategies under different climate-related scenarios (*Strategy c*). Notably, none of the consumer goods companies reviewed and only 2% of the banks reviewed reported on *Strategy c*).

Examples of Climate-Related Financial Disclosure

This subsection includes examples of public companies' reporting on information aligned with one or more of the 11 recommended disclosures. The Task Force sought to include examples from a geographically diverse set of companies, covering all five regions and the 11 recommended disclosures. The examples included are not intended to represent "best practice" nor demonstrate disclosures that fully meet the associated recommended disclosure.³¹ Instead, the examples are provided because

they may help companies generate ideas for their own disclosures.

Governance Recommendation

Governance a) asks companies to describe the board's oversight of climate-related risks and opportunities, and *Governance b)* asks them to describe management's role in assessing and managing those risks and opportunities. [Figure A27](#) shows a U.S. materials company's description of its board oversight and management's role in assessing and managing climate-related issues.

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Figure A27

Board Oversight and Management's Role

The Board of Directors is responsible for ensuring there are adequate policies and strategies in place to understand and manage climate risk while also seizing the strategic opportunities presented by the transition to a low-carbon economy.

Climate change governance

Climate change is a material governance and strategic issue, and the Board of Directors is responsible for ensuring there are adequate policies and strategies in place to understand and manage climate risk while also seizing the strategic opportunities presented by the transition to a low-carbon economy.

The Safety, Health, Environment, Community and Sustainability (SHECS) Committee assists the Board in overseeing its climate-related performance and governance responsibilities. The Risk Committee reviews climate-related risk and is ultimately responsible for overseeing the embedding of climate risk into the Enterprise Risk Management (ERM) approach and setting the risk appetite for the company. The charters for these committees are available in the FY22 Corporate Governance Statement and Director's Report and at www.simsLtd.com/governance. In practice, all members of the Board participate in each committee meeting, which supports holistic consideration of climate-related topics.

MANAGING RISK AND OPPORTUNITY

With support and input of the executive leadership team, our chief risk and compliance officer (CRCO) is responsible for providing and maintaining the ERM framework, in which climate change risk is considered. Reporting to the CEO and Board, the CRCO has accountability for oversight of climate targets and climate-related matters across the company, including monitoring performance across the business, maintaining the ERM system and performance disclosure.

Executives are ultimately the risk owners and are accountable for identifying, managing and monitoring climate-related risks and opportunities within the ERM framework and risk appetite. Key risks are reported to the Board's Risk Committee at least quarterly. The CEO, CRCO and the rest of the executive leadership team are accountable for the company's actions and commitments to embed climate change into our risk management and business strategy.

In relation to opportunities, our executive and management teams, under the leadership of the CEO, are responsible for delivering the strategic direction and goals approved by the Board. These include implementation of climate-related targets and policy positions, identification and management of risks and opportunities, and reporting on these topics to the Board directly and/or through the relevant Board committees.

Sims Limited, *2022 Climate Report*, p. 13

³¹ The mention of specific companies does not imply they are endorsed by the TCFD or its members in preference over other companies of a similar nature that are not mentioned.

Strategy Recommendation

Strategy a) asks companies to describe the material climate-related risks and opportunities they have identified over the short, medium,

and long term. Figure A28 shows the climate-related risks, associated time horizons, and potential impacts of an Italian energy company's Latin American subsidiary.

Figure A28
Climate-Related Risks and Opportunities

Scenario phenomena	Time horizon	Category of risks opportunities	Description of the impact	Impact	Model of management
Acute Physical	From a short period (1 to 3 years)	Extreme events	Risk: Particularly extreme and intense weather events.	Extreme events can cause impacts in terms of damage to property and lack of continuity of operations.	The Company adopts the best practices to manage the return to activity in the shortest possible time. Furthermore, it works to implement investment plans for resilience. With regard to the Risk Assessment activity in the insurance area, it manages a Loss prevention program for Property risks, to value the main exposures linked to natural events, together with prevention activities and internal risk management policies. In the future, the potential impacts of trends due to the most relevant climate variations that will manifest themselves in the term will be integrated into the valuations.
Chronic Physical	From a long period (2030-2050)	Market	Risk/opportunity: Increased or decreased demand for electricity, increase or decrease in production.	Electricity demand is also affected by temperature, fluctuating in which may affect our business. Renewable energy generation can also be affected by structural changes in resource availability.	The geographical and technological diversification of the Enel Group permits it to mitigate the impact of changes (positive and negative) on a single variable at a general level. To guarantee that operations always consider weather and climate events, a number of practices such as weather forecasting, real-time monitoring of plants and long-term climate scenarios are adopted to identify any chronic changes in the availability of renewable sources.
Transition	From a short period (1 to 3 years)	Policy and regulation	Risk/opportunity: CO ₂ , pricing and emissions policies, incentives for energy transition, greater margin for investment in renewables and resilience.	The effects of energy transition and resilience policies can influence the volume and return on investments.	The Company is minimizing its exposure to risks through strategic actions focused on investing in renewables, grids and customers that permit us to mitigate potential threats and seize opportunities related to the energy transition. These activities are carried out within the framework of stakeholder dialogue platforms.
Transition	From an average period (2025-2029)	Market	Risk/opportunity: Changes in the price of commodity: raw materials and energy, evolution of the energy package, changes in retail consumption, modification of the competitive structure.	Considering alternative transition scenarios, the Company assesses the impacts of the different trends with the increase in the weight of renewable sources in the energy package and the electrification of final consumption.	The Company maximizes opportunities thanks to a strategy aimed at the energy transition, the electrification of consumption and the great development of renewable energy production.
Transition	From an average period (2025-2029)	Product & Services	Opportunity: Greater margins and more space to invest as a result of the transition, in terms of electric transport and new electrification technologies and efficiency of final consumption.	Considering two alternative transition scenarios, Enel Américas assesses the impact of the different trends in the electrification of consumption.	Enel Américas maximizes opportunities thanks to a strong strategic positioning on new businesses and services "beyond commodities".
Transition	From an average period (2025-2029)	Technology	Opportunity: Greater margins and more space to invest as a result of the transition, in terms of electric transport and new electrification technologies and efficiency of final consumption.	Faced with the trend of penetration of electrification and efficiency technologies, considering two alternative transition scenarios, the Company values the opportunities to scale in current businesses.	Enel Américas maximizes opportunities thanks to a strong strategic positioning on its networks.

Enel Américas, *Integrated Annual Report Enel Américas 2022*, pp. 132-133
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Strategy b) asks companies to describe the impact of material climate-related risks and opportunities that they have identified on their businesses, strategies, and financial planning.

In Figure A29, a Spanish bank describes the potential impact of certain climate-related risk factors on its operations, reputation, and strategy.

Figure A29
Impact of Climate-Related Risks

Risk type	Potential impact on climate risk factors	What we're doing to manage climate risk	Next steps
Operational	<ul style="list-style-type: none"> → Serious climate events can affect business continuity, infrastructure, processes and headcount at branches and offices. → If energy, water and insurance prices soar, so will operational costs. 	<ul style="list-style-type: none"> → Climate risk was a mandatory addition to our scenario analyses. → We updated our operational risk database with a new climate and environmental risk metric. → We're updating our continuity plan with more details on the threats of climate risk. 	<ul style="list-style-type: none"> → Embed climate risk in the annual operational and control risk self-assessment. → Enhance the operational risk that considers climate risk data. → Study external data sources.
Reputational	<ul style="list-style-type: none"> → Customers, investors and other stakeholders who believe banks aren't doing enough to meet low-carbon targets or their own public commitments can pose reputational risk. → The Group's climate information is considered insufficient or misleading, or product announcements appear to be "greenwashing". 	<ul style="list-style-type: none"> → Updated climate and environmental risk policies and procedures. → Corporate credit committees address reputational risk when assessing sensitive transactions that involve climate and environmental risk. → Strengthen climate and environmental risk governance, which the Reputational risk forum addresses. Formal meetings scheduled to review reputational issues (including climate matters), involving the legal, responsible banking, investor relations, risk and other teams. → Proactive measures that show Santander supports companies' green transition and decarbonization. 	<ul style="list-style-type: none"> → Methodology to quantify the and procedures. reputational impact of climate and environmental risk.
Strategic	<ul style="list-style-type: none"> → The Group's net-zero financing and operations strategy fails to bring about enough change and undermines our strategy. 	<ul style="list-style-type: none"> → Regular monitoring of the strategic 'Climate change' project, including KPIs that relate to the Group's net zero objectives. → Our top risk identification includes a climate change risk event. We analyse the potential impact of low-probability stress scenarios on the Group's strategic plans and draw up action plans accordingly, o budget tracking for inclusion in the strategic risk profile. → Monitoring of ESG initiatives presented at the CPGF and investors' forum. 	<ul style="list-style-type: none"> → Increase granularity of stressed event impacts as part of the top risk identification. → Update key ESG metrics according to the Group's strategy. → Include more ESG factors in our business model performance review. → Continue to include ESG factors in comparisons with peers.

Banco Santander, *2022 Annual Report*, p. 496
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Strategy c) asks companies to describe the resilience of their strategies under different climate-related scenarios. In Figure A30, a Mexican materials and buildings company

describes its business resilience under three different scenarios, including two scenarios under 2°C.

Figure A30
Resilience of Strategy

SCENARIO NAME	STATED POLICIES						SUSTAINABLE DEVELOPMENT						NET ZERO EMISSIONS BY 2050					
Short name - external reference scenario	STEPS						SDS						NZE					
STRATEGY EFFECTIVENESS: RISKS AND OPPORTUNITIES																		
RISKS	PROBABILITY			IMPACT			PROBABILITY			IMPACT			PROBABILITY			IMPACT		
	LOW	MED	HIGH	LOW	MED	HIGH	LOW	MED	HIGH	LOW	MED	HIGH	LOW	MED	HIGH	LOW	MED	HIGH
Reduced market demand for higher-carbon products/commodities	■			■			■			■			■			■		
Physical: Increased business interruption and damage across operations and supply chains with consequences for input costs, revenues, asset values, and insurance claims	■	■		■	■		■			■			■			■		
Increased input/operating costs for high carbon activities under regulated markets (even threats to securing license to operate)	■			■			■			■			■			■		
Risk of stranded assets: plants that cannot be easily upgraded and close to end of their lifetime	■			■			■			■			■			■		
OPPORTUNITIES																		
Increased demand for energy-efficient, lower-carbon products and services	■			■			■			■			■			■		
New technologies available at competitive cost that disrupt markets	■			■			■			■			■			■		
Access to competitive energy sources (AF cost)	■			■			■			■			■			■		
Opportunity to enhance reputation and brand value	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

The results of the analysis confirm that Cemex's carbon strategy is in general robust. Cemex is aware that climate action is the biggest challenge of our times. With the Future in Action program, we remain committed to becoming a net-zero CO₂ company by 2050. We will provide greener products and services for a more sustainable and circular world.

- We will continue working to achieve 2030 target of reducing our net specific CO₂ emissions by 47% compared to our 1990 baseline; mid-term performance validation to guarantee achievement.
- In 2022, Cemex validated its 2050 net-zero CO₂ roadmap and its 2030 decarbonization goals under the Science-Based Targets initiative's (SBTi) recently announced 1.5°C Scenario.

- Also, Cemex expects to continue investing in research and development to deliver innovative building materials and solutions to build climate-smart urban projects, sustainable buildings, and climate-resilient infrastructures, while capitalizing on CX Ventures, Urbanization Solutions, and strategic partnerships.
- We remain committed to identifying and investing in new technologies needed to achieve our 2050 target, and we expect it will be strengthened in the most carbon-constrained scenarios.

CEMEX, 2022 Integrated Report, p. 258
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Risk Management Recommendation

Risk Management a) asks companies to describe their processes for identifying and assessing climate-related risks.

In Figure A31, a Mexican multinational beverage company describes its process for identifying and assessing climate-related physical and transition risks.

Figure A31
Risk Identification and Assessment Processes

TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES (TCFD) REPORT

[...] [...]

Risk Management: Processes used by the organization to identify, assess, and manage climate-related risks

We assess physical and transitional risks and opportunities in line with TCFD recommendations using a five-step method:

1. Identification of climate risks and opportunities (qualitative analysis)
2. Definition of climate scenarios and time horizons
3. Identification of variables associated with climate scenarios
4. Estimation of risk and opportunity parameters
5. Calculation of value at risk from climate change (includes a quantitative estimate of the expected and stressed impact of risks and opportunities).

Multidisciplinary groups in our operations (consisting of areas such as sustainability, strategic planning, operations, marketing, finance, corporate affairs, etc.) work together to identify, prioritize, and quantify the main climate-related risks and opportunities. [...]

Coca-Cola FEMSA, 2022 Task Force on Climate-Related Financial Disclosures (TCFD) Report, p. 1
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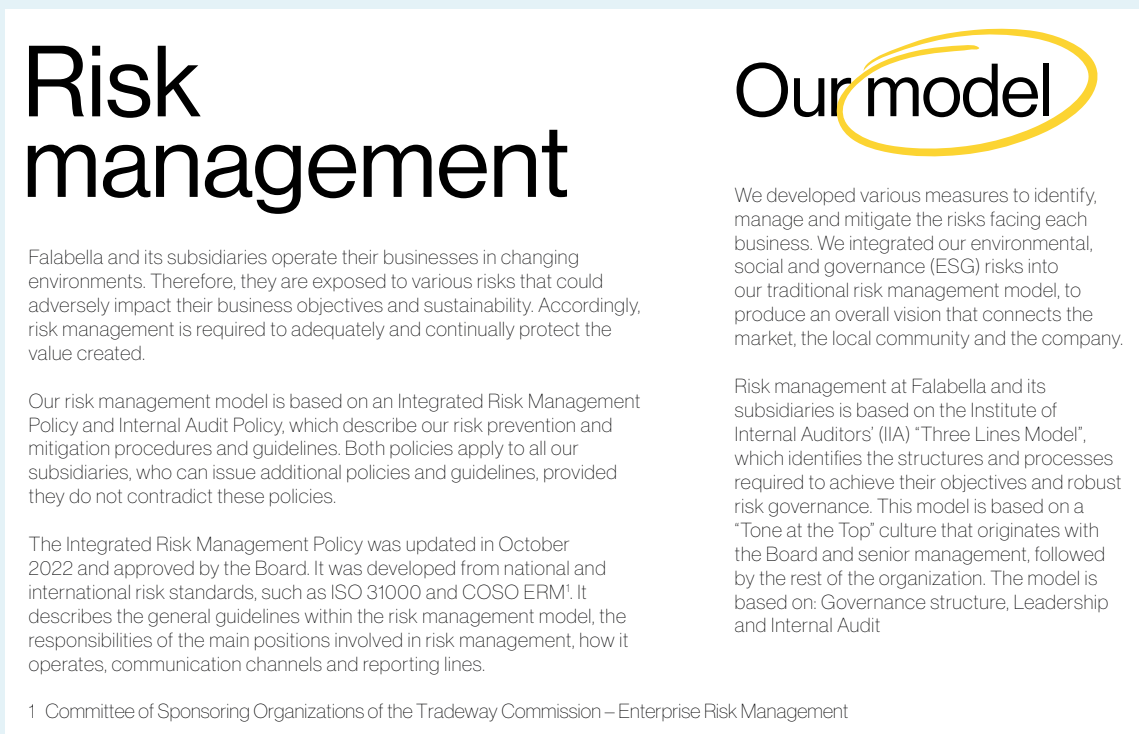
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Risk Management b) asks companies to describe their processes for managing climate-related risks. In [Figure A32](#), a Chilean company describes its climate-related risk management processes.

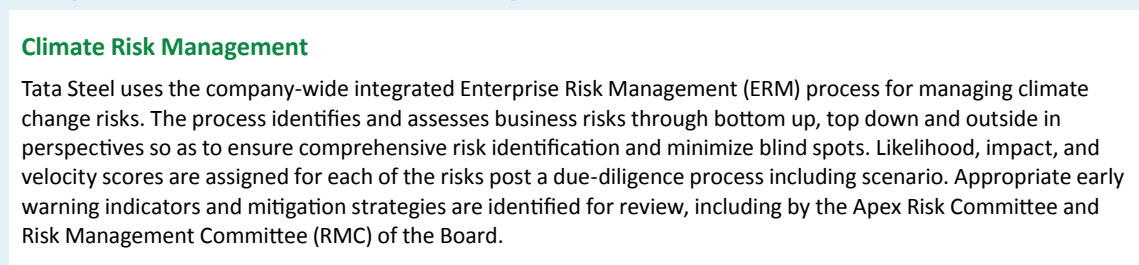
Figure A32
Risk Management Processes



Falabella, *Annual Report 2022*, p. 50
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Risk Management c) asks companies to describe how their processes for identifying, assessing, and managing climate-related risks are integrated into their overall risk management. [Figure A33](#) shows an Indian metals and mining company's description of how climate-related risks are a part of its enterprise risk management processes.

Figure A33
Integration into Overall Risk Management



Tata Steel, *Integrated Report and Annual Accounts 2021–22*, p. 105
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Metrics and Targets Recommendation

Metrics and Targets a) asks companies to disclose the metrics they use to assess climate-related risks and opportunities in line with their strategy and risk management processes. [Figure A34](#) (p. 25) shows a South African metals and mining company's description of a selection of its climate-related metrics, including its Scope 1, Scope 2, and Scope 3 GHG emissions.

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Figure A34
Climate-Related Metrics

Climate adaptation, resilience and transition refer to our capacity to adjust to current and anticipated climate change-related risks, and capitalise on strategic opportunities presented by a low-carbon and resource-constrained economy.

Two of Exxaro's strategic objectives – to transition at speed and scale and to be carbon neutral by 2050 – outline our goals and commitment to fundamentally change our business to positively respond to the climate change agenda.

Our Climate Change Response strategy, TCFD recommendations, decarbonisation plan (under development for the medium and long-term targets) and linked STI scheme across the business support the achievement of these objectives. The principles and mechanisms to respond to climate change are integrated throughout our business and are central to our thinking and actions.

We mitigate climate change and its impacts through:

- Reducing our carbon footprint, guided by our Climate Change Response strategy and decarbonisation plan. In the short term, our operational energy efficiency projects, renewable energy self-generation and potential divestment, will result in emissions reduction of 40% by 2026 for scope 1 and 2. We are developing the medium and long-term elements of our decarbonisation plan, including the capital alignment implications
- Measuring, monitoring and reporting data and performance
- Incentivising performance through the STI scheme
- Prioritising adaptation and resilience of our operations and host communities
- Creating awareness during regular stakeholder engagements
- Supporting research and development

[...]

Snapshot of our performance

Carbon intensity increased by 0.5% to
5.54tCO₂e/kTTM
(2021: 5.51tCO₂e/kTTM)

Scope 3 emissions increased by 5% to
74 488ktCO₂e
(2021: 70 931ktCO₂e)

Scope 1 and scope 2 emissions decreased by 2.5% to
971ktCO₂e
(2021: 995ktCO₂e)

CDP score: **B**
(higher than the coal mining sector C average)

R8.9 million invested in research and development
(2021: R9.5 million)

Exxaro Resources Limited, *Exxaro Resources Limited Integrated Report 2022*, pp. 105–106

Notes: STI stands for short-term incentive and TTM for trailing twelve-month.

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Metrics and Targets b) asks companies to disclose their Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions. Figure A35 shows a British consumer goods company's description of its Scope 1 and Scope 2 GHG emissions over a three-year period as well as its Scope 3 GHG emissions broken down by categories.

Figure A35
Scope 1, Scope 2, and Scope 3 GHG Emissions

GHG emissions (million tonnes CO ₂ e)	2022	2021	2020	2022 – 2021 % change
Scope 1 and 2 GHG emissions: Unilever operations ^(a) (Note 2)	0.62	0.71	0.82	-13%
Scope 3 GHG emissions ^(b)	33.69	33.03	34.85	2%
Raw materials and ingredients	20.16	19.35	19.32	4%
Packaging materials	4.54	4.60	4.53	-1%
Downstream logistics and distribution	1.00	1.02 ^(c)	2.78	-2%
Retail ice cream freezers	3.55	3.75	4.01	-5%
Direct consumer use (HFC propellants)	0.82	0.71	0.77	15%
Product end of life	3.62	3.60	3.44	1%
Scope 1, 2 and 3 GHG emissions in scope of net zero target	34.31	33.74	35.67	2%
Scope 3 GHG emissions – indirect consumer use ^(b)	57.54	64.87	65.76	-11%
Total Scope 1, 2 and 3 GHG emissions	91.85	98.61	101.43	-7%

(a) Measured for the 12 month period ended 30 September.

(b) Measured for the 12 month period ended 30 June.

(c) The change in our logistics and distribution emissions between 2020 and 2021 is a result of a move from using industry-standard global GHG emission conversion factors to industry-standard regional GHG conversion factors in our calculations.

Unilever, *Unilever Annual Report and Accounts 2022*, p. 39

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Metrics and Targets c) asks companies to describe the targets they use to manage climate-related issues as well as the performance against those targets. Consistent with this recommended disclosure, [Figure A36](#) shows a Japanese technology company's

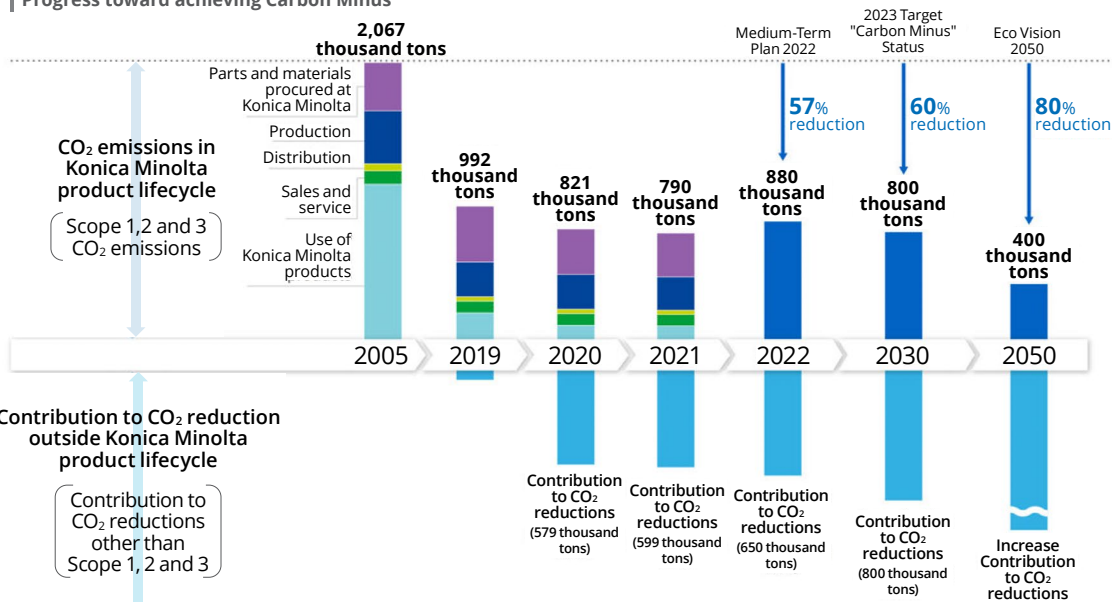
description of its GHG emissions reduction targets for both the medium term and longer term as well as its performance against them. Of note, the company also disclosed avoided emissions — expressed as “contribution to CO₂ reduction.”

Figure A36
Climate-Related Targets

Metrics and Targets Used to Assess and Manage Climate-related Risks and Opportunities

Konica Minolta seeks to achieve Carbon Minus status by actively helping to reduce global CO₂ emissions in cooperation with its stakeholders, especially suppliers and customers. The Group defines “Carbon Minus status” as “contributing more to CO₂ emissions in areas outside of our responsibility than to CO₂ emissions reductions in areas we are responsible for.” Konica Minolta’s goal is to ensure that the Group contributes to emission reductions for customers and the broader society greater than the emissions directly related to its own products and operations (including Scope 1, 2, and 3 emissions). Konica Minolta hopes to accelerate the effects of decarbonization, broaden its ties with stakeholders, and grow its business together, by not only fulfilling its social responsibilities but also helping stakeholders fulfill theirs.

Progress toward achieving Carbon Minus



Konica Minolta, *Konica Minolta, Inc. Sustainability Report 2022*, p. 68
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3. TCFD-ALIGNED REPORTING BY ASSET MANAGERS AND ASSET OWNERS

When the Task Force published its recommendations in 2017, it recognized that reporting by asset managers and asset owners is intended to satisfy the needs of clients, beneficiaries, regulators, and oversight bodies and often follows a format that is generally different from corporate financial reporting.³² For the purposes of asset managers and asset owners’ adoption of the recommendations, the Task Force focused on these organizations’

reporting to their clients and beneficiaries and recommended they use their existing channels of financial reporting, where relevant and feasible.

While the Task Force focused on reporting to clients and beneficiaries, it also recognized that many asset managers and asset owners have a broader range of stakeholders to which they report climate-related financial information.³³ In particular, asset managers that are public companies have two distinct audiences for their climate-related financial disclosures. The first audience is shareholders,

³² See the Task Force’s *2022 Status Report*, October 13, 2022, (p. 30) for more information on asset managers and asset owners, including the types of reporting channels they may use.

³³ TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, October 14, 2021 (pp. 37 and 41–42).

who need to understand enterprise-level risks and opportunities and how they are managed; and the second is clients, for which product-, investment strategy-, or client-specific disclosures are more relevant. For asset owners, the Task Force recognized that they sit at the top of the investment chain and their disclosure of climate-related issues — to the extent possible given existing data and methodology constraints — allows beneficiaries and other audiences to assess the asset owners' investment considerations and approaches to climate change.

As noted previously, asset managers and asset owners were excluded from the AI review

because the types of reports needed for analysis may not be publicly available. To gain insight on these organizations' current reporting of climate-related financial information to their clients and beneficiaries, the Task Force conducted a survey in early 2023. The Task Force also reviewed the largest asset managers and asset owners' publicly available reports to better understand their climate-related reporting practices to a broader group of stakeholders. This subsection describes the scope and approach used to collect information on asset managers and asset owners' reporting practices, summarizes the results from the survey and review of publicly available reports, and highlights key findings related to the results.

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Key Takeaways



Seventy percent (70%) of asset managers and 84% of asset owners indicated they currently report climate-related information to their clients and beneficiaries, respectively.



Asset managers and asset owners indicated the top challenge to climate-related reporting is insufficient information from investee companies. Asset managers highlighted information from public companies as most challenging (62%), while asset owners identified information on private investments (84%).



Over 80% of the largest asset managers and 50% of the largest asset owners reported in line with at least one of the 11 recommended disclosures. Based on a review of publicly available reports, nearly 70% of the asset managers and 36% of the asset owners disclosed in line with at least five of the recommended disclosures.



Over 40% of the largest asset managers and 30% of the largest asset owners described their targets on GHG emissions associated with their assets under management in public reports.



Just over 20% of the largest asset managers and 14% of the largest asset owners described the weighted average carbon intensity of their funds, products, or investment strategies in public reports.

Scope and Approach: Survey of Asset Managers and Asset Owners

In late February 2023, the Task Force issued a survey to better understand asset managers and asset owners' TCFD-aligned reporting practices to their clients and beneficiaries, respectively.³⁴ The Task Force believes it is important to highlight that the survey was distributed primarily to financial institutions that signed up for updates on the Task Force's website, which means most survey respondents were familiar with the Task Force's work. In fact, 93% of the survey respondents indicated they had implemented the TCFD recommendations or planned to in the future. Given the

composition of survey respondents, the Task Force recognizes the survey results should not be extrapolated to a broader population of asset managers and asset owners.

The Task Force distributed the survey to around 1,300 financial institutions, resulting in 150 responses from asset managers and asset owners.^{35,36} The survey asked asset managers and asset owners about their reporting to clients and beneficiaries, respectively, on information aligned with the Task Force's 11 recommended disclosures along with associated challenges. In addition, as part of the questions aligned with the three recommended disclosures related to metrics and targets,

³⁴ The Task Force recognizes that asset owners represent a wide range of organizations with different types of stakeholders. For ease of reference, we refer to these stakeholders as beneficiaries.

³⁵ In addition to distributing the survey to financial institutions that signed up for updates on the Task Force's website, the TCFD Secretariat also sent the survey to the Principles for Responsible Investment and requested the survey be shared with its signatories.

³⁶ In addition to asset managers and asset owners, 40 organizations began the survey and indicated that they were neither asset managers nor asset owners and, as a result, were not asked to complete the survey.

the survey incorporated specific metrics that are included in the Task Force’s supplemental guidance for asset managers and asset owners.³⁷ Other topics covered include the types of reports in which asset managers and asset owners report climate-related financial information, the amount of their assets under management (AUM) or assets in investment portfolios, and whether they are implementing the TCFD recommendations.

Box A7 provides an overview of the composition of the asset managers and asset owners that

responded to the survey. Asset managers represented 71% (106) of the responses, and asset owners represented 29% (44). The plurality (39%) was headquartered in Europe, 30% in North America, 23% in Asia Pacific, 5% in Latin America, and the remaining 3% in the Middle East and Africa.

In terms of the size of survey respondents overall, 77% held \$99 billion or less in AUM. When viewed by organization type, a different picture emerges, wherein 81% of asset manager respondents held \$99 billion

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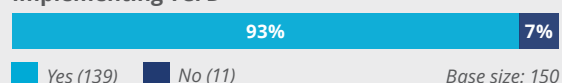
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Box A7
Composition of Asset Manager and Asset Owner Survey Respondents

Percent of Respondents¹

Implementing TCFD

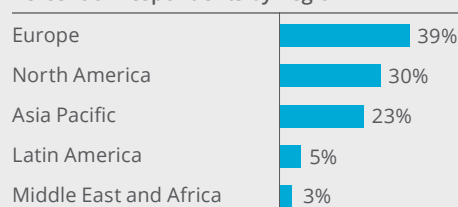


Organization Type



Geographic Distribution of Respondents

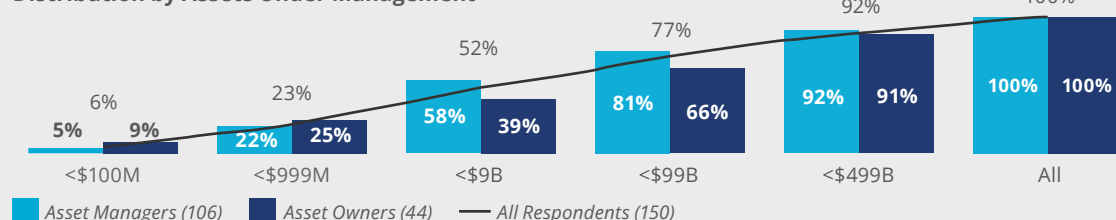
Percent of Respondents by Region



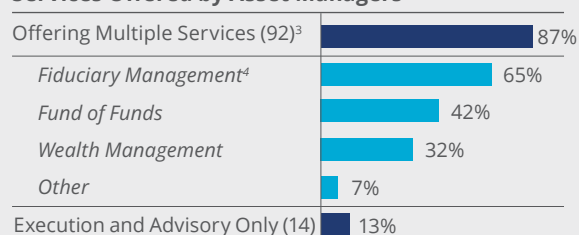
Top 5 Countries by Number of Respondents

United States of America	31
United Kingdom	24
Canada	11
Japan	9
Australia	9

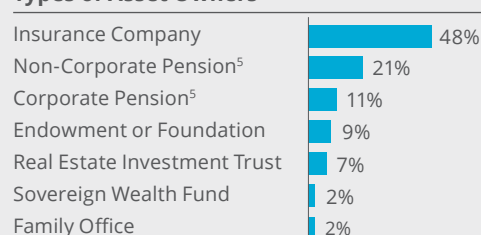
Distribution by Assets Under Management²



Services Offered by Asset Managers



Types of Asset Owners



1. The numbers in parentheses represent the number of respondents.
 2. The percentages in this chart are cumulative percentages.
 3. Respondents could select multiple types of services.
 4. Fiduciary management or other outsourced discretionary fund allocation.
 5. Pension fund, superannuation, retirement, or provident fund or plan.

³⁷ In addition to climate-related metrics, GHG emissions, and climate-related targets—which are part of the 11 recommended disclosures—the survey asked about four other specific metrics as follows: weighted average carbon intensity; the extent to which assets under management or in the investment portfolio are aligned with a well-below 2°C scenario; the extent to which products, funds, or investment strategies are aligned with a well-below 2°C scenario; and targets related to GHG emissions.

or less in AUM compared with 66% of asset owner respondents. Of the asset owner respondents, the vast majority were insurance companies (48%) and corporate or non-corporate pension funds (32%). For asset managers, the survey asked about the types of services they offer and more than one type of service could be selected, with the exception of “execution and advisory services only.” Of the 87% that offered multiple services, 65% indicated they offered fiduciary management or other outsourced discretionary fund allocation, 42% indicated fund of funds, manager of managers, or sub-advised products, 32% indicated wealth management, and the remaining 7% identified other types of services.

Scope and Approach: Review of Largest Asset Managers and Asset Owners

In addition to the survey — which focused on reporting to clients and beneficiaries, the Task Force also reviewed large asset managers and asset owners’ publicly available reports to better understand their reporting practices to a broader group of stakeholders. The review included the top 50 asset managers and top 50 asset owners globally based on their assets under management. The reports reviewed included the most recent financial filings, annual or integrated reports, and climate or sustainability reports published between March 2021 and March 2023. The purpose of the review was to

determine whether the organizations reported information aligned with each of the Task Force’s 11 recommended disclosures.³⁸

As shown in the top two charts in [Box A8](#), the top 50 asset managers represented 63% or \$70 trillion of the total AUM held by asset managers (\$112 trillion); and the top 50 asset owners held 35% or \$26 trillion of the total AUM held by corporate and non-corporate pensions, insurance companies, endowments, and reserve/sovereign wealth funds (\$75 trillion).³⁹ The bottom two charts show the geographic distribution of the survey respondents. The majority of the top 50 asset managers were headquartered in North America (82%), followed by Europe (12%), and then Asia Pacific (6%). There was no representation from Latin America or the Middle East and Africa. Among asset owners, a plurality were headquartered in North America (40%), followed by Asia Pacific (26%), Europe (18%), and the Middle East and Africa (16%). Similar to asset managers, there was no representation from Latin America.

Summary of TCFD-Aligned Reporting

The Task Force’s survey asked asset managers and asset owners whether they currently report, plan to report, or do not plan to report climate-related information to their clients and beneficiaries, respectively. As shown in the top charts in [Box A9](#) (p. 30), the majority of

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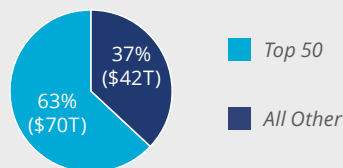
Appendices

Box A8

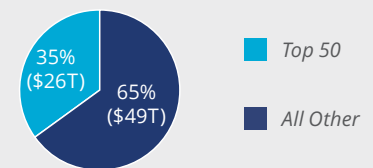
Composition of Top 50 Asset Managers and Top 50 Asset Owners

Percent of Total Global Assets Under Management of Top 50

Asset Managers

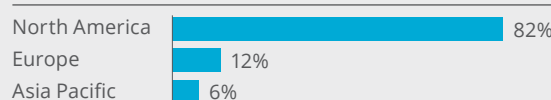


Asset Owners



Distribution of Top 50 by Region

Asset Managers



Asset Owners



³⁸ This approach was not designed to assess the quality or comprehensiveness of the organizations’ climate-related reporting, but rather to provide an indication of the alignment of information in their publicly available reports with the Task Force’s recommendations.

³⁹ All figures are for 2021. The top 50 asset managers’ AUM was sourced from Pensions & Investments, “The Largest Money Managers,” December 31, 2021. The top 50 asset owners’ AUM was sourced from the Thinking Ahead Institute, *The Asset Owner 100*, November 30, 2022. Asset managers’ total AUM was sourced from Boston Consulting Group, “Global Asset Management 2022: From Tailwinds to Turbulence,” May 25, 2022. Asset managers’ AUM includes professionally managed assets, which can include asset owners’ captive AUM when it is delegated to asset managers. Asset owners’ total AUM was sourced from the Preqin database.

respondents indicated they currently report to their clients or beneficiaries — 70% of asset managers and 84% of asset owners, and most of the remainder indicated they plan to report. Respondents that indicated they do not plan to report climate-related financial information to their clients or beneficiaries — 6% of asset managers (6) and 5% of asset owners (2) — were not asked to complete questions about their reporting practices on information aligned with the Task Force’s 11 recommended disclosures. The charts in the middle of [Box A9](#) show the reasons why asset managers and asset owners report or plan to report climate-related information to their clients and beneficiaries, respectively. The most often cited reason by

asset managers for reporting was that climate-related risks are material, followed by requests from clients. For asset owners, the most often cited reason was tied — at 57% — between climate-related risks are material and regulators are or will be requiring such reporting. When reviewing both asset manager and asset owner respondents that indicated one of the reasons for reporting is because of regulatory requirements, the Task Force found 50% were located in Europe, 31% in North America, 18% in Asia Pacific, and the remaining 1% in the Middle East and Africa.

The charts at the bottom of [Box A9](#) show two common reporting channels asset managers

A.
State of Climate-Related Financial Disclosures

B.
Financial Statement Considerations

C.
Case Studies on Scope 3 GHG Emissions

D.
TCFD-Aligned Requirements and Related Initiatives

E.
Types of Financial Impact and Associated Drivers

F.
Insights Gained and View on Future Work

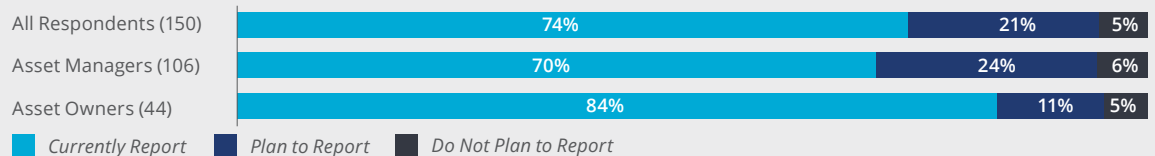
Appendices

Box A9

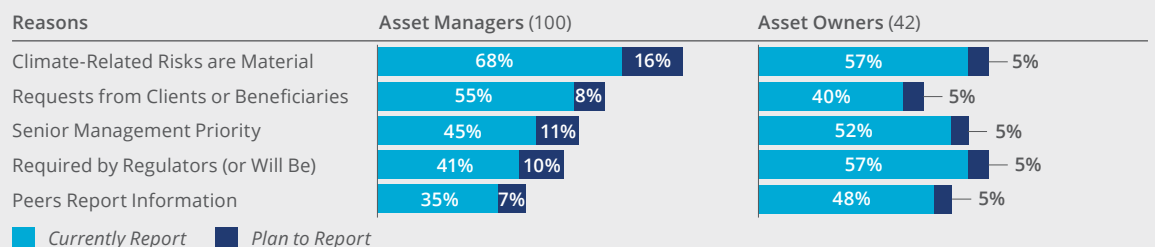
Reporting of Climate-Related Information to Clients and Beneficiaries

Percent of Respondents¹

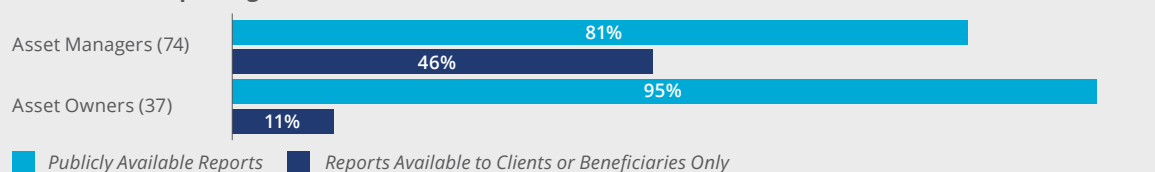
Status of Reporting



Reasons for Reporting or Planning to Report²



Channels for Reporting to Clients and Beneficiaries³



1. The numbers in parentheses represent the number of respondents.
 2. Respondents could select multiple reasons.
 3. Only respondents that indicated they currently report to their clients or beneficiaries received this question.

and asset owners use to report climate-related information to their clients and beneficiaries, respectively — reports that are publicly available and those that are made available to clients or beneficiaries only. Only respondents indicating they currently report climate-related information to their stakeholders were asked about the reporting channels they use. The Task Force was interested in understanding the extent to which asset managers and asset owners use publicly available reports

to communicate climate-related financial information to their stakeholders. The majority of both asset managers (81%) and asset owners (95%) use publicly available reports to communicate this information. In addition, nearly half of the asset managers (46%) indicated they communicate to their clients through reports that are available only to the clients — the vast majority of which are tailored to the clients’ holdings.

TCFD-Aligned Reporting by Asset Managers

Overall, nearly two thirds of asset manager respondents indicated they currently report information in line with at least five of the Task Force’s 11 recommended disclosures, and 15% indicated they report on all 11. [Figure A37](#) provides the percent of asset manager respondents indicating they currently report, plan to report, do not plan to report, or are undecided about reporting to their clients for each of the 11 recommended disclosures.⁴⁰ Of those currently reporting, the highest level of reporting was a tie between descriptions of the material climate-related issues identified (*Strategy a*) and climate-related metrics (*Metrics and Targets a*) — both at 65%. These were followed by reporting on *Governance b*) and *Risk Management a*), both at 61%, and *Governance a*) at 60%. The lowest level of reporting — at 26% — was on the resilience of strategies under different climate-related scenarios (*Strategy c*); however, 32% of asset managers indicated they were planning to report on this in the future.⁴¹

The survey also asked respondents about seven specific climate-related metrics and targets, as shown in [Figure A38](#) (p. 32). The Task Force was interested in the level of reporting on certain metrics included in its supplemental guidance, including GHG emissions associated with assets under management and the weighted average carbon intensity for each product or investment strategy.⁴² [Figure A38](#) (p. 32) shows the percent of asset managers that indicated they currently report on each of the seven metrics to their clients. Just over half of the asset managers (52%) indicated they report on the GHG emissions associated with their AUM. This was the most often reported metric, followed by the weighted average carbon intensity for each product or investment strategy at 45%. The least reported metric — at 21% — was the extent to which assets under management align with a well below 2°C scenario.

In addition to asking respondents about the types of climate-related information they report to their clients, the survey asked

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B. Financial Statement Considerations

C. Case Studies on Scope 3 GHG Emissions

D. TCFD-Aligned Requirements and Related Initiatives

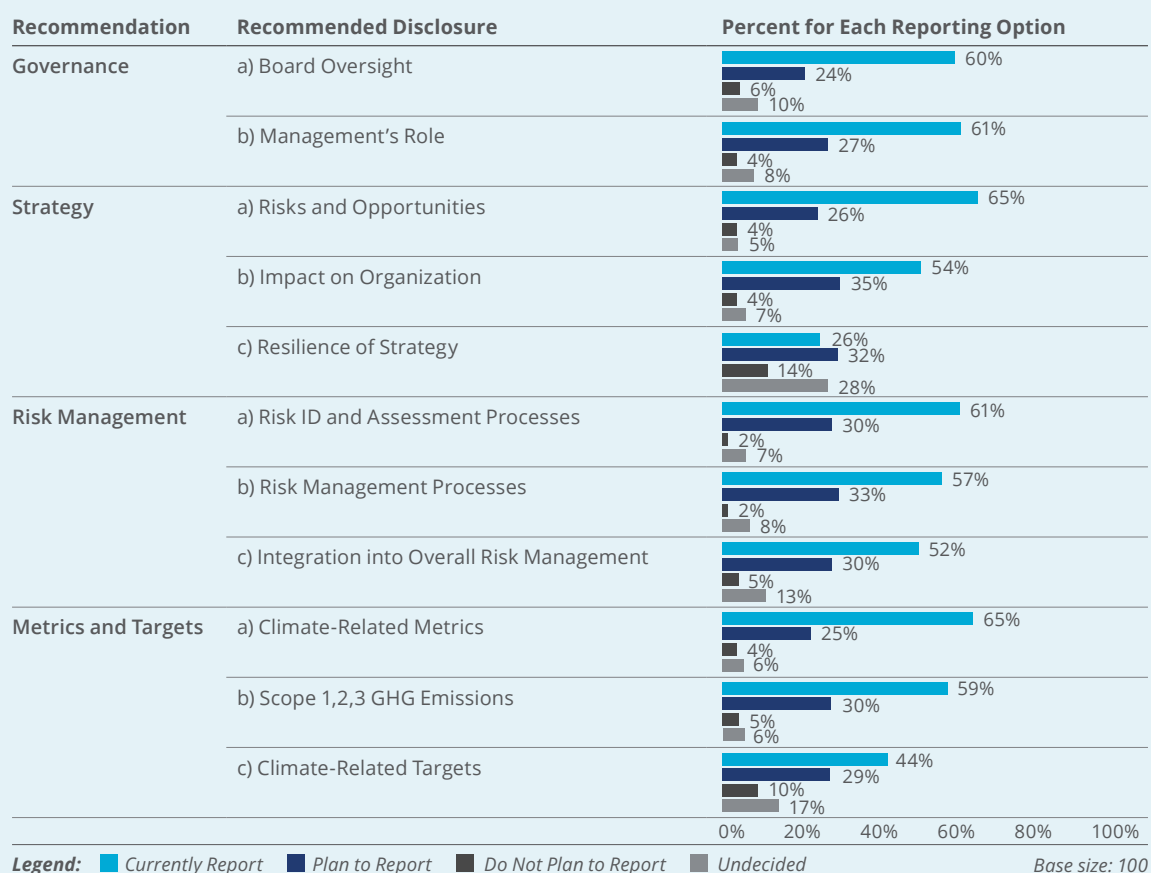
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Figure A37

Asset Managers: Status of TCFD-Aligned Reporting

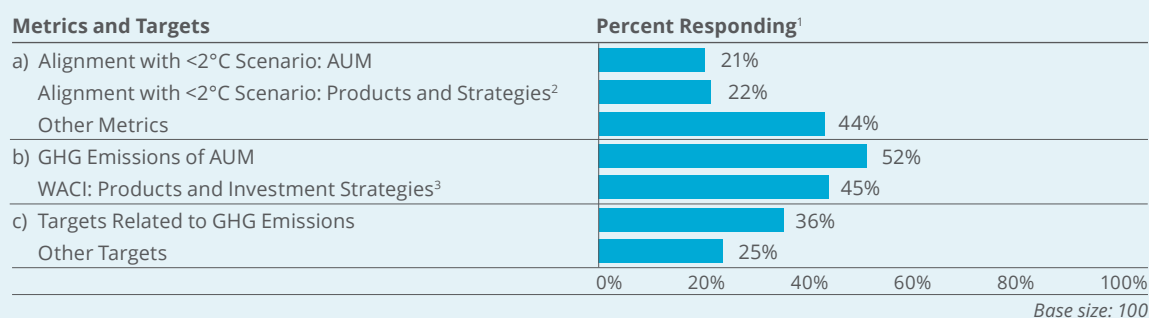


⁴⁰ See [Table A1](#) (p. 4) for descriptions of each of the Task Force’s 11 recommended disclosures.

⁴¹ Nearly 70% of those that indicated they plan to report on *Strategy c*) currently report on at least one of the other recommended disclosures.

⁴² TCFD, [Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures](#), October 14, 2021 (pp. 48–49).

Figure A38
Asset Managers: Currently Report on Select Metrics and Targets



1. The percentages for Metrics and Targets a), b), and c) in [Figure A37](#) (p. 31) are higher than the percentages for specific metrics associated with Metrics and Targets a), b), and c) in this figure because respondents were identified as currently reporting if they indicated reporting at least one of the metrics listed.

2. Alignment with <2°C Scenario: Products and Investment Strategies.

3. Weighted Average Carbon Intensity (WACI).

A.
State of Climate-Related Financial Disclosures

B.
 Financial Statement Considerations

C.
 Case Studies on Scope 3 GHG Emissions

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about challenges in reporting information aligned with each of the Task Force’s four recommendations — Governance, Strategy, Risk Management, and Metrics and Targets. [Figure A39](#) list the challenges identified along with the overall results as well as by recommendation. Consistent with a similar survey conducted by the Task Force last year, insufficient information from investee companies and a lack of methodologies were the two most frequently cited challenges.⁴³ Over 70% of asset manager respondents indicated insufficient information is a challenge for their reporting in general and especially for reporting on metrics and targets, and 53% identified a lack of methodologies.

In anticipation that insufficient information would be identified as a significant challenge again this year, the survey asked respondents to indicate whether the issue of insufficient information related to public companies, private investments, sources other than these two, or some combination of the three options. Of those identifying this challenge, 62% indicated public companies, 49% indicated private investments, and 45% indicated sources other than these two.

The Task Force also reviewed asset managers’ reporting on information aligned with its 11 recommended disclosures based on their size using AUM. [Figure A40](#) (p. 33) shows the percent of asset managers in each size category

Figure A39
Asset Managers: Challenges Reporting Climate-Related Information

Percent of Respondents

Challenge	Governance	Strategy	Risk Mgmt.	Metrics and Targets	Overall
Insufficient Information from Companies	22%	31%	42%	63%	71%
Lack of Methodologies	14%	27%	32%	40%	53%
Lack of Resources	21%	23%	26%	25%	35%
Lack of Expertise and/or Capabilities	13%	13%	15%	16%	25%
Concern about Negative Scrutiny	12%	8%	6%	14%	23%
Lack of Board / Senior Management Support	3%	3%	4%	3%	6%

Base size: 100

Legend: Low to high percentage of respondents

⁴³ TCFD, [2022 Status Report](#), October 13, 2022 (p. 38).

indicating they currently report on each recommended disclosure. The largest asset managers — those with more than \$100 billion in AUM — have the highest percent of reporting on each of the 11 recommended disclosures. This is generally consistent with the AI review results for public companies in which a higher percentage of large companies disclosed TCFD-aligned information than smaller companies. An interesting difference between the AI review results and these survey results is that smaller asset managers do not necessarily report less

than larger ones. For example, asset managers with between \$1 billion and \$9 billion in AUM have higher levels of reporting for eight of 11 recommended disclosures than asset managers with between \$10 billion and \$99 billion in AUM. Notably, only 8% of asset managers with between \$10 billion and \$99 billion in AUM report on *Strategy c)* compared with 27% of asset managers with between \$1 billion and \$9 billion in AUM and 24% for those with less than \$1 billion in AUM.

Figure A40
Asset Managers: Currently Report TCFD-Aligned Information by Size (AUM)

Percent of Respondents¹

Recommendation	Recommended Disclosure	>\$100B	\$10–99B	\$1–9B	<\$1B
		(18)	(24)	(37)	(21)
Governance	a) Board Oversight	72%	58%	57%	57%
	b) Management’s Role	78%	58%	57%	57%
Strategy	a) Risk and Opportunities	83%	54%	65%	62%
	b) Impact on Organization	78%	46%	51%	48%
	c) Resilience of Strategy	50%	8%	27%	24%
Risk Management	a) Risk ID and Assessment Proc.	72%	54%	68%	48%
	b) Risk Management Processes	72%	50%	57%	52%
	c) Integration into Risk Mgmt.	72%	42%	51%	48%
Metrics and Targets	a) Climate-Related Metrics	78%	63%	62%	62%
	b) Scope 1,2,3 GHG Emissions	78%	58%	59%	43%
	c) Climate-Related Targets	50%	38%	46%	43%

1. The numbers in parentheses represent the number of respondents.

Legend: Low to high percentage of respondents

- A. State of Climate-Related Financial Disclosures
- B. Financial Statement Considerations
- C. Case Studies on Scope 3 GHG Emissions
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Figure A41 provides a breakdown of the types of reports in which asset managers indicated they currently report, plan to report, do not plan to report, or are undecided about reporting climate-related information to their clients. Most asset managers currently report in sustainability reports or reports available only to their clients — at 60% and 56%, respectively. Over 35% indicated they report through climate-

specific reports, while another 26% indicated they are planning to report to clients this way in the future. Very few — 8% — indicated they report to clients through their financial filings, and only 5% indicated they plan to report this way in the future. Asset manager respondents, on average, indicated reporting to their clients through two types of reports.

Figure A41
Asset Managers: Location of Reporting

Percent of Respondents

Reporting Type ¹	Reporting Status			
	Currently Report	Plan to Report	Do Not Plan to Report	Undecided
Financial Filing	8%	5%	8%	10%
Annual Report or Integrated Report	32%	14%	13%	11%
Sustainability Report	60%	21%	2%	9%
Climate-Specific Report	37%	26%	12%	15%
Client Report	56%	20%	3%	12%
Other	8%	0%	0%	0%

Base size: 100

1. Respondents could select multiple report types.

Legend: Low to high percentage of respondents by reporting status

As mentioned previously, the Task Force also reviewed the largest asset managers and asset owners' publicly available reports to better understand their reporting practices to a broader group of stakeholders. The Task Force's findings from the review of the top 50

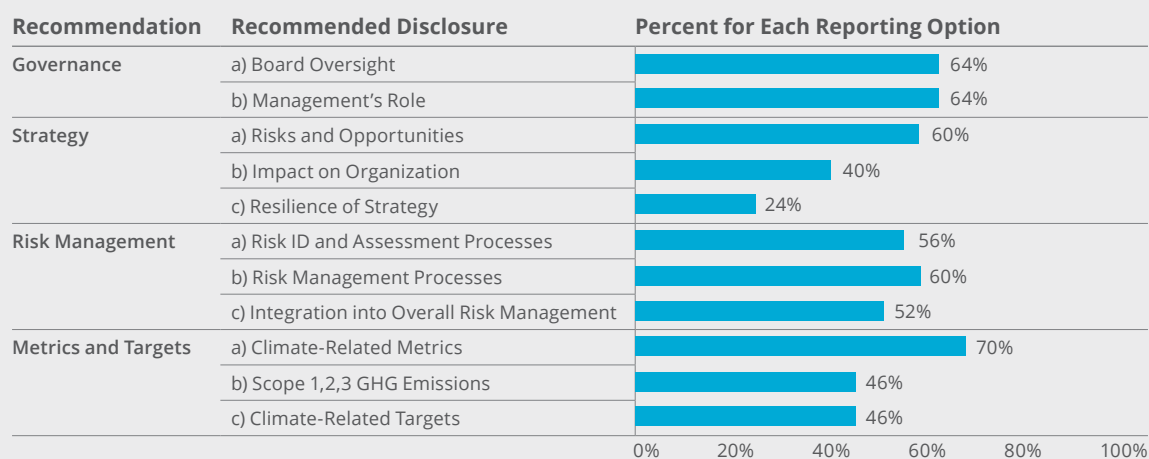
asset managers by AUM are described in [Box A10](#). Notably, 68% of the top 50 asset managers reported climate-related information in line with at least five of the 11 recommended disclosures — which is generally consistent with the survey findings, but only 2% reported in line with all 11.

Box A10

Top 50 Asset Managers: TCFD-Aligned Reporting¹

Reporting Aligned with the 11 Recommended Disclosures

The highest level of reporting for the top 50 asset managers was for *Metrics and Targets a)* at 70%, followed by a tie between *Governance a)* and *Governance b)* at 64%, as shown in the figure below. The lowest level of reporting was on the resilience of asset managers' strategies under different climate-related scenarios — *Strategy c)* — at 24%, which is consistent with results from the survey respondents and previous years' analyses.



Reporting on Specific Metrics and Targets

For climate-related metrics and targets, the Task Force was most interested in those associated with asset managers' AUM versus other types (referred to as operational).² As shown on the right, the highest level of reporting on climate-related metrics was on WACI of AUM at 30%, followed by WACI on products and investment strategies at 22%. For climate-related targets, 56% of asset managers reported on their operational targets vs. 44% on their GHG emission targets for AUM.

Metrics and Targets

	Percent
<2°C Alignment: AUM	8%
<2°C Alignment: Products and Investment Strategies	16%
GHG Emissions of AUM	20%
WACI: AUM	30%
WACI: Products and Investment Strategies	22%
Targets: GHG Emissions of AUM	44%
Targets: Operational	56%

Directional Comparison with Survey Results

Recognizing these results are not directly comparable to the survey results discussed above since survey respondents varied in size and were subject to self-selection bias, the Task Force instead compared the most and least disclosed recommended disclosures from the two groups. The groups were aligned on the least reported recommended disclosure — *Strategy c)*. They were also aligned on the most reported recommended disclosure — *Metrics and Targets a)*; however, the survey results showed a tie between *Metrics and Targets a)* and *Strategy a)* for the most reported recommended disclosure.

1. The base size for the chart and table in this figure is 50.

2. Operational targets include those related to the organization's own carbon footprint, including but not limited to carbon neutrality, energy efficiency, etc.

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TCFD-Aligned Reporting by Asset Owners

The Task Force applied the same approach to asset owners' survey responses as it did to asset managers' responses. As such, the figures included below generally follow the same structure and order as those on previous pages.⁴⁴ Overall, nearly three quarters of asset owner respondents indicated they currently report information in line with at least five of the Task Force's 11 recommended disclosures, and 40% indicated they report on all 11. Notably, the percent of asset owners currently reporting on ten of the 11 recommended disclosures was 67% or higher. Figure A42 provides the percent of asset owners indicating they currently report, plan to report, do not plan to report, or are undecided about reporting to their beneficiaries for each of the 11 recommended disclosures. Of those currently reporting, the highest level of reporting — at 83% — was on *Governance b*, which was followed by reporting on *Governance*

a) at 79%. A similarly high level of reporting — at 76% — was on *Strategy a*). The lowest level of reporting was on *Strategy c*) — the resilience of strategies under different climate-related scenarios, but 60% of respondents indicated they currently report this information and another 24% indicated they plan to. In addition, very few asset owners indicated they were not planning to report on the recommended disclosures, with the exception of *Metrics and Targets b*) — 12% indicated they were not planning to report this information in the future.

The survey asked respondents about seven specific climate-related metrics and targets, as shown in Figure A43 (p. 36). The Task Force wanted to understand the level of reporting on certain metrics included in its supplemental guidance, including GHG emissions associated with assets under management and the weighted average carbon intensity for each fund or investment strategy.⁴⁵ Figure A43 (p. 36) shows

A. State of Climate-Related Financial Disclosures

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D. TCFD-Aligned Requirements and Related Initiatives

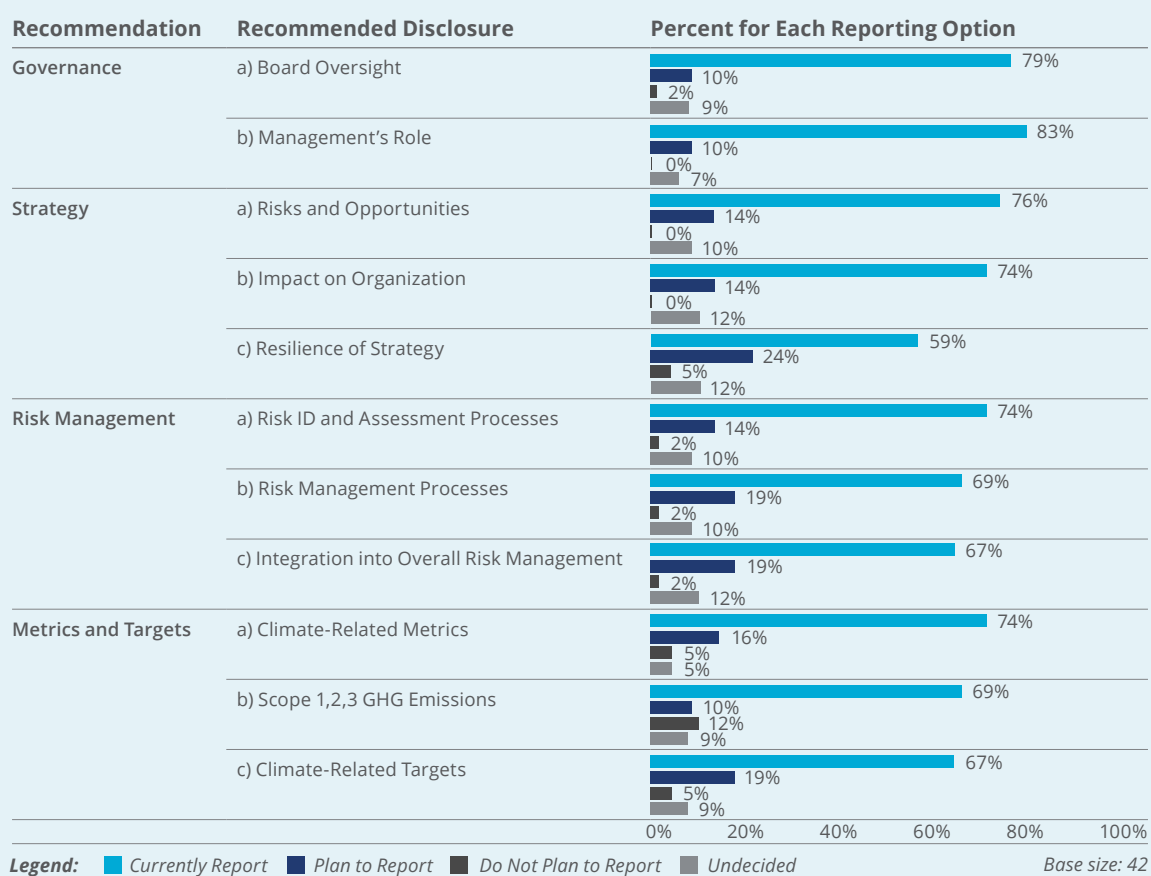
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Figure A42

Asset Owners: Status of TCFD-Aligned Reporting



⁴⁴ The one exception is that there is no figure on asset owners' reporting on information aligned with the 11 recommended disclosures based on their size as there is for asset managers (see Figure A40, p. 33) given the lower number of respondents.

⁴⁵ TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, October 14, 2021 (pp. 41–42).

the percent of asset owners that indicated they currently report on each of the seven metrics to their beneficiaries. Over 60% of the asset owners indicated they report on the GHG emissions associated with their assets under management (under *Metrics and Targets b*). This was the most often reported metric, followed by climate-related targets related to GHG emissions.

In addition to asking respondents about the types of climate-related information they report to their beneficiaries, the survey asked about challenges they face in reporting information aligned with each of the Task Force’s four recommendations — Governance, Strategy, Risk Management, and Metrics and Targets. [Figure A44](#) lists the challenges identified along with the overall results as well as by recommendation.

Consistent with a similar survey conducted by the Task Force last year, a lack of methodologies and insufficient information were the two most frequently cited challenges by asset owners. Over 75% of asset owner respondents indicated insufficient information from investee companies as a challenge for their reporting in general and especially for reporting on metrics and targets.

In anticipation that insufficient information would be identified as a significant challenge again this year, the survey asked respondents to indicate whether the issue of insufficient information related to public companies, private investments, sources other than these two, or some combination of the three options. Of those identifying this challenge, 78% indicated

A.
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B.
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C.
Case Studies on Scope 3 GHG Emissions

D.
TCFD-Aligned Requirements and Related Initiatives

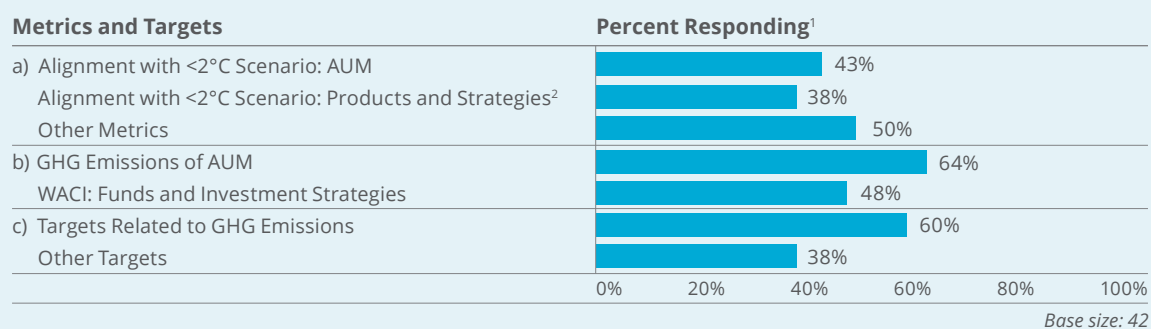
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Figure A43

Asset Owners: Currently Report on Select Metrics and Targets



1. The percentages for Metrics and Targets a), b), and c) in [Figure A42](#) (p. 35), are higher than the percentages for specific metrics associated with Metrics and Targets a), b), and c) in this figure because respondents were identified as currently reporting if they indicated reporting at least one of the metrics listed.

2. Alignment with <2°C Scenario: Funds and Investment Strategies.

Figure A44

Asset Owners: Challenges Reporting Climate-Related Information

Percent of Respondents

Challenge	Governance	Strategy	Risk Mgmt.	Metrics and Targets	Overall
Insufficient Information from Companies	21%	33%	36%	71%	76%
Lack of Methodologies	12%	36%	33%	45%	57%
Lack of Resources	19%	19%	29%	31%	45%
Lack of Expertise and/or Capabilities	21%	21%	24%	26%	38%
Concern about Negative Scrutiny	14%	19%	19%	31%	38%
Lack of Board / Senior Management Support	14%	14%	7%	12%	19%

Base size: 42

Legend: Low to high percentage of respondents

public companies, 84% indicated private investments, and 59% indicated sources other than these two. A lack of methodologies was also identified as a significant challenge by asset owner respondents, especially for metrics and targets (45%). The least identified challenge for reporting in general was a lack of board or senior management support, which was identified by 19% of respondents.

Figure A45 provides a breakdown of the types of reports in which respondents indicated they currently report, plan to report, do

not plan to report, or are undecided about reporting climate-related information to their beneficiaries. Most asset owners indicated they currently report to their beneficiaries in sustainability reports (64%), climate-specific reports (62%), or annual or integrated reports (60%). In addition, 19% indicated they currently report climate-related information in their financial filings. Asset owner respondents, on average, indicated reporting to their beneficiaries through at least two different types of reports.

Figure A45
Asset Owners: Location of Reporting

Percent of Respondents

Reporting Type ¹	Reporting Status			
	Currently Report	Plan to Report	Do Not Plan to Report	Undecided
Financial Filing	19%	7%	14%	2%
Annual Report or Integrated Report	60%	7%	12%	5%
Sustainability Report	64%	14%	10%	2%
Climate-Specific Report	62%	12%	5%	5%
Beneficiaries Report	38%	7%	17%	10%
Other	10%	0%	0%	0%

Base size: 42

1. Respondents could select multiple report types.

Legend:

Low to high percentage of respondents by reporting status

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As mentioned previously, the Task Force also reviewed the largest asset managers and asset owners' publicly available reports to better understand their reporting practices to a broader group of stakeholders. The Task Force's findings from the review of the top 50 asset owners by AUM — which consisted primarily of non-corporate pension funds, insurance companies, and sovereign wealth funds — are

described in [Box A11](#). Overall, 36% of the top 50 asset managers reported climate-related information in line with at least five of the 11 recommended disclosures, and 8% reported in line with all 11. Notably, the Task Force found sovereign wealth funds had the lowest levels of reporting when compared with non-corporate pension funds and insurance companies.

Box A11

Top 50 Asset Owners: TCFD-Aligned Reporting¹

Reporting Aligned with the 11 Recommended Disclosures

The highest level of reporting for the top 50 asset owners was on *Metrics and Targets a)* at 44%, followed by *Governance a)*, *Governance b)*, and *Strategy a)* at 36%, as shown below. The lowest levels of reporting were for *Strategy c)* and *Strategy b)* at 18% and 20%, respectively.

Recommendation	Recommended Disclosure	Percent of Companies Reporting
Governance	a) Board Oversight	36%
	b) Management's Role	36%
Strategy	a) Risks and Opportunities	36%
	b) Impact on Organization	20%
	c) Resilience of Strategy	18%
Risk Management	a) Risk ID and Assessment Processes	24%
	b) Risk Management Processes	34%
	c) Integration into Overall Risk Management	28%
Metrics and Targets	a) Climate-Related Metrics	44%
	b) Scope 1,2,3 GHG Emissions	30%
	c) Climate-Related Targets	30%

Reporting on Specific Metrics and Targets

For climate-related metrics and targets, the Task Force was most interested in those associated with asset owners' AUM versus other types (referred to as operational).² As shown on the right, the highest level of reporting was on targets for GHG emissions of AUM. Notably, this was more commonly reported than operational targets. Reporting on WACI for AUM was the lowest with only 4% of the top 50 reporting on this.

Metrics and Targets	Percent
<2°C Alignment: AUM	12%
<2°C Alignment: Funds and Investment Strategies	14%
GHG Emissions of AUM	14%
WACI: AUM	4%
WACI: Funds and Investment Strategies	14%
Targets: GHG Emissions of AUM	30%
Targets: Operational	22%

Directional Comparison with Survey Results

Recognizing these results are not directly comparable to the survey results discussed above since survey respondents varied in size and were subject to self-selection bias, the Task Force instead compared the most and least disclosed recommended disclosures from the two groups. The groups were aligned on the least reported recommended disclosure — *Strategy c)*. The groups were not aligned on the most reported recommended disclosure, which survey respondents identified as *Governance b)* whereas the most reported item for the top 50 was *Metrics and Targets a)*.

1. The base size for the chart and table in this figure is 50.

2. Operational targets include those related to the organization's own carbon footprint, including but not limited to carbon neutrality, energy efficiency, etc.

Case Studies

This subsection includes two case studies — one from a diversified financial services company that is both an asset owner and asset manager and the other from an asset manager. In the case studies, the organizations describe

their respective experiences in implementing the Task Force's recommendations, which are intended to provide practical insights on and considerations for other asset managers and asset owners implementing the recommendations.

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Case Study by a South African Asset Owner and Asset Manager

Sanlam is a South African diversified financial services company that is both an asset owner and an asset manager. We have a significant commercial presence across the African continent and global operations in India and Malaysia. We offer a wide range of services to both retail and institutional clients, including insurance, asset and wealth management, financial planning, retirement, credit, and healthcare solutions. We develop and deliver these services through five business clusters, namely Sanlam Investment Group, Sanlam Life and Savings, Sanlam Emerging Markets, Sanlam Fintech, and Santam. We have been a signatory to CDP since 2007 and were the first South African private-sector asset owner to become a signatory to the UN Principles for Responsible Investing (UN PRI).

We recognize that climate change amplifies existing challenges related to health, safety, food security, and socioeconomic development. This is particularly the case in Africa, where we conduct a significant portion of our business. Our clients are already experiencing the impacts of climate change, and we are committed to becoming an African champion supporting climate action.

Implementing the recommendations of the TCFD is, in our view, not only about disclosing the potential financial impacts for Sanlam but also a key component of furthering our actions on climate change. This case study shows our journey and the challenges we faced as we first disclosed in line with the TCFD recommendations for our group-wide business, including for our investment portfolios.

Our TCFD Journey

Sanlam Group began implementing the TCFD recommendations in 2021. This was followed by the publication of our Climate Change Resilience Report in 2022, which disclosed climate-related risks and opportunities in line with the TCFD recommendations.⁴⁶ In this inaugural report, we provided a comprehensive view of our progress in aligning our internal processes to enable TCFD-aligned disclosures. The report also provided a view of our key priorities for

advancing our TCFD-aligned reporting in our integrated annual reporting. Our decision to pursue TCFD-aligned disclosures is based on a joint effort by the sustainability and risks teams combined with a need to quantify the financial impacts of climate-related risks and opportunities, including those in our investment portfolios.

We began implementing the TCFD recommendations by analyzing our global financial services peers' reporting practices. This allowed us to gain insights into the best practices of integrating the TCFD recommendations in our industry and the notable gaps in our processes. We also used our group-wide enterprise risk management framework — Own Risk and Solvency Assessment (ORSA) — to quantify the risks our industry faces.

We then commissioned a diagnostic analysis of our readiness for TCFD-aligned reporting, primarily consisting of interviews with internal stakeholders on current practices. The diagnostic report helped guide our efforts and set attainable integration and disclosure goals. The analysis emphasized the importance of raising awareness among board members and executives about climate-related risks and opportunities and highlighted the need to integrate climate-related risk considerations into our business strategy. The analysis further confirmed the importance of incorporating climate-related risk and opportunity assessments into our ORSA processes.

We developed a coordinated plan of action in the form of a five-year roadmap to align with the TCFD recommendations and to drive climate action, prioritizing areas where we estimated high levels of potential financial impacts. The first phase of our roadmap was to initiate dialogue on climate change with both our internal business clusters and our external stakeholders. The subsequent phase — which we are currently in — consists of setting up policies and procedures to monitor, quantify, and manage risks. The final stage of our roadmap — which starts in 2024 — will include the ongoing monitoring, reporting, and management of climate-related risks and opportunities.

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⁴⁶ Sanlam, *Climate Change Resilience Report 2021*, August 2022.

Disclosures

For our inaugural report, we prioritized disclosures on climate-related information that was readily available. For example, we disclosed the board’s role in the governance of climate-related risks and opportunities (see [Figure A46](#)), detailing how two committees advise the board on identifying and managing climate-related risks and opportunities.

We also disclosed our practices on risk management in the same report — as we had already integrated our processes for identifying, assessing, and managing climate-related risks and opportunities across the business through our ORSA process (see [Figure A47](#), p. 41). We also detailed how climate-related risks impacting our strategy were considered in a top-down manner while those impacting our day-to-day operations were considered in a bottom-up manner.

Overcoming Challenges

We have encountered and overcome various challenges in our reporting of climate-related information. This includes complex stakeholder management given our multiple business clusters and large number of stakeholders. To meet the need to bring everyone to the table, we established open lines of dialogue and actively engaged with investors, regulators, and our internal teams. We structured the conversations based on the TCFD framework, which provided a common language for

discussing the importance of climate-related risks and opportunities. This informed dialogue helped us understand stakeholders’ expectations, which we incorporated into our reporting process. This collective engagement has been instrumental in generating the buy-in necessary to maintain momentum with our TCFD-aligned reporting.

Another challenge was our stakeholders’ varying levels of maturity in understanding climate-related information. To ensure that our employees, board, and executives alike are well-equipped to address climate-related risks relevant to our business clusters, we have developed resources and provided training on climate-related risk management. For example, we conducted a webinar on climate-related risk for the board, strengthening board members’ abilities to effectively respond to climate-related challenges and opportunities.

We also face a challenge regarding the lack of available climate-related data and information, specifically from our investee companies. For example, we are actively working through our Sanlam Investments business to understand the underlying carbon footprint of our portfolios. While obtaining comprehensive self-reported emissions data from our investee companies is challenging, we are leveraging third-party climate data providers that enable the measurement and analysis of our portfolios’ carbon footprints.

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Figure A46

Our Board’s Role in Governance of Climate-Related Risks and Opportunities

The following two Board committees provide oversight and support to the Board and advise the Board regarding environmental (and climate-related) aspects.

- The Risk and Compliance committee advises and assists the Board in overseeing risk governance by setting the direction for how risk management should be approached and addressed at Sanlam. This includes (among others) the identification, mitigation and management of climate-related risks that the Group might be exposed to. The committee meets quarterly and provides feedback at every Board meeting.
- The Social, Ethics and Sustainability (SES) committee monitors and advises the Board on all ESG matters, including climate-related risks and opportunities.

The Chairs of both committees are independent non-executive directors and have oversight roles in terms of climate change. Depending on the nature of the climate-related matter submitted to either committee, it will note, provide approval, monitor or advise on the matter and relevant related issues that might impact the Group and its material stakeholders. When necessary, these committees elevate climate-related matters to the Board for its consideration and/or approval.

Sustainability matters (non-financial and ESG) are considered from a risk, governance, compliance and opportunity perspective and are channelled into Sanlam’s enterprise risk management process. Read more about this process, including management’s role in governing climate-related risk, from page 15.

Sanlam, *Climate Change Resilience Report 2021*, p. 8
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Figure A47
Our Risk Management Process

SANLAM'S ORSA PROCESS

The Own Risk and Solvency Assessment (ORSA) is an overarching process that brings together the results from various processes embedded at the Sanlam Group and cluster level as part of the Group Enterprise Risk Management (ERM) framework. The risk in the ORSA take account of Sanlam's risk profile, approved risk appetite and business strategy.

The Group risk function manages the ORSA process and drafts a quarterly Group ORSA Update report, covering assessments and analysis of the Group's top-down strategic risks, bottom-up operational risks, risk profile, approved risk appetite, stress and scenario testing, and projections over the business planning horizon. After management review, the report is tabled at the quarterly Sanlam Risk and Compliance committee and Board meetings.

The Group ORSA process is well established and supported by parallel ORSA processes at cluster level. All clusters report on assessments of cluster's strategic risks, top bottom-up risks, risk profile, risk appetite, emerging risks, issues, solvency, stress, and scenario testing with forward-looking projections.

Sanlam's Group-wide enterprise risk management (ERM) process includes the identification and management of climate change risks at different organisational levels:

- Strategic climate change risks are considered using a top-down approach.
- Operational climate change risks (related to Sanlam's day-to-day operations) are considered using a bottom-up approach.

Each cluster's finance and risk committee/forum maintain risk registers and reports. Quarterly Business Review (QBR) cluster forums provide financial, strategic, risk and operational feedback to the Sanlam Life and Limited Boards and feedback on sustainability-related matters, including climate issues. Significant and emerging climate change risks are thus escalated to Group level via both structures.

The Group has a specific focus on emerging risks that form part of the top-down strategic risk assessment process. Internal and external scanning of emerging risks is performed quarterly as part of this process. Internal scanning includes input from key subject matter experts within the Group regarding emerging risks, whereas the external scanning process focuses on external industry and media risk reports.

As an insurance provider, Sanlam has a specific focus on emerging risks such as the ones posed by climate change. These risks are typically outside of the usual frame of reference and are often unknown.

The Group ERM Forum initiated the process for assessing the potential size and scope of identified climate-related risks and opportunities. Risks are categorised into either general, financial or business-specific risks. A sub-category of risks is then determined, with feedback from key business owners, stakeholders and regulation into primary risk categories such as strategic, market, operational, reputational or credit risk.

Sustainability risks are filtered into this process and prioritised based on materiality and impact on the business. Sanlam's risk appetite statement defines the substantive financial or strategic impact. The board sets the risk appetite statement and is the key mechanism for setting limits for the identified risk categories.

Sanlam, *Climate Change Resilience Report 2021*, p. 15
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Lessons Learned

We have learned that assessing the current capabilities on climate-related information is an important step toward reporting in line with the TCFD recommendations. By thoroughly reviewing our existing processes and identifying gaps, we developed a targeted and effective strategy for TCFD-aligned reporting that has also helped inform our plan for climate action. The assessment further serves as the foundation for ensuring that our internal processes generate relevant information and that our reporting efforts are meaningful and accurate.

Another important lesson we learned through implementing the TCFD recommendations is that estimating the potential financial impacts of climate-related risks and opportunities for different business clusters and stakeholders is incredibly important. This exercise helps us prioritize our efforts, allocate resources effectively, and develop targeted strategies to mitigate climate-related risks. Additionally, it enhances our ability to communicate the financial implications of climate change on our business to our stakeholders, thereby facilitating informed decision-making and fostering transparency.

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In addition, we have learned the importance of committing to multi-year roadmaps for continuous improvement. Climate-related disclosures and risk management are ongoing processes that require regular monitoring, evaluation, and enhancement. By developing our roadmap, we ensure that reporting in line with the TCFD recommendations remains a priority and that our efforts are sustained over time with clear goals, milestones, and allocated resources. It also demonstrates our commitment to transparency, accountability, and resilience in the face of climate change.

Case Study by a Brazilian Asset Manager

Bradesco Asset Management (BRAM) is a Brazilian asset manager and a wholly owned subsidiary of Banco Bradesco. Given the importance of the financial sector to the wider economy, it is important for us to actively address climate-related risks and mobilize financial resources to enable the transition to a low-carbon economy. We believe that disclosure of climate-related information is essential in ensuring market participants have the information they need for decision making.

The content below describes our TCFD journey as well as two recent developments related to our disclosure of climate-related information in line with the TCFD recommendations. The first development is our assessment of potential impacts of carbon pricing on our investee companies, and the second is our calculation of the GHG emissions associated with our assets under management.

Journey on TCFD-Aligned Climate-Related Disclosures

Banco Bradesco started its climate journey over 15 years ago (see [Figure A48](#), p. 43) and has been making progress in managing risks and opportunities, initially focusing on its operations and more recently on transforming its businesses to support the development of a low-carbon economy. In line with this journey, BRAM became a signatory to the UN PRI in 2010. In early 2016, an executive director from Banco Bradesco joined the TCFD as a vice chair; and we became a TCFD supporter in 2017. Since then, we have endeavored — through Banco Bradesco’s group-wide reports — to

disclose climate-related information in line with the TCFD recommendations. For fiscal year 2022 reporting, the climate report — which is referenced several times in Bradesco’s 2022 annual integrated report — addresses the Task Force’s recommended disclosures. We have been seeking to incorporate the TCFD recommendations into our different departments through in-house activities, action plans, and participation in international and national initiatives. We expanded our dedicated climate team in 2022, employing even more efforts to advance the internalization of recommendations.⁴⁷

Conducting Carbon Pricing Sensitivity Analysis on Our Investment Portfolios

One of the more significant improvements we have made recently to our climate-related disclosures is the analysis of potential impacts from carbon pricing on our investee companies, which is in line with the TCFD strategy recommendation. We have conducted scenario analysis in order to test the resilience of our portfolio to potential climate-related issues. For example, we believe that Brazil might introduce carbon pricing regulations in the future and have therefore conducted scenario analysis to prepare our business for the associated risks and opportunities. The goal of our scenario analysis was to assess whether the introduction of a regulated carbon market would affect the net income of our portfolios.

To assess the potential impact of a regulated carbon market, we developed four GHG emissions pricing scenarios based on existing GHG emissions trading systems in other countries and external studies on carbon price estimates for the Brazilian economy. These scenarios covered both the effects of taxing GHG emissions and introducing a trading system for GHG emissions. We applied these carbon pricing scenarios to our investee companies to estimate potential financial losses. Initially, our scope was to evaluate all companies in our equity and credit portfolios. However, due to the lack of GHG emissions disclosures from certain companies, we had to reduce our sample size. Ultimately, we considered only companies that had published their GHG emissions for at least one year in the period between 2016 and 2021.

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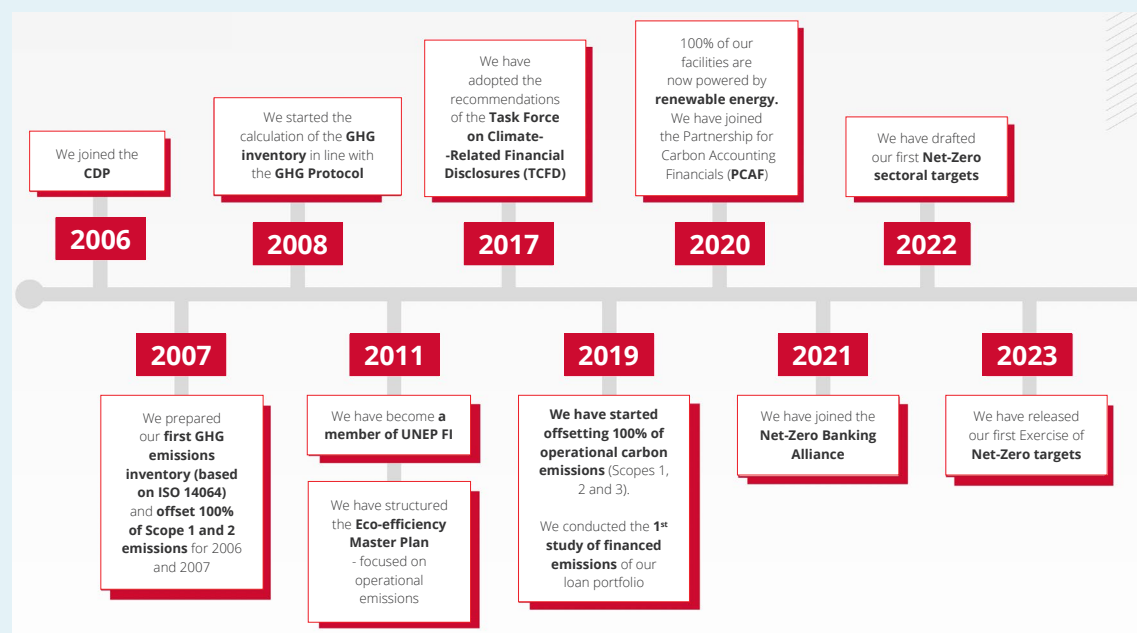
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⁴⁷ This refers to BRAM’s exclusive team that conducts all the commitments of the climate agenda, such as TCFD, PCAF, etc.

Figure A48

Banco Bradesco Journey on the Climate Agenda



Banco Bradesco, *Integrated Report 2022*, p. 185
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Our results indicated that if Brazil were to introduce a GHG emissions trading system, 78% of the sample portfolio would not be significantly impacted, 19% would be negatively impacted, and 3% would have the opportunity to sell carbon credits. We also found that 35% of the companies in the sample portfolio would be directly or indirectly affected by fossil fuel taxation. Finally, our analysis identified that certain industries — such as oil refining, steel, chemicals, electricity, transport, and food — are at higher risk than others. In 2022, we disclosed these results in Banco Bradesco's Integrated Report and, in 2023, within the Climate Report.⁴⁸

We are currently in the process of updating the results of our carbon pricing study, including by using public data and estimations to address the lack of company-reported data. We are also actively working with our investee companies to improve their disclosures. Conducting scenario analyses has helped us gain a deeper understanding of the climate-related risks and opportunities in our portfolio. This has informed our investment decision-making and has helped us develop targeted climate engagement strategies with our investee companies.

Estimating Invested Emissions

We began calculating GHG emissions associated with our assets under management — which we refer to as our invested emissions — in 2020 and provided our first disclosure on this topic in Banco Bradesco 2021 Integrated Report.⁴⁹ In that report, we covered our fixed income and variable income corporate investment portfolios, as shown in the top part of Figure A49 (p. 44). The bottom part of Figure A49 (p. 44) shows our invested emissions calculations per sector. As part of Banco Bradesco's commitment to the Net-Zero Banking Alliance, we have adopted the Partnerships for Carbon Accounting Financials (PCAF) methodology for calculating the GHG emissions associated with our assets under management.⁵⁰ Following PCAF guidance, we prioritized investee companies' reported GHG emissions, which are considered the highest-quality data among potential sources of GHG emissions data. Wherever this information was not available, we relied on estimates based on the economic activity of each client. We estimated Scope 1 and Scope 2 GHG emissions with internal calculations.

⁴⁸ See Banco Bradesco, *Integrated Report 2021*, June 2022 (p. 174) and Banco Bradesco, *Climate Report*, June 2023 (p. 53).

⁴⁹ See Banco Bradesco, *Integrated Report 2021*, June 2022 (p. 195).

⁵⁰ Partnership for Carbon Accounting Finance. *The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second Edition*, December 19, 2022.

Figure A49

Disclosure of Our Invested Emissions

Invested emissions

For investments managed by Bradesco Asset Management, we also calculated invested emissions related to fixed income and variable income portfolios for the years 2021 and 2022.

For the calculations of the invested portfolio, we used the Unlisted Equity asset class of the PCAF methodology.

For the oil and gas and mining sectors, we calculated scope 3 using client data, when available, and the PCAF database for the remainder, resulting in 3.2 MtCO₂ and 130K tCO₂e (2021) and 2.4 MtCO₂ and 90K tCO₂e (2022), respectively.

EMISSIONS – BRADESCO ASSET INVESTMENTS – TOTAL

	Dec/2021	Dec/2022
Value of the portfolio evaluated (R\$ billion)	92.8	126.5
Financed Emissions – Scopes 1 and 2 (millions of tCO ₂ e)	1.2	1.1
Coverage of fixed and variable income portfolios (%)	100	100

EMISSIONS – BRADESCO ASSET INVESTMENTS – SECTORAL

Sector/Year	Total balance covered (R\$ billions)		Scopes 1 and 2 Emissions (MtCO ₂ e)		Emission Intensity (MtCO ₂ e/R\$)		Average Analysis Quality Score	
	2021	2022	2021	2022	2021	2022	2021	2022
Agriculture	0.16	0.16	0.02	0.02	0.10	0.10	1.5	1.5
Aluminum	0.15	0.11	0.02	0.02	0.16	0.16	1.0	1.0
Iron and Steel	0.60	0.35	0.12	0.07	0.20	0.20	2.9	2.9
Power Generation	10.43	14.11	0.45	0.56	0.04	0.04	2.2	2.7
Real Estate (commercial/residential)	1.24	1.11	0.00	0.00	0.00	0.00	3.3	3.2
Oil and Gas	5.44	3.41	0.33	0.21	0.06	0.06	2.2	2.4
Transport	2.38	4.31	0.03	0.06	0.01	0.01	1.9	2.3
Mining	2.63	1.82	0.05	0.04	0.02	0.02	2.7	2.4
Others	69.84	101.2	0.13	0.15	-	-	-	-

Note: Bradesco Asset was not exposed to the coal and cement sectors in 2021 and 2022.

Banco Bradesco, *Integrated Report 2022*, p. 196

Notes: The PCAF methodology requires the inclusion of Scope 3 GHG emissions for the oil, gas, and mining sectors for reports published in 2021 onwards, with additional sectors being added from 2023.

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The key challenge we have faced is the limited availability of climate-related disclosures, specifically data on GHG emissions from our investee companies. We have also faced obstacles in adapting the PCAF methodology to Brazilian companies given the country's unique GHG emissions context. While many countries may have a majority of GHG emissions emitted by the energy sector, in Brazil, land use is a

particularly significant source. Estimating GHG emissions associated with land use requires additional data and more-complex calculations and estimations. The lack of company disclosures has made it challenging for us to make further advancements in how we calculate our invested emissions. To overcome these challenges, we rely on the support of a technical climate consultancy to assist in estimations.

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We also engage with our investee companies as part of our climate strategy to reduce GHG emissions and improve climate-related disclosures. To prepare for engagement, we actively train our employees. For example, we educated BRAM employees about our invested emissions and the climate-related risks in our investments. BRAM analysts and portfolio managers were also trained on how to engage with investee companies on climate-related risk management, including transition planning. This supports our role in enabling the transition to a lower-carbon economy and enables us to continue to advocate for the reporting of climate-related information.

Lessons Learned

Our role as an asset manager places us in a unique position to facilitate positive change on climate action globally. Often, our investee companies do not disclose climate-related data, as they are neither familiar with climate-related reporting nor have the resources to do so. We have learned that through engagement with our investee companies, we can influence them to calculate and report their GHG emissions data, establish climate targets, and join net-zero initiatives. Engagement has thus driven better reporting on climate-related information and improved our own management and disclosures of climate-related risks and opportunities.

Furthermore, our implementation of the TCFD recommendations has helped drive internal alignment with senior leadership on climate-related issues, which has led to key strategic business decisions. We have openly communicated with senior leadership and the board on climate-related risks and opportunities. For example, we presented the results of our carbon pricing study. Leadership's understanding of and alignment with our findings led to several important decisions in terms of managing climate-related risks, including changes to our responsible investments policy and processes.

We also recognize that it is essential to be actively involved in global initiatives such as the TCFD and the United Nations Environment Programme Finance Initiative in order to keep abreast of the rapidly evolving reporting frameworks and regulatory developments. At a regional level, we are involved in working groups led by industry associations such as Investidores pelo Clima, Principles for Responsible Investment, and Associação de Investidores no Mercado de Capitais, which regularly meet to discuss climate-related risks and governance. Our involvement in these global and regional initiatives has supported the disclosure process for the industry as well as helped us gain important insights that we have used for our own disclosures.

Examples of Climate-Related Financial Disclosure

This subsection includes examples of asset managers and asset owners' reporting on information aligned with one or more of the 11 recommended disclosures. The examples included are not intended to represent "best practice" nor demonstrate disclosures that fully meet the associated recommended disclosure(s).⁵¹ Instead, the examples are provided because they may help asset managers and asset owners generate ideas for their own reporting.

The examples are divided into two categories — general and U.K. pension schemes. Beginning on October 1, 2021, U.K. pension schemes with £5 billion or more in assets were required to report in line with the TCFD recommendations, followed by those with £1 billion or more in assets on October 1, 2022.⁵² The last three examples come from U.K. pension schemes that are subject to these reporting requirements.

General

Figure A50 (p. 46) shows an asset manager's interim climate-related targets (*Metrics and Targets c*) on the proportion of its assets under management initially committed to be managed in line with net zero.

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⁵¹ The mention of specific companies does not imply that they are endorsed by the TCFD or its members in preference over other companies of a similar nature that are not mentioned.

⁵² See U.K. Parliament, *The Occupational Pension Schemes (Climate Change Governance and Reporting) Regulations 2021*, July 13, 2021.

Figure A50
Climate-Related Targets

Asset Level 1

Portfolio Coverage Targets

- Every five years, meaningfully increase the percentage of AUM in material sectors which are considered net zero, aligned or aligning and annually report on progress.
- 100% of AUM in material sectors is considered net zero or aligned by 2040.
- In support of our clients and investments teams we will continue to progress collective understanding of Net Zero solutions as data and methodologies evolve.

Asset Level 2

Engagement Threshold Targets

- Companies making up 70% of financed emissions in material sectors will either be assessed as Net Zero, assessed as aligned or subject to direct engagement / active management by 2025
- Companies making up 90% of financed emissions in material sectors will either be assessed as Net Zero, assessed as aligned or subject to direct engagement / active management by 2030
- 100% of assets in material sectors are aligned or achieving Net Zero by 2040, as stipulated in the IIGCC PAII Framework.

Portfolio Level 1

Portfolio Decarbonisation Reference Targets

- 50% lower carbon footprint as measured by tCO2e per USD mn invested by 2030 versus 2019 baseline of 73 tCO2e per USD mn
- Net zero by 2050 against 2019 baseline

Coverage of scope 1, 2, and the extent of scope 3 emissions

Our measurements include Scope 1 and 2 top-down portfolio reduction targets. Given the estimated nature of current scope 3 assessment methodologies available, this measurement is too immature at this stage to include in portfolio construction against a meaningful net zero target.

Whilst scope 3 emissions are not considered in the top-down portfolio emissions target (i.e., 50% reduction by 2030), they still are crucial in assessing the alignment of companies at the issuer-level.

Invesco Ltd., *2022 Taskforce on Climate-related Financial Disclosures Report*, p. 45
Note: Some content was reformatted in order to fit the page.

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Figure A51 provides a description of an asset owner's reporting on *Risk Management a)* and *c)*. This example provides an overview of the asset owner's risk identification and assessment

processes and indicates that climate-related issues are part of its enterprise risk management framework.

Figure A51
Risk Identification and Assessment and Integration into Overall Risk Management

Our Enterprise Risk Management Framework incorporates climate change risk, allowing for the different time horizons over which climate change could impact our business.

Business and risk strategy alignment for climate change risk

We integrate the outcomes of our climate change risk assessment into our business and risk strategy. These inform our response to ensure we remain within our risk appetite and capitalise on climate-related opportunities.

Climate Change Risk Appetite and Preference Statement

We acknowledge the science of climate change and the economic and social implications of the transition from fossil fuels. We strive to address climate change risks timely. Our targets and commitment to reducing carbon emissions aim to measure and manage financial and non-financial climate change risks and reduce our carbon-based and fossil fuel footprint. We work towards managing our exposure to the domestic fossil fuel industry in line with our national policy and international good practice. We seek to grow our renewable energy and green bonds exposure. Our commitment to working with our customers ensures their right to a Just Transition is secured and their exposure to climate change risk is appropriately managed.

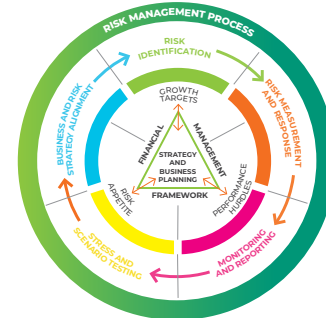
We will refine this Climate Change Risk Preference Statement as the Group progresses in setting measurable targets.

Climate change risk identification

We conducted an extensive risk identification exercise across our business to understand the climate change risks we face. Due to the uncertainty and evolving nature of climate change risks, we consider climate change in our standard and emerging risk methodologies.

The Old Mutual Risk Classification Model comprises 12 level 1 risk categories, which are broken down into level 2 categories and, where appropriate, level 3 categories. Climate change is a separate risk category (level 2 external risk) but may also be a cause for other risk types, such as non-life insurance risk and operational risk. We have further categorised climate change into physical risk and transition risk.

Climate change risk (level 2) – The risk that global warming, extreme weather events and the transition to a low carbon economy will adversely impact economic growth, asset valuations and insurance profitability. These, in combination with increased costs of doing business could threaten the resilience and sustainability of our business.



Physical risk (level 3) – Increased damage and losses due to physical phenomena associated with climate trends (such as changing weather patterns and sea-level rises) and/or climate events (such as natural disasters and extreme weather). Physical risks may have a direct or indirect financial impact, such as property damage leading to impaired asset value and sovereign risk.

Transition risk (level 3) – Transition to low-carbon economy and the resulting technology, regulatory and social effects that may impact the value of assets or the cost of doing business. Transition risks arise when markets adjust towards a low-carbon economy due to regulatory and policy changes, disruptive technologies, new business models, shifting sentiment and societal preferences, or evolving evidence frameworks and legal interpretations.

Climate change risk measurement and response

We determine our risk exposure to physical and transition risks in our areas of operation after considering both the financial and non-financial impacts on our business. We identify and track suitable actions to best mitigate our climate change risks.

We use impact and vulnerability assessments to understand our climate change risks and opportunities and to inform our climate strategy and target-setting processes. We categorised the risks and opportunities within each segment using the TCFD framework and scored them according to the existing Group risk-scoring process.

We expanded on our initial impact and vulnerability assessments through climate scenario planning workshops. The goal of these workshops was to identify strategic responses to the risks and opportunities that would generate value across a range of plausible future scenarios.

When necessary, we partner with climate specialists to ensure best practices are applied to the various dimensions of climate change risk. These dimensions include:

- Evaluating the carbon intensity and implied temperature rise of our investment portfolios
- Improving our operational carbon footprint
- Deepening our understanding of our natural catastrophe modelling and quantitative and scenario modelling capabilities

We believe we have made tangible progress in furthering our understanding of climate change risk and our mitigation plans across these dimensions.

Climate monitoring and reporting

We continually monitor our external and internal environment to understand how it impacts our identified climate change risks. We identify and monitor appropriate indicators and take action as needed. Climate change risks are reported regularly to Executive committees and the Board.

Climate change risk stress and scenario testing

We base our internal analysis on the following three NGFS reference scenarios: orderly transition, disorderly transition, and hot house world. We use the scenarios and their underlying data sources to better understand our business' vulnerabilities to various climate-related risks and opportunities and take measures to improve our resilience. Over time, we will introduce higher granularity to this analysis to accommodate desired outcomes like the Just Transition.

Old Mutual, *Old Mutual Climate Report 2022*, p. 19

U.K. Pension Schemes

Figure A52 shows a U.K. pension fund's reporting on the potential impact of three

different climate-related scenarios on the fund's portfolios (*Strategy c*).

Figure A52
Resilience of Strategy

5.3 The resilience of our investments and funding strategies

In addition to a focus on our investments and assets, DWP's TCFD requirements also include describing the impact of the climate scenarios on our portfolios, liabilities and funding strategy.

The key findings from our scenario analysis show that risk-adjusted returns vary across assets, pathways and time horizons.

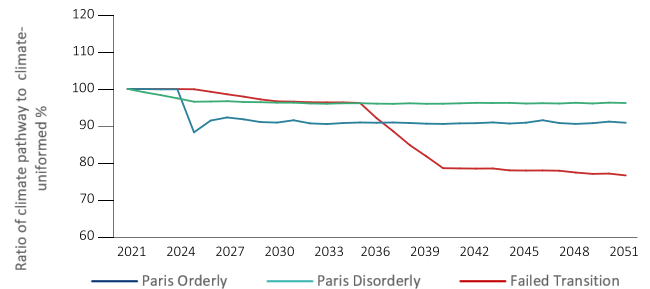
- The analysis found long-term downside risk to DB assets' investment returns in less optimistic climate scenarios. This is relative to a realistic 'best' case climate scenario (Orderly Transition pathway), where transition to below 2°C happens without major shocks to financial markets.

- **In the short term**, the consequences of the transition are particularly detrimental in a Disorderly Transition pathway due to financial markets' response to transition risks.

- **In the long term**, the worst outcomes are in a Failed Transition pathway as a result of physical risks generated by increasing average temperature.

- **In general, cash and corporate bonds are more resilient to climate risks.** The least resilient asset classes are public/listed equities, private equities, property and infrastructure. This is due to their sensitivity to pricing-in shocks, market overreaction and supply chain disruption caused by transition and physical risks.

Figure 1: Cumulative median real returns



Source: USSIM and Ortec Finance (GLASS)

5.3.1 DB cumulative performance and funding position

In Figure 1 above, the Paris Orderly Transition and Failed Transition pathways represent plausible 'best' and 'worst' climate outcomes, and the difference in long-term returns gives us an indication of the scale of the potential impact of climate on DB fund performance.

USSIM's most plausible scenario for climate outcomes sits between Paris Orderly Transition and a Failed Transition.

In the short term, our assets are vulnerable to transition risks. The Paris Disorderly Transition pathway is particularly impactful in the short term due to the sudden repricing of assets in 2025.

This disruptive transition causes financial markets to overreact and inflicts long-lasting damages to returns. In the longer term, physical risks are the main contributor of climate-related risk. The Paris Orderly Transition pathway limits the impacts on the fund, thanks mainly to its mitigated physical risks exposure.

Assuming the trustee is aiming to hold a similar level of Technical Provisions under each scenario, then:

- **in the short term:** lower returns lead to a higher deficit being experienced under the Paris Disorderly pathway
- **in the medium term:** it is the Failed Transition pathway that is likely to impact returns and lead to higher deficits
- **over the longer term:** Paris Orderly and Disorderly Transition pathways have similar returns implications, with Failed Transition having potentially significantly lower returns and an associated impact on funding levels

Another way to illustrate the implications of climate change is to view the annualised performance differentials that result from the different scenarios versus the climate uninformed baseline. As illustrated in Figure 2, returns under all scenarios are lower than the climate uninformed baseline.

Figure 2: Differential between annualised expected returns under different climate scenarios vs. climate uninformed baseline

Climate Scenario	30-year annualized expected returns
Paris Orderly	-0.3%
Paris Disorderly	-0.5%
Failed Transition	-1.0%

Source: USSIM and Ortec Finance (GLASS)

Universities Superannuation Scheme, *Universities Superannuation Scheme TCFD Report 2022*, pp. 16-17
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Figure A53 shows a U.K. pension scheme's reporting on its financed emissions, financed carbon intensity, and weighted average carbon

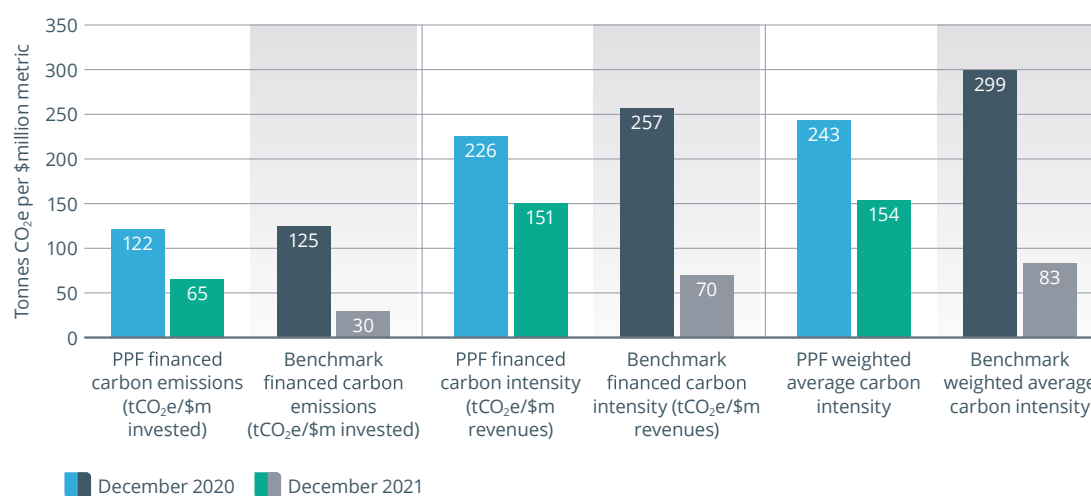
intensity as well as benchmarks for each (*Metrics and Targets b*).

Figure A53
Portfolio Carbon Footprint Metrics

Equities portfolio: carbon intensity metrics

The December 2021 carbon footprint analysis for our listed Equities aggregate shows substantial progress from our 2020 footprint analysis, with our **weighted average carbon intensity (WACI) declining by 37 per cent year-on-year**. The WACI of the Equity benchmark reduced by over 70 per cent as a result of the transition to our new climate-aware equity benchmark. This had the direct effect of reducing the WACI of our equity passive mandates by the same amount, as anticipated.

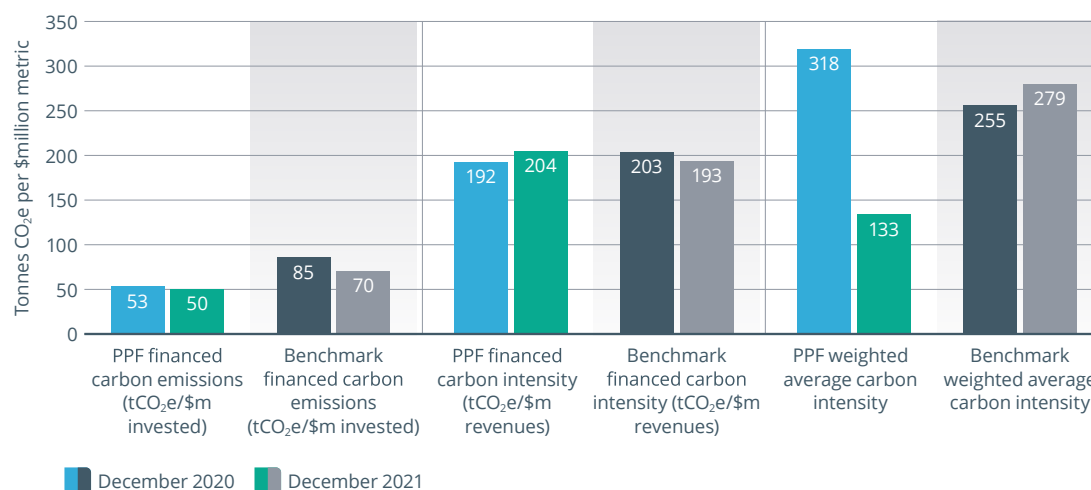
PPF Equities carbon metrics



Credit portfolio: carbon intensity metrics

This is the second year we have included the corporate bonds in our Strategic Cash, IG Credit, EM Debt and Absolute Return portfolios as an aggregate. **The WACI of our global Credit portfolio declined by 58 per cent over the year**, driven largely by our strategic cash portfolio. The financed carbon emissions and financed carbon intensity remained largely unchanged.

PPF Credit carbon metrics*



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Figure A54 shows a U.K. pension scheme’s reporting on its risk management activities related to its funds at different phases — pre-

investment, asset management, and divestment or exit (*Risk Management b*).

Figure A54
Climate Risk Management in the Investment Process

Climate change presents various types of investment risks that could present challenges and opportunities for the investment portfolio in a number of ways. Depending on the type of risk, we typically take actions to avoid, reduce, or exploit the risk:

- **Avoid** the risk – for example we have reduced the Scheme’s exposure to stranded asset risk by excluding thermal coal and tar sands companies
- **Mitigate** the risk – either mitigating climate risk as a systemic risk, or as an idiosyncratic risk. Mitigating climate risk as a systemic risk includes taking measures to align the investment portfolio to net zero by 2050 or sooner, engage policy makers to encourage measures that support a 1.5C temperature outcome, and collaborate with peer investors to help drive down GHG emissions in the real economy. These measures could mitigate the level of systemic risk by reducing the likelihood of a harmful temperature outcome. Mitigating climate risk as an idiosyncratic risk involves analysing potential investments for climate risk, monitoring and engaging companies to encourage them to adopt business plans that manage against physical and transition climate risks, and setting agreements for external managers to mitigate climate risk when managing money on the Trustee’s behalf. These measures could mitigate the level of idiosyncratic risk by ensuring companies in our portfolio are more robust to the risks posed by climate change.
- **Exploit** the risk – for example by investing in climate opportunities, as described in section 5.4.5.

[...]

Idiosyncratic ESG risk is managed by a wide range of actions including climate-related and other portfolio exclusions, ESG risk analysis, securing ownership rights, negotiating contracts and terms, engagement, monitoring, improving asset quality, and supporting value at exit. Systematic ESG risk is managed primarily by engagement (with policy makers, peer investors, and portfolio companies) and shareholder voting.

Figure 5.4.4.1.1: Techniques used to identify and assess climate risks in the investment portfolio. Adapted from Railpen’s ESG Risk Directive (ESG includes climate change).

(note: not every technique is applied for every investment transaction; rather the techniques most appropriate for the investment in question are identified and executed accordingly.)

Pooled Fund	Portfolios	Pre-Investment	Asset Management	Divestment/Exit
Growth Pooled Fund	Quantitative Equities	a	e, f, g, h, j	
	Fundamental Equities	a, b	e, f, g, h, j	l
	External Managers	a, c, d	e, j	
	Property	b, d	j	l
Illiquid Growth Pooled Fund	Co-investments (Private Equity, Private Debt, Venture)	a, b, d	e, f, g, i, j	l
	External Managers	c, d	j	
Long Term Income Pooled Fund	Directs	a, b, d	e, f, g, i, j	l
	External Managers	c, d	j	
Equity Pooled Funds	External Managers (Global Equity; Passive Equity)	a, c, d	e, f, h, j	
DC Pooled Funds	Global Equity	As per Equity Pooled Funds above		
	Long Term Growth	As per Equity Pooled Fund above		

Avoid		Mitigate		Exploit	
a	Climate risk exclusions	d	Legals and contracts	j	Value Creation Plan
b	Climate and ESG Analysis/Due Diligence	e	Ownership rights	l	Value at exit
c	External Manager Due Diligence	f	Dialogue		
		g	Escalation		
		h	Collaboration		
		i	Monitoring and re-measuring		

Railways Pension Scheme, *Combined TCFD Report 2022*, pp. 57–58

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B. Financial Statement Considerations



B. Financial Statement Considerations

When the Task Force published its final recommendations in June 2017, it recommended companies include climate-related financial information in their public annual financial filings (see [Figure B1](#)).⁵³ As part of its efforts to monitor companies' progress in disclosing information aligned with its recommendations over the past several years, the Task Force has found that companies are more likely to disclose such information in their sustainability reports than in their annual financial filings.⁵⁴ While the Task Force recognizes the amount of climate-related financial information included in financial filings has increased over the years, it believes more progress is needed — especially on reporting the impact of climate-related issues on companies' businesses, strategies, and financial planning, including the impact on financial statements (e.g., balance sheets, income statements), as appropriate.⁵⁵ Notably, the ISSB's reporting standards published earlier this year require material climate-related information to be disclosed in "general purpose financial reports" (e.g., financial filings) and were built on the concepts underpinning the International Financial Reporting Standards (IFRS).⁵⁶

In November 2019, a member of the International Accounting Standards Board (IASB) published an article — which was inspired by a joint bulletin issued by Australian standard setters — providing guidance on the application of materiality as the term is defined under IFRS accounting standards and how it relates to climate-related and other emerging risks.⁵⁷ The article, which was later followed by educational material from the IFRS Foundation, highlighted that climate-related risks and other emerging risks are predominantly discussed outside the financial statements; however, "qualitative external factors, such as the industry in which [a] company operates, and investor expectations may make some risks 'material' and may warrant disclosures in financial statements, regardless of their numerical impact."⁵⁸

Figure B1 Reporting in Financial Filings

In most G20 jurisdictions, companies with public debt or equity have a legal obligation to disclose material information in their financial filings — including material climate-related information. In its 2017 report, the Task Force indicated its recommendations should be useful to companies in complying more effectively with existing disclosure obligations.

It also noted that disclosure in financial filings should foster shareholder engagement and broader use of climate-related financial disclosures, thus promoting a more informed understanding of climate-related risks and opportunities by investors and other users. Furthermore, publication of climate-related financial information in annual financial filings should help ensure that appropriate controls govern the production and disclosure of the required information.

In addition, the educational material published by the IFRS Foundation describes specific accounting requirements as well as overarching requirements that could be relevant for companies when considering climate-related matters. As to the latter, companies are required to disclose information not specifically required by IFRS accounting standards and not presented elsewhere in the financial statements but is relevant for understanding the financial statements. In other words, companies need to consider whether to provide additional disclosures when compliance with the specific requirements in the accounting standards is insufficient to enable investors to understand the impact of climate-related issues on their financial positions and financial performance.⁵⁹

Moreover, regulatory authorities are increasingly focusing on companies' inclusion of climate-related financial information in their financial filings, including in the financial

⁵³ Financial filings refer to the annual reporting packages in which companies are required to deliver their audited financial results under the corporate, compliance, or securities laws of the jurisdictions in which they operate. While reporting requirements differ internationally, financial filings generally contain financial statements and other information such as governance statements and management commentary.

⁵⁴ TCFD, *2018 Status Report*, September 26, 2018 (p. 14); TCFD, *2019 Status Report*, June 5, 2019 (p. 9); TCFD, *2020 Status Report*, October 29, 2020 (p. 12); and [Section A.1. TCFD-Aligned Reporting by Public Companies](#) (p. 2).

⁵⁵ TCFD, *2022 Status Report*, October 13, 2022 (p. 63).

⁵⁶ IFRS, "Ten Things to Know about the First ISSB Standards," June 27, 2023.

⁵⁷ The Australian Accounting Standards Board and Auditing and Assurance Standards Board, *Climate-Related and Other Emerging Risks Disclosures: Assessing Financial Statement Materiality Using AASB Practice Statement 2*, December 2018 (republished April 2019).

⁵⁸ Nick Anderson, *IFRS Standards and Climate-Related Disclosures*, November 2019.

⁵⁹ IFRS, *Educational Material: Effects of Climate-Related Matters on Financial Statements*, November 2020 (republished July 2023) (p. 2).

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statements. For example, the U.S. Securities and Exchange Commission created a task force in its Division of Enforcement to identify potential violations including material gaps or misstatements in companies' disclosure of climate-related risks under existing rules.⁶⁰

In addition, the European Securities and Markets Authority included climate-related matters as one of its priorities for monitoring and assessing compliance with relevant reporting requirements in companies' 2022 financial filings.⁶¹ Finally, the U.K. Financial Reporting Council conducted a review of how well companies explained the link between their net-zero targets and transition plans and their financial statements when there was a reasonable expectation that there could be a material impact on the financial statements.⁶²

In light of the above, the Task Force worked with professionals in accounting and auditing to describe the following:

- some of the general factors considered when incorporating climate-related issues into financial statements,
- common challenges faced in considering the impact of climate-related issues on financial statements, and
- brief descriptions of guidance and other resources companies may find useful when incorporating climate-related issues into their financial statements.

In addition, several excerpts from companies' financial filings that show how they described the impact of climate-related issues on their financial statements are included at the end of this section.

1. GENERAL FACTORS CONSIDERED

Climate change affects nearly all economic sectors; and, based on the Intergovernmental Panel on Climate Change's (IPCC's) recent report, many climate-related risks are higher than previously assessed and projected long-term impacts are up to multiple times higher than currently observed.⁶³ In addition, the report indicated projected adverse impacts and related losses and damages from climate change escalate with every increment of global warming. While many companies recognize their exposure to climate-related transition and physical risks and opportunities and make strategic and operational decisions in light of these, many others may not. Given findings in the recent IPCC report, it is becoming increasingly important for companies to assess and address their climate-related issues — which could affect their financial statements.

When it issued its recommendations in June 2017, the Task Force acknowledged the interconnectivity of its recommendations with existing financial statement and disclosure requirements. In particular, the Task Force highlighted specific standards from two accounting frameworks — the IFRS and U.S.

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Key Takeaways



Investors and other users are interested in companies' disclosure of their assessments and evaluations of assets for potential impairment, contingencies, and useful lives to understand the impact of climate-related issues on companies' financial position and financial performance.



Under overarching IFRS accounting requirements, a company must consider whether to provide additional disclosures when compliance with the specific requirements in IFRS standards is insufficient to enable investors to understand the impact of climate-related issues on its financial statements.



Developing estimates — including dealing with measurement uncertainty — is a core component of companies' financial reporting, but it also presents certain challenges, especially as the level of uncertainty increases.



It is important that those responsible for preparing, approving, and auditing a company's financial statements have sufficient experience with and knowledge of climate-related risks and the company's exposure to such risks when making judgments about their impact on the financial statements.

⁶⁰ Securities and Exchange Commission, "Enforcement Task Force Focused on Climate and ESG Issues," Accessed July 24, 2023.

⁶¹ European Securities and Markets Authority, *European Common Enforcement Priorities for 2022 Annual Financial Reports*, October 28, 2022.

⁶² Financial Reporting Council, *CRR Thematic Review of Climate-Related Metrics and Targets*, July 26, 2023.

⁶³ Intergovernmental Panel on Climate Change, *Summary for Policymakers in Climate Change 2023: Synthesis Report*, March 20, 2023.

Generally Accepted Accounting Principles (US GAAP).⁶⁴ The standards that were highlighted in 2017 related to assessing the impairment of assets and accounting for provisions and disclosing contingencies.^{65,66} Since the 2017 report was published, several organizations have provided guidance on incorporating climate-related issues into the financial statements, as described in [Section B.3. Resources on Climate-Related Issues in Financial Statements](#). The Task Force drew from these in identifying key considerations that may be useful to companies as they assess and incorporate the impact of climate-related issues on their financial statements. One example of such guidance is educational material published by the IFRS Foundation that was developed to help companies determine how to consider climate-related issues when preparing their financial statements according to IFRS accounting standards.⁶⁷ Some of the standards included were International Accounting Standard (IAS) 36 *Impairment of Assets*, IAS 16 *Property, Plant and Equipment*, and IAS 37 *Provisions, Contingent Liabilities and Contingent Assets*, all of which are described below.⁶⁸

Prior to the discussion of the accounting standards noted above, it is important to highlight that a core component of financial reporting is developing estimates, including dealing with measurement uncertainty. Developing estimates presents certain challenges, especially as the level of uncertainty increases (see [Figure B2](#) for more information).⁶⁹ Recent examples of events that introduced significant uncertainty — and associated challenges — for companies in preparing their financial filings relate to the COVID-19 pandemic and the Russia-Ukraine conflict. Climate-related issues present similar challenges in terms of measurement uncertainty and may have implications for both 1) disclosing narrative information, such as that found in governance statements and management commentary, and 2) measuring and valuing assets and liabilities reflected in financial statements and notes to the financial statements. Reporting on the impact of climate-related issues on the financial

Figure B2 Measurement Uncertainty in Financial Reporting

In general, “uncertainty” means a state of limited knowledge where it is impossible or impracticable to describe exactly an existing state or a future outcome. Uncertainty exists in financial statements where measurements “to a large extent...are based on estimates, judgments, and models rather than exact depictions.” As the level of uncertainty increases, challenges may exist for:

- financial statement preparers to estimate the future outcome of the uncertainties inherent in many business transactions,
- auditors to verify the subjective judgments about those uncertainties, and
- investors to understand those uncertainties and assess their potential impact on future earnings or cash flows.

statements can be complex and challenging and often requires companies to exercise judgment on factors that they may not have considered or had to consider in the past.

Impairment of Non-Financial Assets

One of the issues companies may face is how to take climate-related issues into account in their impairment considerations for non-financial assets. For instance, jurisdictions’ actions (such as imposing a carbon tax) as well as companies’ own actions to address climate-related risks (such as reducing their GHG emissions) could have a significant effect on their future expected cash flows and result in the impairment of certain assets. Some of the potential climate-related issues companies consider when developing their financial statements in accordance with IAS 36 *Impairment of Assets* are described below.

Identifying Climate-Related Impairment Indicators. Under IAS 36, companies are required to assess, at the end of each reporting period, whether there is any indication that an asset or cash-generating unit may be

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⁶⁴ The Task Force recognizes that there are other accounting frameworks such as those applied in India, China, and other jurisdictions.

⁶⁵ The Task Force referred to IFRS, *IAS 36 Impairment of Assets*, May 2013, and Accounting Standards Codification (ASC) 360 “Long-lived Asset Impairment” as well as ASC 450 “Contingencies” and IFRS, *IAS 37 Provisions, Contingent Liabilities and Contingent Assets*, May 2020.

⁶⁶ For the sake of simplicity in this report, the Task Force refers only to standards under the IFRS since the majority of jurisdictions use these standards. Based on the IFRS Foundation’s analysis of 168 jurisdictions, which represents 98% of the world’s gross domestic product, 160 of the 168 jurisdictions have a commitment to IFRS Accounting Standards. See IFRS Foundation, “[Analysis of the IFRS Accounting Jurisdiction Profiles](#),” Accessed July 24, 2023.

⁶⁷ IFRS, *Effects of Climate-Related Matters on Financial Statements*, November 2020 (republished July 2023).

⁶⁸ The International Accounting Standards Board (IASB) is the independent accounting standard-setting body of the IFRS Foundation.

⁶⁹ Sources for [Figure B2](#) are Hubbard, Douglas, *How to Measure Anything: Finding the Value of Intangibles in Business*, John Wiley & Sons, July 2007 and FASB, *Statement of Financial Accounting Concepts No. 8*, August 2018.

impaired.^{70,71} An impairment arises when the carrying amount of an asset or a cash-generating unit exceeds its recoverable amount.⁷² Climate-related issues may give rise to indications that an asset is impaired. For example, a decline in the demand for diesel-based products of a manufacturing company could indicate that its production equipment may be impaired. Significant changes in the environment in which the company operates — such as new regulations that limit the amount of GHG emissions that can be produced — may also be an indication that a GHG emissions producing asset could be impaired.

Determining Cash Flows Included. Where the “value in use” method, which is the present value of future cash flows expected to be derived from an asset or cash-generating unit, is used in determining the recoverable amount, a company is required to make an estimate of future cash flows. IAS 36 places certain constraints on the future cash flows that can be incorporated when calculating the value in use and requires 1) the cash flows to be estimated for the asset (i.e., single asset or group of assets) in its current condition and 2) future capital expenditure that would improve the asset’s performance and the related benefits to be excluded.⁷³

This has raised practical questions on the extent to which future capital investments related to climate-related commitments or targets can be included in the value in use cash flow projections (that is, whether the expenditure incurred to reduce the GHG emissions associated with an asset represents future cash outflow to enhance the asset or to maintain the asset to continue operating). As part of its *Business Combinations: Goodwill and Impairment* project, the IASB indicated in March 2023 that it tentatively decided to propose removing the existing constraint on cash flows used to estimate value in use in IAS 36.^{74,75}

More specifically, the IASB has tentatively decided to retain the requirement that future cash flows shall be estimated for an asset in its current condition. Therefore, companies would not be prohibited from including cash flows arising from improving or enhancing an asset’s performance as long as the asset has the current potential to generate those future cash flows. A public consultation on IAS 36 is currently expected in the first half of 2024; and, if the aforementioned proposed changes were made, they would allow companies to reflect future capital expenditure in response to climate-related issues in determining the recoverable amount of an asset (or a cash-generating unit) if the potential for generating cash flows exists for the asset (or a cash-generating unit) in its current condition.⁷⁶

Evaluating Terminal Value Assumptions.

The terminal value reflects the value of an asset after the explicit forecast period. For many companies, climate-related issues are expected to affect their businesses in the longer term; and, as a result, the terminal value is the value in use component that is likely to be most affected. A small change in the long-term growth rate — which is a key input in the terminal value calculation — could significantly change the terminal value amount. Given this, it is important for companies to consider and reflect the impact of climate-related issues, including carbon price and physical climate-related risks, in the long-term growth rate. The Task Force recognizes there are challenges in determining an appropriate long-term growth rate given the uncertainties around the impact of climate-related risks on a company, coupled with limited external data.⁷⁷ Further challenges may exist when a company needs to use a forecast period longer than five years to reach a sustainable level of cash flows that reflect climate-related issues, considering the

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⁷⁰ Cash-generating unit is the smallest identifiable group of assets that generates cash inflows that are largely independent of cash inflows from other assets or groups of assets. IFRS, *IAS 36 Impairment of Assets*, May 2013 (paragraph 36.6).

⁷¹ Irrespective of any indicator of impairment, IAS 36 requires goodwill and intangible assets with indefinite useful lives and intangible assets that are not yet available for use to be tested for impairment annually.

⁷² The carrying amount is the amount at which an asset is recognized after deducting any accumulated depreciation (amortization) and accumulated impairment losses thereon, and the recoverable amount of an asset or a cash-generating unit is the higher of its fair value less costs of disposal and its value in use. IFRS, *IAS 36 Impairment of Assets*, May 2013 (paragraph 36.6).

⁷³ The effects of upcoming climate-related regulation or legislation may be included in the measurement of the value in use if management’s best estimate is that there will be an effect on the entity’s future cash flows. See Deloitte, *A Closer Look—IAS 36 Impairment of Non-Financial Assets—Reminders and Hot Topics*, May 3, 2023.

⁷⁴ IFRS, “*Business Combinations—Disclosures, Goodwill and Impairment*,” Accessed July 12, 2023.

⁷⁵ IFRS, “*IASB Update March 2023*,” March 20, 2023.

⁷⁶ IFRS, “*IFRS Foundation Work Plan*,” Accessed July 12, 2023.

⁷⁷ IAS 36.33 requires that when measuring value in use, a company must base cash flow projections on reasonable and supportable assumptions that represent management’s best estimate of the range of economic conditions that will exist over the remaining useful life of the asset and greater weight should be given to external evidence. IAS 36.33 also requires a company to use a steady or declining growth rate to estimate cash flow projections beyond the period covered by the most recent budget unless an increasing rate can be justified. IFRS, *IAS 36 Impairment of Assets*, May 2013.

requirements in IAS 36.35.⁷⁸ If extending the forecast period is not possible, adjusting the cash flows and the long-term growth rate in the terminal value formula to reflect the impact of climate-related matters can be challenging when different growth rates and/or profit margins are expected in future periods.

Asset Useful Lives

As various jurisdictions work towards transitioning to low-carbon economies, companies' use of certain assets may be affected. The development or emergence of new, lower-carbon technologies may lead to companies replacing their production-related assets earlier than originally expected. In addition, the introduction of laws and regulations to limit companies' GHG emissions — such as a carbon tax — may lead companies to retire GHG emissions producing assets sooner than planned to avoid higher costs. These and other events related to climate change could affect the useful lives of companies' assets, which they may need to consider when reviewing the useful lives of their assets at each annual reporting date (or more frequently). Companies in carbon intensive industries such as oil and gas, utilities, coal, and metals and mining likely face a higher risk of the useful lives assigned to some of their assets being significantly shortened, resulting in an acceleration of the depreciation/amortization charged to the income statement.

An asset's useful life is defined as the period of time over which a company expects to use the asset or the number of production or similar units that it expects to obtain from the asset.⁷⁹

Provisions and Contingent Liabilities

Another section in the financial statements that involves developing estimates with measurement uncertainty and could be affected by climate-related issues is provisions and contingent

liabilities.⁸⁰ As jurisdictions take actions to address climate change, they may pass new laws that could result in new or changed provisions or require disclosure of a contingent liability by affected companies. For example, a law passed to accelerate the timing for the decommissioning of long-lived assets such as those related to coal or oil and gas could lead to companies needing to revise existing decommissioning provisions based on the impact of discounting future cash flows.⁸¹ Where the details of a proposed new law have yet to be finalized, the cost that will be required to meet the legislation is not required to be recognized until the proposed legislation is virtually certain to be enacted as drafted.⁸² In addition, companies may need to assess whether constructive obligations have been created by their actions or specific public statements related to climate change.

IAS 37 indicates a constructive obligation may arise from a company's actions or sufficiently specific public statements through which it has indicated to others that it will accept certain responsibilities and, as a result, has created a valid expectation that it will discharge those responsibilities.⁸³

Notably, in March 2023, the IASB announced a project to explore whether and how companies' financial statements can provide better information about climate-related risks (see [Section B.3. Resources on Climate-Related Issues in Financial Statements](#)).⁸⁴ The IASB indicated stakeholders have asked several questions including why companies that have made net-zero commitments do not recognize liabilities or impair the value of their assets as a result of those commitments. Regardless of whether such commitments lead to provisions, investors and other users have expressed interest in information on the potential costs to deliver against climate-related commitments as this

⁷⁸ IAS 36.35 states that detailed, explicit, and reliable financial budgets/forecasts of future cash flows for periods longer than five years are generally not available. For this reason, management's estimates of future cash flows are based on the most recent budgets/forecasts for a maximum of five years. Management may use cash flow projections based on financial budgets/forecasts over a period longer than five years if it is confident that these projections are reliable and it can demonstrate its ability, based on past experience, to forecast cash flows accurately over that longer period. IFRS, *IAS 36 Impairment of Assets*, May 2013.

⁷⁹ IFRS, *IAS 16 Property, Plant and Equipment*, May 2020 (paragraph 16.6) and IFRS, *IAS 38 Intangible Assets*, May 2014 (paragraph 38.8).

⁸⁰ A provision is a liability of uncertain timing or amount. IFRS, *IAS 37 Provisions, Contingent Liabilities and Contingent Assets*, May 2020 (paragraph 37.10).

⁸¹ A decommissioning or asset retirement obligation may need to be recognized for an obligation associated with the decommissioning or retirement of a tangible long-lived asset (such as coal, oil and gas, and chemicals and cement plants) to the extent that the company is obliged to rectify damage already caused, as per IAS 37.19. IFRS, *IAS 37 Provisions, Contingent Liabilities and Contingent Assets*, May 2020.

⁸² IFRS, *IAS 37 Provisions, Contingent Liabilities and Contingent Assets*, May 2020 (paragraph 37.50).

⁸³ IFRS, *IAS 37 Provisions, Contingent Liabilities and Contingent Assets*, May 2020 (paragraph 37.10).

⁸⁴ IFRS, "Connectivity in Practice: The IASB's New Project On Climate-Related Risks in the Financial Statements," March 23, 2023.

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would be useful for their financial decision making.⁸⁵ Companies could describe these costs in the notes to their financial statements — in accordance with IAS 1 — if they believe these costs would be material to investors.^{86,87}

Summary

As described previously, the effects of material climate-related issues disclosed in the management commentary of companies' public financial filings may affect the recognition and measurement of financial statement amounts that require some form of estimation. In some cases, these material climate-related issues may not be factored in when measuring the amounts in the financial statements due to the recognition and measurement requirements under IFRS. In these situations, disclosing the potential impact of material climate-related issues on the assumptions used or amounts in the financial statements could provide investors and other users with useful information for their financial decision making.

2. COMMON CHALLENGES RELATED TO CLIMATE CHANGE AND FINANCIAL STATEMENTS

As mentioned previously, the Task Force drew from various sources to identify key considerations that may be useful to companies as they assess and incorporate the impact of material climate-related issues into their financial statements. The Task Force also drew from these sources as well as others to identify some common challenges that companies may face, as noted below.

- Companies that do not have sufficient expertise on climate-related issues across the organization may be at risk of underestimating the impact of climate-related issues on their businesses, strategies, and financial planning, including the impact on their financial statements.
- Data and systems-related issues faced by preparers may hinder their ability to disclose

material climate-related information in financial filings for use by investors and other users.

Companies that overcome challenges associated with considering and disclosing the impact of material climate-related issues on their financial statements may be better positioned to provide investors and other users with more decision-useful information in their financial filings, which is being increasingly demanded by investors and other users (see [Box B1](#), p. 57).

Experience with and Knowledge of Climate-Related Issues

For companies with limited to no experience with or knowledge of climate-related issues, incorporating such issues into their financial statements can be a challenge. In fact, several studies and surveys support the notion that many companies do not have sufficient expertise (i.e., experience and knowledge) to appropriately assess and address issues related to climate change.⁸⁸ Based on a 2022 survey of senior executives, 82% said they are not "completely confident" that their companies are properly staffed to meet the demands of increased environmental, social, and governance (ESG) disclosures — including those related to climate change.⁸⁹ Notably, staffing concerns related to meeting the demands for increased disclosure were higher among finance and accounting executives than executives in other areas of the companies. In addition, the Association of Chartered Certified Accountants (ACCA) surveyed more than 3,000 accountancy and finance professionals from around the world and across corporate, public, financial, and nonprofit sectors and asked how their organizations are addressing climate-related risk.⁹⁰ Nearly 25% of the respondents indicated one of the barriers preventing finance teams from supporting organizations in addressing climate-related issues was their own lack of professional skills in this area.

Sufficient expertise among boards of directors and audit committees has also been highlighted as a challenge. A survey of global companies' boards of directors found that around 70% of

⁸⁵ Investor alliances, including groups representing over \$100 trillion in assets under management, have called on companies to disclose how a net-zero pathway will affect the companies' financial positions. See "[Investor Groups Call on Companies to Reflect Climate-Related Risks in Financial Reporting](#)," September 16, 2020. Another investor group sent letters to 17 of Europe's largest companies asking why expectations over climate-related accounting disclosures have failed to be met. See "[Investors Put Audit Committee Chairs on Notice over Continued Omission of Climate Risks in Financial Reporting Ahead of 2022 AGM Season](#)," April 5, 2022.

⁸⁶ Climate Disclosure Standard Board, [Accounting for Climate: Integrating Climate-Related Matters into Financial Reporting](#), December 2020.

⁸⁷ IFRS, [IAS 1 Presentation of Financial Statements](#), February 2021 (paragraph 1.29).

⁸⁸ Boston Consulting Group, [Directors Can Up Their Games on Environmental, Social and Governance Issues](#), March 30, 2022; Whelan, T., [U.S. Corporate Boards Suffer From Inadequate Expertise in Financially Material ESG Matters](#), January 2021; and Eversheds Sutherland and KPMG, [Climate Change and Corporate Value: What Companies Really Think](#), November 11, 2020.

⁸⁹ Deloitte, [ESG Executive Survey Preparing for High-Quality Disclosures](#), March 31, 2022.

⁹⁰ Association of Chartered Certified Accountants, [Climate Action and the Accounting Profession: Building a Sustainable Future](#), October 2021.

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Box B1

User Demand for Climate-Related Information in Financial Filings

In November 2019, a member of the IASB published an article emphasizing that companies have an obligation under current IFRS rules to disclose material climate-related information and illustrating how companies can use IFRS guidance when they make materiality judgements related to disclosures about climate-related risks.¹

In September 2020, a large group of investors — representing over US \$103 trillion in assets under management globally — published an [open letter](#) welcoming the IFRS article and calling upon companies to ensure that their *financial statements accurately report their performance by incorporating material information about climate-related risks*.²

The investors also asked for *companies to “apply the IASB opinion”* in letter and spirit, including showing the key assumptions that have been made with regard to climate-related risks and *auditors to “only sign off on financial statements [that] are consistent with the IASB opinion”* in letter and spirit, including showing the key assumptions that have been made with regard to climate-related risks.

In addition, based on a recent survey of investors and analysts, nearly 90% indicated they use financial statements and related notes to understand how companies manage their risks and opportunities (including those related to climate change), with around 60% indicating that they use sustainability reports.³ The survey respondents also described some of the information they want companies to disclose, as shown below.⁴

73%

the cost to meet their sustainability commitments

70%

the effect of sustainability risks and opportunities on financial statement assumptions

69%

the relevance of sustainability factors to the business model

1. IFRS, *IFRS Practice Statement 2: Making Materiality Judgements*, September 2, 2017.

2. The letter was signed by the PRI, the UN Environment Program Finance Initiative, the UN-convened Net-Zero Asset Owner Alliance, the Institutional Investors Group on Climate Change, Investor Group on Climate Change, the Asia Investor Group on Climate Change, and the Pensions and Lifetime Savings Association.

3. PwC, *PwC’s Global Investor Survey 2022*, February 2023.

4. Sustainability commitments, risks, and factors include those related to climate change.

the directors indicated they are only moderately or not at all effective at integrating climate-related issues into company strategy and governance.⁹¹ In addition, based on a global survey of over 350 audit committee members and chairs, nearly half of the respondents said they do not consider their audit committees to have the resources or background needed to address climate-related issues effectively. Thirty-four percent (34%) of respondents stated that their biggest challenge in overseeing climate change is a shortage of people with the requisite experience and knowledge.⁹²

Companies that do not have sufficient expertise on climate-related issues across the organization — at the staff level; in business lines, finance, and internal audit; among senior management; and on the board of directors — may be at risk of underestimating the impact of climate-related issues on their businesses, strategies, and financial planning, including the impact on their financial statements. For example, companies with senior management and boards of directors that lack sufficient expertise on climate change issues and their implications could result in relevant climate-related issues not receiving the appropriate level of assessment

and consideration. For companies with material climate-related risks, this could result in not accounting for impairment or provisions related to climate factors, potentially affecting the quality, accuracy, and completeness of such companies’ financial statements.

External auditors also play an important role in the context of companies’ financial statements as they may be required to conduct independent assessments of those financial statements and related disclosures and consider whether there is any key information missing — including related to climate-related issues — that could bear on whether the disclosures are fairly presented and free of material misstatement. As a result, it is equally important that the external auditors have sufficient expertise on issues related to climate change.

Data and System-Related Issues

Complete, accurate, and reliable data are critical inputs for companies when preparing their financial statements and, ultimately, disclosing decision-useful information investors and others rely on when making financial decisions. In the ACCA global survey of accountancy and financial professionals mentioned

⁹¹ Boston Consulting Group, *Directors Can Up Their Games on Environmental, Social and Governance Issues*, March 30, 2022. Another study based on U.S. companies found that 47% of executives said their boards of directors have poor climate expertise (PwC, *Board Effectiveness: A Survey of the C-Suite*, May 2023).

⁹² Deloitte, *The Audit Committee Frontier – Addressing Climate Change*, November 2021.

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previously, 28% of respondents indicated one of the barriers preventing finance teams from supporting organizations in addressing climate-related issues was “poor data to work with.” In addition, a study by the U.K. Financial Reporting Council Lab found that the production of ESG data (including climate-related data) used for financial reporting as well as other purposes is associated with several challenges.⁹³ The study noted challenges related to obtaining data from third-party suppliers, the manual input of data and associated risk of human error, and the inconsistency of data resulting from differences in jurisdictional requirements. As an example, collecting data on Scope 3 GHG emissions and ensuring its quality poses a significant challenge for some companies, as most of these GHG emissions are from activities not under the companies’ ownership or direct control.⁹⁴

Another data issue relates to market prices that may not fully reflect climate-related physical and transition risks. Under IFRS standards, companies are required to report certain assets and liabilities in their financial statements at fair value. In measuring the fair value of a company — or its assets or liabilities, IFRS 13 requires that companies prioritize the use of unadjusted market prices (e.g., prices quoted on a stock exchange) over unobservable ones (e.g., prices that cannot be verified with external sources but were developed internally by companies to reflect their own assumptions).⁹⁵ However, as highlighted in a 2022 study, while climate-related risks are starting to be reflected in market prices, concerns are growing that current market prices do not fully reflect the risks.⁹⁶ In addition, a survey of investment professionals in 20 jurisdictions managing \$34.5 trillion of investments found that the majority of participants believed climate-related issues are not adequately incorporated into market prices.⁹⁷ Requirements to use market prices for assets and liabilities — despite such prices not fully reflecting the impact of climate-related issues — may lead to valuations in financial statements that do not fully reflect such issues.

Moreover, the systems for climate-related and other ESG data have likely been used for a

different purpose than those used for financial data and, therefore, are not necessarily subject to internal controls intended to ensure the integrity of the information.⁹⁸ For example, collecting and maintaining climate-related and other ESG data may be siloed within business units or functions with little governance or formal processes supporting them. In addition, the data collected may not be defined clearly or consistently across a company, leading to differences in the types of information collected and inability to aggregate the information. These types of issues can pose challenges to using climate-related data in the same way financial data are used.

3. RESOURCES ON CLIMATE-RELATED ISSUES IN FINANCIAL STATEMENTS

This subsection summarizes an IASB project on climate-related risks in financial statements as well as guidance published by standard setters, regulators, and other organizations that may be helpful for companies in considering the impact of climate-related issues in their financial statements based on current accounting standards.

IASB Project

In March 2023, the IASB announced a project to explore whether and how companies’ financial statements can provide better information about climate-related risks. As part of the announcement, the IASB indicated stakeholders have asked the following questions:

- Why do companies that are expected to be affected by climate-related risks not provide information about these effects in their financial statements?
- Why do companies that have made net-zero commitments not recognize liabilities or impair the value of their assets as a result of those commitments?
- How should companies factor long-term uncertainties into the measurement of amounts in the financial statements?⁹⁹

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⁹³ Financial Reporting Council Lab, *Improving ESG Data Production*, August 2022.

⁹⁴ World Resources Institute and World Business Council for Sustainable Development, *The Corporate Value Chain (Scope 3) Accounting and Reporting Standard*, April 16, 2013.

⁹⁵ IFRS, *IFRS 13 Fair Value Measurement*, May 2011.

⁹⁶ Bank for International Settlements, *BIS Papers No 130 Pricing of Climate Risks in Financial Markets: A Summary of the Literature*, December 9, 2022.

⁹⁷ KPMG, “*Can Capital Markets Save the Planet*,” October 28, 2021.

⁹⁸ Financial Reporting Council, *FRS Statement of Intent on Environmental, Social and Governance Challenges*, July 2021.

⁹⁹ IFRS, “*Connectivity in Practice: The IASB’s New Project on Climate-Related Risks in the Financial Statements*,” March 23, 2023.

As part of the project, the IASB indicated it would explore the nature and causes of stakeholder concerns about the reporting of climate-related risks in the financial statements, which would help inform appropriate actions to take. It further noted that one of the causes of those concerns could be that investors' information needs go beyond the objective of financial statements and that such information needs are outside the scope of the project. It indicated the ISSB's climate-related standard addresses these information needs.

In September 2023, the IASB provided an update on the project, indicating that the project objective was expanded to cover reporting on the effects of uncertainties more broadly (rather than just climate-related uncertainties).¹⁰⁰ The IASB also indicated it would explore 1) whether to create examples to illustrate how to apply requirements in IFRS accounting standards to reporting the effects of climate-related and other uncertainties and 2) clarifying or enhancing requirements in IFRS accounting standards in relation to disclosing information about estimates.

Guidance on Climate-Related Issues in Financial Statements

Effects of Climate-Related Matters on Financial Statements (Republished July 2023): IFRS educational material that reminds stakeholders of the long-standing requirements in IFRS accounting standards to report on the effects of climate-related matters in the financial statements when those effects are material.

IFRS for SMEs® Accounting Standard (May 2023): IFRS educational material similar to the *Effects of Climate-Related Matters on Financial Statements* but tailored to entities that do not have public accountability and publish general purpose financial statements for external users.

Intersection of Environmental, Social and Governance Matters with Financial Accounting Standards (March 2021): Financial Accounting

Standards Board educational material that provides investors and other interested parties with an overview of the intersection of ESG matters with financial standards. It also provides examples of how an entity may consider the effects of material ESG matters when applying current accounting standards.

CRR Thematic Review of TCFD Disclosures and Climate in the Financial Statements (July 2022): U.K. Financial Reporting Council report describing results of a thematic review of 1) TCFD disclosures and 2) climate-related reporting in the financial statements of 25 listed companies. The report includes examples of disclosure that show good practices and areas that need further improvement.

Accounting for Climate (December 2020): Climate Disclosure Standards Board guidance on integrating climate-related matters into the financial statements.

4. EXAMPLES OF CLIMATE-RELATED DISCLOSURES IN FINANCIAL STATEMENTS

This subsection includes examples of disclosure contained in financial statements. The Task Force sought to include examples that cover some of the standards described above, such as IAS 36 *Impairment of Assets* and IAS 16 *Property, Plant and Equipment*. The examples included contain primarily qualitative information and are not intended to represent "best practice" or demonstrate disclosures that meet the associated accounting standards. Instead, the examples are provided because they may be useful to other companies to assess and incorporate the impact of climate-related issues into their financial statements.

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¹⁰⁰ IFRS, "Climate-Related and Other Uncertainties in the Financial Statements," Accessed September 27, 2023.

Figure B3 shows an extract from the financial statements of a British mining and mineral resources company describing the sensitivity testing of cash-flows performed to assess the

impairment of certain assets under a scenario they consider to be Paris-aligned (namely, the “Aspirational Leadership” scenario).

Figure B3 Use of Sensitivities to Paris Aligned Accounting

Under the Aspirational Leadership scenario, which is not used in the preparation of these financial statements, nor for budgeting purposes, the economic performance of copper and aluminium is expected to be stronger under supply and demand forward pricing curves which we believe will be consistent with the Paris Agreement. It is possible therefore, under the right conditions, that historical impairments associated with these assets could reverse. We recognised an impairment of US\$202 million during the year for the Boyne smelter cash-generating unit, triggered by economic and operating performance of the smelter (note 4). When measuring the recoverable amount for this cash-generating unit we utilised net present value of cash flows to the end of the existing joint venture agreements in 2029, which also coincides with the Group’s targeted carbon emission reductions by 2030. The Group continues to evaluate lower emission power solutions for the smelter that could extend its life to at least 2040. In such circumstances, the net present value of forecast future cash flows could support the reversal of past impairments. Both the recorded outcome and the sensitivity represent a reduction in emissions that we considered to be Paris-aligned.

In the Aspirational Leadership scenario the prices for lower-grade iron ore are supported in the medium term by an assumed underlying increase in GDP-driven demand. However, in the longer term we assume the pricing for lower grade iron ore to be weaker than in our core scenarios. This will depend on the development of low-emissions steel technology, the pace of which is uncertain, but is expected to be offset by higher prices for higher-grade iron ore. This is unlikely to give rise to impairment triggers for 2022 or in the foreseeable future due to the high returns on capital employed in the Pilbara.

Rio Tinto, *Annual Report*, p. 154
Note: Some content was reformatted in order to fit the page.

Figure B4 shows an extract from note 8 to the financial statements of a British industrials company describing the impairment testing of

intangible assets (including goodwill) for their relevant cash-generating units (CGUs) in a 1.5°C scenario.

Figure B4 Impairment Testing of Intangible Assets

The Group believe there are significant business growth opportunities to come from Rolls-Royce playing a leading role in the transition to net zero, whilst at the same time climate change poses potentially significant risks. The assumptions used by the Directors are based on past experience and external sources of information. The main climate-related areas that have been considered are the risk that regulatory changes could materially impact demand for its products (and hence the utilisation of the products whilst in service and their useful lives) and shifting investment focus towards more sustainable products and solutions. Based on the climate scenarios prepared, the forecasts do not assume a significant deterioration of demand for Civil Aerospace (including Rolls-Royce Deutschland) programmes given that all commercial aero-engines will be compatible with sustainable fuels by the end of 2023. Similarly, the most popular reciprocating engines in Power Systems will be compatible with sustainable fuels by the end of 2023. The investment required to ensure our new products will be compatible with net zero operation by 2030, and to achieve net zero scope 1 and 2 GHG emissions is reflected in the forecasts used.

A 1.5°C scenario has been prepared using key data points from external sources including Oxford Economics, Global Climate Service and Databank and the International Energy Agency. This scenario has been used as the basis of a sensitivity. It is assumed that governments adopt stricter product and behavioural standards and measures that result in higher carbon pricing. Under these conditions it is assumed that markets are willing to pay for low carbon solutions and that there is an economic return from strategic investments in low carbon alternatives. The sensitivity has considered the likelihood of demand changes for our products based on their relative fuel efficiency in the marketplace and the probability of alternatives being introduced earlier than currently expected. The sensitivity also reflects the impact of a broad range of potential costs imposed by policy or regulatory interventions (through carbon pricing). This sensitivity does not indicate the need for an impairment charge.

Rolls Royce plc, *Annual Report and Audited Financial Statements*, p. 82
Note: Some content was reformatted in order to fit the page.

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Figure B5 shows an extract from the note 13 to the financial statements of an Australian resources company describing the assessment of indicators of impairment or impairment reversal of non-current assets including impacts from risks related to climate change and the transition to a low carbon economy.

Figure B5
Estimation of Useful Lives of Property, Plant, and Equipment

Key judgements and estimates

Judgements: Assessment of indicators of impairment or impairment reversal and the determination of CGUs for impairment purposes require significant management judgement.

Indicators of impairment may include changes in the Group's operating and economic assumptions, including those arising from changes in reserves or mine planning, updates to the Group's commodity supply, demand and price forecasts, or the possible additional impacts from emerging risks including those related to climate change and the transition to a low carbon economy.

Climate change

Impacts related to climate change and the transition to a low carbon economy may include:

- demand for the Group's commodities decreasing, due to policy, regulatory (including carbon pricing mechanisms), legal, technological, market or societal responses to climate change, resulting in a proportion of a CGU's reserves becoming incapable of extraction in an economically viable fashion
- physical impacts related to acute risks resulting from increased frequency or severity of extreme weather events, and those related to chronic risks resulting from longer-term changes in climate patterns

The Group's assessment of the potential impacts of climate change and the transition to a low carbon economy continues to mature. As outlined in the Basis of Preparation, where sufficiently developed, the potential financial impacts on the Group of climate change and the transition to a low carbon economy have been considered in the assessment of Indicators of impairment, including:

- the Group's current assumptions relating to demand for commodities and carbon pricing, including their impact on the Group's long-term price forecasts
- the Group's operational emissions reduction strategy

Estimates: The Group performs a recoverable amount determination for an asset or CGU when there is an indication of impairment or impairment reversal.

When the recoverable amount is measured by reference to FVLCD, in the absence of quoted market prices or binding sale agreement, estimates are made regarding the present value of future post-tax cash flows. These estimates are made from the perspective of a market participant and include prices, future production volumes, operating costs, capital expenditure, closure and rehabilitation costs, taxes, risk factors applied to cash flows and discount rates. The cash flow forecasts may include net cash flows expected from the extraction, processing and sale of material that does not currently qualify for inclusion in ore reserves. Reserves and resources are included in the assessment of FVLCD to the extent that it is considered probable that a market participant would attribute value to them.

When recoverable amount is measured using VIU, estimates are made regarding the present value of future cash flows based on internal budgets and forecasts and life of asset plans. Key estimates are similar to those identified for FVLCD, although some assumptions and values may differ as they reflect the perspective of management rather than a market participant.

All estimates require management judgements and assumptions and are subject to risk and uncertainty that may be beyond the control of the Group; hence, there is a possibility that changes in circumstances will materially alter projections, which may impact the recoverable amount of assets/CGUs at each reporting date. While no indicators of impairment, or impairment reversal, were identified across the Group's CGUs at 30 June 2022, with the exception of the Cerro Colorado CGU, the carrying value of the Spence CGU is the most susceptible to changes in the significant estimates outlined below in the next reporting period.

BHP, *Annual Report*, p. 155

Notes: Abbreviations used include CGU for cash generating units, FVLCD for fair value less cost of disposal, and VIU for value in use. Some content was reformatted in order to fit the page.

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Figure B6 shows an extract from note 1.5 to the financial statements of a British power generation company describing the estimation of the useful lives of assets considering factors arising from climate transition.

Figure B6 Estimation of Useful Lives of Property, Plant and Equipment

Property, plant and equipment represents a significant proportion of the asset base of the Group, primarily due to power plants owned, being 59.6% (2021: 63.2%) of the Group's total assets. Estimates and assumptions made to determine their carrying value and related depreciation are significant to the Group's financial position and performance. The annual depreciation charge is determined after estimating an asset's expected useful life and its residual value at the end of its life. The useful lives and residual values of the Group's assets are determined by management at the time the asset is acquired and reviewed annually for appropriateness. The Group derives useful economic lives based on experience of similar assets, including use of third party experts at the time of acquisition of assets, and these lives may exceed the period covered by contracted power purchase agreements.

Emerging governmental policies are also considered when reviewing the appropriateness of useful economic lives, including whether asset life assessments could be impacted by factors arising from climate transition or other regulatory and market factors. This includes consideration of government energy transition policies, and how our thermal assets are expected to be used, in particular to provide a secure supply during a medium to long-term transition to renewables. In particular, during 2022 the expiration of the Maritsa PPA in February 2024 was considered together with the emerging geopolitical issues and the continued high dependency on the asset in the region which outweigh the climate transition factors in the short to medium term. As a result, during the year, the useful life of the asset was increased. The impact on depreciation was not material.

A decrease in the average useful life by one year in power plant assets would result in a decrease in the net book value of \$16.0 million (2021: \$21.1 million).

ContourGlobal Limited, *Annual Report and Financial Statements*, p. 69
Note: Some content was reformatted in order to fit the page.

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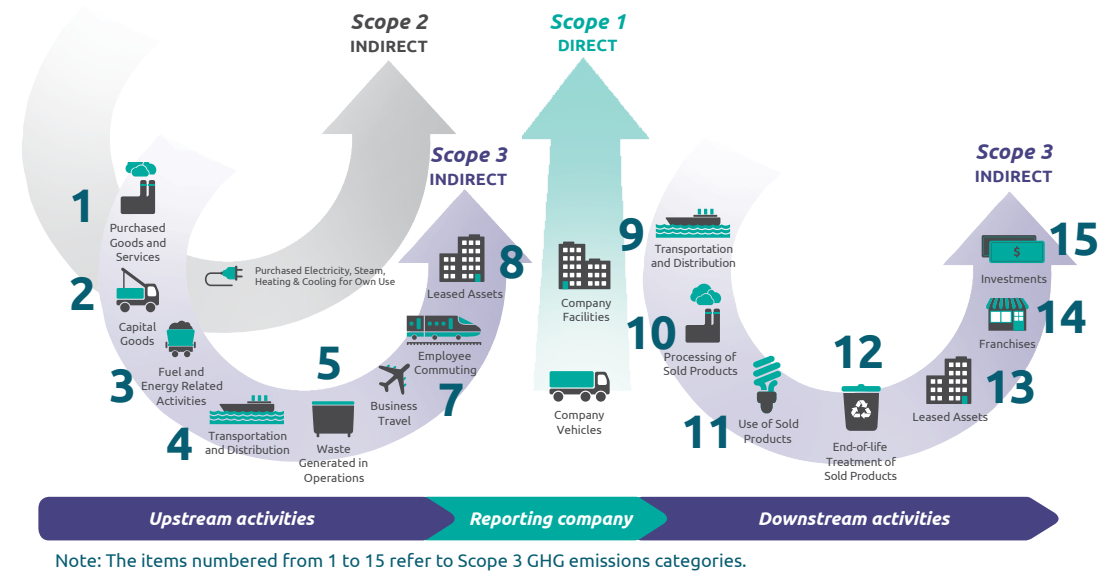
In October 2021, the Task Force published guidance on metrics, targets, and transition plans in which it encouraged all companies to report their Scope 3 GHG emissions (see [Box C1](#)).¹⁰¹ The Task Force noted growing demand for

Scope 3 GHG emissions by investors and other users for financial decision-making but also recognized there are challenges associated with disclosing this information — including data and methodological challenges.¹⁰²

Box C1

Scope 3 GHG Emissions Categories

Based on the GHG Protocol Corporate Accounting and Reporting Standard, Scope 3 GHG emissions are those that occur in the value chain of a company. Under this standard, Scope 3 GHG emissions can be broken down into 15 categories, as shown below.



Adapted from World Resources Institute and World Business Council for Sustainable Development, *The Corporate Value Chain (Scope 3) Accounting and Reporting Standard*, April 16, 2013

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As part of its efforts to support companies in implementing its recommendations, the Task Force worked with five companies to develop case studies describing their respective approaches to estimating and disclosing Scope 3 GHG emissions, including the challenges they face.¹⁰³ In the case studies that follow, the companies highlight challenges related to the limited availability of supplier- or customer-

specific GHG emissions data, costs associated with making GHG emissions estimates, double counting of GHG emissions, and accuracy of assumptions related to downstream processing and end-of-life of products. The Task Force believes the case studies offer insights that may be useful to other companies as they face similar challenges in estimating and disclosing Scope 3 GHG emissions.

Key Takeaways



Scope 3 GHG emissions are often a significant portion of companies' GHG emissions inventories and represent an important driver of climate-related issues.

¹⁰¹ TCFD, *Guidance on Metrics, Targets, and Transition Plans*, October 14, 2021.

¹⁰² In a 2022 TCFD survey, 71% of companies indicated disclosing Scope 3 GHG emissions was difficult, with data collection in the value chain noted as a challenge (TCFD, *2022 Status Report*, October 13, 2022). Similarly, in a survey conducted by the SBTi, 85% of respondents that estimated Scope 3 GHG emissions highlighted data access as a challenge (SBTi, *Catalyzing Value Chain Decarbonization*, February 2023).

¹⁰³ There is also a case study in [Section A.3. TCFD-Aligned Reporting by Asset Managers and Asset Owners](#) that covers Scope 3 GHG emissions.

Key Takeaways *(continued)*



For companies beginning to measure and report on Scope 3 GHG emissions, it may be helpful to develop initial estimates that can be improved over time.



Companies indicated continuous improvements to their systems and processes; coordination with various internal teams; engagement with companies in the value chain; and active participation in industry initiatives on GHG emissions measurement are important to overcome the various challenges related to Scope 3 GHG emissions measurement and to achieve reliable and comprehensive reporting.

Case Study by a Resources Company

BHP is a resources company headquartered in Melbourne, Australia. We operate globally across a range of commodities, including iron ore, copper, nickel, and metallurgical and thermal coal, and are working toward our first potash production.

We have long been focused on the business implications of climate change and on communicating those implications and our response to our investors and other stakeholders. For example, we released our *Climate Change: Portfolio Analysis* in September 2015 to provide investors with more information regarding how climate-related risk might affect our portfolio and our response to climate change.^{104,105} In addition, we were one of the first companies to align our climate-related disclosures with the recommendations of the Task Force, of which our Group Climate Change and Sustainability Officer, Dr. Fiona Wild, has been a member since its inception in late 2015. In fact, we have been reporting in line with the Task Force’s 11 recommended disclosures since they were released in 2017. More recently, we published our Climate Transition Action Plan (CTAP) in 2021, which outlines our approach to the reduction of GHG emissions and managing climate-related risks for our operations and in our global value chain.¹⁰⁶ The latest updates on our CTAP progress are available in our Annual Report 2022.¹⁰⁷

Our broader corporate strategy defines our approach to decarbonization, which includes pursuit of our long-term goal of net-zero Scope 3 GHG emissions by 2050. Downstream Scope 3 GHG emissions are the largest contributor to

our GHG emissions inventory and achievement of our goal is uncertain, particularly given the challenges of a net-zero pathway for our customers in steelmaking. It is, therefore, of particular importance for us to report on Scope 3 GHG emissions. Engaging with our value chain is also important as we cannot ensure the outcome of our long-term goal alone. In the sections that follow, we describe key aspects of — and lessons learned from — our efforts to improve our disclosures with respect to Scope 3 GHG emissions.

Our Approach to Scope 3 GHG Emissions Disclosures and Challenges Faced

We disclose both upstream and downstream Scope 3 GHG emissions in our Annual Report. Downstream GHG emissions disclosures include Processing of Sold Products (category 10) and Use of Sold Products (category 11).¹⁰⁸ Scope 3 GHG emissions from third-party processing of our products (predominantly iron ore and metallurgical coal for steelmaking) are the most material, constituting approximately 76% of our total reported Scope 3 GHG emissions inventory in financial year (FY) 2022 (see [Figure C1](#), p. 66). Use of Sold Products comprises mainly combustion of sold energy coal, post the merger of our petroleum business. The remaining GHG emissions in this category are anticipated to decrease significantly following the anticipated closure of our energy coal mine in New South Wales, Australia, by the end of FY 2030. To highlight our commitment to transparency — one of the key principles of the GHG Protocol — we publish a detailed methodology that provides information on Scope 3 GHG emission calculations and assumptions.¹⁰⁹

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¹⁰⁴ BHP, *Climate Change: Portfolio Analysis*, September 29, 2015.

¹⁰⁵ We have also provided periodic updates on this information since then. For example, see BHP, *Climate Change: Portfolio Analysis – Views after Paris*, October 11, 2016 and BHP, *Climate Change Report 2020*, February 2020.

¹⁰⁶ BHP, *Climate Transition Action Plan 2021*, September 14, 2021.

¹⁰⁷ BHP, *Annual Report 2022*, September 6, 2022.

¹⁰⁸ World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD), *Technical Guidance for Calculating Scope 3 Emissions*, April 23, 2013.

¹⁰⁹ BHP, *Scope 1, 2 and 3 GHG Emissions Calculation Methodology 2022*, September 6, 2022.

Figure C1

Breakdown of Our Scope 3 GHG Emissions by Category in FY 2022 Disclosures

Scope 3 GHG emissions by category (MtCO₂-e)¹

Year ended 30 June	2022	2021	2020
Upstream			
Purchased goods and services (including capital goods) ²	9.9	10.1	9.8
Fuel and energy related activities	1.0	1.1	1.2
Upstream transportation and distribution ³	4.6	4.8	4.6
Business travel ⁴	0.1	0.1	0.1
Employee commuting ⁴	0.3	0.4	0.2
Downstream			
Downstream transportation and distribution ⁵	3.2	3.1	2.9
Investments (i.e. our non-operated assets) ⁶	2.7	2.7	2.7
Processing of sold products⁷			
GHG emissions from steelmaking ⁸	305.3	300.5	292.9
– Iron ore processing to crude steel	270.8	260.7	252.8
– Metallurgical coal processing to crude steel ⁹	34.5	39.8	40.1
Copper processing ¹⁰	1.0	1.0	1.0
Nickel processing ¹¹	0.3		
Total processing of sold products	306.7	301.5	294.0
Use of sold products			
Energy coal ^{12,13}	37.6	38.3	56.4
Natural gas ¹³	17.4	19.5	20.6
Crude oil and condensates ¹³	15.9	16.8	17.9
Natural gas liquids ¹³	1.7	1.8	1.9
Total use of sold products	72.6	76.4	96.8
Total Scope 3 GHG emissions	401.2	400.1	412.3
Total Scope 3 GHG emissions (adjusted for divested operations)¹⁴	364.3	359.7	369.5

BHP, *Annual Report 2022*, pp. 50–51

Note: Footnotes 1–14 can be found in BHP's 2022 Annual Report.

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Our approach to calculating Scope 3 GHG emissions is aligned with the GHG Protocol. We calculate GHG emissions from Processing of Sold Products by each of our significant commodities. We also make assumptions on the most common process type the significant commodities can go through and the associated industry-average GHG emission factor per input volume of our commodity.¹¹⁰ The commodities not covered have comparably lower volumes — and associated GHG emissions — and the variety of end uses associated with these commodities means applying a meaningful average GHG emission factor is challenging.

The following paragraphs describe an example of how we calculate GHG emissions from the processing of iron ore to steel. For calculation of Processing of Sold Products, we use the “average-data” method outlined in the Technical Guidance for Calculating Scope 3 Emissions, which involves applying industry average emission factors to production volumes for each commodity to determine a GHG emissions estimate.¹¹¹ As part of our annual reporting, we obtain independent limited assurance over certain sustainability data and disclosures in our Annual Report, which includes Scope 3 GHG emissions and the calculation approach.¹¹²

¹¹⁰ For example, we use data from the International Energy Agency's *Iron and Steel CCS Study*, April 2013 and *Iron and Steel Technology Roadmap*, October 2020. For details, refer to pages 18 and 19 and Appendix 1 in *BHP Scope 1, 2 and 3 GHG Emissions Calculation Methodology 2022*, September 6, 2022.

¹¹¹ WRI and WBCSD, *Technical Guidance for Calculating Scope 3 Emissions*, April 23, 2013.

¹¹² Refer to Independent Assurance Report in section 7.19 of our *Annual Report 2022* for further details.

Example Calculation: GHG Emissions from Steelmaking

Most steelmaking by our customers occurs through a process that follows the blast furnace-basic oxygen furnace (BF-BOF) route.¹¹³ We estimate the volume of crude steel that can be produced from our iron ore and apply the International Energy Agency's (IEA's) industry average GHG emission factor per ton of crude steel for the BF-BOF route. This GHG emission factor may not accurately represent (geographically, technologically, or temporally) the actual GHG emissions intensities of our customers' facilities, but it is considered sufficiently representative of average industry conditions to provide a meaningful estimation.

We have entered several collaborative partnerships with customers and research institutions to support the trial and piloting of solutions designed to reduce the GHG emissions intensity of existing steelmaking routes — and to help support the establishment of low-emission production routes. We are also currently working with our customers in the steel sector to understand their ability to provide GHG emission factors to allow us to improve the accuracy of our calculations over time. Some of the challenges associated with a more accurate calculation include GHG emissions measurement capability and maturity in our customer locations, commercial and confidentiality concerns regarding data sharing, and the potential for inconsistent measurement approaches to be applied across our customer base.

Another challenge in the calculation of Scope 3 GHG emissions from steelmaking is the overlap of reporting boundaries. In addition to iron ore, steel production from the BF-BOF process route consumes metallurgical coal as an input, a portion of which is also produced by BHP. Therefore, some form of allocation of GHG emissions is needed to avoid double counting within the Scope 3 GHG emissions inventory for these two commodities. Currently, no guidance exists on how to manage this allocation, however we have approached this by an apportionment of the steelmaking Scope 3 emissions based on the mass ratio of iron ore and metallurgical coal needed to produce a ton of crude steel.

Developing Industry-Specific Guidance

The lack of industry-specific guidance on Scope 3 GHG emissions calculation is a key challenge for us. At the time of this report, there is no

GHG Protocol Scope 3 guidance specific to the mining industry, and the general guidance has sometimes been difficult to apply to our particular circumstances. For example, some of our products have a number of potential downstream applications, each of which will have a different GHG emissions profile — and the eventual end uses of our products may be unknown. In these cases, we must make various assumptions about the most likely processing route or end use and, in doing so, unavoidably introducing an additional source of uncertainty into our reported Scope 3 GHG emissions inventory. To improve consistency of reporting across the industry on these issues, we are now working with the International Council of Mining and Metals to develop supplementary guidance.

Lessons Learned

We have learned that improving the accuracy of disclosures — in addition to efforts by our customers and suppliers to reduce Scope 3 GHG emissions — has, and will continue to, require time. A large share of our reported Scope 3 GHG emissions inventory comes from processes that are considered hard-to-abate (particularly steelmaking and shipping) and will require investment in research, early pilots, and commercial trials intended to bring low-emission solutions to maturity. In these industries, investment now is crucial. Steelmaking assets are capital-intensive and have a long life, so opportunities for substantial decarbonization exist primarily in two timeframes — when a new asset is built or when an asset undergoes major refurbishment, which typically occurs 15 to 20 years into its operational life. For these reasons, early investment in pilots and trials to decarbonize the steelmaking industry may not achieve material GHG emissions reductions for decades to follow. We also know that measurement improvements are vital to accurately account for Scope 3 GHG emissions reductions in the value chain. It is challenging both to influence Scope 3 GHG emissions reductions in the value chain and to see improvement in the accuracy of Scope 3 GHG emissions measurement. To manage these challenges, we have learned to prioritize wherever our efforts can have the highest potential impact.

To support both improved data accuracy and progress towards GHG emissions reduction, engagement across the value chain is required to align incentives. We have learned that the most impactful partnerships can be created where the source of Scope 3 GHG emissions

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¹¹³ See the following to learn more about different steelmaking processes: World Steel Association, *The Steelmaking Process*, January 23, 2022.

in our inventory is material and where we have influence — which depends both on our leverage in the value chain and the maturity of the value chain. The maturity of the value chain in relation to climate-related issues differs between industries. Both materiality and influence must be considered in order to evaluate the potential impact that can be achieved. For example, we are a major charterer of ships and — although this is a less-material Scope 3 GHG emissions source for us than steelmaking — we can have a significant influence on the industry through our procurement decisions and vessel selection. We have implemented a decision support and reporting system that allows us to take into account GHG emissions in our vessel selection criteria. We also look for opportunities to influence progress towards the decarbonization of the shipping industry by tendering for new and emerging low-emissions vessels and fuels. This helps to provide a demand signal and supports the industry in overcoming commercial barriers.

Finally, we have learned that — in addition to alignment of value chain incentives — alignment with both internal and external stakeholders such as investors is important. Management of our approach to Scope 3 GHG emissions occurs across lines of business, markets, and functions. We have therefore made a targeted effort to build capacity around climate-related issues in the organization and with our external stakeholders. It has proven important to engage with senior management across relevant functions as well as our external stakeholders as early as possible to ensure everyone is aligned in their understanding of the risks and challenges associated with Scope 3 GHG emissions, in terms of both reporting and achieving our reduction goals. It is becoming increasingly important that people throughout our organization continue to build their

knowledge and closely monitor climate-related developments in order to understand where they can have the most influence in their role.

Case Study by a Global Risk Assessment Firm

Moody's is an integrated risk assessment firm that provides credit ratings, risk analysis, research, and other services. We have set and validated near- and long-term net-zero targets with the goal of achieving decarbonization across our value chain. As such, our targets are centered on reducing all three scopes of our GHG emissions and increasing the proportion of suppliers that have set science-based targets.¹¹⁴ For example, we set a target that 60% of the suppliers of our purchased goods and services — by spend — have science-based targets by 2025.^{115,116} See [Figure C2](#) (p. 69) for more detail on our targets.

Our response to the TCFD recommendations followed the initial confirmation of support signed by our Chief Executive Officer and Chief Financial Officer in June 2017; and Richard Cantor, Vice Chairman of Moody's Investors Service, serves as a member of the Task Force. We have been disclosing in line with the TCFD recommendations — including our GHG emissions inventory — since then. Our annual disclosures of the GHG emissions inventory are important to support the achievement of our targets. We disclose our GHG emissions inventory through our Stakeholder Sustainability Report, TCFD Report, and response to the CDP Climate Change questionnaire.¹¹⁷ Scope 3 GHG emissions comprise 99% of our total Scope 1, 2, and 3 GHG emissions inventory (see [Figure C3](#), p. 69, for disclosure of our GHG emissions). Our most material category of Scope 3 GHG emissions is category 1, Purchased Goods and Services. As a result, supplier data are a key area of focus in our disclosures.

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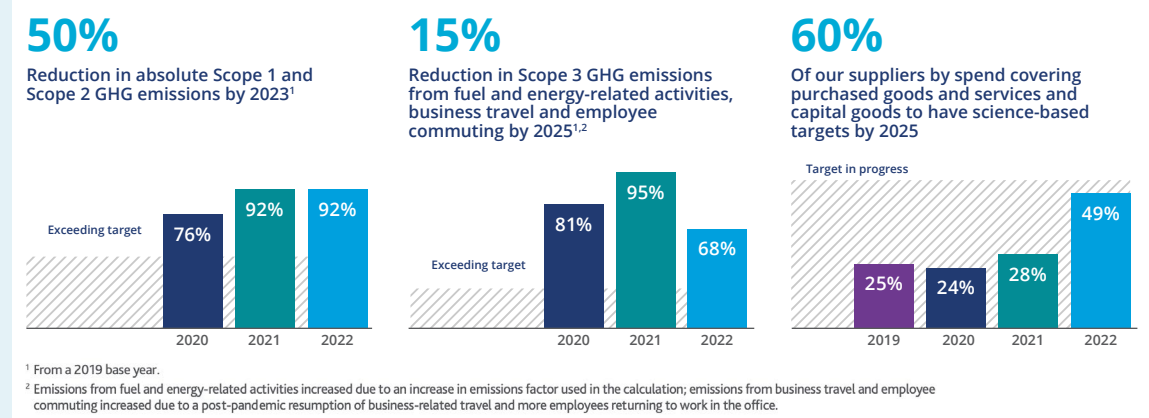
¹¹⁴ We also have carbon offset projects that were chosen based on funding certified projects, the geographies where we operate, and alignment with the Sustainable Development Goals. Although carbon offsets neither reduce our own carbon footprint nor are considered in our net-zero target, they do support voluntary carbon market development and reduction of GHG emissions elsewhere in the global economy.

¹¹⁵ We are also targeting 15% Scope 3 GHG emissions reductions in the categories of fuel and energy-related activities, business travel, and employee commuting. Actions to achieve this include the following: 1) lower business travel by imposing an internal carbon price on air travel, 2) lower employee commuting by implementing a hybrid work model and supporting work-from-home capabilities, and 3) reduce fuel and energy-related activities that cause GHG emissions by implementing initiatives that promote energy efficiency across our global real estate portfolio and to procure 100% renewable electricity for global operations.

¹¹⁶ GHG emissions and targets are calculated in accordance with the [GHG Protocol Reporting Standard](#) and the [SBTi guidance](#) — and are externally validated in accordance with the latest SBTi Target Validation Protocol.

¹¹⁷ See Moody's, [2022 Stakeholder Sustainability Report](#), May 3, 2022; Moody's, [2022 TCFD Report](#), April 19, 2023; and Moody's, [Moody's Corporation 2022 CDP Response](#), July 28, 2022.

Figure C2
Our Science-Based Targets



Moody's, *2022 Stakeholder Sustainability Report*, p. 25
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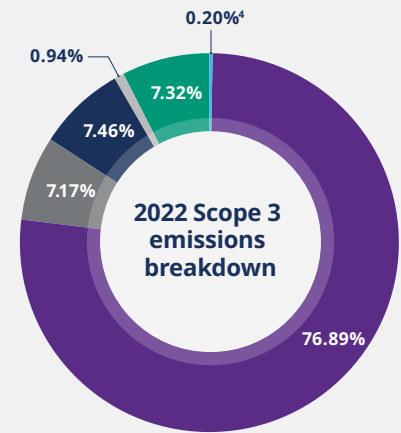
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Figure C3
Our Total Absolute GHG Emissions

GHG emissions (mtCO₂e)

	2019	2020	2021	2022
Scope 1	1,744	919	851	810
Scope 2 market-based²	13,591	2,745	432	440
Scope 3	171,260	112,158	121,290	137,981
● Purchased goods and services	122,500	86,000	102,900	106,100
● Capital goods	5,600	12,200	7,900	9,900
● Business travel	23,100	3,300	1,480	10,300
● Employee commuting	10,400	3,100	208	1,300
● Investments	6,100	6,900	8,500	10,100
● Other³	3,560	658	302	281
Total Scope 1, Scope 2 market-based, Scope 3	186,595	115,822	122,573	139,231



¹ [...]

² Scope 2 location-based emissions were as follows: 2022 – 7,696 mtCO₂e, 2021 – 6,878 mtCO₂e, 2020 – 8,767 mtCO₂e and 2019 – 14,035 mtCO₂e.

³ Other includes fuel and energy-related activities (2022 – 200 mtCO₂e, 2021 – 230 mtCO₂e, 2020 – 590 mtCO₂e and 2019 – 3,100 mtCO₂e) and waste generated in operations (2022 – 81 mtCO₂e, 2021 – 72 mtCO₂e, 2020 – 68 mtCO₂e and 2019 – 460 mtCO₂e).

⁴ Other includes fuel and energy-related activities (0.14%) and waste generated in operations (0.06%).

Moody's, *2022 TCFD Report*, p. 36

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Our Approach to Scope 3 GHG Emissions Disclosures and Challenges Faced

We calculate Scope 3 GHG emissions from our supply chain according to the GHG Protocol and use a methodology based on supplier-specific data, when available.¹¹⁸ We leverage

industry-based emissions factors to augment gaps in supplier-specific data. Doing so allows us to have more precise and complete data and aligns us with the GHG Protocol guidance on supply chain Scope 3 GHG emissions. It also enables us to effectively track progress on our decarbonization targets.

¹¹⁸ WRI and WBCSD, *Technical Guidance for Calculating Scope 3 Emissions*, April 23, 2013.

We measure supply chain Scope 3 GHG emissions for nearly 500 of our top suppliers — by spend — which jointly cover approximately 90% of our total spend. Our top 500 suppliers’ Scope 1, Scope 2, and upstream Scope 3 GHG emissions are calculated based on their CDP responses which are accessible in standardized data types. We attribute the company-level GHG emissions to our Scope 3 supply chain GHG emissions based on our spend. For suppliers that do not report to CDP, we use a spend-based methodology that estimates Scope 3 GHG emissions inventories by multiplying our spend with a particular supplier by inflation-adjusted industry-based GHG emissions factors that are sourced from the GHG Protocol Scope 3 Evaluator tool.¹¹⁹ Results from our top 500 suppliers are then extrapolated to our total spend.

Expansion of the Coverage of Suppliers

Since first reporting our supply chain Scope 3 GHG emissions in 2019, we have worked to improve our disclosures, the cornerstone of which has been expanding the coverage of supplier-specific GHG emission data across our supply chain. When we first began reporting supply chain Scope 3 GHG emissions, we collected supplier-specific data for our top 100 suppliers, which we increased to 500 in 2021. In the same year, we restated our Scope 3 GHG emissions for 2019 and 2020 to include our top 500 suppliers and merger and acquisition activity.

As we expanded our coverage of suppliers, mapping company names between our internal systems and the CDP database required manual effort. Given that many company names are coded in CDP differently from our internal systems, mapping our suppliers to the CDP database became a key challenge. Certain suppliers disclose through a parent company or by using identifying details — such as trade names — that may be entered differently in the CDP database. Our mapping allows us to partially automate the process, reducing the effort required in the future.

Identifying the most appropriate GHG emissions factor for the suppliers that do not report climate-related information requires manually identifying the most relevant industry GHG emissions factors. This involves categorizing each company with a North American Industry Classification System (NAICS) code, which classifies business activities across more than a thousand industries. This is

a time-consuming effort, and it can be difficult to evaluate what the most appropriate NAICS code for our suppliers’ activities are and match that with emissions factors.

Increased Use of Supplier-Specific Data

We are further making efforts to move from industry-based GHG emission factors to supplier-specific data in order to better track the progress of our suppliers’ GHG emissions. Increasing the use of supplier-specific data is challenging, as many suppliers do not report climate-related information. In particular, many smaller companies do not respond to CDP, as it can be a challenge to fill out the extensive questionnaire. It should also be noted that CDP’s data are at the company level; and product-level climate-related data are very scarce.

We actively engage with our suppliers to encourage them to respond to the CDP questionnaire so that we can leverage their specific emissions data. The engagement further aims to encourage suppliers to set science-based targets in line with our targets. In 2022, we engaged nearly 500 suppliers in partnership with CDP’s supply chain membership and conducted targeted engagement with suppliers that have the highest impact on our targets. In certain cases, this included incorporating language that addresses how to meet climate requirements in our contracts. Additionally, we arranged one-on-one discussions between key suppliers and leaders from our executive team.

We have also put in place internal policies and incentives that further advance our supply chain Scope 3 GHG emissions disclosures. For example, Moody’s Supplier Code of Conduct encourages suppliers to disclose their carbon footprint and set science-based targets of their own. Starting in 2022, sourcing managers — managers in our procurement function who are involved with sourcing vendors — are required to complete a responsible sourcing training module that focuses on how to incorporate responsible sourcing metrics, such as science-based targets, into contract decisions. Additionally, we provide incentives for certain employees to proactively manage and address climate-related issues.¹²⁰

Lessons Learned

In developing calculations for supply chain Scope 3 GHG emissions, we have come to realize how important it is for us to prioritize our efforts. In our first year in this endeavor,

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¹¹⁹ Quantis, “Scope 3 Evaluation Tool,” Accessed July 1, 2023.

¹²⁰ See Moody’s, *Moody’s Corporation 2022 CDP Response*, July 28, 2022 (pp. 7–8) for additional information about these incentives.

we prioritized collecting supplier-specific data and industry-based emission factors from our top 100 suppliers by spend. Since then, we have significantly increased the number of suppliers to cover 90% of our spend; however, we are not collecting GHG emissions data for all of them. That remaining share of suppliers comprises thousands of companies, and because collecting data for each of them would add only limited accuracy at a substantial effort. We instead cover these suppliers by extrapolating GHG emissions data from the other suppliers for which we have that information.

We have also learned that there can be a material difference between industry-based emission factors and reported GHG emissions from our suppliers. Effective supplier engagement to encourage transparency of GHG emissions is critical to improve our disclosures of supply chain Scope 3 GHG emissions and decarbonization actions such as science-based target setting — as decarbonization of our upstream Scope 3 GHG emissions depends on the actions of our suppliers.

This requires close collaboration between the procurement and sustainability teams, as the procurement team is best suited to engage with suppliers, while the sustainability team has specific expertise. It is important that the sustainability team provide the procurement team with a technical review and detailed documentation to guide the engagement.

Finally, it has become clear that the restating of Scope 3 GHG emissions due to changes in the organization or improvement of the methodology is a natural part of the process. We are continuously working on improving our disclosures, which in some years has required us to restate our disclosed Scope 3 GHG emissions. With clear explanations of the updates, our experience is that such restatements have been well-received by the stakeholders.

Case Study by a Global Automotive Group

FORVIA is a French-domiciled automotive group recently formed through the acquisition of HELLA by Faurecia. We produce vehicle interiors, seating systems, mobility systems, lighting, and electronics for automated vehicles that are produced and sold globally. Climate change is one of the more urgent disruptions the world is facing, and we believe that, as a

company, we play a key role in facing up to this challenge. We can have a positive impact on the planet through, for example, reducing our GHG emissions and offering solutions for sustainable mobility. We have committed to the Science Based Targets initiative's (SBTi's) most ambitious standard and are aiming to — by 2045 — reduce our absolute Scope 1, 2, and 3 GHG emissions by 90% from 2019. To support decisions in line with this commitment, we developed an internal carbon dioxide (CO₂) price in 2021.¹²¹

Scope 3 GHG emissions constitute the majority of our emissions and category 1, Purchased Goods and Services, is one of the more significant contributors to those emissions. Faurecia has been working with Ecovadis since 2017 for in-depth assessment of our suppliers' ethical, social, and environmental practices. This year, HELLA will be included in the scope of this assessment as well.

Faurecia has applied the TCFD framework in our climate-related disclosures since 2019. Accurate disclosures of GHG emissions are important for us to support the achievement of our decarbonization targets and inform business strategy. We further need to frequently update our GHG emissions — at least twice annually — in order to monitor performance. Manually calculating Scope 3 GHG emissions would be a time-consuming endeavor, as we have thousands of suppliers. We have therefore developed tools that automate certain calculations and parts of the data collection process for upstream Scope 3 GHG emissions. In the following pages, we describe how we developed these tools as well as the insights we have gained.

Our Approach to Scope 3 GHG Emissions Disclosures and Challenges Faced

FORVIA follows the GHG Protocol to quantify and categorize Scope 3 GHG emissions. We disclose our Scope 3 GHG emissions across all 15 categories of the GHG Protocol in our annual universal registration document, along with a qualitative estimate of uncertainty and a description of the methodologies used (see Figure C4, p. 72). Within our upstream Scope 3 GHG emissions, category 1, Purchased Goods and Services, and category 4, Upstream Transport and Distribution, are most significant.¹²²

FORVIA uses dedicated tools to collect data and calculate upstream Scope 3 GHG emission categories. To reduce the uncertainty of these calculations, it is necessary to collect primary

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¹²¹ FORVIA, *Sustainability Report 2021–22*, November 1, 2022.

¹²² WRI and WBCSD, *Technical Guidance for Calculating Scope 3 Emissions*, April 23, 2013.

Figure C4
Breakdown of Our Scope 3 GHG Emissions by Category

		2019 baseline		2021		2022		Level of uncertainty	
		Faurecia	FORVIA	Faurecia	FORVIA	Faurecia	FORVIA		
Scope 1	Scope 1 direct emissions	156,000	213,000	173,000	231,000	121,000	170,000	low	
	Scope 2 indirect emissions	707,000	992,000	526,000	804,000	478,000	660,000	low	
SCOPES 1 AND 2 (INTERNAL EMISSIONS)		863,000	1,205,000	699,000	1,035,000	599,000	830,000	LOW	
Scope 3	Upstream	Purchased goods and services	6,218,000	8,102,000	5,227,000	7,103,000	6,502,000	8,177,000	medium
		Capital goods	389,000	614,000	253,000	530,000	304,000	573,000	high
		Fuel & energy related emissions	245,000	359,000	208,000	319,000	203,000	302,000	low
		Upstream transport and distribution	783,000	944,000	909,000	1,094,000	1,079,000	1,262,000	medium
		Wastes generated	186,000	202,000	121,000	134,000	119,000	141,000	medium
		Business travel	68,000	76,000	18,000	20,000	42,000	50,000	medium
		Employee commuting	176,000	230,000	137,000	179,000	175,000	209,000	medium
	Downstream	Upstream leased assets	50,000	58,000	54,000	62,000	58,000	65,000	medium
		Downstream transport and distribution	118,000	167,000	112,000	168,000	127,000	183,000	medium
		Processing of sold products	85,000	278,000	73,000	239,000	81,000	275,000	high
		Products end of life	228,000	681,000	219,000	668,000	331,000	682,000	medium
		Downstream leased assets							N/A
		Franchises							N/A
		Investments	23,000	96,000	23,000	80,000	26,000	65,000	medium
SCOPES 1, 2 AND CONTROLLED SCOPE 3 (EXCLUDING THE USE OF PRODUCTS)		9,432,000	13,012,000	8,053,000	11,631,000	9,646,000	12,814,000	MEDIUM	
Uncontrolled	Use of products sold in the car	19,240,000	23,776,000	14,029,000	18,148,000	18,627,000	22,817,000	medium	
	SCOPE 3 TOTAL	27,809,000	35,583,000	21,383,000	28,744,000	27,674,000	34,801,000	MEDIUM	
	SCOPES 1, 2 AND 3 TOTAL	28,672,000	36,788,000	22,082,000	29,779,000	28,273,000	35,631,000	MEDIUM	

Forvia, 2022 Universal Registration Document, p. 330
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data at the most granular level possible. To do so, we use automated tools to collect primary and secondary data and perform GHG emissions calculations, applying proprietary methodologies we have designed in-house. The tools increase accuracy while saving time for our teams to focus on analyzing the results and decarbonization plans.

Calculation of Emissions from Purchased Goods and Services

For the calculation of GHG emissions from Purchased Goods and Services, our tool collects data from our Enterprise Resource Planning system — such as item type and supplier details — and then finds and applies the most accurate cradle-to-gate GHG emission factor available. We give priority to supplier-specific emission factors, and if they are not available, we use —

by order of availability — quantity-based, then spend-based emission factors.

We currently cover around 55% of Faurecia's total purchased goods emissions with supplier-specific or quantity-based GHG emission factors. We aim to refine our estimates by collecting more supplier-specific factors moving forward; however, the automotive industry is not yet mature in terms of calculating and sharing products' GHG emission data. The complexities surrounding the products and value chains are significant, largely due to the multiple materials, process stages, and suppliers involved with each. Hence, we have started to collect supplier data for commodities within less-complex value chains and large players used to calculating and reporting GHG emissions (e.g., steel, chemicals).

In the case of calculations using quantity-based emission factors, we have an internal database of cradle-to-gate GHG emission factors for materials and components by weight. The weight by material of the purchased items is first collected from the International Material Database System through which automotive companies provide details of the material and component composition of their sold products.¹²³ The tool then proceeds to match the item with the most appropriate GHG emission factors — using the material segmentation — to estimate the Scope 3 GHG emissions. The spend-based emission factors, used as a last resort, are calculated using the Scope 3 GHG emissions of similar “proxy purchases” for which quantity-based emission factors can be used.

For purchased services, Faurecia has partnered with a digital solution to offer the suppliers a high-level GHG emission estimation at a lower cost. We also use this tool to send a questionnaire to our service providers to collect their total GHG emissions data, which we use to estimate a spend-based GHG emission factor that we apply to our spend with them. We also collect other climate-related information from our suppliers via this tool to better understand their transition plans.

Calculation of Emissions from Upstream Transportation and Distribution

For Upstream Transportation and Distribution, we have implemented a Transport Management Solution that allows us to collect — for each trip — the actual load weight and distance traveled, the name of the carrier, and the means of transport. We have also partnered with a service provider to collect GHG emission factors by carrier. Coupling these data points allows us to calculate GHG emissions. We plan to improve our calculations by increasing the coverage of the Transport Management Solution and collecting more GHG emission factors from carriers.

Lessons Learned

Calculating the GHG emissions of our major Scope 3 categories for Faurecia twice instead of only once per year has significantly improved our monitoring of progress towards our decarbonization targets. This frequency helps us evaluate our initiatives to ensure efficiency and supports strategic and operational decisions. Further, it supports a continuous dialogue with internal and external stakeholders regarding our Scope 3 GHG emissions.

Calculations of Scope 3 GHG emissions twice a year would not have been realistic without a dedicated tool that supports the calculation and data collection processes.

Building a proprietary tool for GHG emission calculations requires having the right IT infrastructure in place. When we began, our IT systems did not support GHG emissions calculations as these calculations require connecting systems and databases from different parts of the organization. For example, we had to connect our Enterprise Resource Planning system to databases containing emission factors. To enable this, we had to consolidate GHG emission factors in a single database, which had not been systematized prior to the project. Today, we have around 6,000 GHG emission factors in our database and are adding more to further improve granularity and accuracy. The database is maintained centrally with a strict governance policy to ensure accuracy and traceability.

Further, when building a tool for GHG emissions calculation, it can be useful to leverage external databases and off-the-shelf tools. Building everything in-house becomes very time-consuming and there are often products that can be tailored and integrated as part of a solution. An example is the external solution for transport management we recently purchased and integrated into our calculation tool.

Case Study by an Integrated Energy and Chemicals Company

Sasol is a South African integrated energy and chemicals company, and our products are sold across 118 countries. We are committed to addressing the challenges of climate change and taking steps to reduce our carbon footprint in line with our 2050 net-zero ambition. To achieve this goal, we are applying a three-pillar action framework that involves reducing emissions, transforming our business, and shifting our portfolio to low carbon product solutions (see [Figure C5](#), p. 74). The implementation of the TCFD recommendations is a key part of our target-setting and evaluation processes, and we have embraced the TCFD framework in our reporting since 2018 as one of the earliest adopters in the region.

Our Approach to Scope 3 GHG Emission Disclosures

Scope 3 GHG emissions are an important part of our target-setting and TCFD-aligned

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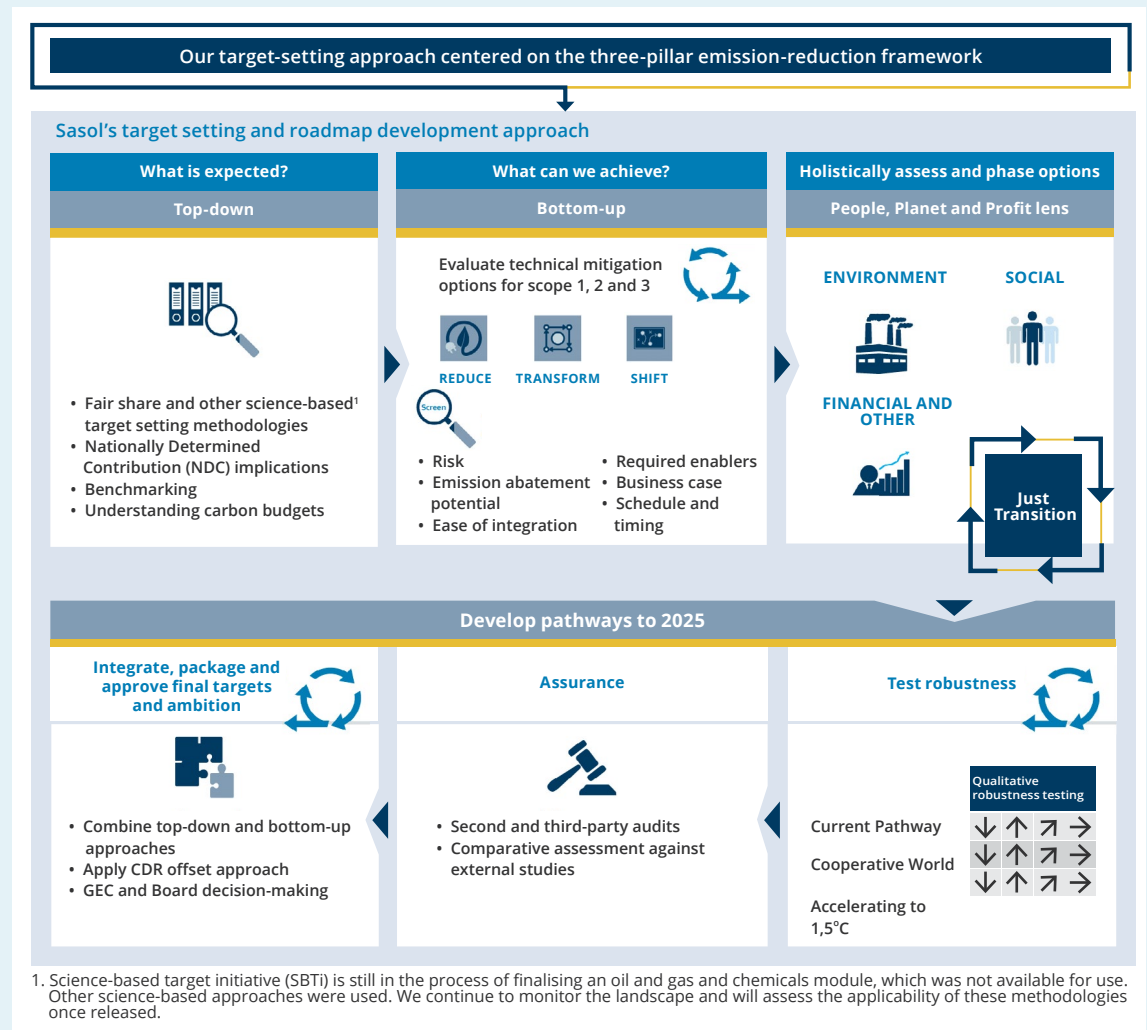
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¹²³ See “International Material Database System,” Accessed July 1, 2023.

Figure C5
Our Target Setting Approach



Sasol, *Climate Change Report 2021*, p. 8
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disclosures.¹²⁴ Today, Scope 3 GHG emissions total 37,557 CO₂e (kilotons), and are approximately 37%, of the company's total emissions (see Figure C6, p. 75). The largest portion of these emissions originates from the use of our sold products in South Africa.

We acknowledge the need to also reduce our Scope 3 GHG emissions. Accordingly, we set an interim target to reduce absolute Scope 3 emissions for GHG Protocol category 11 (Use of Sold Products) by 20% by 2030, with the ambition of achieving net zero for these emissions by 2050. We are cognizant of our role in the economy and the global energy and chemicals ecosystem, and as such we approach climate management of our downstream and

upstream operations with the care and nuance necessary to ensure that our actions have a positive impact on society at large.

We began reporting our Scope 3 GHG emissions in 2010 and have made significant improvements to our calculation methodologies over this period. Today, our approach to calculating these emissions is tailored to each emission category. We strive to use the most appropriate methodologies for each category while aligning with the principles of the GHG Protocol.

It can be difficult to determine how to best apply existing standards and guidance documents to our complex operations given the rapidly evolving Scope 3 GHG emissions reporting

¹²⁴ WRI and WBCSD, *Technical Guidance for Calculating Scope 3 Emissions*, April 23, 2013.

Figure C6
GHG Emissions per Category

Category ¹	2022 (tCO ₂)	2021 (tCO ₂)	2020 (tCO ₂)	2019 (tCO ₂)	Accounting accuracy
1. Purchased Goods and Services	5 247 445	5 432 140	5 978 086	5 732 504	●
2. Capital Goods		N/A			●
3. Fuel- and Energy-Related Activities ²	249 435	240 993	285 641	156 747	●
4. Upstream Transportation	402 850	478 974	449 465	533 494	●
5. Waste Generated in Operations ²	77 345	70 159	78 608	87 390	●
6. Business Travel ²	2 007	600	4 105	10 371	●
7. Employee Commuting	36 237	32 584	50 471	36 096	●
8. Upstream Leased Assets	3 725	4 785	4 906	Not measured	●
9. Downstream Transportation	273 038	253 280	211 901	201 756	●
10. Processing of Sold Products		N/A			●
11. Use of Sold Products ²	29 585 273	30 831 235	29 661 747	35 618 580	●
12. End-of-Life Treatment of Sold Products		Baseline under development			●
13. Downstream Leased Assets		N/A		148 402	●
14. Franchises	148 389	141 412	144 131	3 244	●
15. Investments ³	1 531 284	1 330 133	737 234	1 207 542	●
Total	37 557 028	38 816 295	37 606 295	43 736 126	

● Highly Certain ● Moderate Certainty ● Low Certainty ● Unknown ● Not applicable

1. Explanation of data changes and further details on our calculation methodology are indicated in the Appendix pages 61 – 63. 2. Subjected to external assurance.
3. 2021 Category 15 data restated upwards due to accounting improvements, refer to page 63.

Sasol, *Climate Change Report 2022*, p. 32

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landscape. As such, we augment existing guidance with internal research and expertise, as well as a wide range of external sources most applicable to each category. However, it is important to recognize that Scope 3 GHG emission calculations rely on a variety of assumptions and, therefore, attaining complete accuracy is not always feasible.

Examples of Category-Level Methodologies

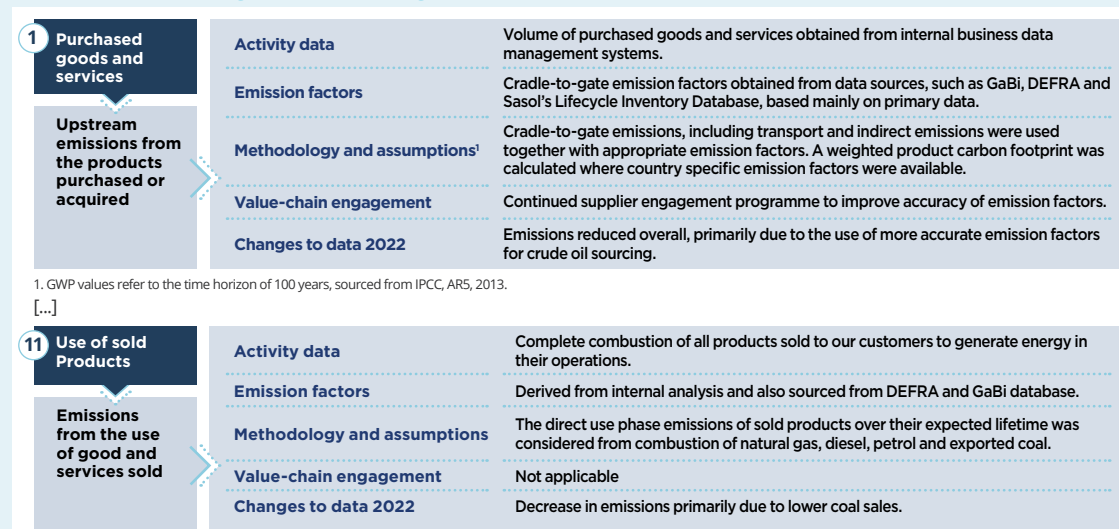
In the case of category 1, Purchased Goods and Services, we use data on the volume of purchased goods and services obtained from our internal data management systems with cradle-to-gate emission factors from a variety of data sources, including Sphera's Life Cycle Assessment (referred to as GaBi), the U.K. Department for Environment Food and Rural Affairs (DEFRA) as well as our internal lifecycle inventory database. For our most significant category, Use of Sold Products (category 11), we assume complete combustion of applicable sold products and use emission factors from our internal analysis, augmented by additional details from DEFRA and GaBi as necessary (see [Figure C7](#), p. 76). Having access to these third-party data sources has been helpful in both validating our initial assumptions as well as improving on them. We also leverage external auditing, which has been helpful in confirming that the requisite checks and balances are in place, while working internally to strive towards improved data accuracy.

Improving the Reliability of Scope 3 GHG Emission Estimates

Over the past few years, we have taken several measures to strengthen the robustness of our Scope 3 GHG emission calculations. Although our Scope 3 GHG emissions program focuses on all 15 categories of emissions (some of which are not relevant to our operations), we have paid particular attention to improving the calculation approach of our largest Scope 3 GHG emissions source, category 11.

For example, we conducted extensive internal studies to identify emission sources and refine our internal emission factors. Given our position in the supply chain, we developed detailed factors for combustion emissions, which we use to increase the reliability of our calculations. Although the amount of work needed to arrive at detailed estimates for this category was significant, we have found the results helpful beyond Scope 3 GHG emission calculations. One way our detailed knowledge of category 11 factors is particularly useful is in our internal emission reduction planning. For instance, knowing how feedstock substitutions impact our emissions is extremely useful in targeting our reduction efforts given that our emissions profile is by and large the result of feedstock choice.

Figure C7
Our Methodologies for Categories 1 and 11



Sasol, *Climate Change Report 2022*, pp. 61–63

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While category 11 has been a priority for us, we have also taken steps to address other categories. For example, we have reviewed opportunities to improve reporting of category 1 emissions associated with crude oil sourcing, which provides a more accurate baseline for reporting. This deep dive has also created opportunities to engage crude oil suppliers and transporters to investigate potential emission reduction interventions. We also implemented measures to increase efficiency in our vehicles and driver techniques and initiated an engagement project with our clients and customers to improve emission factors. In addition, we have also fully offset our business travel emissions for fiscal year 2021.

Challenges in Scope 3 GHG Emissions Reporting

We have faced several challenges on our path to implement the TCFD recommendations. At the onset, our sustainability team worked hard to generate the necessary internal support and recognition of the importance of TCFD-aligned disclosures. With support from our senior leadership, we made steady progress in our reporting through methodological improvements each year.

We also acknowledge that our work to improve the robustness of our Scope 3 GHG emissions calculations will need to continue. As of today, we have several categories for which the certainty of our emission estimates is lower or unknown, such as Upstream Transportation and End-of-life Treatment of Sold Products. We recognized early on the need to work more closely with our

clients and suppliers and are actively engaging in this area to support them in their own climate-related disclosure processes on which our Scope 3 GHG emissions calculations depend.

A particularly challenging area is in the quantification of GHG emissions from End-of-life Treatment of Sold Products (category 12). The complexity of accurately determining the fate of thousands of products sold into an even greater number of applications and countries is particularly difficult. Through peer benchmarking, we identified the World Business Council for Sustainable Development methodology as being the most appropriate for undertaking these calculations. These calculations use the product's carbon content and region-specific disposal data to estimate emissions. However, even within this methodology certain assumptions need to be made that can yield a range of calculated outcomes for this category. We are working to develop a deeper understanding of this category of emissions.

Lessons Learned

Our TCFD-aligned disclosure approach has allowed us to make significant strides in refining our baseline for Scope 3 GHG emissions, as well as gain a better understanding of these emissions to be able to pinpoint opportunities to reduce them. We acknowledge that achieving significant reductions will necessitate fundamental changes to our business model, which we are currently evaluating in line with our net-zero ambition by 2050.

We have learned that reliable Scope 3 GHG emission calculations and continuous improvements therein cannot be achieved by one team alone. Instead, it requires integration of various teams from multiple disciplines within the company (e.g., supply chain, operations, finance, human resources, infrastructure management, etc.), managed through an overall centralized effort. We have found that a certain degree of centralization is helpful in both establishing clear roles and procedures as well as ensuring that institutional memory is maintained.

For companies starting out on their Scope 3 GHG emissions reporting journey, it is valuable to ensure that the reporting systems being developed have the flexibility to adapt to the evolving and nuanced reporting requirements. In addition, it is important that the reporting system can accommodate data and adjustments from a variety of sources, including internal data systems.

Openly discussing the evolution of our methodologies builds confidence in our reporting and supports the growth of TCFD-reporting in our industry and across our peers. Our hope is that our own disclosures will help others in our value chain to start disclosing in alignment with the requirements of TCFD, which in turn will help us improve our scope calculation approaches through greater collaboration with our value chain partners.

Case Study by a Global Gaming, Hospitality, and Entertainment Company

MGM Resorts International is a global gaming and entertainment company with both domestic and international locations. In 2019, we conducted a formal ESG materiality assessment through which we identified climate change as the highest priority issue for our company. As a result, we have developed a comprehensive approach to address the challenges of climate change, including a long-term climate strategy and climate governance framework. We have been committed to voluntary climate disclosures for a decade and aligned our reporting with the TCFD recommendations in 2022 when we issued our first TCFD report.

Our climate strategy focuses on reducing GHG emissions, increasing energy efficiency, sourcing renewable energy, and advocating for the transition to a lower carbon economy. We have established targets for all major areas of our strategy, including 50% reductions in our Scope 1 and Scope 2 GHG emissions by 2030. As of April 2023, we had registered a near-term commitment with SBTi to reduce absolute Scope

1 and Scope 2 GHG emissions by 50% by 2030 over 2019 figures and to reduce absolute Scope 3 GHG emissions from Purchased Goods and Services, Fuel- and Energy-Related Activities, Waste Generated in Operations, and Employee Commuting by 30% within the same timeframe.

Our Approach to Scope 3 GHG Emission Disclosures

As of today, Scope 3 GHG emissions account for a significant portion of our total GHG emissions (see [Figure C8](#), p. 78). Of these, 51% are attributable to Purchased Goods and Services. Our path to our current Scope 3 GHG emissions inventory and related calculation processes began with the GHG Protocol's spend-based method using data acquired from our procurement department. The initial iterations of our process involved a significant amount of manual work, including reviewing and categorizing purchase data to identify the applicable Scope 3 GHG emission categories and emission factors. Although our initial spend-based assessment was labor intensive, it was an important effort to undertake, as it allowed us to quickly identify Purchased Goods and Services as the category accounting for the largest share of our Scope 3 GHG emissions. More specifically, we identified the Food and Beverage category (F&B) as the greatest contributor to our Scope 3 GHG emissions.

As we continuously seek new and different ways to improve our methods for calculating GHG emissions, today, we calculate Scope 3 GHG emissions inventory based on a combination of methods. For example, we use both weight and industry emission factors to estimate the footprint associated with our beef consumption. Our procurement department has recently begun implementing changes to our internal systems in order to improve data availability and quality, which are essential for reliably assessing our Scope 3 GHG emissions.

Increasing the Specificity of Our Disclosures

We are working to increase the specificity of our Scope 3 GHG emissions across our entire spend, specifically focusing on the F&B category, which is the single largest emissions segment of our Purchased Goods and Services. Our aim is to disclose at a sufficient level of detail in the main categories — including beef and dairy — to allow for more effective supplier engagement and spend management.

We have partnered with the World Resources Institute's "Coolfood" initiative to help calculate the carbon footprint of our served meals at the

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Figure C8
GHG Emissions Metrics

Metric	Performance (2019-2022)				% Change (2019-22)
	2019	2020	2021	2022	
<i>Scope 1 and 2 Emissions:ⁱ</i>					
Absolute Scope 1 emissions (global), MTCO ₂ e ⁱⁱ	278,476	199,686	249,387	242,877	-12.8%
Absolute Scope 2 emissions (Location-based; global), MTCO ₂ e ^{ii,iii}	726,872	538,557	569,208	531,176	-26.9%
Absolute Scope 2 emissions (Market-based; global), MTCO ₂ e ^{ii,iii}	689,594	509,131	480,185	405,589	-41.2%
Absolute emissions (Location-based; global), MTCO ₂ e (Scope 1 and 2) ^{ii,iii}	1,005,348	738,243	818,595	774,053	-23.0%
Absolute emissions (Market-based; global), MTCO ₂ e (Scope 1 and 2) ^{ii,iii}	968,070	708,817	729,572	648,466	-33.0%
<i>Scope 3 Emissions:^{i, viii}</i>					
Absolute Scope 3 emissions (Purchased Goods & Services; global), MTCO ₂ e ^{iv, ix}	1,199,537	511,708	748,023	1,088,261	-9.3%
Absolute Scope 3 emissions (Capital Goods; global), MTCO ₂ e ^v	406,586	268,855	418,324	557,138	37.0%
Absolute Scope 3 emissions (FERA; global), MTCO ₂ e	261,515	204,483	236,147	240,081	-8.2%
Absolute Scope 3 emissions (Upstream Transportation & Distribution; global), MTCO ₂ e ^{vi}	773	10,962	14,028	25,241	3165.3%
Absolute Scope 3 emissions Waste Generated in Operations; global), MTCO ₂ e	26,088	14,180	22,611	27,307	4.7%
Absolute Scope 3 emissions (Business Travel; global), MTCO ₂ e	5,225	2,459	836	2,112	-59.6%
Absolute Scope 3 emissions (Employee Commuting; global), MTCO ₂ e ^{vii}	107,435	85,823	88,857	98,250	-8.5%
Absolute Scope 3 emissions, combined significant categories (global), MTCO ₂ e	2,007,159	1,098,470	1,528,826	2,038,389	1.6%
<i>Scope 1, 2 and 3 Emissions:^{i, ii, iii, iv, v, vi}</i>					
Absolute Scope 1, 2 and 3 Emissions (Location-Based; global), MTCO ₂ e	3,012,507	1,836,713	2,347,421	2,812,442	-6.6%
Absolute Scope 1, 2 and 3 Emissions (Market-Based; global), MTCO ₂ e	2,975,229	1,807,287	2,258,398	2,686,855	-9.7%

(i) Any data point that is blue has received external assurance. We submitted our 2022 data for independent third-party verification in April 2023. See here for an archive of GHG emission verification statements. Metrics that are externally verified may differ slightly from other reported metrics given the time of external assurance.

(ii) Absolute Scope 1 and 2 carbon emissions data in this table are unadjusted for the Circus Circus Las Vegas divestiture completed in December 2019.

(iii) Beginning in 2022, Scope 2 emissions have been calculated using both location-based and market-based approaches. Our location-based emissions reflect the average emissions intensity of grids where our electricity is consumed, whereas our market-based calculation reflects the electricity that we have chosen through our energy procurement strategies.

(iv) Emissions from purchased goods and services in 2021 differ from our 2021 CDP Climate Change filing, reflecting an update to our activity data exclusions. The change is an increase in emissions in this category by 42,829 MTCO₂e. Additionally, 2019 purchased goods and services differ from CDP reported metrics based on guidance from SBTi, as part of our climate target baseline validation.

(v) Emissions from capital goods are susceptible to high annual variability due to changes in annual capital expenditures. Examples include purchases related to major renovation projects.

MGM, *TCFD Report*, p. 23
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ingredient level (see Figure C9, p. 79).¹²⁵ Emission factors sourced from Coolfood help us combine spend and weight data with publicly-facing and third-party validated emission factors at the product level, which increases our confidence in the resulting estimations. Additionally, Coolfood goes beyond the supply chain GHG emissions that are typically reported to also include the carbon opportunity costs associated with each food type. Carbon opportunity costs estimate the missed potential carbon capture if the land used for food production — such as cleared land for cattle feedlots — were instead able to return to native vegetation, including forests. For some of our operations, we also use the GHG Protocol Scope 3 Evaluator tool from Quantis to inform our calculations.¹²⁶

One key challenge we face is the inability to consistently obtain specific GHG emissions data from our suppliers. For example, many of our suppliers are bulk distributors that may not have data on the origins of ingredients beyond a country level. We also source ingredients from smaller companies, many of which are in an early stage of maturity with regard to

GHG emissions disclosures. Another challenge we face concerns spend data and today's historically high levels of inflation, which in turn can inflate our emissions estimates if not addressed correctly. Finally, the cost of transporting goods to our resorts (a distinct category of Scope 3 GHG emissions per the GHG Protocol) is often embedded in the costs we use for our spend-based analysis. This may lead to overestimated Purchased Goods and Services GHG emissions and underestimated Upstream Transportation GHG emissions.

Managing Our Clients and Suppliers

In addition to seeking more specific data from our suppliers, we are also beginning to place a greater emphasis on conducting assessments on how suppliers manage GHG emissions themselves. As a first step, we have identified the largest contributors to our Scope 3 GHG emissions inventory and are exploring ways to actively engage them to reduce the GHG emissions in our own supply chain. For example, we are working with our largest F&B suppliers to source new products and enhance menu options, with a target of having 10% of our

¹²⁵ World Resources Institute, "Coolfood," Accessed July 1, 2023.

¹²⁶ Quantis, "Scope 3 Evaluation Tool," Accessed July 1, 2023.

Figure C9
Food and Beverage Emissions

Metrics and Goals

Metric	Goal	2019 Baseline	2022 Performance	2030 Target	Change Needed from Baseline	Change Achieved by 2022	Progress to Target
Agriculture Supply Chain Emissions, MTCO ₂ e		240,401	200,284	180,301	(60,100)	(40,118)	66.8%
Carbon Opportunity Cost, MTCO ₂ e		953,007	714,755	240,401	(238,252)	(156,898)	65.9%
Total Food-Related Emissions, MTCO ₂ e	25% reduction	1,193,408	895,056	240,401	(298,352)	(197,016)	66.0%

Proportion of Food-Related Emissions

Category	Ruminant Meats	Dairy	Pork	Poultry	Seafood	Eggs	Grains
Percent	66%	12%	7%	6%	4%	3%	2%

MGM, Internal Data.

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F&B offerings being low-carbon. We are also encouraging our clients — including event organizers — to embrace low carbon menus and reduce waste through smaller portion sizes. While important, these efforts are still in their nascent phases. We are also seeking ways to overcome such challenges as navigating lengthy contract terms during which changes are not easy to implement.

Supplier engagement is critical to driving progress on emissions reduction, and we intend to leverage the significant work MGM Resorts has already done in the arena of supplier diversity to inform our engagement strategy regarding embedded carbon. Our suppliers report their diversity qualifications in order to enable our reporting, just as their environmental characteristics (e.g., emission factors) enable greater carbon accounting. Our Supplier Diversity program has a large education component and we mentor small, diverse-owned business leaders to give them the tools they need to do business with MGM Resorts. Incorporating environmental sustainability and carbon reduction measures into this education and mentorship program will help us continue to prepare small business enterprises to meet the reporting requirements of MGM Resorts and other like-minded companies.

Taking Action to Reduce Scope 3 GHG Emissions Across Our Own Operations

We recognize that meeting our GHG emission targets requires dedicated action from MGM Resorts across the most material Scope 3 GHG emission categories. In addition to our actions in Purchased Goods and Services, we are also

reducing our GHG emissions in the category Waste Generated in Operations. For example, we aim to reduce the amount of materials disposed in landfills or by incineration by 75% by 2030. We are accomplishing this in part through significant manual intervention to divert materials from landfills. At Mandalay Bay, for example, materials from throughout the resort are brought to one of eleven recycling docks where they are hand-sorted for recycling, reuse, composting, or disposal. Reducing food waste — and its associated GHG emissions — is particularly important for us as a U.S. Environmental Protection Agency (EPA) Food Loss and Waste 2030 Champion, so we conduct targeted waste-stream audits to identify food waste and strategies for diversion.

Lessons Learned

The key lesson we have learned is the importance of starting with the available data, even if it is not perfect or complete. Using the spend data as a starting point has helped us to identify our most significant Scope 3 GHG emissions categories and to prioritize our efforts accordingly.

We have realized that refining our Scope 3 GHG emission calculation across the board as we move from manual reviews to using data from our improved procurement systems is an ongoing process that requires dedicated time and effort to improve. As we continue this journey, we anticipate that our methodology will mature, and the usefulness of our data will expand. Moving forward, we aim to incorporate more specific data into our procurement systems, which will help us better understand and manage our GHG emissions across our value chain.

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D. TCFD-Aligned Requirements and Related Initiatives

Over the past year, the Task Force has seen continued momentum around and support for its recommendations. For example, since the Task Force released its 2022 status report, over 800 additional companies and other organizations have indicated support for the TCFD, bringing the total number of supporters to just over 4,850.^{127,128} Of these supporters, 4,486 are companies and 369 are other organizations (e.g., industry associations, governments). The companies supporting the TCFD represent a broad range of sectors, with

a combined market capitalization of \$29.5 trillion, including more than 1,800 financial institutions responsible for assets of \$222.2 trillion. These supporters come from all around the world — as shown in Box D1 — with the Asia Pacific region having the highest percent of supporters at 51%, largely driven by supporters in Japan. In addition, 97 of the 100 largest companies in the world have declared support for the TCFD, report in line with the TCFD recommendations, or both.¹²⁹

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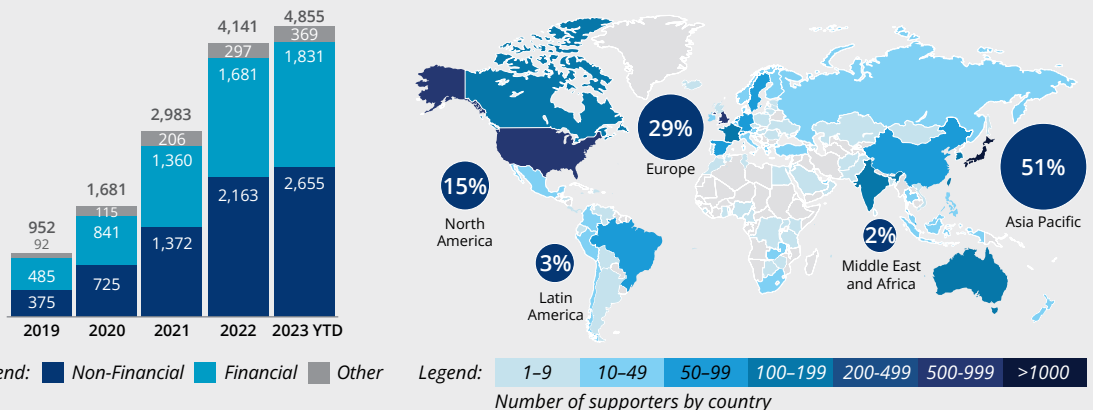
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Box D1
Number and Geographic Distribution of TCFD Supporters



Another example of the momentum around the Task Force’s recommendations relates to the continued efforts of governments, regulators, stock exchanges, and standard setters to incorporate the TCFD recommendations — in full or in part — into laws, rules, and guidance on climate-related disclosure or reference the recommendations as a basis for their disclosure requirements. The Task Force believes its recommendations have been a key driver of greater consistency among major climate-related disclosure regimes that existed when the Task Force was created as well as climate-related disclosure requirements and standards that have been developed more recently.

As indicated in its 2017 report, “[t]he Task Force’s recommendations provide a common set of principles that should help existing disclosure regimes come into closer alignment over time. [...] The Task Force also encourages standard setting bodies to support adoption of the recommendations and alignment with the recommended disclosures.”¹³⁰

By 2019, several major climate-related disclosure regimes had incorporated the TCFD recommendations into their requirements and guidance, including the Principles for

¹²⁷ Importantly, not all organizations that support the TCFD recommendations implement them. Some organizations express support by convening their members and facilitating consistency in implementation, while others—such as governments and regulators—express support by encouraging or requiring companies and other organizations to implement the recommendations.

¹²⁸ There were nearly 4,000 supporters at the time the Task Force released its 2022 status report.

¹²⁹ Forbes, “The World’s Largest Public Companies,” Accessed June 8, 2023. In reviewing the 100 largest public companies, the Task Force identified whether a company indicated that it reported in line with the TCFD recommendations or planned to.

¹³⁰ TCFD, *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*, June 29, 2017 (p. 33).

Responsible Investment, the Climate Disclosure Standards Board, and CDP.¹³¹ More recently, the U.S. Securities and Exchange Commission, the European Parliament, and the ISSB have drawn on the TCFD recommendations in developing proposed climate-related disclosure

requirements or directly incorporated them into their climate-related disclosure requirements and standards.¹³² Figure D1 provides a summary of these final and proposed requirements and standards and how they compare to the TCFD recommendations.

Figure D1
TCFD Recommendations Support Alignment across Disclosure Regimes

	International	European Union		United States
	Framework	Standards		Laws/Regulations
Organization	TCFD	IFRS ¹	EFRAG	
Short Title	Recommendations	IFRS S1 and S2	ESRS	CSRD SEC Proposal
Focus	Climate Change	Sustainability	Sustainability	Sustainability Climate Change
Required ¹	Voluntary	Voluntary	Required	Required Required
Materiality ²	Financial	Financial	Financial/Impact	Financial/Impact Financial
Finalized	2017	2023	2022 ³	2022 Proposed
Incorporate or draw from the Task Force's 11 recommended disclosures				

1. IFRS S1 and S2 are not required until jurisdictional authorities mandate their use.
 2. See Figure D2 (p. 85) for descriptions of materiality.
 3. EFRAG delivered final draft standards to the European Commission in late 2022. In July 2023, the European Commission adopted the first set of standards.

The rest of this section is organized into three subsections, as described below.

- The first subsection provides information on jurisdictions that have issued final or proposed climate-related disclosure requirements that incorporate or draw from the TCFD recommendations (referred to as TCFD-aligned disclosure requirements).
- The second subsection provides brief descriptions of efforts — occurring since

the publication of the last status report in October 2022 — by governments, regulators, stock exchanges, and international and regional standard setters that support the implementation of the TCFD recommendations.

- The third subsection provides brief descriptions of efforts — since October 2022 — by private-sector groups that support the implementation of the TCFD recommendations.

Key Takeaways



The number of TCFD supporters has grown this year to just over 4,850, largely driven by support in the Asia Pacific region.



In June 2023, the ISSB finalized its general sustainability-related and climate-related standards, which incorporate and build on the TCFD recommendations.



The majority of jurisdictions with final or proposed climate-related disclosure requirements specify that such disclosures be reported in financial filings or annual reports.

¹³¹ See Principles for Responsible Investment, “Meeting the TCFD Recommendations in the 2018 PRI Reporting Framework,” December 18, 2017; the Climate Disclosure Standards Board (now part of the IFRS Foundation), *Framework for Reporting Environmental and Social Information*, January 2022; CDP, “How CDP is aligned to the TCFD,” Accessed June 21, 2023; and the Sustainability Accounting Standards Board (now part of the IFRS Foundation), *TCFD Implementation Guide*, May 1, 2019.

¹³² U.S. Securities and Exchange Commission, “Press Release: SEC Proposes Rules to Enhance and Standardize Climate-Related Disclosures for Investors,” March 21, 2022; European Parliament and Council of the European Union, *Directive 2022/2464 as Regards Corporate Sustainability Reporting*, December 14, 2022; International Sustainability Standards Board, “ISSB Issues Inaugural Global Sustainability Disclosure Standards,” June 26, 2023.

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1. FINAL AND PROPOSED TCFD-ALIGNED DISCLOSURE REQUIREMENTS

This subsection summarizes final and proposed climate-related disclosure requirements that incorporate or draw from the TCFD recommendations and were issued by governments, regulatory authorities, or stock exchanges, as shown in [Table D1](#). Currently, companies in 14 jurisdictions are subject to TCFD-aligned disclosure requirements, and companies in another two jurisdictions will be subject to such requirements by 2025.¹³³

In addition, three jurisdictions have proposed disclosure requirements that incorporate or draw from the TCFD recommendations. These 19 jurisdictions account for close to 60% of global 2022 gross domestic product.¹³⁴ In addition, the requirements cover a range of company types, with some applying to certain listed issuers, others applying to specific financial institutions, and still others applying to some combination of financial institutions and large companies. The time frames included in the table refer to the first fiscal year to which the requirements apply.

Table D1
TCFD-Aligned Disclosure Requirements in Select Jurisdictions

Final Requirements				
Jurisdiction: Authority	Scope	Threshold	Time Frame	Report Type
Brazil: Central Bank of Brazil		Regulated institutions except Segment 5 ¹³⁵	FY 2022	
Brazil: Securities and Exchange Commission		Regulated issuers	FY 2022	
Canada: Office of the Superintendent of Financial Institutions		Federally regulated financial institutions ¹³⁶	FY 2024	 
Colombia: Financial Superintendent of Colombia		Large issuers ¹³⁷	FY 2023	
Egypt: Financial Regulatory Authority ¹³⁸		Issued capital or net ownership >€€500M	FY 2022	
European Union: European Commission ¹³⁹		Large issuers on EU regulated markets ¹⁴⁰	FY 2023	
European Union: European Parliament and Council		Large EU undertakings subject to NFRD ¹⁴¹	FY 2024	
		Large EU undertakings ¹⁴²	FY 2025	
		Small and medium EU undertakings ¹⁴³	FY 2026	
Japan: Financial Services Agency		Non-EU undertakings ¹⁴⁴	FY 2028	
		All issuers	FY 2023	
Kenya: Central Bank of Kenya		Licensed institutions	FY 2023	

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¹³³ If a jurisdiction has TCFD-aligned requirements in effect now as well as requirements that go into effect in the future, it is counted as a jurisdiction with requirements currently in effect. This applies specifically to the European Union.

¹³⁴ For 2022, global GDP was \$100.2 trillion (IMF, "IMF Datamapper," Accessed June 14, 2023).

¹³⁵ The requirements address qualitative aspects of governance, strategy, and risk management. [Segment 5](#) includes institutions that account for less than 0.1% of GDP and use an optional simplified methodology to calculate regulatory capital, unless they are multiple banks, commercial banks, investment banks, foreign exchange banks, or federal savings banks.

¹³⁶ The requirements apply to 1) domestic systemically important banks and internationally active insurance groups beginning on or after October 1, 2024 and 2) small and medium-sized deposit taking institutions and all other federally regulated insurers beginning on or after October 1, 2025.

¹³⁷ TCFD-aligned reporting requirements apply to "Group A" issuers, which are defined in [Annex 2](#) of External Circular 031.

¹³⁸ The Egyptian Financial Regulatory Authority's announcement is in Arabic; however, the United Nations Sustainable Stock Exchanges Initiatives provides a [summary of the announcement](#) in English.

¹³⁹ See Article 449a of [Regulation 575/2013/EU](#). While the regulation does not mention the TCFD, the European Banking Authority published final draft implementing standards on uniform disclosure formats—as required under Article 434a—that incorporate several TCFD elements.

¹⁴⁰ The regulation applies to large institutions as defined in Article 4(146) of [Regulation 575/2013/EU](#).

¹⁴¹ The EU issued [Directive 2014/95/EU](#) (the Non-Financial Reporting Directive or NFRD) in late 2014 which required large companies to disclose information on environmental (including climate-related) and other matters beginning in their 2017 financial year reports.

¹⁴² See Article 3(4) of [Directive 2013/34/EU](#).

¹⁴³ See Article 3(2) and Article 3(3) of [Directive 2013/34/EU](#).

¹⁴⁴ See Article 40a of [Directive 2013/34/EU](#).

Table D1
TCFD-Aligned Disclosure Requirements in Select Jurisdictions (continued)

Final Requirements					
Jurisdiction: Authority	Scope	Threshold	Time Frame	Report Type	
Malaysia: Bursa Malaysia Stock Exchange		Specific listed issuers ¹⁴⁵	FY 2025		
Mauritius: Central Bank of Mauritius		Licensed banks and deposit taking non-banks	FY 2022		
New Zealand: New Zealand Government		Issuers: securities >NZ\$60M	FY 2023		
		Banks: assets >NZ\$1B	FY 2023		
		Asset managers: AUM >NZ\$1B	FY 2023		
		Insurers with premium income >NZ\$250M	FY 2023		
Philippines: Securities and Exchange Commission		All registrants ¹⁴⁶	FY 2022		
Singapore: Singapore Exchange		Specific industries ¹⁴⁷	FY 2023		
		Specific industries ¹⁴⁸	FY 2024		
Switzerland: Federal Council		Employees ≥500 and assets >€20M or revenues >€40M	FY 2024		
Switzerland: Financial Market Supervisory Authority		Assets >€100B or AUM >€500B	FY 2021		
Taiwan: Financial Supervisory Commission		Banks and insurance companies ¹⁴⁹	FY 2023		
Thailand: Central Bank of Thailand		All financial institutions	FY 2023		
United Kingdom: Financial Conduct Authority		Issuers of standard-listed shares and GDR	FY 2022		
		Asset managers: AUM >€50B Asset owners: AUM >€25B	FY 2022		
		Asset managers and asset owners: AUM >€5B	FY 2023		
United Kingdom: U.K. Parliament		Specific U.K. companies and LLPs >500 employees ¹⁵⁰	FY 2022		
		Occupational pension schemes: assets >€5B	FY 2022		
		Occupational pension schemes: assets >€1B	FY 2023		
Proposed Requirements					
Jurisdiction: Authority	Scope	Threshold	Time Frame	Report Type	
Australia: Treasury		Large entities ¹⁵¹	Phased		
Canada: Canadian Securities Administrators		Regulated issuers ¹⁵²	Phased		
Hong Kong: Hong Kong Stock Exchange		All issuers	FY 2024		
Singapore: The Accounting and Corporate Regulatory Authority and Singapore Exchange		All issuers and large non-listed companies ¹⁵³	Phased		
United States: Securities and Exchange Commission		All registrants ¹⁵⁴	Phased		

LEGEND

Scope



Listed Companies



Listed and Private Companies



Financial Institutions



Other

Report Type



Financial Filing/Annual Report



Other



Sustainability Report

¹⁴⁵ TCFD-aligned reporting requirements apply to “Main Market” listed issuers, which are defined in the [Main Market Listing Requirements](#).

¹⁴⁶ All issuers were required to report on a “comply or explain” basis beginning with their 2019 annual reports; and mandatory reporting became effective three years later, with 2022 annual reports.

¹⁴⁷ All issuers are required to report on a “comply or explain” basis for the year beginning on January 1, 2022. See SGX Group, [Practice Note 7.6 Sustainability Reporting Guide](#), June 20, 2016. Issuers in the financial; agriculture, food, and forest products; and energy industries were subject to mandatory reporting beginning on January 1, 2023.

¹⁴⁸ Issuers in the transportation and materials and buildings industries are subject to mandatory reporting beginning on January 1, 2024.

¹⁴⁹ See the press releases for “[Guidelines for Domestic Banks’ Climate Risk Financial Disclosure](#)” and “[Guidelines on Climate-Related Financial Disclosures of Insurance Companies](#).”

¹⁵⁰ See [The Companies Regulations 2022](#) and [The Limited Liability Partnerships Regulations 2022](#).

¹⁵¹ See p. 6 of the [proposed requirements](#) for a summary of the types of large listed and unlisted companies and financial institutions in scope.

¹⁵² See [Proposed National Instrument 51-107 Disclosure of Climate-Related Matters](#), October 18, 2021 (pp. 6-11).

¹⁵³ See pp. 15-16 of the [consultation paper](#) for a summary of the phase in for listed companies and large non-listed companies.

¹⁵⁴ See p. 290 of the [proposed rule](#) for a summary of the phase-in for specific types of registrants.

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TCFD-aligned disclosure requirements specify how companies should determine materiality for climate-related reporting purposes. In its 2017 report, the Task Force indicated that companies should determine materiality for climate-related issues consistent with how they determine the materiality of other information included in their annual financial filings (i.e., financial materiality).¹⁵⁵ Since then, the EU issued a directive that requires information to be reported from a double materiality perspective whereby companies are required to report information necessary to understand their respective developments, performance, and positions (financial materiality) as well as the impact of their respective activities on environmental, social, and employee matters, respect for human rights, anti-corruption, and bribery matters (impact materiality). Of the 19 jurisdictions with final and proposed TCFD-aligned disclosure requirements, the Task Force found that seven included explicit guidance on materiality in the requirements — either financial materiality or double materiality (both financial and impact materiality).¹⁵⁶ Figure D2 summarizes financial materiality and impact materiality.

The Task Force also reviewed the final and proposed TCFD-aligned disclosure requirements to determine whether some form of assurance is required on the information reported. Of the requirements reviewed for the 19 jurisdictions, the Task Force found that seven explicitly

require some form of assurance of the climate-related information that is reported, while five indicated that assurance is not required.

2. GOVERNMENTAL, REGULATORY, AND OTHER DEVELOPMENTS

This subsection summarizes efforts and developments by governments, regulatory authorities, international and regional standard setters, and stock exchanges that support the implementation of the TCFD recommendations and occurred since the Task Force published its previous status report in October 2022. To the extent a government, regulatory authority, or stock exchange mentioned in Table D1 (p. 83) issued a final or proposed TCFD-aligned disclosure requirement during this period, a brief description of the requirement is included below.

Governmental and Regulatory Developments

Australia: In June 2023, the Australian Government Treasury published for consultation proposed climate-related financial disclosure requirements, which are generally in line with the TCFD recommendations and ISSB standards. As proposed, the requirements would apply to large listed and unlisted companies as well as financial institutions and would be phased in over a three-year period beginning with the 2024–2025 reporting year. Feedback received on a previous

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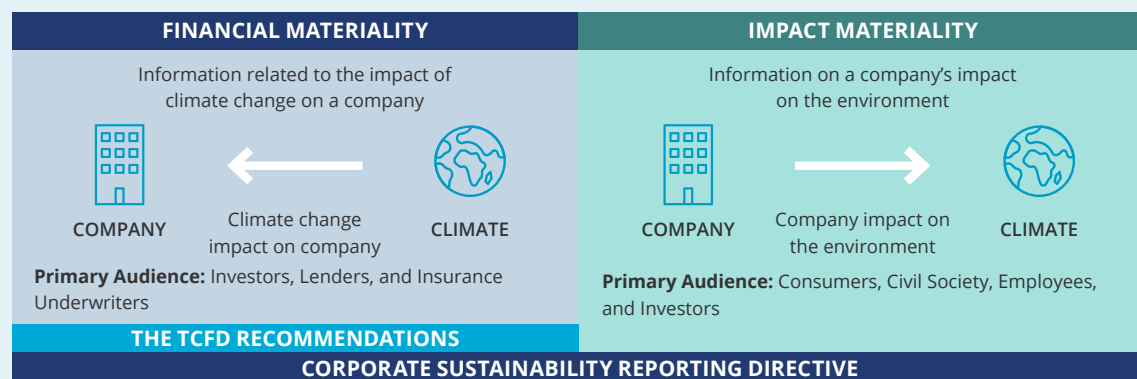
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Figure D2
Financial Materiality and Impact Materiality

In financial reporting, the term “material” generally refers to information whose omission or misstatement could influence the economic decisions that users make based on a company’s financial statements. This type of materiality — financial materiality — is the basis upon which the TCFD recommendations were developed. In its *Corporate Sustainability Reporting Directive*, the European Commission indicated that reporting should be viewed from two perspectives: one consistent with financial materiality and the other based on the impact of the company on the environment and people (impact materiality).



Adapted from European Commission, *Guidelines on Reporting Climate-Related Information*, June 17, 2019, p. 7

¹⁵⁵ See TCFD, *Recommendations of the Task Force on Climate-related Financial Disclosures*, June 2017 (p. 41).

¹⁵⁶ See Article 19a(1) and Article 29a(1) of *Directive 2013/34/EU*.

consultation, conducted between December 2022 and February 2023, informed the proposed requirements.

Canada: In October 2022, the Canadian Securities Administrators (CSA) issued a [press release](#) on the status of its proposed TCFD-aligned [disclosure requirements](#) for reporting issuers published in October 2021. The CSA announced it was reviewing the U.S. Securities and Exchange Commission's proposed climate-related disclosure requirements and the ISSB's (then proposed) standards on disclosing [sustainability-related](#) and [climate-related](#) financial information to consider how those proposals may impact or further inform its proposed disclosure requirements. In March 2023, the Office of the Superintendent of Financial Institutions released [guidance](#) on climate-related risk management for financial institutions that also includes its expectations on climate-related financial disclosure. The guidance on disclosure references an annex that outlines minimum mandatory climate-related financial disclosure expectations, which incorporate the Task Force's 11 recommended disclosures.

European Union: In December 2022, the EU Parliament and Council approved a [sustainability reporting directive](#) (the Corporate Sustainability Reporting Directive or CSRD), which superseded a previous [reporting directive](#). The CSRD went into effect on January 5, 2023; and companies subject to the previous reporting directive are required to report in line with the CSRD beginning with fiscal year 2024. Other large companies are required to report beginning with fiscal year 2025; small and medium-sized public companies are required to report beginning with fiscal year 2026; and non-EU companies are required to report beginning with fiscal year 2028. Companies subject to the CSRD will have to report according to the sustainability reporting standards developed by EFRAG (formerly known as the European Financial Reporting Advisory Group), which are aligned with the TCFD recommendations.¹⁵⁷

Hong Kong: In August 2023, the Hong Kong Monetary Authority (HKMA) released a [circular](#) with high-level principles to assist authorized institutions in planning for a net-zero transition. The HKMA developed the high-level principles based on the findings and recommendations of international bodies, including findings in the Task Force's [Guidance on Metrics, Targets, and Transition Plans](#).

Japan: In January 2023, the Japan Financial Services Agency announced [new rules](#) that require listed companies to disclose sustainability information — including climate-related information — in four categories generally aligned with the TCFD recommendations. The governance and risk management categories are required, while the strategy and indicators and targets (i.e., metrics and targets) categories are subject to materiality. The rules went into effect on January 31, 2023, and apply to securities registration statements and annual securities reports for fiscal years ending on and after March 31, 2023.

New Zealand: In November 2022, the Ministry of Business, Innovation and Employment and the Ministry for the Environment published a [consultation paper](#) on the inclusion of an assurance requirement in New Zealand's [climate-related disclosure law](#). The law, passed in October 2021, applies to large publicly listed companies, insurers, banks, non-bank deposit takers, and investment managers and required the development of climate-related standards based on the TCFD recommendations.

Singapore: In July 2023, the Accounting and Corporate Regulatory Authority and Singapore Exchange Regulation launched a public [consultation](#) on climate-related reporting in line with the ISSB standards and the TCFD recommendations. The Singapore Exchange currently has climate-related disclosure requirements for listed issuers in select industries, and this consultation paper proposes expanding the companies subject to disclosure requirements to all listed issuers and large non-listed companies.

Switzerland: In November 2022, the Federal Council of Switzerland finalized an [ordinance](#) on climate-related reporting for large Swiss companies that enters into force on January 1, 2024. Under the ordinance, large public companies, banks, and insurance companies are required to make disclosures based on the TCFD recommendations and its implementation guidance, which was updated in 2021.

Thailand: In January 2023, the Thai Securities and Exchange Commission published [guidelines](#) for asset managers on managing and disclosing climate-related risks and opportunities. The guidelines on disclosure describe how asset managers could disclose information to stakeholders in accordance with the TCFD recommendations. In addition, the Bank

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¹⁵⁷ EFRAG, [Draft European Sustainability Reporting Standards](#), April 29, 2022 and EFRAG, [Draft European Sustainability Reporting Standards Appendix IV – TCFD Recommendations and ESRS Reconciliation Table](#), November 2, 2022. See [Section D.2. International and Regional Standard Setting](#) for more information. On January 21, 2022, the European Financial Reporting Advisory Group changed its name to EFRAG.

of Thailand released a [policy statement](#) in February 2023 requesting that all financial institutions disclose climate-related information in line with the TCFD recommendations at least once a year beginning in 2024.

International and Regional Standard Setting

In November 2022, EFRAG delivered draft [sustainability reporting standards](#) (the European Sustainability Reporting Standards or ESRS), which the EU Parliament and Council integrated into the CSRD in December 2022. The ESRS align with the TCFD recommendations and the ISSB standards. In July 2023, after a [public consultation](#), the European Commission adopted the [first set of ESRS](#).

In December 2022, New Zealand's External Reporting Board (XRB) finalized its climate-related disclosure [standards](#), which were developed in line with the TCFD recommendations as required under [legislation](#) passed in October 2021. The XRB's standards include [Climate-Related Disclosures; Adoption of Aotearoa New Zealand Climate Standards](#); and [General Requirements for Climate-Related Disclosures](#) — all of which went into effect on January 1, 2023.

In June 2023, the ISSB finalized its [general sustainability-related disclosure standards](#) (IFRS S1) and [climate-related disclosure standards](#) (IFRS S2). Both IFRS S1 and IFRS S2 build upon the TCFD recommendations, with the latter integrating elements of all 11 recommended disclosures. In July 2023, the ISSB published a [comparison document](#) that summarizes some differences between the core content requirements in IFRS S2, including associated application guidance, and the TCFD's recommendations, recommended disclosures, and guidance.

Also in June 2023, the International Public Sector Accounting Standards Body [announced](#) it would begin developing the first sustainability reporting standard for the public sector on climate-related disclosures and published an [overview](#) of the project that indicates the standard would be built off IFRS S2, which is based on the TCFD recommendations.

Stock Exchange Developments

In December 2022, the Swiss Stock Exchange released an [investor relations handbook](#) to help listed companies comply with upcoming Swiss regulations on climate-related disclosures in line with the TCFD recommendations.

In March 2023, the Prague Stock Exchange [announced](#) the release of sustainability reporting [guidelines](#) to help companies in the Czech Republic understand their obligations under the CSRD and ESRS. The guidelines encourage companies to adopt TCFD in 2023 to support compliance with the CSRD and ease convergence with IFRS S1 and S2.

In April 2023, the Hong Kong Stock Exchange released a [consultation paper](#) on revising its ESG reporting framework to require all issuers to disclose climate-related information in their ESG reports in line with the TCFD recommendations and ISSB standards (vs the current “comply and explain” approach). If adopted, the rule would go into effect on January 1, 2024, with an expected phased implementation approach for certain disclosure elements.

3. INDUSTRY-LED INITIATIVES

This subsection provides brief descriptions of efforts by private-sector groups that support the implementation of the TCFD recommendations and occurred since the Task Force published its previous status report in October 2022.

In October 2022, the We Mean Business Coalition in conjunction with CDP, Ceres, and the Environmental Defense Fund released a [report](#) on transition action plans that mentions the TCFD recommendations as well as its guidance on [Scenario Analysis for Non-Financial Companies](#) and [Risk Management Integration and Disclosure](#) along with other materials to support climate transition planning.

In October 2022, the Japan TCFD Consortium published the third edition of its [guidance](#) on climate-related financial disclosures, which describes the content of the TCFD recommendations to help Japanese companies with TCFD implementation and reporting.

In November 2022, the U.K. Transition Plan Taskforce (TPT) released guidelines on climate transition plans for private-sector financial and non-financial companies for consultation until February 2023. The guidelines included a [disclosure framework](#) and [implementation guidance](#), with the former building on the Task Force's guidance on transition planning. In October 2023, the U.K. TPT published its [final framework](#).

In November 2022, the Glasgow Financial Alliance for Net Zero (GFANZ) released a [report](#)

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that provides voluntary guidance for financial institutions on developing net-zero transition plans. The report’s recommendations build on the Task Force’s work as well as the work of others. See [Figure D3](#) for more information on transition plans.

In November 2022, the World Business Council for Sustainable Development (WBCSD) launched a [climate scenario tool](#), with climate-related transition risk scenarios designed specifically for companies in the Food, Agriculture, and Forest Products industry. The scenario tool was accompanied by a [guide](#) that describes the features of the scenario tool and outputs of scenario analysis and includes several case studies. The scenario tool and guide are intended to help companies effectively apply scenario analysis, better assess the resilience of their strategies, and disclose information in line with the TCFD recommendations. In the guide, the WBCSD also indicated a companion guide on using scenarios to support transition planning — as outlined in the Task Force’s [Guidance on Metrics, Targets, and Transition Plans](#) — would be forthcoming. The [companion guide](#) was published in February 2023.

In January 2023, the Centre for Sustainable Finance and the Cambridge Institute for Sustainability Leadership (i.e., ClimateWise) released an independent [review](#) analyzing the insurance industry’s role in mitigating climate change. The report suggests that insurers use the TCFD framework as the industry standard. The report also noted that TCFD disclosures by the insurance industry have increased over time.

In January 2023, SBTi released [guidance](#) for the financial sector describing suggested pathways for financial institutions that want to adopt the SBTi-FI framework or the TCFD framework or both.

In February 2023, the WBCSD released a [report](#) describing proposals for a business-relevant climate scenario analysis reference approach for companies in the energy system — as requested

Figure D3 Transition Plan Resources

In October 2021, the Task Force issued guidance on metrics, targets, and transition plans. Since the release of this guidance, there have been several groups that have released guidance and tools to help companies develop transition plans. Due to ongoing interest in this topic, the Task Force has compiled the following list of resources on developing a transition plan:

- [The Transition Plan Taskforce Disclosure Framework](#) (U.K. TPT)
- [Climate Transition Action Plans](#) (We Mean Business Coalition et al.)
- [OECD Guidance on Transition Finance: Ensuring Credibility of Corporate Climate Transition Plans](#) (OECD)
- [Transition Planning and Climate Scenario Analysis: Food, Agriculture and Forest Products](#) (WBCSD)
- [Financial Institution Net-Zero Transition Plans](#) (GFANZ)
- [CDP Technical Note: Reporting on Climate Transition](#) (CDP)
- [The Good Transition Plan](#) (Climate Safe Lending Network)

by the Task Force. The business-relevant climate scenario analysis reference approach is intended to support energy companies in using scenario analysis to assess the resilience of their strategies to climate-related risks and to inform disclosures made in line with the TCFD recommendations.

In March 2023, the U.K. Climate Financial Risk Forum published an [updated guide](#) for U.K. companies to disclose climate-related risks in line with the TCFD recommendations. The guide includes example disclosures and specific suggestions for asset managers, banks, and insurers.

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E. Types of Financial Impact and Associated Drivers

A key goal of the Task Force's work has been to promote better disclosure by companies on the financial impact of climate-related risks and opportunities on their businesses, strategies, and financial planning. Investors, lenders, and insurance underwriters (i.e., users) need such information to make informed financial decisions — by understanding how climate-related issues could potentially affect a company's financial performance and financial position as reflected in its income statement, cash flow statement, and balance sheet. The Task Force recognizes the challenges associated with making such disclosures — some of which are described in [Section B. Financial Statement Considerations](#). The Task Force also recognizes that, while climate change affects nearly all economic sectors, the level of exposure and the impact of climate-related issues may differ by industry, geography, and company. Furthermore, the financial impact of climate-related issues on companies is not always clear or direct; and, for many companies, identifying the issues, assessing potential impacts, and ensuring material issues are reflected in financial filings may be challenging.

Since issuing its final recommendations in 2017, and at the request of the FSB, the Task Force has monitored companies' reporting of TCFD-aligned information and issued annual status reports that describe both current practices related to such reporting as well as other topics. Some of the topics covered in past status reports include the challenges faced by companies in implementing the TCFD recommendations and the types of climate-related financial information investors and other users find most useful in making financial decisions.

Based on its previous work, the Task Force understands that companies find its Strategy recommendation — which asks companies to disclose the actual and potential impacts of climate-related risks and opportunities on their businesses, strategies, and financial planning (see [Figure E1](#)) — particularly difficult to implement.¹⁵⁸ In fact, as described in the past five status reports as well as in this one, the lowest level of disclosure across all 11

Figure E1

Strategy Recommendation

Disclose the actual and potential impacts of climate-related risks and opportunities on the company's businesses, strategy, and financial planning wherever such information is material.

- a) Describe the climate-related risks and opportunities the company has identified over the short, medium, and long term.
- b) Describe the impact of climate-related risks and opportunities on the company's businesses, strategy, and financial planning.
- c) Describe the resilience of the company's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.

recommended disclosures relates to *Strategy c*). This recommended disclosure asks companies to describe the resilience of their strategies under different climate-related scenarios, and the associated guidance encourages them to describe the potential impact of climate-related issues on their financial performance and financial position.¹⁵⁹ Notably, as part of a 2021 survey, the Task Force asked companies whether they disclosed the impact of climate-related issues on their financial performance and financial position. Of the 100 companies responding, 20% indicated they disclosed the impact on their financial performance, while only 14% indicated they disclosed the impact on their financial position.¹⁶⁰

Also as part of its previous work, the Task Force has solicited views from users of climate-related financial disclosures to understand which types of information they find most useful for decision-making. In a 2020 survey of users, respondents identified the single-most useful disclosure element — out of nearly 60 specific disclosure elements drawn from the TCFD recommendations and related guidance — as a company's description of how its climate-

¹⁵⁸ TCFD, *2019 Status Report*, June 5, 2019 (pp. 56–57) and TCFD, *2022 Status Report*, October 13, 2022 (pp. 61–62).

¹⁵⁹ Financial performance refers to a company's income and expenses as reflected in its income and cash flow statements (actual) or potential income and expenses under different climate-related scenarios. Financial position refers to a company's assets, liabilities, and equity as reflected on its balance sheet (actual) or potential assets, liabilities, and equity under different climate-related scenarios.

¹⁶⁰ TCFD, *2021 Status Report*, October 14, 2021 (p. 57).

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related risks and opportunities have affected its business and strategy.¹⁶¹ In addition, in a 2021 survey, the Task Force asked users about the usefulness of several types of climate-related metrics, including the impact of climate-related issues on a company's financial performance and financial position. Of the 106 users responding, over 70% indicated a company's disclosure of the impact on its financial performance (75%) and financial position (73%) is very useful.¹⁶² Of the ten metrics rated, the only two that were higher were Scope 1 and Scope 2 GHG emissions at 91% and Scope 3 GHG emissions at 80%.¹⁶³

Given users' views on the usefulness of information associated with the Task Force's Strategy recommendation — especially information on financial performance and financial position — and the relatively low level of disclosure of such information, the Task Force sought to provide companies with information and insights on the types of financial impacts associated with specific climate-related risks and opportunities that other companies have identified. This section

describes common types of financial impact and associated drivers and includes case studies from companies on their experiences in implementing aspects of the Strategy recommendation. The Task Force believes such information may be useful to companies beginning to implement *Strategy b)* and *c)* (see [Figure E1](#), p. 90) and, ultimately, disclosing in line with those recommended disclosures.

1. SCOPE AND APPROACH

To gather information on the types and associated drivers of financial impact that companies have identified, the Task Force used companies' responses to the CDP Climate Change 2022 Questionnaire (2022 questionnaire).¹⁶⁴ The Task Force's analysis focused on the approximately 5,000 companies that provided public or non-public responses to the 2022 questionnaire based on investor requests made through CDP.¹⁶⁵ While the 2022 questionnaire included nearly 300 questions, the Task Force reviewed responses to a set

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Key Takeaways



Of the over 4,000 companies that identified climate-related issues with potential substantive impact, 68% provided estimates of the potential financial impact — either as single amounts or as ranges.



The most common type of financial impact estimated for climate-related risks was increased indirect operating costs. For climate-related opportunities, it was increased revenues from increased demand.



There are inherent uncertainties in estimating potential financial impact from climate-related issues. Transparency — particularly on assumptions made — is important to highlight these uncertainties to investors and other stakeholders.



Estimating potential financial impact from climate change requires expertise from different functions within a company. As a result, it may be useful to set up a cross-functional team for such efforts.

¹⁶¹ TCFD, [2020 Status Report](#), October 29, 2020 (pp. 29–31).

¹⁶² TCFD, [Guidance on Metrics, Targets, and Transition Plans](#), October 14, 2021 (p. 16).

¹⁶³ *Ibid.* (p. 14).

¹⁶⁴ The Task Force wishes to thank CDP for sharing select reporting results from the CDP Climate Change 2022 Questionnaire (CDP, "[CDP Climate Change 2022 Questionnaire](#)," Accessed May 1, 2023). The reporting results provided a standardized source of information on climate-related risks and opportunities and associated potential financial impacts identified by thousands of companies. Collecting information similar to that provided by CDP would entail reviewing individual companies' reports, which would take thousands of hours and would not be feasible for the Task Force.

¹⁶⁵ Of the approximately 5,000 companies, around 3,600 made their responses public. Only public responses are available on the CDP website.

of ten questions that asked companies to provide information on climate-related risks and opportunities with the potential to have substantive financial or strategic impact on their businesses.¹⁶⁶ These questions asked companies about which specific types of climate-related risks and opportunities they identified as well as the types and magnitudes of associated potential financial impacts. The types of climate-related risks and opportunities used in the 2022 questionnaire were the same as those described in the Task Force’s 2017 report.¹⁶⁷ (See [Figure E2](#) for more information on CDP.)

[Box E1](#) and [Box E2](#) (p. 93) provide an overview of the distribution of the roughly 5,000 companies that responded to the 2022 questionnaire based on their respective locations, sectors, and sizes. The companies were headquartered all around the world, with 40% in Asia Pacific and 32% in Europe. In addition, companies were grouped into sectors, as shown in the chart on the left in [Box E2](#) (p. 93).¹⁶⁸ Eighty eight percent (88%) came from non-financial sectors, and 12% came from the financial sector. As shown in the chart on the right, 61% of the companies had a market capitalization of at least \$1.5 billion.¹⁶⁹ In addition, 86% of the companies were public companies, representing nearly \$65 trillion of market capitalization. The vast majority of the remaining 14% were private companies, for which financial information was not available.

Figure E2
About CDP

CDP is a global non-profit that runs an environmental disclosure platform for companies, cities, states and regions. Founded in 2000 and working with more than 740 financial institutions with over \$130 trillion in assets, CDP works with capital markets and corporate procurement to encourage companies to disclose their environmental impacts, and to reduce greenhouse gas emissions, safeguard water resources, and protect forests. Nearly 20,000 organizations around the world disclosed data through CDP in 2022, including more than 18,700 companies worth half of global market capitalization, and over 1,100 cities, states, and regions.

CDP was an early supporter of the TCFD and aligned its climate change questionnaire with the TCFD’s recommendations in 2018. CDP also operates the TCFD Knowledge Hub, which provides a wide range of resources—including free training courses—for companies and other organizations interested in understanding and implementing the TCFD recommendations. CDP is also a founding member of the Science Based Targets initiative, We Mean Business Coalition, The Investor Agenda, and the Net Zero Asset Managers initiative.

Source: CDP Staff

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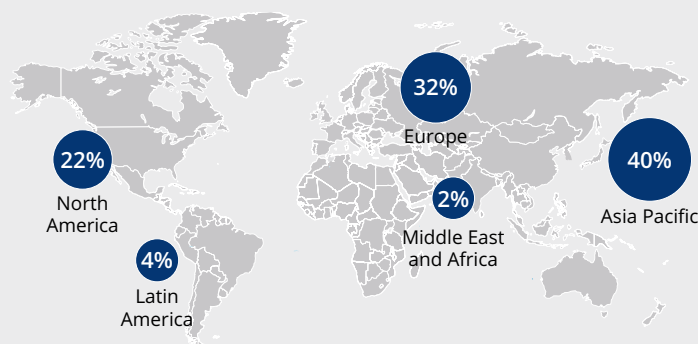
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Box E1
Demographics by Region and Top 5 Countries
Percent and Number of Companies

Distribution by Region



Top 5 Countries by Number of Companies

Japan	1,101
United States of America	916
United Kingdom	391
Republic of Korea	179
France	171

Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Base size: 5,021

¹⁶⁶ The TCFD Secretariat reviewed questions from the “Risks and Opportunities” and “Business Strategy” modules of the 2022 questionnaire.

¹⁶⁷ TCFD, *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*, June 29, 2017 (pp. 10–11).

¹⁶⁸ Companies were categorized based on the Global Industry Classification Standard (GICS) sector assigned to each company in the Bloomberg Professional Service. For companies not found in the Bloomberg Professional Service or where GICS sectors were not assigned, the most appropriate GICS sector was assigned to each company based on its primary activity as defined in the data provided by CDP.

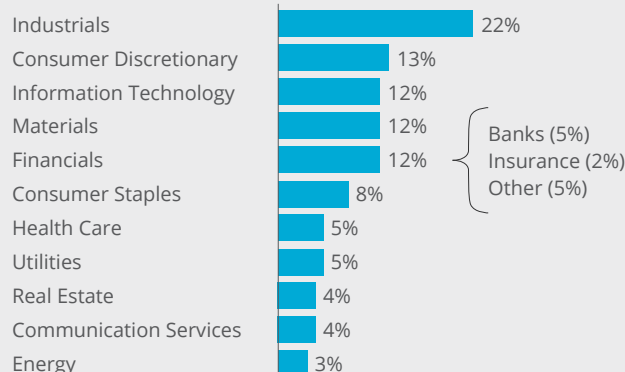
¹⁶⁹ Market capitalization is as of September 30, 2022, which is the date the CDP platform closed for 2022 reporting.

Box E2

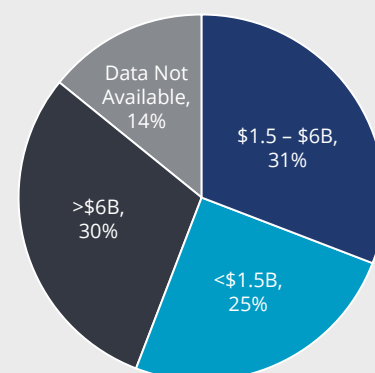
Demographics by Sector and Company Size

Percent of Companies

Distribution by Sector



Distribution by Market Capitalization



Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Base size: 5,021

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2. SUMMARY OF RESULTS

This subsection summarizes — at an aggregate level — the types and magnitudes of financial impacts associated with specific climate-related risks and opportunities that companies identified in their responses to the 2022 questionnaire. The Task Force also reviewed such information at a sector level, which is summarized in [Appendix 4: Additional Information on Financial Impact](#). The Task Force believes companies that are in the early stages of incorporating financial issues related to climate change into their internal processes may find this information useful in understanding the types of climate-related risks and opportunities to which they may be exposed as well as the types and potential size of associated financial impacts.

[Box E3](#) (p. 94) provides a breakdown of the 5,021 companies that responded to the 2022 questionnaire based on investor requests in terms of whether they identified climate-related risks or opportunities with the potential to have substantive financial or strategic impacts on their businesses (referred to as “substantive risks” and “substantive opportunities”). Of these companies, 80% identified substantive climate-related risks and 83% identified substantive opportunities. Of the companies that did not identify substantive climate-related risks or opportunities, 28% and 37%, respectively, said they were in the process of evaluating

their climate-related risks or opportunities. In terms of estimating potential financial impacts associated with their climate-related risks and opportunities, over 50% of the companies provided such estimates.¹⁷⁰ The percentages shown in Boxes E3 through E6 and Figures E3 and E4 are based on those companies that identified substantive climate-related issues and provided estimates of potential financial impacts. It is important to note that companies used their own definitions of substantive impact and were not required to include all substantive climate-related issues they identified. Given this, the percentages of companies identifying specific substantive climate-related issues may be greater than those shown in Boxes E3 through E6 and Figures E3 and E4.

The Task Force also reviewed the types of substantive climate-related issues that were identified by companies that provided estimates of potential financial impacts. As shown in [Box E4](#) (p. 94), the most common type of climate-related risk identified was policy and legal risk at 73%, followed by acute physical risks at 56%. Notably, of the companies that identified policy and legal risk, the vast majority selected risks related to current and emerging regulations, with only 4% identifying risks related to their exposure to litigation. For substantive climate-related opportunities, 70% identified opportunities related to products and services, followed by resource efficiency at 38%.

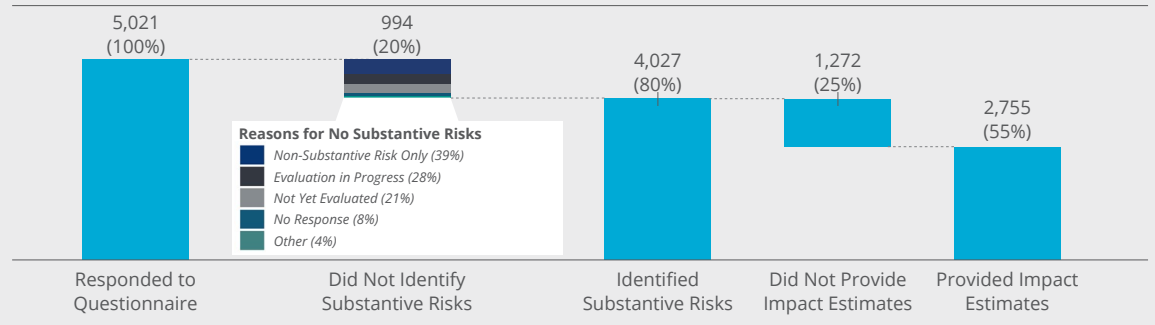
¹⁷⁰ This does not include companies that indicated in the 2022 questionnaire that they were able to provide potential financial impact estimates but did not include such estimates in their responses. Two percent (2%) of companies responded this way on climate-related risks, and 3% responded this way on climate-related opportunities.

Box E3

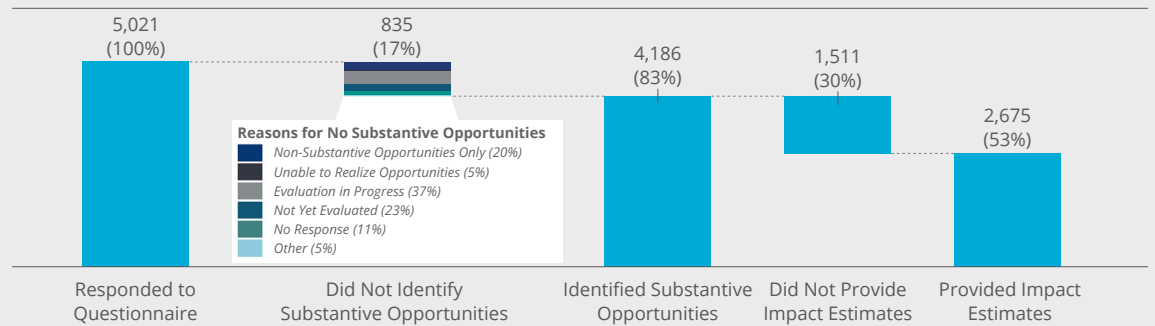
Companies Identifying Substantive Issues and Estimating Impacts

Number and Percent of Companies

Companies Identifying Substantive Climate-Related Risks and Estimating Impacts



Companies Identifying Substantive Climate-Related Opportunities and Estimating Impacts



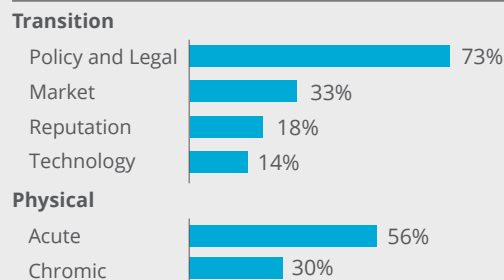
Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Box E4

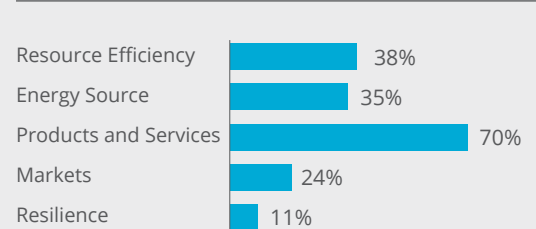
Types of Substantive Climate-Related Issues Identified

Percent of Companies

Types of Substantive Risks



Types of Substantive Opportunities



Base size: 2,755

Base size: 2,675

Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Box E5 (p. 95) shows the seven most frequently estimated types of potential financial impacts for both climate-related risks and opportunities. For climate-related risks, the most common type of financial impact that companies estimated was increased indirect operating costs at 49%, which was closely followed by increased direct costs at 46% — both of which relate to a company’s financial performance. Companies provided estimates of financial

impacts related their financial positions at a much lower rate, with 5% of companies estimating decreased access to capital and 7% estimating decreased asset values or useful lives of assets. For climate-related opportunities, the most frequent type of financial impact that companies estimated was increased revenues resulting from increased demand for products and services at 63%.

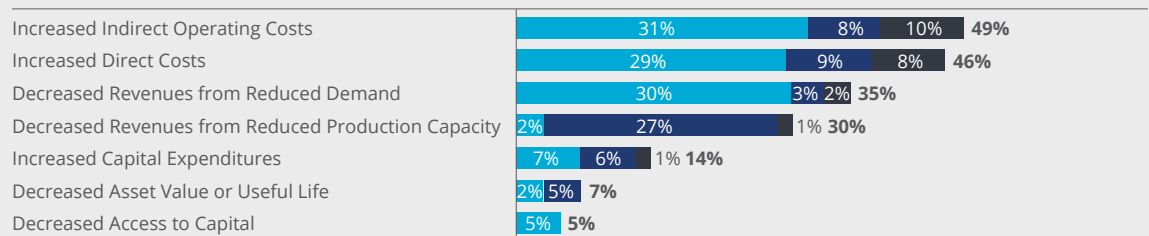
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Box E5

Types of Potential Financial Impact Estimated for Substantive Issues

Percent of Companies

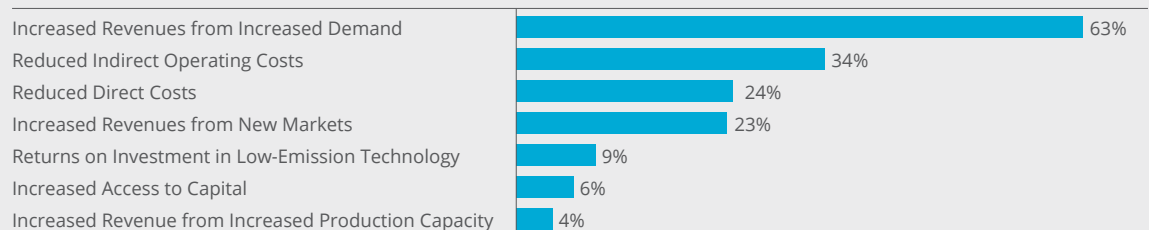
Types of Potential Financial Impact for Substantive Climate-Related Risks¹



Legend: Transition Risks Only Physical Risks Only Both Transition and Physical Risks

Base size: 2,755

Types of Potential Financial Impact for Substantive Climate-Related Opportunities



Base size: 2,675

1. Percentages in bold represent the total percent of companies estimating a given type of financial impact. Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

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Figure E3 and Figure E4 (p. 96) provide a breakdown on the specific climate-related risks and opportunities, respectively, driving the types of potential financial impact included in Box E5. As shown in Figure E3, policy and legal risk was the most frequently identified risk type driving increased operating costs (by 74% of companies) and increased direct costs (by 64% of companies). Market risk was the most

frequently cited risk type driving decreased revenues from reduced demand (by 53% of companies). Acute physical risk was the most frequently identified risk type driving decreased revenues from decreased production capacity (by 71% of companies), decreased asset value or useful life (by 54% of companies), and increased capital expenditure (by 38% of companies).

Figure E3

Potential Financial Impacts and Associated Drivers: Climate-Related Risks

Percent of Companies

Types of Potential Financial Impact ¹	Transition Risk Types				Physical Risk Types	
	Policy and Legal	Market	Reputation	Technology	Acute	Chronic
Increased Indirect Operating Costs (1,350)	74%	10%	2%	4%	22%	17%
Increased Direct Costs (1,267)	64%	19%	2%	6%	24%	16%
Decreased Revenues from Reduced Demand (958)	17%	53%	28%	13%	7%	7%
Decreased Rev. from Reduced Prod. Capacity (816)	4%	3%	2%	1%	71%	32%
Increased Capital Expenditures (408)	31%	5%	2%	22%	38%	15%
Decreased Asset Value or Useful Life (198)	18%	8%	3%	11%	54%	14%
Decreased Access to Capital (129)	11%	16%	71%	1%	2%	1%

1. The numbers in parentheses represents the base size. Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Legend: Low to high percentage of companies

As shown in Figure E4, opportunities related to products and services were most frequently associated with increased revenues from increased demand (by 89% of companies), increased revenues through access to new markets (by 58% of companies), and increased revenues from increased production capacity (by 44% of companies). Resource efficiency was the most frequently identified driver of reduced indirect operating costs (by 59% of companies) and reduced direct costs (by 57% of companies). Opportunities related to energy source were most frequently associated

with returns on investment in low-emissions technology (by 58% of companies).

Further, 65% and 56% of companies that provided estimates of potential financial impact from their climate-related risks or opportunities, respectively, had estimates that were less than 5% of their revenue, as shown in Box E6.¹⁷¹ In addition, 15% and 16% of companies provided estimated financial impacts from climate-related risks or opportunities, respectively, that ranged between 6% and 15% of their revenue.^{172,173}

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Figure E4
Potential Financial Impacts and Associated Drivers: Climate-Related Opportunities

Percent of Companies

Types of Potential Financial Impact ¹	Opportunity Types				
	Resource Efficiency	Energy Source	Products and Services	Markets	Resilience
Increased Revenues from Increased Demand (1,690)	4%	6%	89%	11%	3%
Reduced Indirect Operating Costs (919)	59%	44%	5%	2%	8%
Reduced Direct Costs (647)	57%	41%	9%	2%	8%
Increased Revenues from New Markets (620)	2%	7%	58%	40%	3%
Returns on Inv. in Low-Emissions Technology (230)	15%	58%	17%	7%	7%
Increased Access to Capital (173)	6%	8%	18%	62%	9%
Increased Rev. from Increased Prod. Capacity (110)	25%	15%	44%	8%	14%

1. The numbers in parentheses represents the base size.
 Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Legend: 
 Low to high percentage of companies

Box E6
Potential Financial Impacts Associated with Drivers as Share of Revenue

Percent of Companies

Percent of Revenue	Climate-Related Risks	Percent of Revenue	Climate-Related Opportunities
0% to 5%	65%	0% to 5%	56%
6% to 15%	15%	6% to 15%	16%
16% to 30%	7%	16% to 30%	8%
31% to 50%	3%	31% to 50%	4%
Over 51%	5%	Over 51%	11%
Data Not Available	5%	Data Not Available	5%

Base size: 2,755

Base size: 2,675

Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

¹⁷¹ Revenue figures are from the Bloomberg Professional Service as of September 30, 2022, which is the date the CDP platform closed for 2022 reporting.

¹⁷² Companies could provide a single-figure estimate or an estimated range. When a range was provided, the average of the minimum and maximum estimates was used.

¹⁷³ Companies could disclose multiple climate-related risks and opportunities with their potential financial impacts. In such cases, the sum of a company's financial impacts was used for its estimated potential financial impact.

3. CASE STUDIES ON FINANCIAL IMPACT

Given both users' interest in understanding the impact of climate-related issues on companies to support their financial decision-making processes and preparers' challenges in disclosing financial impacts associated with climate-related issues, the Task Force sought to provide a selection of case studies on companies' approaches to, challenges encountered on, and lessons learned from determining potential financial impacts associated with climate change and disclosing those impacts.

This subsection includes case studies by four companies — a forest, pulp, and paper company; a global mining and metals company; a financial services company; and a global insurance company. The case studies describe each company's experience and lessons learned in implementing the Strategy recommendation. They are intended to provide practical insights for other companies on implementing and disclosing the actual or potential impacts of climate-related risks and opportunities on companies' businesses, strategies, and financial planning.

Case Study by a Forest, Pulp, and Paper Company

Klabin is an integrated forest, pulp, and paper company headquartered in Brazil that manages over 700,000 hectares of land. Approximately 60% of the land is planted with species for industrial applications and the remaining kept as native preserved forests, with an important biodiversity. Many of our assets and operations are tied to nature, and we recognize that climate change may cause important impacts on our business. Sustainability issues, including those related to climate change, are incorporated into our business strategy. In addition, we were one of the first Brazilian companies to have our decarbonization targets approved by the Science Based Targets initiative (SBTi) in May 2021.¹⁷⁴

In 2020, we took an important step in our sustainability journey with the launch of the Klabin 2030 Agenda, called Klabin Objectives for Sustainable Development (KODS). KODS are a set of short- (2021), medium- (2025), and long-term (2030) commitments that are aligned with the Sustainable Development Goals of the United Nations, including goal number 13 on climate change. The KODS commitments

are a priority for the company. They are tied to our strategic growth plan, and we disclose the progress on these targets annually. The same year as the KODS were launched, we also became a TCFD supporter and began to follow the Task Force's recommendations. Even with all our experience on climate change issues, we still face challenges with disclosing in line with the TCFD recommendations — in particular, a lack of standardized data and methodologies for reporting climate-related financial information.

We decided to transform these challenges into opportunities and aim to become a leading example for the Brazilian market. We partnered with a specialized consultancy firm to prepare our first TCFD disclosures the same year we became supporters. The TCFD framework provided critical guidance for standardized disclosures of climate-related information and better understanding of our climate-related risks.

In the pages that follow, we provide insights from our experiences in evaluating and reporting information aligned with the TCFD recommendations over the past three years. More specifically, we give details on our approach to estimate and present potential climate-related financial impacts and how we use the estimated results to support our strategic decision-making.

Our Approach for Estimating Potential Financial Impact and Challenges Faced

To better understand the potential financial impacts of climate change on our company, we have developed a risk identification and assessment process tailored to our specific risks. Because of the range of physical and transition risks we face — and their unique characteristics — we are unable to apply one standardized methodology across all risks.

Identifying and Assessing Climate-Related Risks

We began our process by identifying all potential risks we face based on a range of different climate-related scenarios. For identification of physical risks, we used the Intergovernmental Panel on Climate Change Representative Concentration Pathways (RCPs) RCP 2.6 and RCP 8.5 scenarios; and for transition risks, we used the IEA's "Sustainability Development Scenario."^{175,176} Next, we performed a qualitative assessment

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¹⁷⁴ Klabin, *Sustainability Report*, June 2021.

¹⁷⁵ Riahi, Keywan et al., *RCP 8.5—A Scenario of Comparatively High Greenhouse Gas Emissions*, August 13, 2011.

¹⁷⁶ International Energy Agency, *The Sustainability Development Scenario*, December 4, 2019.

of our potential vulnerability and potential impact to assign each risk a criticality rating of critical, high, medium, or low. An internal multidisciplinary working group is responsible for the input to this risk assessment process, contributing with their broad expertise in several areas, including business strategy, forest research, climate change, and risk management.

Calculating Potential Financial Impact

Our risk assessment process identified water scarcity caused by climate change, regulatory changes such as carbon pricing, and temperature increases as the highest-priority risks. We then calculated the potential financial impact of each of these risks based on methodologies tailored to each risk type. Calculating potential financial impacts was challenging in the current absence of a global, standardized calculation methodology and a lack of guidance on which climate-related scenarios to use. Therefore, we leveraged external research and studies to develop assumptions in the calculation process — for example, a study on projected carbon pricing in Brazil. We aimed to be transparent with our assumptions and disclose the details

of our potential financial impact calculation methodologies in our TCFD ESG Panel.

We calculated potential financial impact as a percentage of earnings before interest, taxes, depreciation, and amortization (EBITDA) and the required investment in resilience strategy. Figure E5 shows an example of our calculations and describes how we quantified the potential financial impact from water scarcity. One of our most significant physical risks was water scarcity. Our analysis of this risk was based on the climatic history of the region for the period 1981–2010 and climate-related scenarios, including RCP 8.5. Informed by these scenarios, we conducted internal studies on current and future climate conditions and the impact of climate change on the regions in which we have forestry operations. The potential climate-related effects — including reduced water availability — could directly impact forest productivity, especially by reducing the growth of our planted forests. Based on research from our internal forest research team, the loss could be on average 3% to 5% for our forest productivity between 2020 and 2035. We estimated the potential financial impact of this lower productivity to be 0.15% of EBITDA.

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Figure E5
Potential Financial Impacts of Temperature Increases

Faster pace of forest pests and drop in forest productivity

Description	Time Frame	Amount of Financial Impact	EBITDA Percentage (2021)	Investment in Resilience and Strategy
The distribution and frequency of pests depends on a set of ecological and agroclimatic factors. The rise in the region's average temperature and other associated climate changes can accelerate pest proliferation cycles. PESTS: Attack rate: 50% Volume of infested eucalyptus: 3,756,845 tons. Volume of infested pine: 5,461,349 tons. DISEASES: Infestation risk rate: 15% (eucalyptus) and 10% (pine) Volume of infested eucalyptus: 1,502,738 tons. Volume of infested pine: 1,456,360 tons	Medium Term	Medium	1.61%	BRL 3,669,666.00
Amount and frequency of intense drought, minimum temperature, average temperature, potential evapotranspiration and water deficit are factors that affect the growth of the planted pine and eucalyptus forest. Thus, the rise in temperature, all the more constant, can imply an increase in evapotranspiration, and consequent reduction of forest productivity for both pine and eucalyptus. This effect can be intensified by increased periods of drought or reduction of average precipitation. Klabin has developed specific studies that pointed to an overall trend of rising temperatures in the Paraná region, with an average rise of 0.32°C per decade. For 2020-2035, these studies estimate a loss of forest productivity of 3% for eucalyptus and 5% for pine.	Long Term	Low	0.41%	

Klabin, "ESG Panel: Task Force on Climate-Related Disclosures," Accessed May 11, 2023.
 Notes: Medium term is defined as two to three years, and long term is defined as beyond four years.
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Informing Actions to Mitigate Risk

For each of the highest-priority risks, we developed and disclosed a corresponding resilience strategy, each of which describes how to mitigate our identified risk. For risks related to water scarcity, for example, we described our actions to reduce and monitor water consumption and our projects to increase the reuse of water. The assessment of financial impacts from risks has proven crucial for effectively prioritizing our risk mitigation actions. Our risk management function organizes quarterly review meetings to reassess the risks and monitor the implementation of our resilience strategies.

Lessons Learned

We have learned that it is important to have a consistent and broad methodology to assess, compare, and prioritize risks. The definitions of risk criticality must be very clear, and a group that includes multi-disciplinary expertise is best positioned to prioritize risks. The breadth of perspective is particularly important in the assessment of vulnerability. To achieve this breadth, we considered vulnerability across different time frames, scenarios, and socioeconomic trajectories.

We have also come to appreciate that disclosing the potential financial impact in the form of tangible financial metrics, such as EBITDA, facilitates communication with internal and external stakeholders as it can easily be understood by a wide range of stakeholders. This approach enables us to provide a clear picture of our exposure to climate-related risks, demonstrate our commitment to manage these risks, and effectively prioritize actions internally.

Finally, we recognize the need for continuous improvement in our evaluation and disclosure of climate-related risks and intend to update our risk model to identify risks based on new scenarios, including a net-zero scenario. We acknowledge that improving our models will require ongoing effort and collaboration with experts in the field. However, we believe that this is a critical step to enable resilience of our business in terms of climate change.

Case Study by a Global Mining and Metals Company

Anglo American is a global mining company headquartered in the U.K. We produce a diversified range of metals and minerals which play a significant role in meeting the needs of

a growing global population, in terms of basic infrastructure and improvements in living standards, and are critical raw materials for many of the systems and technologies required to deliver the energy transition. We recognize that climate change presents both significant risks and opportunities for our business model, including the potential to cause material financial impact. We assess and disclose these risks and opportunities in our climate-related disclosures, including our integrated annual report and climate change report, which we have been preparing in alignment with the TCFD framework since 2019. We have a target to be carbon neutral across Scope 1 and Scope 2 GHG emissions by 2040, and an ambition to reduce our Scope 3 GHG emissions by 50% by the same year.

Sustainability considerations — including those related to climate change — are fully integrated into our work and are central to our strategy and decision-making, most notably in decisions related to our asset portfolio maintaining a resilient and competitive position. Accordingly, understanding the resilience of our current portfolio to the financial implications of climate change is essential for ourselves and our stakeholders. We undertake comprehensive assessments of the resilience of our product portfolio. Given their material impact on our industry and operations, we focus specifically on transition risks and opportunities, including understanding the potential impact across different climate-related scenarios. In the following pages, we describe our three-step process of quantifying potential financial impact and the learnings we have gained.

Our Approach to Quantifying Potential Financial Impacts

Our three-step quantification process begins by selecting and benchmarking climate-related scenarios, which we use to establish end-sector technology pathways that inform commodity demand estimates. In the past, we have used in-house climate-related scenarios based on IEA's Current Policies, Announced Policies, and Sustainable Development scenarios. For our most recent analysis, we opted to use scenarios from Wood Mackenzie's Energy Transitions Service, as it offers a comprehensive set of third-party-developed global scenarios that provide sufficient detail on relevant sectors that use our metals and minerals. Wood Mackenzie's scenarios also meet the conditions outlined by the IPCC for a 1.5°C pathway and are within the benchmarks of other IPCC-recognized scenarios.

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Where existing scenarios do not contain sufficient information for our needs, we augment them with internal assessments developed by our research teams. For example, in the case of the platinum group metals, for which external scenarios do not provide sufficient detail, we have developed internal estimates using the Wood Mackenzie scenario variables as inputs.

Next, we use proprietary models to develop product demand, supply, and price forecasts by scenario. Our models are continuously improved and refined based on our in-house knowledge of markets' supply and demand for each product. The forecasts produced by the models help us assess how various profit pools might develop in the future, and to estimate potential impacts on cash flows and other key metrics in the financial statements.

Finally, we use the results of our forecasting to assess the strategic resilience of our product portfolio. Our aim is to understand how Anglo American's asset positioning and ability to generate cash flow may be impacted based on the different climate-related scenarios and profit pool forecasts. To focus on the

resilience of our current portfolio, at this stage of analysis, we keep production volumes constant and consider only existing assets and organic growth opportunities. It is important to note that the results of the assessments are not meant to be taken as definitive results or financial guidance.

Insights That Support Our Resilience Planning and Influence Our Business Strategy

Performing scenario analysis provides our external stakeholders — through our disclosures — a deeper understanding of our business. One of the main benefits is the enhanced understanding of the sensitivity of our product profit pools to the energy transition and the associated long-term resilience of our portfolio (see [Figure E6](#)). Our climate-related scenario analysis and modelling show that our portfolio is resilient in our considered scenarios, largely due to the high quality and long expected life of our assets, our exposure to metals and minerals that support a lower carbon future and the diversified mix of products in our portfolio, as well as our potential organic growth pathways.

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Figure E6
Results of Our Analysis Translated into Outlooks on the Resilience of Our Portfolio

Recommended disclosures	References
[...]	
c) Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	<p>Summary: Anglo American's strategy seeks opportunities in the metal and mineral needs of the future, including, critically, the impacts of climate change and the energy transition. The resilience of our portfolio to a changing climate also forms a key part of the Group's strategy. We draw on multiple sources to judge the contribution that individual assets would make to the portfolio under different climate scenarios and, amongst other things, this informs the way that we allocate capital.</p> <p>Integrated Annual Report 2022: Pages 28–35 and page 46 describe the Group's portfolio strategy and evolution and how that has been influenced by climate change. Pages 40–41 describe the technological innovations being delivered across the Group to reduce energy and water consumption, and pages 43–44 describe the efforts of our Marketing business to deliver products that help enable our customers to achieve their climate change ambitions. Page 46 gives more detail on our strategy to deliver a future-enabling portfolio and Page 65 describes our approach to capital allocation to achieve our carbon reduction targets, including the carbon pricing we use when appraising investment decisions. Pages 45–46 describe our approach to transition risk and explain how we believe Anglo American will remain resilient in a 1.5°C future. Pages 64–66 describe how broader sustainability considerations, including climate change, are embedded in our capital allocation decisions.</p> <p>Climate Change Report 2021: Pages 15–19 give a detailed overview of Anglo American's strategic and financial resilience to a 3°C, 2°C and 1.5°C scenario, including potential impacts on cash flow (upside and downside).</p> <p>Climate Change Report 2022: Page 15 explains the strategic principles that guide our portfolio choices and how we assess the resilience of our portfolio in a 1.5°C world. Page 17 gives further details on the role we believe our products have to play in a low carbon future, including the risks and opportunities related to each of the products and commodities we produce as we make that transition. Pages 19–22 describe our approach to adaptation and physical resilience in the face of a changing climate.</p>

Anglo American, *Integrated Annual Report*, pp. 116–117

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As described in our reporting, the results of our analyses indicate our cash flows should remain relatively stable across ~3°C, 2°C, and 1.5°C scenarios. However, there is a greater variation of outcomes in the lower temperature scenarios given the broad range of potential pathways involved. For example, in the next decade, under a 1.5°C scenario our cash flow could be up to 30% higher than under a ~3°C scenario, while in the subsequent decade, our cash flow could be 20%–25% lower under a 1.5°C scenario than a ~3°C scenario.

Although there is still more work to do in further improving our analysis and disclosures, the scenario-based quantification of financial risks and opportunities has allowed us to gain a deeper understanding of the role of our products in the low-carbon transition and how to maintain a portfolio of products that is resilient to the risks and opportunities of the low-carbon transition.

Lessons Learned

Our scenario analysis benefits from externally sourced climate-related scenarios, which provide an integrated, dynamic view of global energy transition pathways with sufficient detail to enable us to understand the financial implications of different product demand scenarios. Given today's pace of change, we also believe it is necessary to update our scenarios on an ongoing basis. When choosing between various scenario options, we take various factors into account, including whether the data is openly available to and accessible by our stakeholders and whether it has been validated by external parties.

One of the most significant learnings from our disclosure process is that it is often necessary to augment existing global climate-related scenarios to better fit our individual circumstances and better understand potential financial impacts on our business. A one-size-fits-all approach is usually not sufficient. We augment scenarios from public sources and third-party vendors using our proprietary knowledge of the markets in which we operate for the results to maximize our understanding of the implications of changes in supply and demand for our products.

It is particularly difficult to assess the impact of a 1.5°C scenario on future product prices and profit pools because there are many scenario variables that could radically diverge, such as macroeconomic inputs, underlying costs of mined

production, and trade flows. During the scenario process, we tend to limit the variables we adjust in order to keep the analysis and its impact as transparent as possible.

Quantifying financial impacts of climate change requires engagement across several internal functions and the task cannot be accomplished by climate subject-matter experts alone. Our quantification process depends on a range of in-house experts on product-specific markets, overall business strategy, and the evolution of government policies and regulations.

Finally, analyzing impact at the product level is critical to understanding how resilient our business is to climate change. By analyzing the potential impacts on specific products and their respective profit pools, we can identify areas where we can optimize growth and profitability while mitigating climate-related risks. This approach also enables us to determine which products are most impacted by climate change, allowing us to develop strategies to reduce associated risks and capture related opportunities.

Case Study by a Financial Services Company

Mitsubishi UFJ Financial Group (MUFG) is a financial services group headquartered in Japan. We provide commercial banking services to clients in all major markets — including markets in advanced economies (such as Europe and the U.S.) and developing economies (such as Asia). We have existing lending relationships with clients in a wide range of industries, including GHG emissions-intensive sectors that are having to adapt their business models as part of the transition to a low-carbon economy. Given the existing exposures we have, facilitating our clients' transition to become net-zero aligned is an essential step for our net-zero journey. This transition is expected to result in major changes to the global and regional industrial landscape, creating both climate-related risks and opportunities for our clients — which in turn represent risks and opportunities for us.

Supporting our clients in accelerating their climate transition journeys by providing them with transition finance is at the center of our strategy for managing and mitigating climate related risks. In 2021, we pledged to achieve net-zero GHG emissions from our finance portfolio

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by 2050.¹⁷⁷ We are the first Japanese financial institution to have joined the Net-Zero Banking Alliance (NZBA) — and our representative leads the NZBA's work on developing a guideline for transition finance.¹⁷⁸

As both a preparer and user of climate-related disclosures, we aim to “lead by example” by disclosing information to investors and other stakeholders in line with the TCFD framework through our Sustainability Report and TCFD Report.¹⁷⁹ We have been TCFD supporters since the TCFD recommendations were first published in 2017. In particular, the following describes how we assess, manage, and disclose potential financial impact associated with transition risks.

Our Approach to Estimating Potential Financial Impact and Challenges Faced

Based on the recommendations of the TCFD, we disclose our analyses of physical and transition climate-related risks and associated potential impacts for major risk categories including, but not limited to, credit risk, market risk, and liquidity risk. We have identified climate change as one of our priority risk drivers on which to focus and, therefore, have expanded our classification and disclosure of climate-related risks and integrated them into our Risk Appetite Framework.

Top-Down and Bottom-Up Analysis of Potential Financial Impact

We conduct scenario analysis to estimate the total potential impact of our exposure to both transition risks and physical risks. Since 2019,

we have participated in a pilot project led by United Nations Environment Programme Finance Initiative (UNEP-FI) that supports the development of industry practice for climate-related financial disclosures for the banking industry. Based on the results of this pilot, we have conducted an analysis of transition risks up to the year 2050 and physical risks through 2100. We have disclosed the results of our scenario analyses and estimated the potential impact of transition risks to range from 1.5 billion to 28.5 billion yen in total credit losses on an annual basis (see [Figure E7](#)).

Our comprehensive approach to determining potential financial impact combines a top-down method at the sector level with a bottom-up method at the individual company level. The top-down approach entails conducting sensitivity analyses under different climate-related scenarios. This is done in order to assess the potential impact of transition risks on credit ratings and on credit portfolios in certain prioritized sectors. Our analysis is based on scenarios provided by IEA and Network for Greening the Financial System (NGFS), including the IEA sustainable development well-below 2°C scenario and the NGFS 1.5°C scenario.

In the bottom-up method, we engage with clients in prioritized sectors to better understand their strategies and transition plans. Accordingly, both publicly disclosed client data and direct inputs from our client engagements serve as inputs into our analysis. To improve the accuracy of this analysis, we have improved the granularity of our bottom-up approach

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Figure E7
Potential Financial Impact Analysis for Climate-Related Transition Risk

Scenario	<ul style="list-style-type: none"> • Various scenarios, including the sustainable development scenario (the [less than] 2°C scenario) of the IEA and the 1.5°C scenario that the NGFS has released
Analytical method	<ul style="list-style-type: none"> • An integrated approach is adopted to assess the impact by combining the bottom-up approach at the individual company level and the top-down approach at the sector level. Using this approach, the impact on credit ratings in each scenario is analyzed along with the effect on the overall financial impact of the sector's credit portfolio.
Target sector	<ul style="list-style-type: none"> • Energy, utilities, automotive, steel, air, and maritime sectors
Target period	<ul style="list-style-type: none"> • Until 2050 using the end of March 2022 as the standard
Result of analysis	<ul style="list-style-type: none"> • Single-year basis: 1.5 billion yen to 28.5 billion yen

MUFG, *Sustainability Report 2022*, p. 99
Note: Some content was reformatted in order to fit the page.

¹⁷⁷ MUFG, *Carbon Neutrality Declaration*, May 2021.

¹⁷⁸ MUFG, “MUFG Appointed as a Lead for the Net Zero Banking Alliance Financing & Engagement Work Track Group,” November 22, 2021.

¹⁷⁹ MUFG, *Sustainability Report 2022*, September 2022 and MUFG, *TCFD Report 2022*, October 2022.

while also verifying the validity of the sensitivity analyses conducted as a part of the top-down approach. Results show that a deep engagement with our clients and support for their transitions are necessary to mitigate climate-related risks and the associated potential financial impacts within our own portfolio.

The challenges we faced are mainly related to data availability and sector-specific future outlooks. Indeed, the lack of a fully standardized disclosure format required us to gather client-specific data with ad hoc forms for different clients. In addition, for certain sectors for which scenario outlooks were not fully provided by IEA and NGFS, we had to develop supplemental outlooks internally as inputs for our analysis. In these cases, we validated our approach by consulting relevant divisions within our organization and third parties.

Approach to Mitigating Climate-Related Risks

To achieve our net-zero commitment while also building a resilient portfolio, we must take a client-centric approach to risk mitigation and transition planning. We have disclosed our climate targets as part of a roadmap to carbon neutrality in our Progress Report 2023 (see [Figure E8](#), p. 104).¹⁸⁰ The initiatives within our roadmap are designed to mitigate climate-related financial risks, support our clients as they pursue decarbonization through the provision of transition finance, and reduce financed GHG emissions to net zero by 2050. As part of the initiatives to reach this mission, we are committed to supporting the decarbonization of our clients through the provision of financial services, including the initiative to provide a total of 35 trillion yen (of which 18 trillion yen is earmarked for climate change) in sustainable financing from FY 2019 through FY 2030.

The insights from the assessment of the potential financial impact confirm the importance of managing and mitigating climate-related risks and opportunities. Rather than divesting from high-emitting sectors and clients, we are committed to engaging with our clients to support them in developing and implementing credible transition plans to reduce their GHG emissions. Thus far, we have engaged with more than 1,500 corporate clients globally to understand and support their

transition plans and provide financial solutions, including transition finance.

Lessons Learned

While our disclosure of the potential financial impacts of climate-related transition risk has been positively received by our stakeholders, it has not been without its challenges, such as the complexity of applying scenario analysis for risk over the long term until 2050. Since the analysis results are based on many assumptions — and the level of uncertainty around them is high — it is necessary to carefully incorporate them into our strategy and financial planning — and at the same time, continuously improve our methodology.

The process of quantifying the potential financial impacts of climate-related risks has provided important insights that inform the actions of our management team. We have come to realize that the qualitative information we gain from engagement with our clients is often just as useful as the outcome of the quantification.

Through both engagement with our clients and internal research, we have learned the importance of acquiring a full understanding of the unique characteristics of an industry or region as well as each client's transition strategy.¹⁸¹ In fact, engagement with our clients in Japan and the rest of Asia has allowed us to understand that a “whole of economy” transition is required. The key sectors to unlock this journey to accelerate energy transition are the power and industrial sectors — as approximately 70% of GHG emissions in Japan and the South East Asian region are from these sectors (almost 50% from power) — which we have therefore prioritized for our scenario analysis. Energy transition in any given economy requires an “all-hands-on-deck” approach, including engaging with not only the local government but also the entire supply chain. We believe that providing transition finance for the purpose of executing credible energy transition plans will unlock decarbonization opportunities in other sectors, including those that are GHG emissions intensive.

Our engagement strategy — informed by our scenario analysis — is premised on the understanding that to reach a single target (i.e., net zero by 2050), each of our clients will have a different starting point and pathway depending on their business model — as well as on the countries and regions in which they

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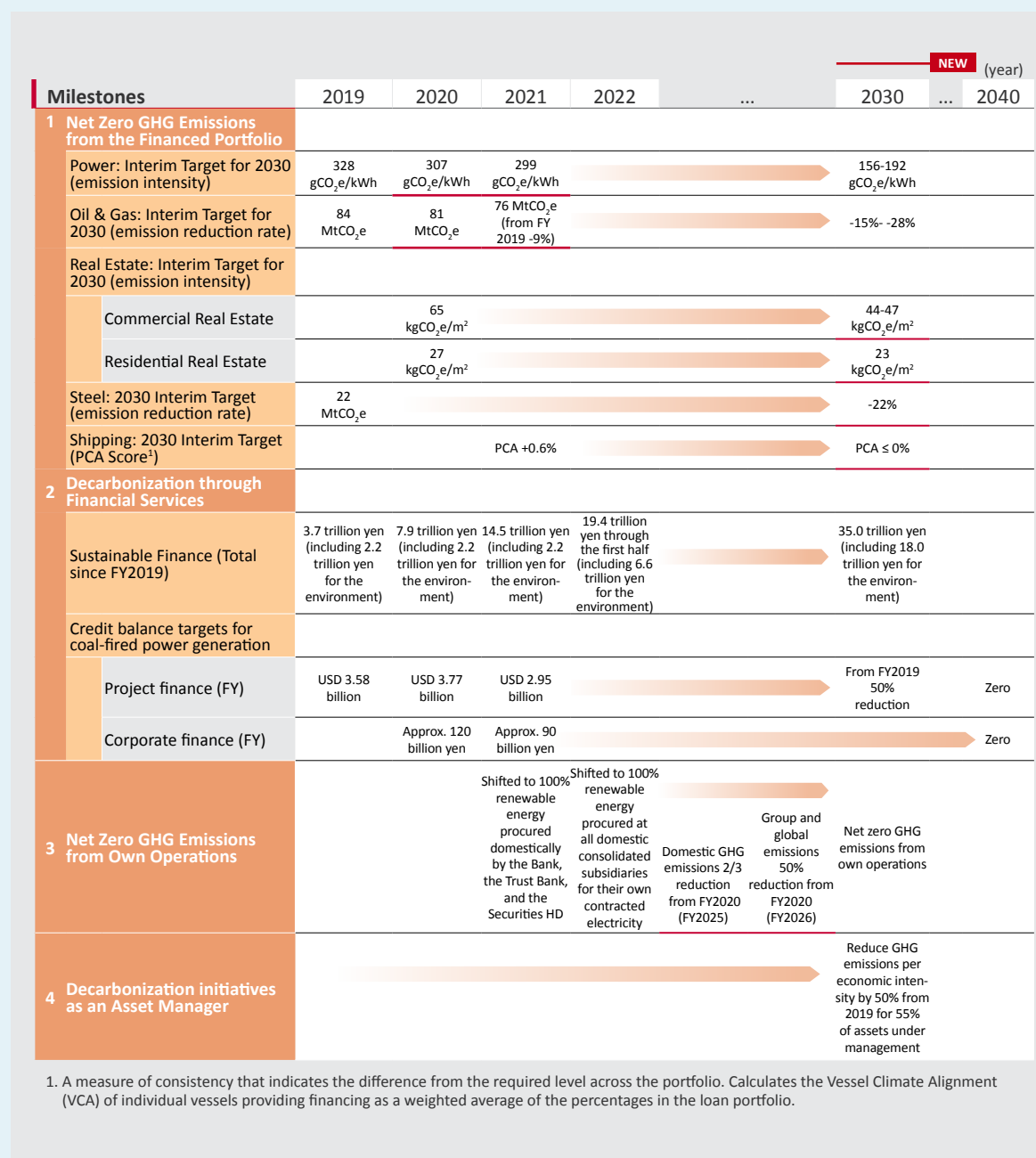
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¹⁸⁰ MUFG, *Progress Report 2023*, April 2023.

¹⁸¹ MUFG, *Transition Whitepaper 2022*, October 26, 2022.

Figure E8
Roadmap for Achieving Carbon Neutrality



MUFG, *Progress Report 2023*, p. 3
Note: Some content was reformatted in order to fit the page.

operate. We will continue to engage with our clients to understand their transition strategies, respectfully challenge their transition plans, and provide financing to support them. We are

confident that this approach will allow us to seize this opportunity to reduce our — and our clients’ — climate-related risks over time.

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Case Study by a Global Insurance Company

AXA is an insurance company headquartered in France. We are engaged in insurance, reinsurance, asset management, and banking businesses on a global scale — and as such, we are exposed to a wide variety of risks, including market risks, credit risks, insurance risks, operational risks, and other material risks. We invest in companies that have a clear path to reduce emissions and limit warming to 1.5°C, based on ambitious science-based targets.

Addressing climate-related risks is part of our risk management framework and disclosures. We have published climate-related disclosures since 2016 and have been TCFD supporters since its recommendations were first released in 2017. Since our first publication, we have tested different approaches to analyzing climate-related risks and opportunities of our various asset classes. Scenario analysis has been central to our approach to understanding different potential outcomes. We engage with industry groups and data providers to continuously refine our methodologies.

We have been experimenting with various methods of analyzing the impact of climate-related events on our investments since 2016. Today, we use a host of climate-related metrics to measure and monitor our climate impact and climate-related risk and opportunities for our asset classes.¹⁸² For example, we collect and analyze data on building-level impacts of extreme events on our real assets expressed in absolute monetary terms. For each metric and asset class, we have developed a tailored methodology. Some of the methodologies use in-house models while others are produced by external providers such as MSCI and S&P Trucost.

Our Approach for Estimating Potential Financial Impact and Challenges Faced

Our Investment and Risk Management team has developed Natural Catastrophe models (henceforth called “NatCat” models) to estimate the potential financial losses from climate change-related hazards.

Developing In-House NatCat Modelling and Forward-Looking Risk Frameworks

Our in-house NatCat models include different hazards depending on asset type, region, and

other factors. To identify perils and regions that will most likely be impacted by climate change, we have developed maps using data from the IPCC and other scientific reports. In assessing risk exposure to natural hazards, our models are based on asset-level data, which include the geolocation of buildings and their primary usage. Whenever possible, we also incorporate more detailed information from real estate managers about the physical characteristics of each building, as doing so can provide more precise and asset-specific results. From a risk modelling perspective, it is critical to include detailed information regarding vulnerability in order to have an accurate representation of the risk leveraging internal data or national data (e.g., eventual flood defense system presence). Therefore, our models consider up to 200 vulnerability curves.¹⁸³

Furthermore, our NatCat modelling informs our forward-looking analysis up to 2050. This analysis depends on climate scenarios and time horizons considered (e.g., IPCC climate scenarios RCP 2.6, 4.5, and 8.5).¹⁸⁴ AXA identified different approaches that range from simple to sophisticated to assess the future of natural hazards risks based on exposure to different peril and region combinations. The simple approach relies on available literature and datasets (e.g., open-source datasets for floods) that provide a percentage of impact (projection factors) for hazard, exposure, and vulnerability at different time intervals. This provides insights on where the risk may significantly evolve — along with the associated uncertainties — and enables AXA to identify and prioritize areas requiring further study. The most sophisticated approach integrates a modified view of hazard, exposure, and vulnerability within the NatCat models in order to capture forward-looking scenarios.

One challenge we have dealt with is the level of uncertainty around certain assumptions at the basis of our analysis. This is particularly the case for natural climate variability, climate model uncertainty, and scenario uncertainty (i.e., RCPs). Since this uncertainty cannot be eliminated from such work, it is appropriate to acknowledge and — wherever possible — assess it. In order to do so, our multi-model approach leverages an ensemble of datasets that provide a more comprehensive view of climate change impact across different

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¹⁸² For more details, see AXA, *Climate and Biodiversity Report*, June 29, 2023 (p. 19).

¹⁸³ A vulnerability curve describes the relationship between the hazard intensity and the degree of damage to a given asset or group of assets.

¹⁸⁴ Representative Concentration Pathways have been defined by IPCC experts and used as climate model inputs to evaluate the impact of different mitigation policies (from no mitigation actions to the complete cessation of high-carbon activities).

scenarios. Further, it is important to be transparent about these assumptions and uncertainties, and to properly communicate them.

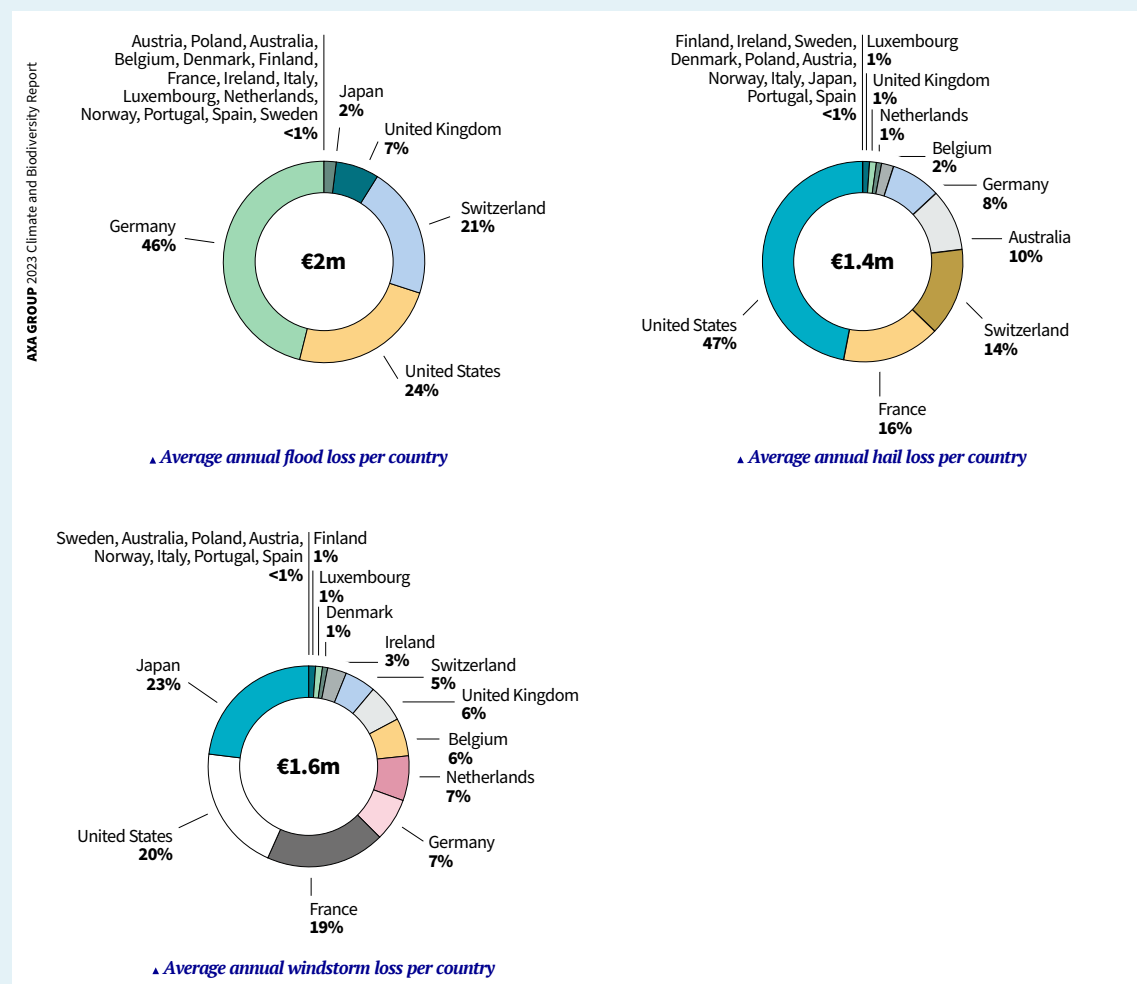
We also faced challenges in gathering data at the required level of granularity. The asset-level data we use to run the analysis currently relies on the geolocation of buildings and their main occupancy: datasets that have limited granularity. We have also been working to improve the process over time to incorporate more detailed information about the physical characteristics of buildings into the model, which can generate more refined and asset-specific results. Currently, such detailed information is not systematically available for the real estate portfolio, but we have started to engage with real estate managers to source granular information about a given building's structure, year of construction, height and floor levels owned, total value, and insured value.

Quantifying the Financial Impacts of Climate Change on Our Real Estate Investments

We leverage our in-house risk modelling framework to assess the potential direct financial impact of physical climate-related risks on our real estate portfolio (building damages) following possible extreme weather events in the current climate. In 2022, this assessment covered more than €45 billion in direct property investments and analyzed the financial impact of floods, windstorms, and hail in 20 countries. The results are disclosed as average annual losses and losses from a one-in-a-fifty-year event for the full portfolio. Furthermore, the results are broken down by country and event. Based on our assessment, our portfolio's highest risk exposure is from flooding (representing 40% of potential average annual losses), followed by windstorms (32%) and hail (28%) (see Figure E9).

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Figure E9
Breakdown of Average Annual Losses by Peril and Country



AXA, *Climate and Biodiversity Report*, p. 38

We incorporate the results of the potential financial impact assessment of real estate directly into our investment decision-making processes. For example, we leverage the outputs of our analysis during acquisition processes — specifically in the technical due diligence phase — as well as in designing adaptation strategies for assets where required.

Lessons Learned

Although there is a common misconception that climate-related risks are only related to hazards, in order to assess potential financial impacts, it is important to take into account all the components of climate risk: physical hazards, exposures, and vulnerability. Each of these elements plays a unique role in driving climate-related risks and the associated actual and potential financial impact.

Developing internal climate risk models requires a multidisciplinary team with a

variety of specific expertise, such as actuaries, engineers, and climate risk researchers. At the same time, it is critical to build and engage a network of external collaborations, including scientists and academics, to ensure that data and methodologies are aligned with the most advanced studies and research on an ongoing basis. To foster collaborations with external stakeholders, AXA has a dedicated climate research team that is involved in several joint research initiatives.

We believe that openly sharing our methodologies and results has significant value for research and industry communities working on these topics. Introducing climate into risk assessment processes is a complex exercise; therefore, we are fostering a collaborative approach with our stakeholders to accelerate best practices being defined and then shared.

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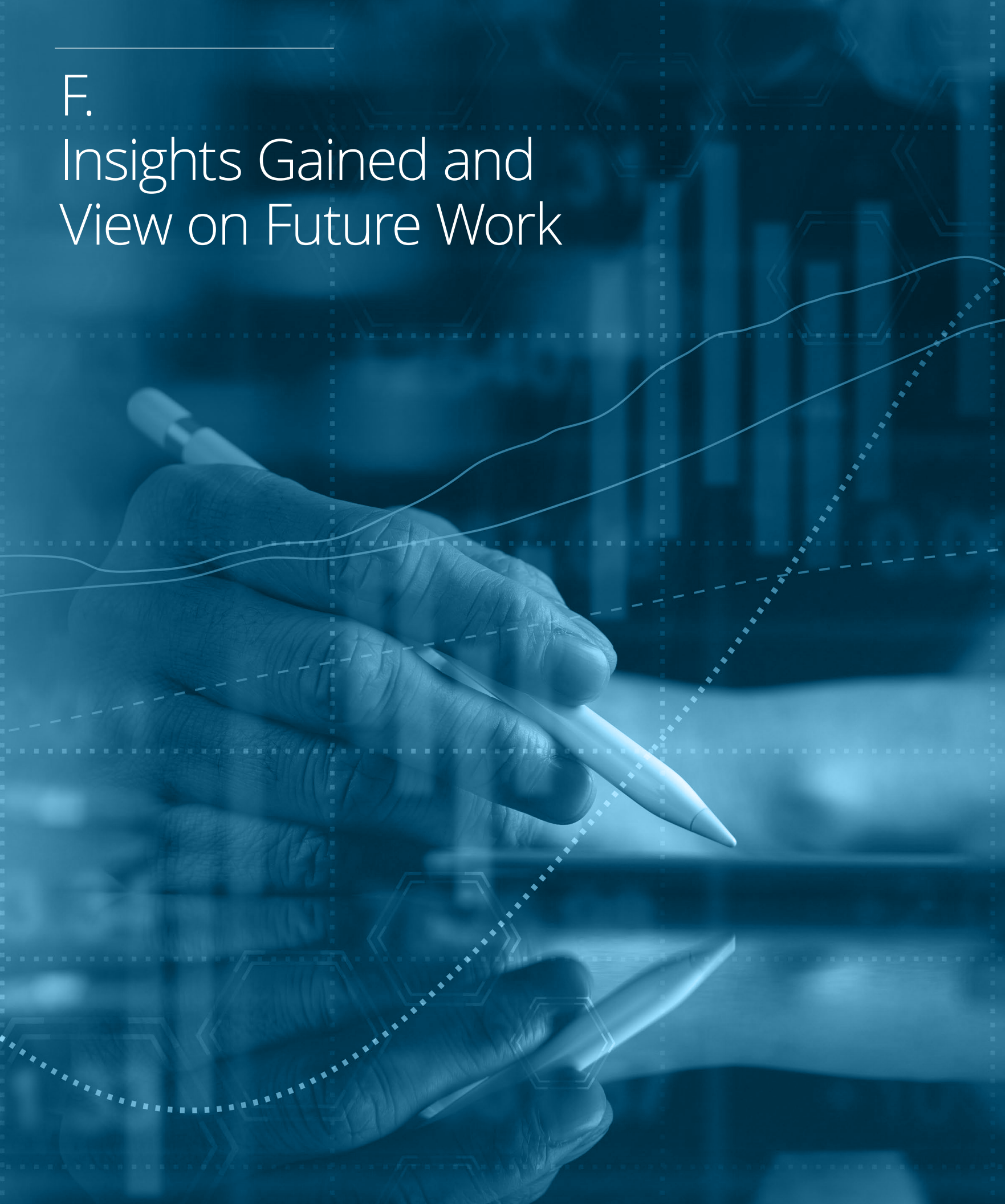
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On July 6, 2023, the Financial Stability Board (FSB) announced that the International Sustainability Standards Board's (ISSB's) general sustainability-related and climate-related disclosure standards — released in June 2023 — can be seen as a culmination of the Task Force's work.¹⁸⁵ As such, the FSB disbanded the TCFD with the release of this status report and asked "the ISSB to deliver a report in 2024 on progress in firms' disclosures, [...] including early take-up of the ISSB standard for climate-related disclosures and progress in achieving interoperability."¹⁸⁶ The Task Force wishes to commend the FSB on its leadership in establishing the TCFD as an industry-led task force to develop voluntary recommendations on climate-related financial disclosure and for supporting its work to promote and monitor adoption of the recommendations for the past several years. Since this is the Task Force's last report, it reflected on its experiences and insights gained over the past eight years as well as areas that warrant continued focus or further work, as described below.

1. MEETING THE REMIT FROM THE FSB

The FSB created the Task Force in late 2015 and asked it to make recommendations on consistent climate-related financial disclosures for use by companies in providing information to investors, lenders, and insurance underwriters.¹⁸⁷ The FSB also emphasized that any disclosure recommendations by the Task Force would be voluntary and would need to 1) incorporate the principle of materiality; 2) weigh the balance of costs and benefits; and 3) not add to the already well developed body of existing climate-related disclosure schemes.¹⁸⁸

In developing its recommendations, the Task Force sought to balance the needs of the users of disclosures with the challenges faced by the preparers and was keenly aware of 1) companies' concerns that multiple climate-related disclosure frameworks increase the administrative burden and cost of their disclosure efforts and

2) investors and other users' identification of non-comparable reporting by companies as a major obstacle to incorporating climate-related issues into their financial decisions.¹⁸⁹ In light of these concerns and consistent with its remit, the Task Force drew on existing climate-related disclosure regimes to develop a singular, accessible framework for climate-related financial disclosure.

In addition, when it released its recommendations in June 2017, the Task Force indicated its recommendations provide a common set of principles that should help existing disclosure regimes come into closer alignment over time. It further noted that preparers, users, and other stakeholders share a common interest in encouraging such alignment as it relieves a burden for reporting entities, reduces fragmented disclosure, and provides greater comparability for users. The Task Force also encouraged standard setting bodies to support adoption of the recommendations and alignment with the 11 recommended disclosures.

*The Task Force believes its recommendations, which provide a **singular, accessible framework for climate-related financial disclosure**, have helped existing disclosure regimes come into closer alignment over time.*

In reflecting on its work (see [Box F1](#), p. 110) and related developments over the past eight years, the Task Force believes it has successfully met its remit. The TCFD recommendations have been a key driver of greater consistency among major climate-related disclosure regimes that existed when the Task Force was created as well as climate-related disclosure requirements and standards that have been developed more recently, effectively reducing fragmentation and supporting consistency across reporting regimes. For example, by 2019, several major climate-related disclosure regimes had incorporated the TCFD recommendations into their requirements

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¹⁸⁵ FSB, "FSB Plenary Meets in Frankfurt," July 6, 2023.

¹⁸⁶ FSB, *FSB Roadmap for Addressing Financial Risks from Climate Change: 2023 Progress Report*, July 13, 2023.

¹⁸⁷ FSB, "FSB to Establish Task Force on Climate-related Financial Disclosures," December 4, 2015.

¹⁸⁸ FSB, "Proposal for a Disclosure Task Force on Climate-Related Risks," November 9, 2015.

¹⁸⁹ TCFD, *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*, June 29, 2017.

and guidance.¹⁹⁰ In addition, as described elsewhere in this report and previous reports, several governments, regulators, and standard setters have incorporated or drawn from the TCFD recommendations in developing climate-related reporting requirements and standards, including the U.S. Securities and Exchange Commission, the U.K. Parliament, the European Commission, and the ISSB.^{191,192} Furthermore, the International Organization

of Securities Commissions endorsed the ISSB standards and called on its 130 member jurisdictions “to consider ways in which they might adopt, apply or otherwise be informed by the ISSB standards within the context of their jurisdictional arrangements, in a way that promotes consistent and comparable climate-related and other sustainability-related disclosures for investors.”¹⁹³

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Box F1 TCFD Major Milestones 2016–2023

<p>2016</p> <ul style="list-style-type: none"> Public Consultation Phase 1 Report Public Consultation TCFD Recommendations <p>2017 100+ TCFD Supporters</p> <ul style="list-style-type: none"> Final TCFD Recommendations TCFD Recommendations Supported by 100+ CEOs 390 Investors Called on G20 Leaders to Support TCFD Recommendations <p>2018 ~500 TCFD Supporters</p> <ul style="list-style-type: none"> TCFD Knowledge Hub WBCSD TCFD Preparer Forum Report First TCFD Status Report CDP, CDSB, and PRI Aligned with TCFD <p>2019 ~800 TCFD Supporters</p> <ul style="list-style-type: none"> Japan TCFD Consortium Second TCFD Status Report European Commission Guidelines in Line with TCFD Recommendations WBCSD TCFD Preparer Forum Reports <p>2020 1,500+ TCFD Supporters</p> <ul style="list-style-type: none"> WBCSD TCFD Preparer Forum Report Risk Management Guidance 	<ul style="list-style-type: none"> March 2016: Consultation on Phase I Report Sought feedback on the scope and objectives of the Task Force’s work to develop recommendations on climate-related financial disclosures. December 2016: Consultation on TCFD Recommendations Sought feedback on the draft TCFD recommendations and engaged with users, preparers, and other stakeholders in relevant industries and sectors around the world. 2016–2017: Engagement with Over 2,700 Individuals in 43 Countries <ul style="list-style-type: none"> 128 Industry Interviews and 5 Focus Groups in 20 countries 10 Webinars and 793 Attendees in 30 countries 523 Responses on Public Consultations from 34 countries Outreach Events in 13 countries June 2017: Final TCFD Recommendations Published its final recommendations on climate-related financial disclosures along with implementation guidance and a technical supplement on scenario analysis. 2017–2018: Conferences and Workshops Held to Drive Adoption <ul style="list-style-type: none"> Held two scenario analysis conferences in Europe and North America. Hosted three implementation workshops in Europe and Asia Pacific. May 2018: TCFD Knowledge Hub Launched the TCFD Knowledge Hub to help companies implement the TCFD recommendations. September 2018: The Task Force’s First Status Report Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ user case studies describing how TCFD-aligned information is used. 2018–2019: TCFD Implementation and Use Survey Surveyed preparers on implementing the TCFD recommendations and related challenges and users on the usefulness, availability, and quality of TCFD-aligned disclosures. June 2019: 2019 Status Report Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ user case studies ■ survey results ■ insights on disclosing strategy resilience. March 2020: User Survey on Decision-Useful Information Surveyed expert users on most useful climate-related information for financial decision-making. Expert users rated 60+ disclosure elements drawn from the TCFD framework.
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Legend: ■ TCFD Reports and Other Resources ■ Support from Prepares, Users, and Official Bodies ■ External Engagement

¹⁹⁰ See Principles for Responsible Investment, “Meeting the TCFD Recommendations in the 2018 PRI Reporting Framework,” December 18, 2017; Climate Disclosure Standards Board (now part of the IFRS Foundation), *Framework for Reporting Environmental and Social Information*, January 2022; CDP, “How CDP is aligned to the TCFD,” Accessed June 21, 2023; and Sustainability Accounting Standards Board (now part of the IFRS Foundation), *TCFD Implementation Guide*, May 1, 2019.

¹⁹¹ See Section D. TCFD-Aligned Requirements and Related Initiatives for additional information.

¹⁹² U.S. Securities and Exchange Commission, “Press Release: SEC Proposes Rules to Enhance and Standardize Climate-Related Disclosures for Investors,” March 21, 2022; U.K. Parliament, “Companies Act 2006 s414(CA),” (as amended), Accessed June 21, 2023; European Parliament and European Council, *Directive 2022/2464 as Regards Corporate Sustainability Reporting*, December 14, 2022; IFRS Foundation, “ISSB Issues Inaugural Global Sustainability Disclosure Standards,” June 26, 2023.

¹⁹³ International Organization of Securities Commissions, “IOSCO Endorses the ISSB’s Sustainability-Related Financial Disclosures Standards,” July 25, 2023.

Box F1

TCFD Major Milestones 2016–2023 (continued)

- Scenario Analysis Guidance
- Third TCFD Status Report
- Public Consultation: Forward-Looking Financial Sector Metrics

2021 2,600+ TCFD Supporters

■ WBCSD TCFD Preparer Forum Report

■ Public Consultation: Metrics, Targets, and Transition Plans

■ Metrics, Targets, and Transition Plans Guidance

■ Updated Implementation Guidance

■ Fourth TCFD Status Report

■ FSB Report Encouraging Use of the TCFD Framework

■ ISSB to Develop Standards Based on TCFD

■ Mexico TCFD Consortium

2022 3,900+ TCFD Supporters

■ U.S. SEC Proposed Rules Leveraging TCFD

■ ISSB Draft Standards Based on TCFD

■ EFRAG Draft Standards in Line with TCFD

■ Fifth TCFD Status Report

2023 4,850+ TCFD Supporters

■ ISSB Final Standards

■ First Set of Final EFRAG Standards

■ Last TCFD Status Report

■ TCFD Disbanded

October 2020: Guidance on Risk Management and Scenario Analysis

Issued guidance on 1) integrating climate-related issues into existing risk management processes and disclosing relevant information and 2) conducting climate-related scenario analysis for non-financial companies.



October 2020: 2020 Status Report

Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ insights from users on most useful TCFD-aligned information for financial decision-making ■ case studies by preparers ■ regulatory developments.



2020–2021: Consultations on Metrics, Targets, and Transition Plans

Sought feedback on various forward-looking, climate-related metrics for the financial sector in October 2020.

Sought feedback on proposed guidance on metrics, targets, and transition plans in June 2021.

October 2021: 2021 Status Report

Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ insights on disclosing financial impact of climate-related issues ■ regulatory developments.



October 2021: Guidance on Metrics, Targets, and Transition Plans and Updated Implementation Guidance

Issued guidance on seven, core cross-industry metrics and transition plans and updated implementation guidance to reflect industry developments.



February 2022: TCFD Workshop Presentation Series

Released a set of five presentations to support TCFD implementation.

February and March 2022: Surveys on Reporting Trends and Challenges

Sought input from asset managers and asset owners on reporting of climate-related information to clients and beneficiaries, respectively.

Sought input from preparers on TCFD implementation over five-year period and from users on using TCFD-aligned information for decision-making.

October 2022: 2022 Status Report

Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ progress and challenges with TCFD implementation over past five years ■ users' views of the usefulness of TCFD-aligned disclosures ■ regulatory developments.



October 2023: The Task Force's Last Status Report

Included an overview of TCFD-aligned disclosure practices ■ disclosure examples ■ regulatory developments ■ case studies by preparers ■ climate-related issues in financial statements ■ insights gained over the past eight years ■ areas of continued focus and further work.



Legend: ■ TCFD Reports and Other Resources ■ Support from Prepares, Users, and Official Bodies ■ External Engagement

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2. INSIGHTS GAINED FROM THE TASK FORCE'S WORK

As part of reflecting on its experiences (see [Box F1](#), p. 110) and insights gained over the past eight years, the Task Force considered reasons why its voluntary climate-related financial disclosure recommendations and overall framework were well received by both the private sector and the public sector, ultimately serving as the foundation upon which several jurisdictional and international climate-related reporting requirements and standards were built. The Task Force attributes the global spread of the TCFD recommendations to the support

and willingness of thousands of companies to implement the recommendations on a voluntary basis; the tremendous support from investors and others in asking companies to disclose information in line with the recommendations; and the FSB's work to promote use of the TCFD recommendations by governments, regulators, and standard setters as a basis for climate-related financial disclosure requirements. The Task Force believes the insights gained from its work could be useful for similar types of initiatives. As such, the Task Force summarizes the major contributing factors to the success of its recommendations in [Table F1](#) (p. 112) and provides further details in the paragraphs below.

Table F1
Major Contributing Factors to Success of the TCFD Recommendations

	Supported by the FSB , including encouraging financial authorities to promote the TCFD framework
	Focused on decision-useful information structured around companies' strategy, risk management, and governance processes
	Developed by a global, industry-led group of expert preparers and users to ensure relevance and balance
	Backed by preparers, users, and industry associations from the start, with continuous involvement and support throughout
	Developed as a voluntary framework to allow for gradual development of reporting approaches based on experience
	Supplemented by guidance based on practical experience to facilitate learning, support implementation, and direct attention to areas identified by preparers as challenging
	Built on existing frameworks and practices with a strong commitment from the outset to promote convergence and simplification of reporting
	Supported by full time, professional secretariat staff with strong private-sector and public-sector experience

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FSB Support: The FSB created the Task Force and asked it to make recommendations on consistent climate-related financial disclosures for use by companies in providing information to investors and other users for financial decision-making. With the release of the Task Force’s recommendations in 2017 and each year thereafter, the FSB asked the Task Force to continue its work — promoting adoption of the TCFD framework; providing further guidance; supporting educational efforts; monitoring climate-related financial disclosure practices in terms of their alignment with the TCFD recommendations; and preparing annual status reports. In addition, in July 2021, the FSB published its *Report on Promoting Climate-Related Disclosures*, in which it encouraged financial authorities “to use a framework based on the TCFD Recommendations across all sectors (non-financial corporates and financial institutions) for climate-related financial disclosures, in line with jurisdictions’ regulatory and legal requirements.”¹⁹⁴

Concurrent with its *Report on Promoting Climate-Related Disclosures*, the FSB also published the

FSB Roadmap for Addressing Climate-Related Financial Risks, which laid out a comprehensive and coordinated plan for addressing climate-related financial risks. In the report, the FSB welcomed the IFRS Foundation’s “work to develop a baseline global sustainability reporting standard under robust governance and public oversight, built from the TCFD framework and the work of an alliance of sustainability standard setters.”¹⁹⁵ The FSB also recognized that some jurisdictions were already taking domestic steps in a more accelerated timeframe than the IFRS’s work and indicated the following:

“[t]he TCFD framework provides a basis for initiatives that jurisdictions may wish to take, based on domestic regulatory frameworks, while work towards a global baseline corporate reporting standard progresses. This would be an important step forward on the path towards a global baseline standard that is interoperable with jurisdiction-specific requirements in order to achieve comparability in disclosures.”

¹⁹⁴ FSB, *Report on Promoting Climate-Related Disclosures*, July 7, 2021.

¹⁹⁵ FSB, *FSB Roadmap for Addressing Climate-Related Financial Risks*, July 7, 2021.

The Task Force recognizes that the FSB’s support of the Task Force and promotion of the TCFD recommendations as a foundation for financial authorities to use in developing climate-related reporting requirements were critical factors to the success of the TCFD recommendations and their incorporation into the ISSB standards, which were endorsed by the International Organization of Securities Commissions.¹⁹⁶

Decision-Useful Information: In developing the recommendations, the Task Force focused on the types of information needed by investors, lenders, and insurance underwriters to appropriately assess and price climate-related risks and opportunities as part of their financial decision-making. The Task Force structured its recommendations around four thematic areas that represent core elements of how companies operate: governance, strategy, risk management, and metrics and targets. In addition, the Task Force focused specifically on the impact of climate-related risks and opportunities on a company rather than a company’s impact on the environment, with the latter being the focus of most of the existing climate-related disclosure regimes at the time.

Global Industry Experts: In creating the Task Force, the FSB modeled it on its successful Enhanced Disclosure Task Force (EDTF), which was an industry-led group established in 2012 to make recommendations on financial risk disclosures for banks.¹⁹⁷ The EDTF comprised preparers, auditors, and users of banks’ financial statements. Similarly, in identifying TCFD members, the FSB selected preparers and users of climate-related financial disclosures from across the G20’s constituency, covering a broad range of sectors.

Given the Task Force’s remit and expertise of its members, it sought to develop a set of recommendations on climate-related financial disclosure — for inclusion in mainstream financial filings — that could be adopted by companies of all sizes across sectors and jurisdictions. As such, the Task Force engaged with key stakeholders throughout the development of its recommendations to ensure that its work would 1) promote alignment across existing disclosure regimes; 2) consider the perspectives of users and the concerns of preparers of climate-related financial disclosures; and 3) be efficiently implemented

by companies and other organizations in their financial reporting.

The Task Force conducted extensive outreach and engagement — through public consultations, industry interviews, focus groups, outreach events, and webinars — to support the development of its recommendations. Such engagement served two primary purposes — 1) to raise the level of awareness and educate stakeholders on the Task Force’s work and 2) to solicit feedback from stakeholders on the Task Force’s proposed recommended disclosures and implementation guidance. In total, more than 2,700 individuals in 43 countries were included in the Task Force’s outreach and engagement. The Task Force believes its members’ expertise and extensive stakeholder engagement were key in developing a singular, accessible framework for climate-related financial disclosure.

Involvement and Support of Preparers, Users, and Others: Another contributing factor to the success of the TCFD recommendations relates to the support received from individual companies, investor groups, and industry groups. When the final TCFD recommendations were published in 2017, over 100 CEOs and their companies with a combined market cap of around \$3.5 trillion and financial institutions responsible for assets of about \$25 trillion publicly committed to support the recommendations. In addition, several investor groups expressed support for the TCFD recommendations over the past several years. One of the first investor-led initiatives to support the TCFD was a combined group of 390 investors — coordinated by the Asia Investor Group on Climate Change; CDP; Ceres; Investor Group on Climate Change; Institutional Investors Group on Climate Change; and signatories of the Principles for Responsible Investment — that called on G20 leaders and their nations to support the TCFD recommendations.¹⁹⁸ In addition, Climate Action 100+ engaged the world’s largest corporate greenhouse gas emitters to strengthen climate-related disclosures by implementing the TCFD recommendations.

The Task Force also received support from several industry associations or groups, including the World Economic Forum, the World Business Council for Sustainable Development (WBCSD), the Institute of International Finance,

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¹⁹⁶ The International Organization of Securities Commissions endorsed the ISSB standards and called on its 130 member jurisdictions, regulating more than 95% of the world’s financial markets, to consider ways in which they might adopt, apply, or otherwise be informed by the ISSB standards within the context of their jurisdictional arrangements. International Organization of Securities Commissions, “[IOSCO Endorses the ISSB’s Sustainability-Related Financial Disclosures Standards](#),” July 25, 2023.

¹⁹⁷ FSB, “[FSB Announces the Formation of the Enhanced Disclosure Task Force](#),” May 10, 2012.

¹⁹⁸ Asia Investor Group on Climate Change, et al., “[Letter from Global Investors to Governments of the G20 Nations](#),” July 3, 2017.

as well as others. These groups provided support for the TCFD recommendations in various ways, such as providing forums in which companies learned more about the TCFD recommendations and their implementation as well as developing implementation guidance for companies in specific sectors. For example, the WBCSD established the TCFD Oil and Gas Preparer Forum in October 2017, with input from the TCFD Secretariat. The forum brought together four major oil and gas companies to show how they were implementing the TCFD recommendations and give practical examples of effective climate-related disclosure.¹⁹⁹ Over the past six years, the WBCSD has led several other industry-specific TCFD forums, including ones for the following sectors: electric utilities; chemical; automotive; construction and building materials; and food, agriculture, and forest products. It also published a business-relevant approach to climate-related scenario analysis in line with TCFD’s recommendations.

The Task Force wishes to emphasize that there have been many different groups and organizations — more than 80 — that provided support related to TCFD implementation since the recommendations were finalized. The Task Force believes that this support significantly contributed to the willingness of thousands of companies to implement the recommendations on a voluntary basis.

*The Task Force **expresses its deep gratitude** to all the investor groups, industry associations, and other groups that **provided invaluable support to preparers and users in implementing the TCFD recommendations and using them for financial decision-making.***

Voluntary Framework: Importantly, the Task Force developed a voluntary framework on climate-related financial disclosures, which allowed companies to develop and refine reporting approaches gradually based on experience and ongoing feedback from investors and other users.

Guidance Based on Practical Experience: Given the composition of its members, the Task Force was keen to provide preparers with guidance and other insights based on practical experience. Over the past six years, the Task Force published guidance on several topics to support preparers in implementing the TCFD recommendations.

In 2017, it published general and sector-specific guidance on implementing the recommendations (referred to as the annex) and a technical supplement on conducting climate-related scenario analysis to support the development of TCFD-aligned disclosures. In 2020, the Task Force published guidance on risk management and scenario analysis to clarify certain topics and address feedback received from companies and other organizations implementing the recommendations. It also released a consultation paper on forward-looking metrics for the financial sector. In 2021, the Task Force published guidance on metrics, targets, and transition plans and updated its annex.

In addition, in its annual status reports, the Task Force addressed various topical issues to further support implementation. For example, for its 2020 status report, the Task Force conducted a survey to better understand specific types of climate-related information that investors and others find the most useful for decision-making — the purpose of which was to help preparers develop more effective climate-related financial disclosures. In addition, all the status reports include examples of companies’ disclosures that align with the recommendations; and many include case studies from companies preparing disclosures or organizations using TCFD-aligned disclosures for decision-making. The Task Force believes its efforts to continually support preparers in implementing the recommendations helped drive greater adoption of the recommendations and better disclosure over time.

Convergence and Simplification of Reporting: From the outset, the Task Force sought to develop a climate-related financial disclosure framework that would simplify reporting for companies and lead to convergence of climate-related disclosure regimes over time. The Task Force believes its recommendations, which provide a singular, accessible framework for climate-related financial disclosure, helped existing disclosure regimes come into closer alignment over time.

Professional Secretariat: The Task Force was chaired by Michael Bloomberg — Chair and Founder, Bloomberg LP and Bloomberg Philanthropies — and supported by full-time, professional Secretariat staff with strong private-sector and public-sector experience.

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¹⁹⁹ WBCSD, *Climate-Related Financial Disclosure by Oil and Gas Companies: Implementing the TCFD Recommendations*, July 18, 2018.

3. AREAS OF CONTINUED FOCUS OR FURTHER WORK

The Task Force also reflected on areas that it believes warrant continued focus or further work by the ISSB or other appropriate bodies, as described below and summarized in [Table F2](#). Importantly, the Task Force recognizes some of the issues highlighted below are part of the ISSB's current and planned work over the next two years, including ensuring interoperability of the standards with other sustainability standards; supporting implementation of the standards; and researching targeted enhancements to the standards.²⁰⁰ As the ISSB and other appropriate bodies continue to drive improvements in climate-related financial disclosure and support companies' efforts to make such disclosures, the Task Force believes it is especially important to recognize the dynamic nature of climate-related (as well as broader sustainability) issues and the need for ongoing assessment and adjustment, as appropriate, as practices continue to evolve. In addition, the Task Force strongly encourages the ISSB and other appropriate bodies to consider the insights gained by the Task Force over the past eight years as they further develop other areas of sustainability reporting. In particular, the Task Force believes an effective model for such work is to create a group of expert practitioners — representing preparers, users, and other stakeholders — supported by a strong Secretariat to develop voluntary disclosure

recommendations that are supplemented by implementation guidance and promoted, monitored, and refined based on learning experiences.

Interoperability

As indicated by the FSB, the ISSB's publication of general sustainability and climate-related disclosure standards is a substantial achievement and represents a culmination of the Task Force's work.²⁰¹ Since the ISSB standards are meant to serve as a global framework for sustainability (and climate-related) disclosures and support consistent reporting by different companies around the world, the Task Force believes ensuring interoperability of the ISSB standards with jurisdictional frameworks is critical. In particular, the Task Force emphasizes the importance of consistent company reporting across jurisdictions and avoiding the need for companies to report through multiple venues.

Implementation Guidance

As noted previously, the Task Force believes its efforts to continually support preparers in implementing the recommendations — through the development of guidance, case studies, examples of disclosure, and so forth — helped drive greater adoption of the recommendations and better disclosure over time. As such, the Task Force encourages the ISSB and other appropriate bodies to continue this type of work.

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Table F2
Areas Warranting Continued Focus or Further Work

	Ensuring interoperability of the ISSB standards with jurisdictional frameworks to support consistent company reporting across jurisdictions and avoid the need for companies to report through multiple venues.
	Developing implementation guidance on topics such as climate-related physical risk assessment and adaptation planning, climate-related scenario analysis at a sector or industry level, and Scope 3 GHG emissions measurement at a sector or industry level.
	Continuing to focus on companies' disclosure of the resilience of their strategies under different climate-related scenarios , including a climate-related scenario aligned with the latest international agreement on climate change.
	Continuing to focus on decision-useful disclosure on other sustainability topics — such as biodiversity, water, and social issues — and consider the linkages between climate-related and other sustainability issues (for example, in the context of companies' transition plans).
	Developing a consistent climate-related financial disclosure framework for use by countries and other sovereign entities. Consistent and comparable reporting by sovereigns would support companies in preparing comprehensive TCFD-aligned disclosures and transition plans that appropriately reflect their operating environment.

²⁰⁰ ISSB, *Consultation on Agenda Priorities*, May 4, 2023.

²⁰¹ FSB, *FSB Roadmap for Addressing Financial Risks from Climate Change: 2023 Progress Report*, July 13, 2023.

Some of the areas where the Task Force sees the need for additional guidance are described below.

- **Physical Risk Assessment and Adaptation Planning:** Over the years, the Task Force has received feedback that companies are interested in guidance on climate-related physical risks, including on developing adaptation plans. The Task Force encourages the appropriate bodies to further explore and develop the type(s) of guidance needed by the industry.
- **Climate-Related Scenario Analysis:** Another area warranting further guidance relates to companies performing climate-related scenario analysis; assessing the resilience of their strategies under different climate-related scenarios; and disclosing any resulting material information. The Task Force published guidance on scenario analysis in June 2017 and October 2020 to support preparers in using climate-related scenario analysis for purposes of disclosing in line with its recommendations.²⁰² However, the Task Force believes further guidance — such as guidance on climate-related scenario analysis at a sector or industry level — would help preparers in disclosing the resilience of their companies' strategies. A recent example of such guidance is the WBCSD's *Climate Scenario Analysis Reference Approach* for companies in the energy system.²⁰³
- **Scope 3 GHG Emissions:** The Task Force is aware that many companies find calculating and disclosing Scope 3 GHG emissions difficult. The development of sector-specific guidance on calculating such emissions may be useful in improving the consistency of companies' disclosures. One example of such guidance relates to the Partnership for Carbon Accounting Financials' standard for the financial sector that provides detailed methodological guidance on measuring and disclosing financed and insurance-associated GHG emissions.²⁰⁴ The Task Force encourages the appropriate bodies to consider developing other sector-specific guidance on measuring Scope 3 GHG emissions.

Disclosing Resilience of Strategy under Different Climate-Related Scenarios

In its 2017 report, the Task Force indicated that one of its key recommended disclosures is on the resilience of a company's strategy under different climate-related scenarios, including a 2°C or lower scenario (i.e., a scenario aligned with the latest international agreement on climate change).²⁰⁵ The Task Force emphasized that a company's disclosure of how its strategy might change to address potential climate-related risks and opportunities is a key step to better understanding the potential implications of climate change on the company. The Task Force continues to believe companies should disclose the resilience of their strategies ***under different climate-related scenarios, including a scenario aligned with the latest international agreement on climate change***. Investors and others use such information to inform their expectations about the future performance of companies.

Decision-Useful Disclosure on Other Sustainability Topics

The Task Force recognizes there are several other sustainability-related issues — such as biodiversity, water, and social issues — that may warrant further consideration by the appropriate bodies in terms of promoting decision-useful disclosure.²⁰⁶ Further, these issues may have linkages with climate-related issues that are important for investors and others to consider, for example, in the context of companies' transition plans. The Task Force is encouraged by current work underway — such as that by the Taskforce on Nature-related Financial Disclosures to develop a risk management and disclosure framework on nature-related risks and the Science Based Targets Network to develop corporate science-based targets for nature — and recognizes that such areas warrant continued attention in the future.²⁰⁷

Climate-Related Disclosure by Sovereigns

While the Task Force believes more companies should be disclosing decision-useful climate-related financial information, it also recognizes significant progress has been made over the

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²⁰² TCFD, *Technical Supplement – The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities*, June 29, 2017 and TCFD, *Guidance on Scenario Analysis for Non-Financial Companies*, October 29, 2020.

²⁰³ WBCSD, *Climate Scenario Analysis Reference Approach*, February 1, 2023.

²⁰⁴ Partnership for Carbon Accounting Financials (PCAF), *The Global GHG Accounting and Reporting Standard Part A: Financed Emissions (Second Edition)*, December 19, 2022 and PCAF, *The Global GHG Accounting and Reporting Standard Part C: Insurance-Associated Emissions*, November 16, 2022.

²⁰⁵ The Task Force used the phrase “a 2°C or lower scenario” in its report based on the Paris Agreement and views the phrase “a scenario aligned with the latest international agreement on climate change” as consistent with its intent in using “a 2°C or lower scenario.”

²⁰⁶ The Organization for Economic Cooperation and Development, *Biodiversity: Finance and the Economic and Business Case for Action*, December 6, 2019.

²⁰⁷ Taskforce on Nature-related Financial Disclosures, “About the Taskforce on Nature-related Financial Disclosures,” Accessed July 24, 2023 and Science Based Targets Network, “Our Mission, Science Based Targets Network,” Accessed July 24, 2023.

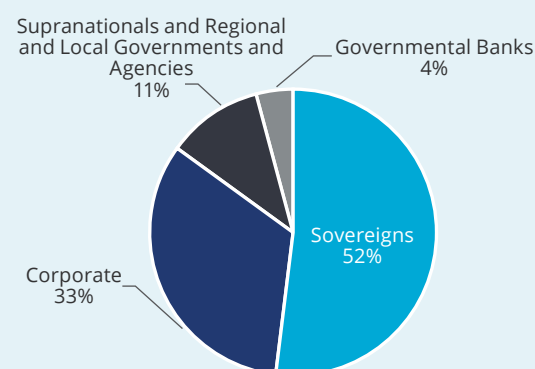
past several years. For example, the percentage of companies disclosing information in line with the Task Force's recommendations has steadily increased each year as has the amount of TCFD-aligned information companies disclose (see [Box A1](#), p. 4). Furthermore, based on a survey conducted last year, the vast majority of respondents that use climate-related financial disclosures for decision-making or other purposes saw an increase in the availability and quality of such disclosures since 2017. The Task Force expects further progress will be made given the ISSB's finalization of its climate-related disclosure standards — which are based on the TCFD recommendations — and various jurisdictions' efforts to require such disclosures. In light of this, the Task Force believes an important next step is the development of a consistent climate-related financial disclosure framework for use by countries and other sovereign entities — consistent with the TCFD recommendations and ISSB standards, as appropriate — and is encouraged by the International Public Sector Accounting Standards Body's (IPSASB's) plans to develop a climate-related disclosure standard for the public sector.²⁰⁸

Need for Sovereigns' Disclosure of Climate-Related Information

Both preparers and users have an interest in countries and other sovereign entities' (referred to as sovereigns) disclosure of climate-related information. For preparers, understanding the latest international agreement on climate change and the associated commitments in the jurisdictions in which they operate is critical in conducting scenario analysis to assess the resilience of their companies' strategies and developing transition plans. Furthermore, understanding jurisdictions' actions as they relate to climate-related commitments and their climate-related risks is important for companies in preparing comprehensive TCFD-aligned disclosures and transition plans. For example, information on a jurisdiction's GHG emissions reduction targets and plans to reach those targets provides important context for companies in setting their own climate-related targets. Likewise, such information is useful to investors and other users when evaluating companies' climate-related financial

disclosures and transition plans. Investors and other users are also increasingly interested in understanding sovereigns' exposure to climate-related risks and actions they are taking to address these risks given that sovereign debt represents half of the \$129 trillion global bond market (see [Figure F1](#)).^{209,210} In addition, sovereign debt plays a central role as a reference rate for the pricing of other financial instruments — which is important to both preparers and users.

Figure F1
Global Bond Market, December 2022



Source: Bloomberg Finance L.P.

In early 2022, the World Bank published a report calling for the development of a reporting framework or guidance tailored to sovereigns for reporting on climate and nature issues.²¹¹ In the report, the World Bank indicated “[s]overeign reporting would help meet the needs of investors who are increasingly requesting such disclosures for all asset classes in their portfolios so that they can measure portfolio alignment with the Paris Agreement.”²¹² The World Bank encouraged the IPSASB to lead such an effort.

IPSASB Climate-Related Disclosure Standard

In May 2022, the IPSASB issued a consultation paper seeking feedback on developing public sector sustainability reporting guidance — which it proposed to align with the ISSB's work and the TCFD recommendations.²¹³ On June 14, 2023, the IPSASB announced its decision to develop a climate-related disclosure standard

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²⁰⁸ IPSASB, “IPSASB Begins Development of Climate-Related Disclosures Standard for the Public Sector,” June 14, 2023.

²⁰⁹ For example, the ASCOR (Assessing Sovereign Climate-related Opportunities and Risks) project is focused on developing a tool to help investors assess sovereign exposure to climate-related risk. ASCOR is comprised of investor networks, asset owners, and asset managers.

²¹⁰ As of December 2022, sovereign debt was 52% of the total global bond market (source: Bloomberg Professional Service).

²¹¹ World Bank, *Sovereign Climate and Nature Reporting: Proposal for a Risks and Opportunities Disclosure Framework*, January 31, 2022.

²¹² *Ibid.*, p. vii.

²¹³ IPSASB, *Consultation Paper: Advancing Public Sector Sustainability Reporting*, May 9, 2022.

for the public sector.²¹⁴ The IPSASB indicated that there was “strong global stakeholder support for the proposals in its consultation paper,” with significant support for developing guidance on climate-related disclosures first. The Task Force is encouraged by the IPSASB’s efforts to date and believes development of a consistent climate-related financial disclosure framework for sovereigns — consistent with the TCFD recommendations and ISSB standards, as appropriate — is important

for both preparers and users of climate-related financial disclosures. Consistent and comparable reporting by sovereigns would support companies in preparing comprehensive TCFD-aligned disclosures and transition plans that appropriately reflect their operating environment. Such reporting would also improve investors’ ability to appropriately assess and price their climate-related risks and effectively allocate capital.

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²¹⁴ IPSASB, “IPSASB Begins Development of Climate-Related Disclosures Standard for the Public Sector,” June 14, 2023.

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Chair
Founder
Bloomberg LP and Bloomberg Philanthropies

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Singapore Exchange

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Investing Global Leadership Team
CPP Investments

Mathew Nelson

Partner, Oceania Chief Sustainability Officer
EY

Ashley Schulten

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Martin Skancke
Chair, Risk Committee
Storebrand

Lucy Thomas
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UBS Asset Management

Steve Waygood
Chief Responsible Investment Officer
Aviva Investors

Martin Weymann
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Jon Williams
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PwC
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HSBC Bank (U.K.) Pension Scheme
Former Group Chief Accounting Officer, HSBC

Deputy Chair, Chair of Investment Committee
Universities Superannuation Scheme Limited

SECRETARIAT

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Vice Chair for Global Public Policy and
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MSCI

Simon Weaver
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KPMG

Fiona Wild
Group Climate and Sustainability Officer
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Mara Childress
Director, Global Public Policy
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FINANCIAL STABILITY BOARD OBSERVERS

Rupert Thorne
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Appendix 2: Company Selection and AI Review Methodology

As described in [Section A.1. TCFD-Aligned Reporting by Public Companies](#) and [Section A.2. TCFD-Aligned Reporting by Public Companies by Region](#), the Task Force used artificial intelligence (AI) technology to review the alignment of information included in companies' public reports with the TCFD recommendations. This appendix describes the Task Force's process for selecting the companies included in the reviews, the types of documents reviewed, and the AI review methodology.

Companies Included in the AI Reviews

The AI technology was used to review financial filings, annual reports, integrated reports, sustainability reports, and other relevant reports of public companies from five regions in eight industries.²¹⁵ Six of the eight industries align with groups highlighted in the Task Force's 2017 report — Banking; Insurance; Energy; Materials and Buildings; Transportation; and Agriculture, Food, and Forest Products. To incorporate other types of companies that may be exposed to climate-related risks, two additional industries — Technology and Media and Consumer Goods — were also included.

For the AI review population used in [Section A.1. TCFD-Aligned Reporting by Public Companies](#), the Task Force sought to maintain as much consistency with the final review population used in the 2020 status report as possible. For the 2020 status report, the Task Force selected companies using the following methodology:

- Identified a set of public companies — companies with public debt or equity — in the eight selected industries using the 29 subindustries listed in [Figure A2-1](#) (p. 123). The 29 sub-industries are adapted from the Global Industry Classification Standard subsectors and industries.
- Removed subsidiaries to avoid double counting of companies. Identified companies that shared the same industry and ultimate parent for capital structure purposes and retained the company with the largest annual revenue (for non-financial industries) or the largest total assets (for financial industries). This approach was followed to avoid, as much as possible, including companies that

published annual reports separate from their parent company.

- Removed smaller companies from the population to maintain focus on larger companies. We retained banks and insurance companies with total assets of at least \$10 billion and \$1 billion, respectively, and companies in the six non-financial industries with annual revenue of \$1 billion or more. This resulted in 4,446 total companies; and the break-down by industry and sub-industry is shown in [Figure A2-1](#) (p. 123).
- Removed companies that did not have reports available in English.
- Removed companies that did not have annual reports available for review for fiscal years 2017, 2018, and 2019. This was done to ensure a consistent population of companies and comparable reporting across all three years.
- This methodology resulted in a final review population of 1,701 companies.

To identify the final review population for the past three status reports — including this one, the Task Force began with the list of companies included in the final review population for the previous year's status report and removed companies that no longer existed or did not have annual reports available for the three relevant fiscal years. For this status report, the Task Force began with an initial review population of 1,434 companies, which was the final review population used in the 2022 status report. Of the 1,434 companies, 69 were removed based on the criteria mentioned above, leading to a final review population of 1,365 for this report.²¹⁶

For this year's report, the Task Force also used the AI technology to review fiscal year 2022 reports for a larger and more geographically diverse set of public companies (around 3,100) to provide AI review results for each of the eight industries by region (Asia Pacific, Europe, Latin America, Middle East and Africa, and North America). The Task Force used the same AI technology and followed the same general approach described above. The one difference related to the scope of public companies included in the review.

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²¹⁵ Other relevant reports include those specifically focused on climate change or the TCFD recommendations.

²¹⁶ In the interest of maintaining a consistent sample of companies, the Task Force did not remove companies from the review population if their total assets or annual revenue fell below the relevant size threshold after the 2020 selection process.

Figure A2-1

Industry and Sub-Industry of Companies Selected for Review in 2020

Industries	Sub-Industries	
Banking <i>608 Companies</i>	Regional Banks Large, Diversified Banks	Investment and Asset Management Firms
Insurance <i>246 Companies</i>	Multi-line Insurance Property and Casualty Insurance	Life and Health Insurance Reinsurance
Energy <i>483 Companies</i>	Oil and Gas Coal	Utilities
Transportation <i>456 Companies</i>	Air Freight Passenger Air Transportation Maritime Transportation	Rail Transportation Trucking Services Automobiles
Materials and Buildings <i>1,580 Companies</i>	Chemicals Construction Materials Capital Goods	Metals and Mining Real Estate Management and Development
Agriculture, Food, & Forest <i>325 Companies</i>	Beverages Agriculture	Packaged Foods and Meats Paper and Forest Products
Technology and Media <i>292 Companies</i>	Technology Hardware and Equipment	Interactive Media and Services
Consumer Goods <i>456 Companies</i>	Consumer Retailing	Textiles and Apparel

Total: 4,446 Companies

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The Task Force began with the 1,365 companies used in the review of the past three fiscal years of reporting, which was originally identified using specific size thresholds so that only the largest companies were included. To achieve statistically significant AI review results at an industry level for each region, the Task Force supplemented the AI review population with an additional 1,748 companies, which required including companies of all sizes. In addition, because the AI technology cannot process reports in languages other than English, the number of companies that could be included in the reviews for Asia Pacific, Europe, Latin America, and the Middle East and Africa was smaller than it otherwise would be.

To determine the number of companies needed to achieve statistically significant results in a given region, the Task Force began with a confidence level of 95% and then lowered it for regions where many companies reported in languages other than English.²¹⁷ The lowest confidence level used was 80%, and, for some industries in Latin America, there were still not enough companies with reports in English to provide AI review results that were statistically significant at this level.²¹⁸

²¹⁷ The confidence level for Asia Pacific and Europe was 90%, 85% for the Middle East and Africa, 80% for Latin America, and 95% for North America.

²¹⁸ Analysis was not feasible due to there not being enough companies with reports in English for Consumer Goods and Technology and Media in Latin America.

Documents Reviewed

The Task Force focused on companies' fiscal year 2020, 2021, and 2022 financial filings, annual reports, integrated reports, sustainability reports, and other relevant reports. These documents were identified using the Bloomberg Terminal.

- **Financial Filings** (including 10-Ks, 20-Fs, annual report and accounts, and registration documents): Reports that describe companies' audited financial results under the corporate, compliance, or securities laws of the jurisdictions in which they operate. While reporting requirements differ internationally, financial filings generally contain financial statements and other information such as governance statements and management commentary.
- **Annual or Integrated Reports:** Reports that describe companies' activities for the preceding year (annual reports) or the broader range of measures that contribute to companies' long-term value and the role they play in society (integrated reports).
- **Sustainability Reports** (including Corporate Social Responsibility and Environmental, Social, and Governance reports): Reports that describe companies' impact on the environment and society as well as their corporate governance.
- **Other Relevant Reports:** Reports that describe how climate change may affect companies' businesses, strategies, or financial planning, including those focused on the TCFD recommendations.

AI-Based Review Methodology

The AI technology used to review companies' publicly available reports for this report was different from the AI technology used in the Task Force's previous status reports. The goal of the AI review was to automatically identify information in financial filings and other company reports that aligned with one or more of the 11 recommended disclosures (referred to as TCFD-aligned information). One of the challenges in designing an automated AI technology to review company reports for TCFD-aligned information is that the language and semantics used to describe a particular recommended disclosure could differ across countries, sectors, and even between companies in the same sector. To help address these challenges, the AI technology used

language models that can represent whole sentences and paragraphs mathematically and capture meaning in context.²¹⁹

Training the AI Model

The AI technology employed a language model that was trained to identify TCFD-aligned information. The model was based on a deep learning-based natural language processing model trained on a large database of text — namely, Robustly Optimized Bidirectional Encoder Representations from Transformers Pretraining Approach (RoBERTa). RoBERTa encodes text into a mathematical representation based on its context. For instance, while other approaches might have encoded the word “cement” in the two phrases “GHG emissions per ton cement” and “cement our approach” in the same way, RoBERTa takes the context into account and provides a different representation for “cement” in the two phrases. This allows RoBERTa models (and other similar architectures) to consider the contextual meaning of words while making classification decisions.

A language model built on the RoBERTa architecture was trained jointly with a proprietary dataset of climate-related text and passages of text or excerpts identified as aligning with the Task Force's 11 recommended disclosures — referred to as labeled data. To create the labeled data, a panel of subject matter experts developed a “definition” for each of the 11 recommended disclosures and trained “annotators” to classify text passages according to these definitions. Once the annotators' performance on identifying TCFD-aligned information was deemed satisfactory, they reviewed a large sample of text passages and labelled them. The annotators' labelling was continuously checked by subject matter experts.

Review of Company Reports

As part of the review process, text passages were first extracted from the documents available for review using a separate AI model that incorporated computer vision techniques, which enables identification of paragraphs and allows certain types of information — such as that included in tables — to be evaluated as text. Millions of text passages and tables were identified across the available documents. Given the large number of text passages, a “prefilter” was used to identify text passages and tables containing specific keywords and phrases that could indicate the potential presence of

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²¹⁹ Liu et al., *RoBERTa: A Robustly Optimized BERT Pretraining Approach*, July 26, 2019.

TCFD-aligned information.²²⁰ The text passages identified by the prefilter were input into the trained language model, which assessed alignment with the 11 recommended disclosures.

Performance Validation

The performance of the AI technology was assessed by comparing model predictions with the human-annotated labels on a set of text passages. The set of text passages that was used to evaluate performance was only run once through the model to ensure that the model prediction was unbiased. If the model's determination of whether a passage sufficiently captured a particular recommended disclosure matched the label, it was marked as correctly classified.

Two important measures of model performance are recall and precision. Recall is the proportion of true positives captured by a model, while precision is the proportion of positive model predictions that are true positives. The F1 score is the harmonic mean of precision and recall and hence an indicator of the performance of a model.²²¹ The F1 score is commonly used in machine learning applications to evaluate performance. The model F1 scores and the human reviewers' F1 scores for the 11 recommended disclosures are shown in [Figure A2-2](#).

There is often a tradeoff between precision and recall — tuning the model to be stricter on classifying a passage as a relevant disclosure can increase precision at the expense of recall. The model was tuned such that precision matched recall and hence was not biased. One exception was on *Strategy a)* where the prefilter was found — based on a sample of qualitative “manual” reviews — to not identify certain types of disclosures. In order to reduce bias and

Figure A2-2
Paragraph-Level Model Performance

Recommended Disclosure	F1 Score	
	Model	Human ¹
<i>Governance a)</i>	0.85	0.88
<i>Governance b)</i>	0.86	0.88
<i>Strategy a)</i>	0.65	0.78
<i>Strategy b)</i>	0.38	0.53
<i>Strategy c)</i>	0.69	0.74
<i>Risk Management a)</i>	0.66	0.53
<i>Risk Management b)</i>	0.53	0.46
<i>Risk Management c)</i>	0.80	0.87
<i>Metrics and Targets a)</i>	0.85	0.91
<i>Metrics and Targets b)</i>	0.88	0.94
<i>Metrics and Targets c)</i>	0.90	0.91

1. Human F1 scores serve as reference points to the corresponding model F1 scores and represent the performance of annotators' assessments in comparison to subject matter experts' assessments.

maintain a balance between precision and recall, the model was tuned to require high recall, which lowered the F1 score for *Strategy a)* to 0.58.

Outcome

The AI technology was applied to the excerpts from the reports of the reviewed companies. If a company had a text paragraph in any of its reports for a given fiscal year that was classified as aligning with one of the 11 recommended disclosures, the company was classified as reporting in line with that specific recommended disclosure for that year. The results were aggregated for analysis.

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²²⁰ For instance, “Board of Directors also oversees climate-related issues” was one such phrase used to identify a potential disclosure of *Governance a)*. Many phrases were included to ensure all relevant content was detected. The prefilter was designed with support from the subject matter experts.

²²¹ The harmonic mean is the reciprocal of the arithmetic mean of the reciprocals of the values.

Appendix 3: AI Review Results by Industry

As summarized in [Section A.1. TCFD-Aligned Reporting by Public Companies](#), the Task Force developed an approach using artificial intelligence (AI) technology to review the alignment of information included in public companies' fiscal years 2020, 2021, and 2022 reports with the Task Force's 11 recommended disclosures. This appendix provides the AI review results for companies in each of the eight industries covered as follows: Banking; Insurance; Energy; Materials and Buildings; Transportation; Agriculture, Food, and Forest Products; Technology and Media; and Consumer Goods.

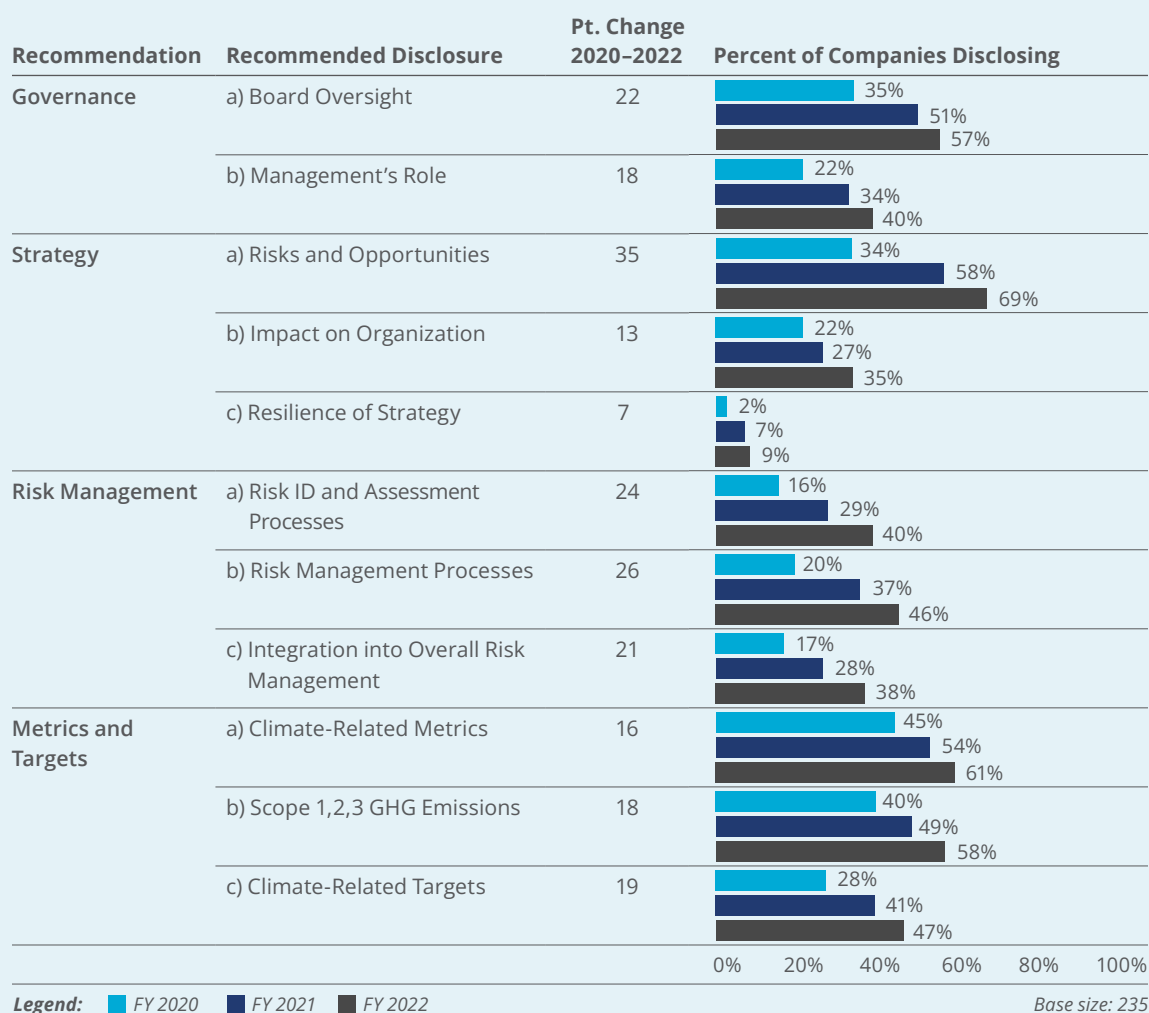
Banking

The AI technology reviewed reports from 235 banks in three sub-industries: investment and asset management firms, large and diversified banks, and regional banks. The 235 banks ranged in size from about \$4 billion to \$5 trillion in assets, with a mean asset size of nearly \$337 billion in assets. The AI review results for banks are shown in [Figure A3-1](#). The largest increase in disclosure between 2020 and 2022 for the banking industry was 35 percentage points for *Strategy a*).

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Figure A3-1
Banking Review Results

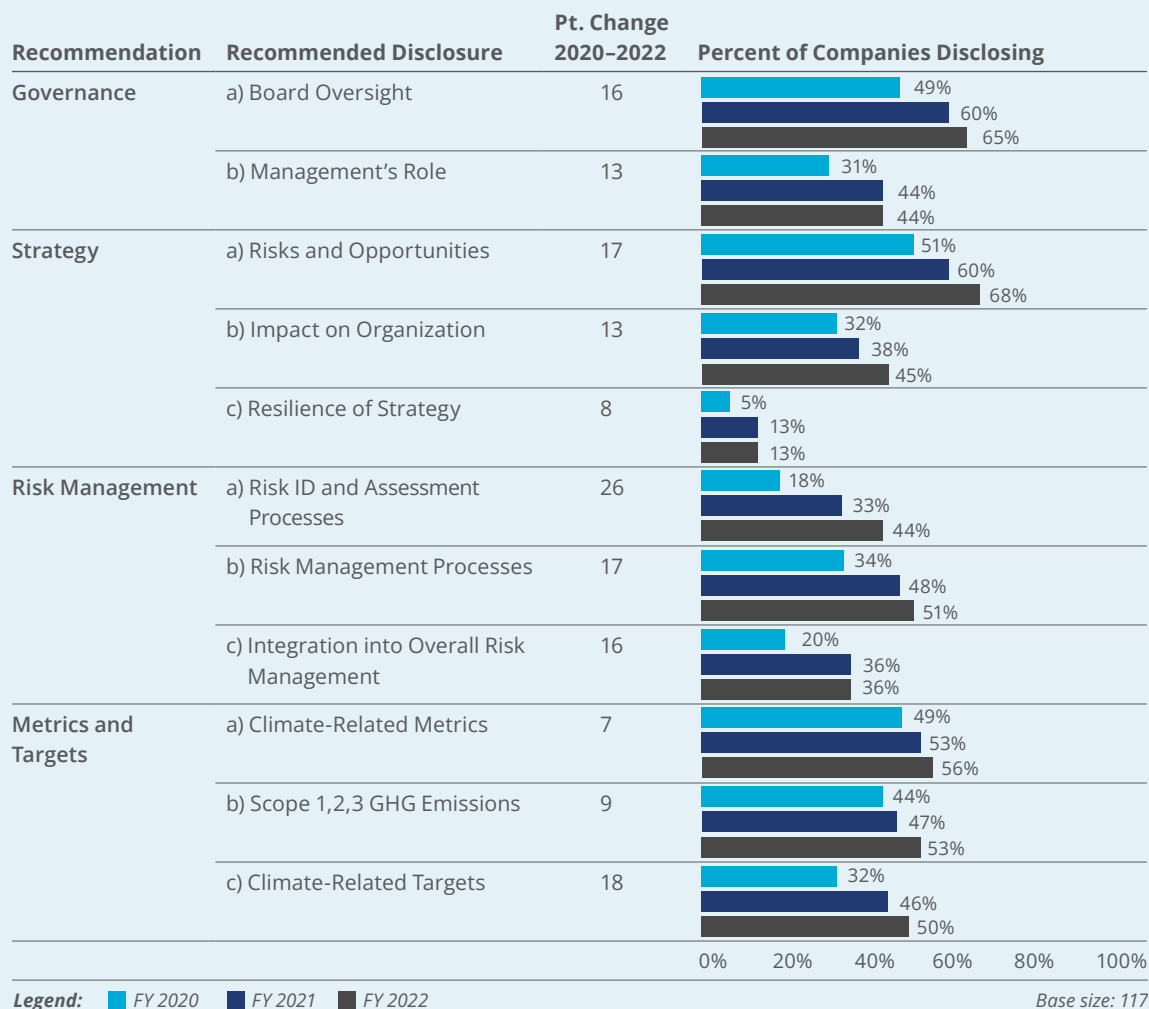


Insurance

The AI technology reviewed reports from 117 insurance companies in four categories: multiline insurance, property and casualty insurance, reinsurance, and life and health insurance. The 117 insurance companies reviewed ranged in size from about \$1 billion to \$1.6 trillion in assets, with a mean asset size

of around \$129 billion in assets. The AI review results for these companies are shown in [Figure A3-2](#). In 2022, insurance companies most often disclosed information aligned with *Strategy a)* at 68%. Additionally, between 2020 and 2022, the percent of insurance companies reporting information aligned with *Risk Management a)* increased by 26 percentage points.

Figure A3-2
Insurance Review Results



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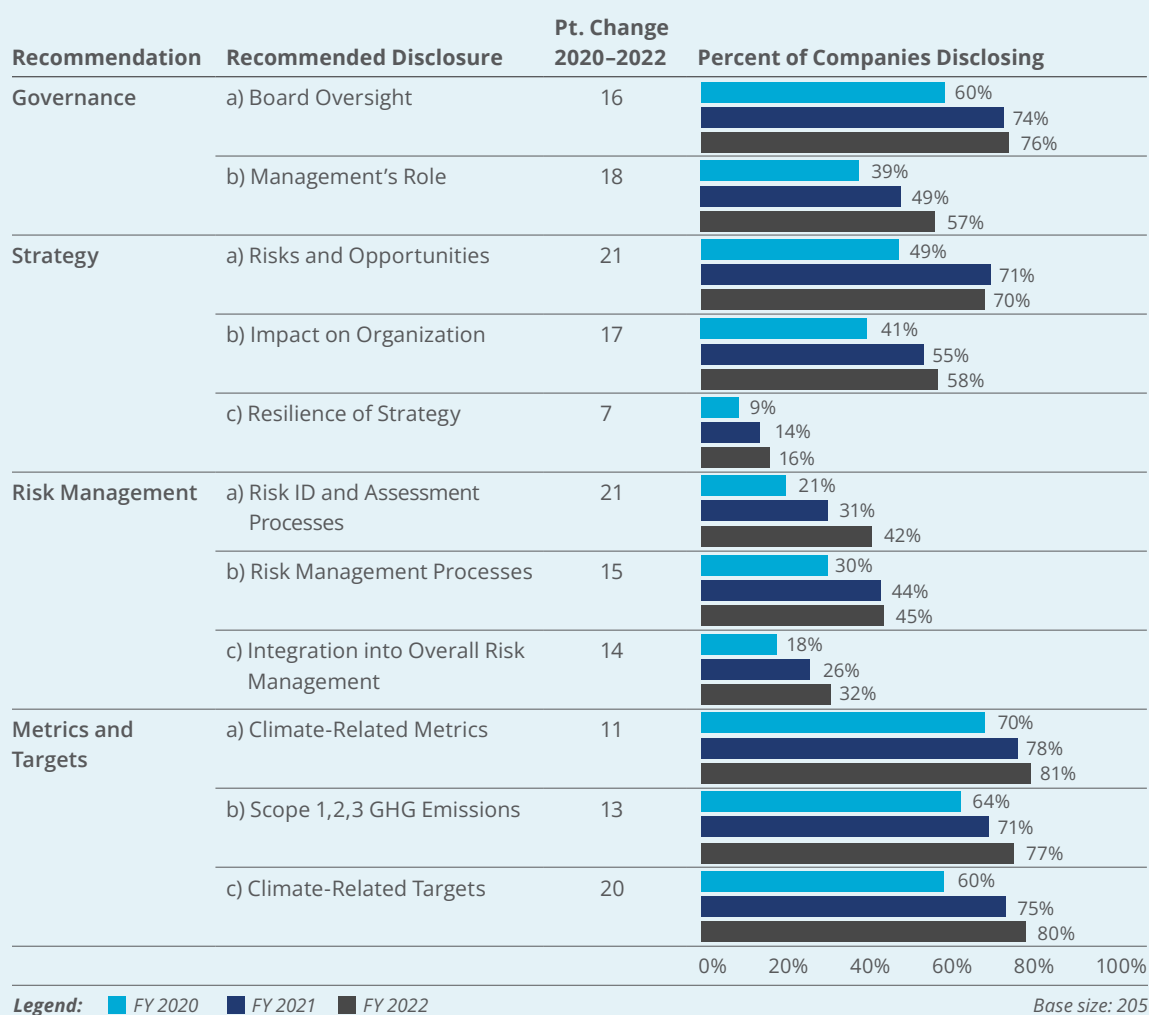
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Energy

The AI technology reviewed reports from 205 energy companies in three categories: oil and gas, coal, and utilities. The 205 energy companies ranged in size from about \$118 million to \$399 billion in annual revenue, with a mean annual revenue of nearly \$26 billion. The AI review results for these companies are shown in Figure A3-3. In 2022, energy companies,

on average, disclosed information in line with more of the 11 recommended disclosures than companies in other industries (see Figure A3, p. 6). For all three years of reporting reviewed, the energy companies reviewed had the highest percent of disclosure across all industries for information aligned with *Governance a) and b), Strategy b), and Metrics and Targets a), b), and c).*

Figure A3-3
Energy Review Results



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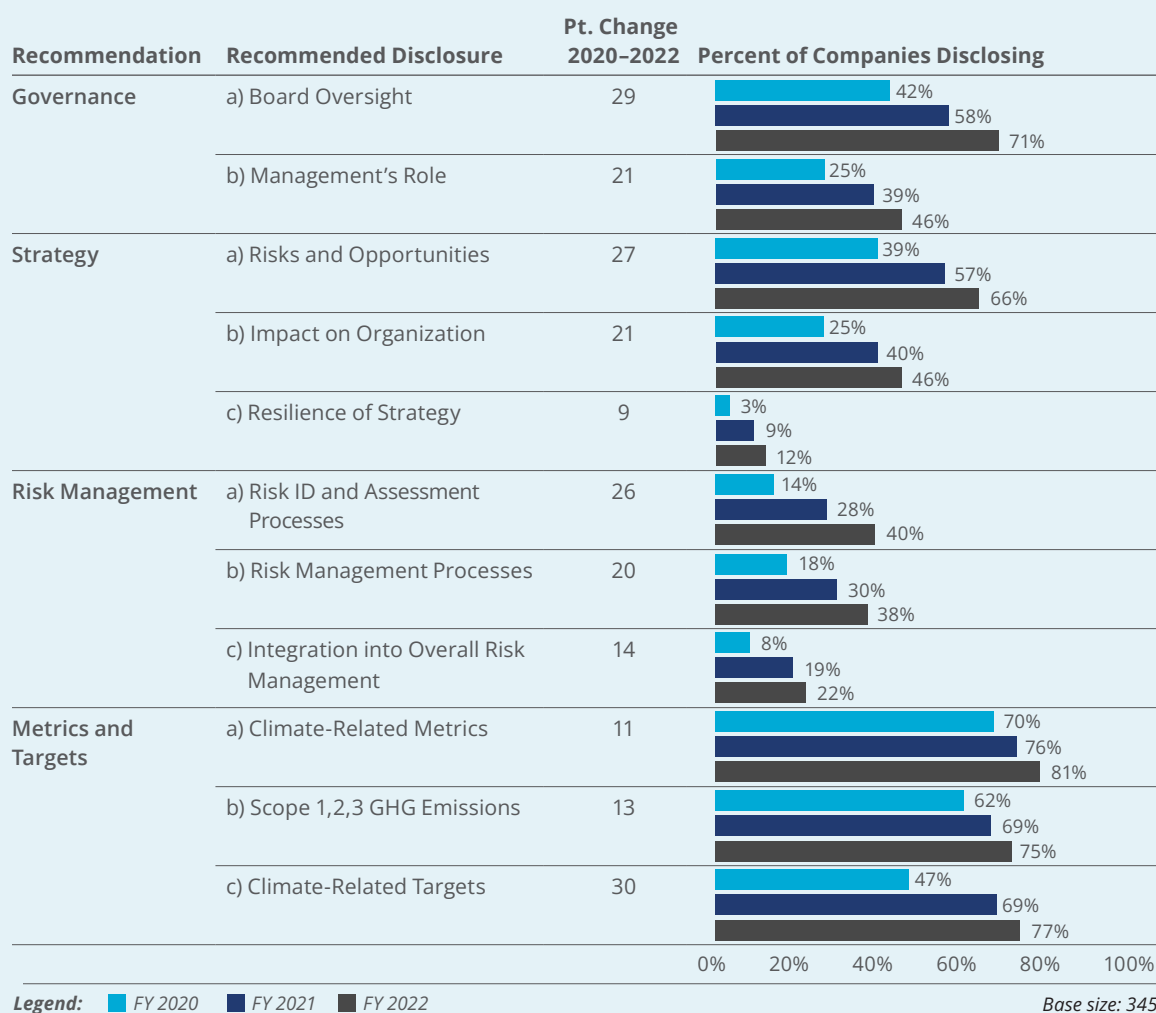
Materials and Buildings

The AI technology reviewed reports from 345 materials and buildings companies in five categories: capital goods, chemicals, construction materials, metals and mining, and real estate management and development. The 345 materials and buildings companies ranged in size from about \$298 million to \$255 billion

in annual revenue, with a mean annual revenue of \$14 billion. The AI review results for these companies are shown in Figure A3-4. In 2022, the highest level of reporting for materials and buildings companies was on *Metrics and Targets a)* at 81%, followed by *Metrics and Targets c)* at 77%.

Figure A3-4

Materials and Buildings Review Results



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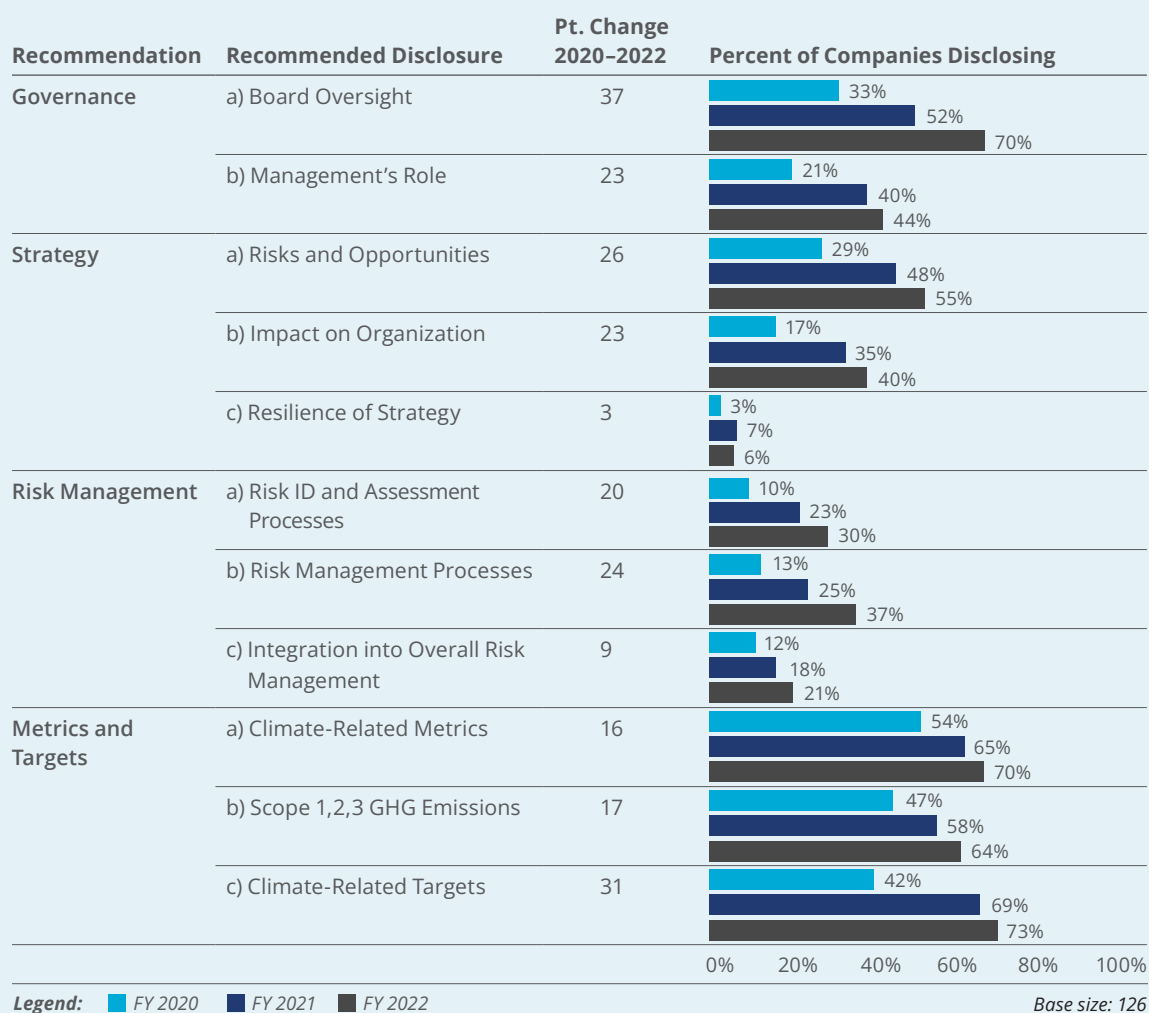
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Transportation

The AI technology reviewed reports from 126 transportation companies in six categories: air freight, automobiles, maritime transportation, passenger air transportation, rail transportation, and trucking services. The 126 transportation companies ranged in size from \$812 million to \$294 billion in annual revenue, with a mean annual revenue of over \$19 billion. The AI review results are shown in Figure A3-5. In 2022, transportation companies most often

disclosed information aligned with *Metrics and Targets c)* at 73%. Transportation companies had the largest increase in the average number of recommended disclosures reported per company for any industry, increasing by 2.3 recommended disclosures between 2020 and 2022. In addition, the recommended disclosure with the largest increase in reporting was *Governance a)*, with an increase of 37 percentage points between 2020 and 2022.

Figure A3-5
Transportation Review Results



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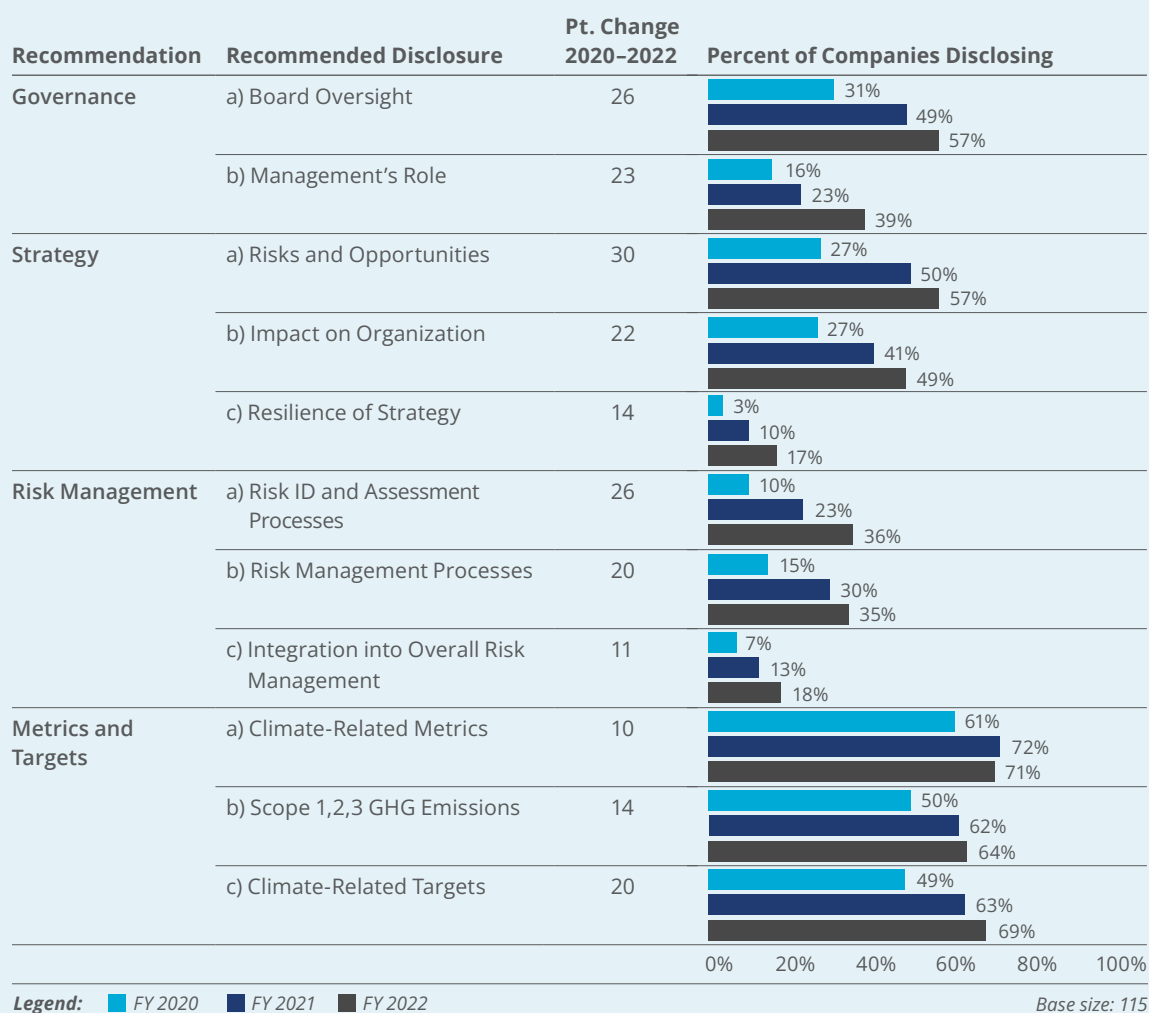
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Agriculture, Food, and Forest Products

The AI technology reviewed reports from 115 agriculture, food, and forest products companies in four categories: beverages, packaged foods and meats, agriculture, and paper and forest products. The 115 agriculture, food, and forest products companies ranged in size from about \$276 million to \$102 billion in annual revenue, with a mean annual revenue

of over \$12 billion. The AI review results for these companies are shown in [Figure A3-6](#). In 2022, agriculture, food, and forest products companies most frequently disclosed information on *Metrics and Targets a)*, at 71%, although reporting on the recommended disclosure decreased by one percentage point between 2021 and 2022. Between 2020 and 2022, the largest increase in disclosure — at 30 percentage points — was for *Strategy a)*.

Figure A3-6
Agriculture, Food, and Forest Products Review Results



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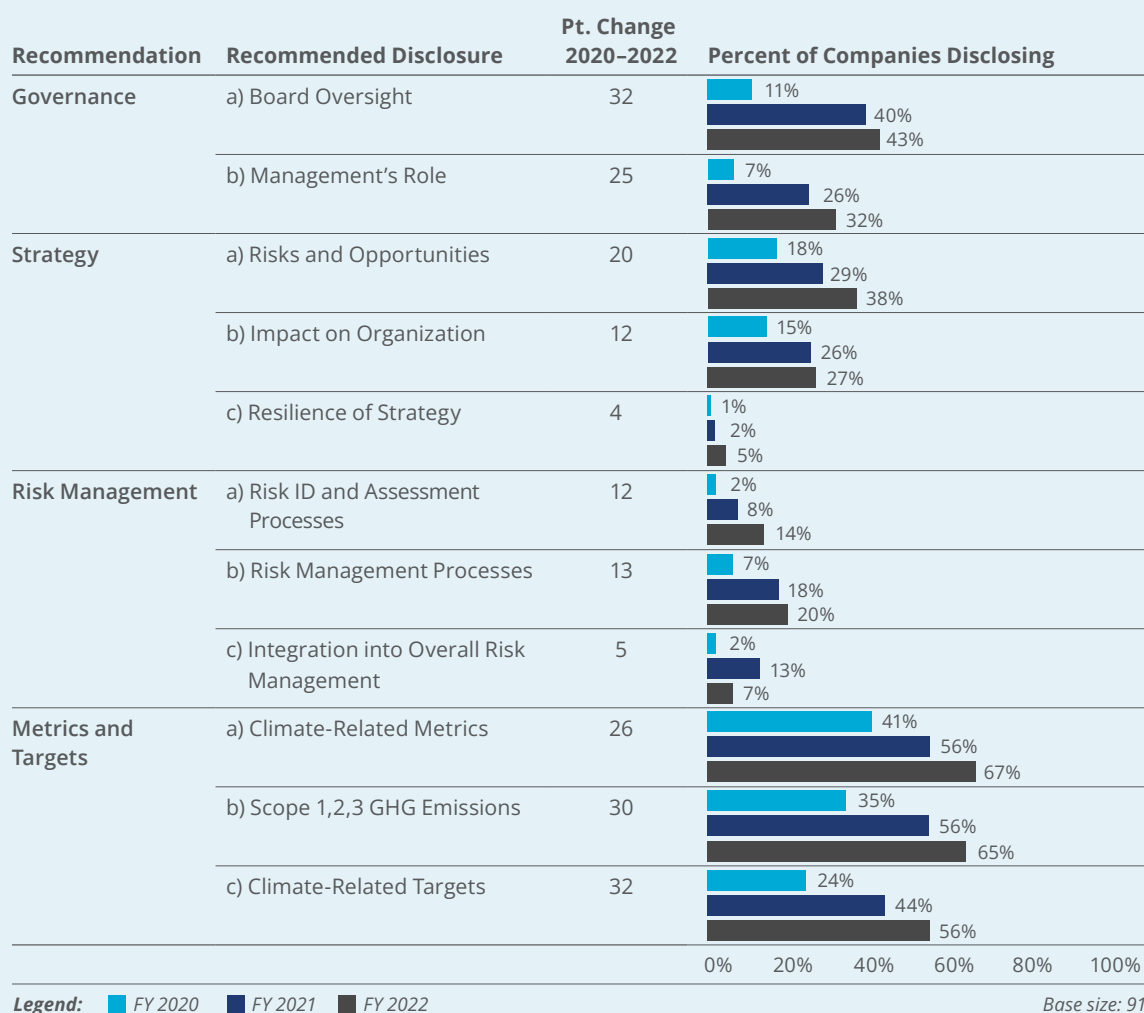
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Technology and Media

The AI technology reviewed reports from 91 technology and media companies in two categories: interactive media and services and technology hardware and equipment. The 91 technology and media companies ranged in size from about \$733 million to \$394 billion in annual revenue, with a mean annual revenue

of \$22 billion. The AI review results for these companies are shown in [Figure A3-7](#). In 2022, reporting on *Risk Management c*) decreased by 6%, making the disclosure the second least reported across all recommended disclosures at 7%. In 2022, technology and media companies, on average, reported on fewer recommended disclosures (3.7) than any of the other industries reviewed (see [Figure A3](#), p. 6).

Figure A3-7
Technology and Media Review Results



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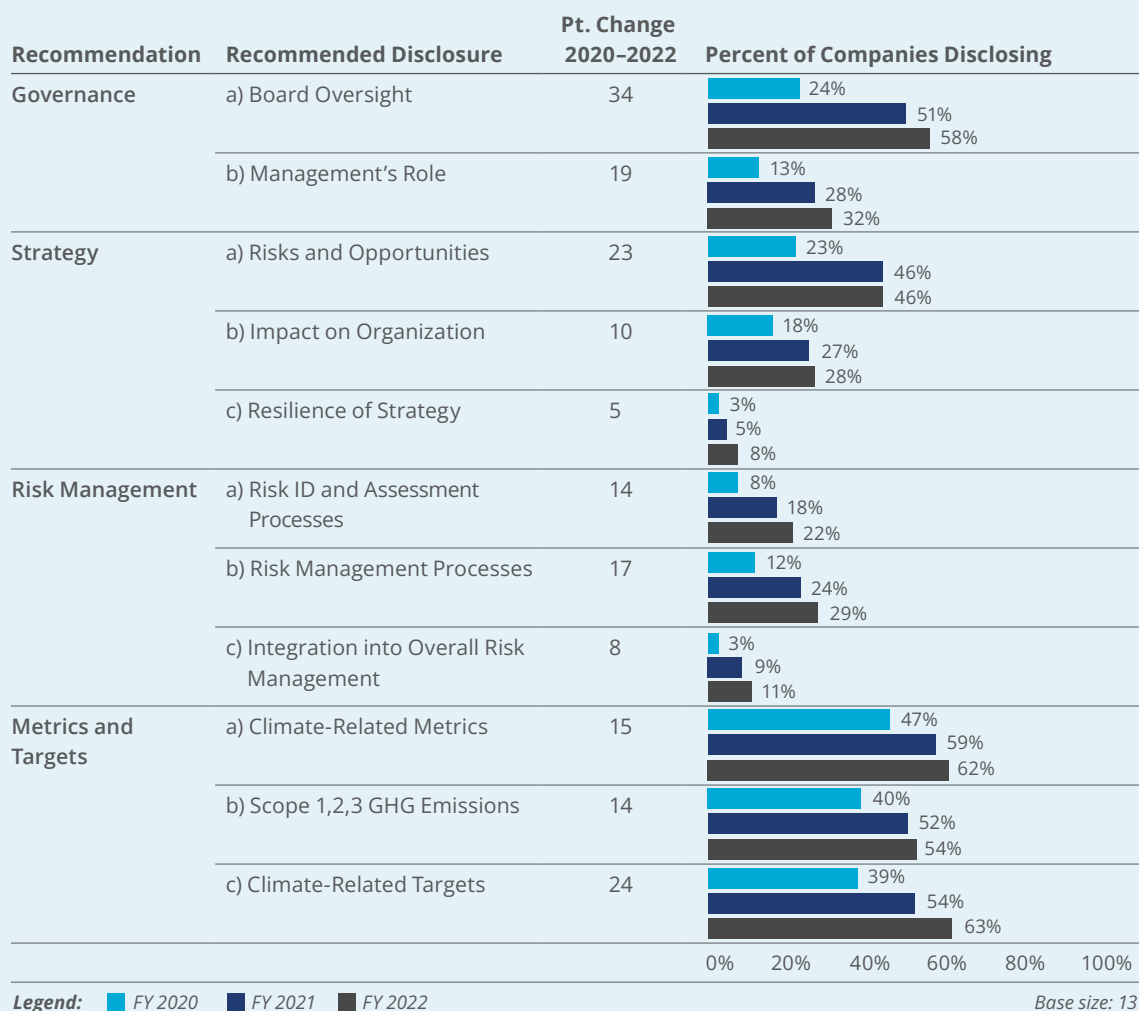
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Consumer Goods

The AI technology reviewed reports from 131 consumer goods companies in two categories: consumer retailing and textiles and apparel. The 131 consumer goods companies ranged in size from \$599 million to \$611 billion in annual

revenue, with a mean annual revenue of more than \$26 billion. The AI review results for these companies are shown in [Figure A3-8](#). In 2022, consumer goods companies most often disclosed information aligned with *Metrics and Targets c*) at 63%.

Figure A3-8
Consumer Goods Review Results



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Appendix 4: Additional Information on Financial Impact

As summarized in [Section E. Types of Financial Impact and Associated Drivers](#), the Task Force analyzed responses from the approximately 5,000 companies — or subsets of these companies — that provided public or non-public responses to the CDP Climate Change 2022 Questionnaire (2022 questionnaire).²²²

This appendix provides additional information on this analysis, including the following:

- companies’ identification of substantive climate-related issues and estimation of potential financial impacts by sector and
- the types of substantive climate-related risks and opportunities companies identified by sector.

Climate-Related Issues Identified and Estimated Impact by Sector

The Task Force reviewed companies’ identification of substantive climate-related issues and estimation of potential financial impacts by sector, as shown in [Figure A4-1](#). Notably, 95% of the companies in the utilities sector identified substantive climate-related risks, and 72% provided estimated potential financial impacts. In addition, a high percentage of companies in the energy sector and materials sector identified substantive climate-related risks and estimated the potential financial impacts — 94% and 60%, respectively, for the energy sector — and 91% and 67%, respectively, for the materials sector. The percentage of companies that identified substantive climate-related

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Figure A4-1
Companies Identifying Substantive Issues and Estimating Impacts by Sector

Percent of Companies

	Total (5,021)	Banks (235)	Insurance (110)	Other Financial (234)	Energy (174)	Utilities (238)	Materials (581)
Identified Substantive Risks	80%	81%	84%	64%	94%	95%	91%
Provided Estimated Impact	55%	58%	60%	36%	60%	72%	67%

	Real Estate (218)	Industrials (1,116)	Consumer Discretionary (634)	Consumer Staples (404)	Health Care (262)	Information Technology (600)	Comm. Services (215)
Identified Substantive Risks	82%	80%	82%	87%	71%	66%	70%
Provided Estimated Impact	63%	53%	53%	60%	48%	43%	50%

	Total (5,021)	Banks (235)	Insurance (110)	Other Financial (234)	Energy (174)	Utilities (238)	Materials (581)
Identified Substantive Opp. ¹	83%	87%	87%	74%	93%	96%	92%
Provided Estimated Impact	53%	62%	57%	35%	55%	72%	63%

	Real Estate (218)	Industrials (1,116)	Consumer Discretionary (634)	Consumer Staples (404)	Health Care (262)	Information Technology (600)	Comm. Services (215)
Identified Substantive Opp. ¹	83%	85%	83%	86%	73%	74%	73%
Provided Estimated Impact	58%	53%	52%	59%	47%	40%	48%

1. Identified Substantive Opportunities

Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Legend:  Low to high percentage of companies

²²² CDP, “CDP Climate Change 2022 Questionnaire,” Accessed May 1, 2023.

opportunities and estimated the associated potential financial impacts followed a similar pattern.

Types of Climate-Related Risks and Opportunities Identified by Sector

Figure A4-2 and Figure A4-3 show the percentage of companies in each sector that identified substantive climate-related risks by type (transition or physical) and provided estimates of their potential financial impacts. The most common transition risk companies identified was policy and legal risk at 73%,

with over half of companies that identified substantive risks in every sector selecting at least one substantive policy and legal risk. The least identified transition risk type was technology risk at 14% for companies overall — the range across the sectors was from 6% for insurance companies to 18% for industrials and real estate companies. For physical risks, 56% of companies identified acute physical risks, with a range from 39% for companies in the energy sector to a high of 83% for companies in the insurance sector.

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Figure A4-2
Types of Substantive Climate-Related Transition Risks by Sector

Percent of Companies¹

	Total (2,755)	Banks (136)	Insurance (66)	Other Financial Services (85)	Energy (104)	Utilities (172)	Materials (390)
Policy & Legal	73%	73%	50%	74%	83%	56%	81%
Market	33%	24%	29%	24%	38%	25%	34%
Reputation	18%	21%	24%	28%	22%	12%	13%
Technology	14%	12%	6%	7%	16%	13%	13%

	Real Estate (137)	Industrials (593)	Consumer Discretionary (339)	Consumer Staples (244)	Health Care (126)	Information Technology (256)	Comm. Services (107)
Policy & Legal	80%	74%	73%	75%	67%	72%	69%
Market	45%	37%	33%	29%	25%	33%	32%
Reputation	27%	16%	15%	17%	19%	22%	24%
Technology	18%	18%	14%	10%	9%	15%	10%

1. Includes companies that identified substantive climate-related risks and provided estimates of potential financial impacts of these risks.

Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Legend: Low to high percentage of companies

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Figure A4-3
Types of Substantive Climate-Related Physical Risks by Sector

Percent of Companies¹

	Total (2,755)	Banks (136)	Insurance (66)	Other Financial Services (85)	Energy (104)	Utilities (172)	Materials (390)
Acute	56%	65%	83%	51%	39%	66%	52%
Chronic	30%	22%	24%	25%	20%	44%	29%

	Real Estate (137)	Industrials (563)	Consumer Discretionary (339)	Consumer Staples (244)	Health Care (126)	Information Technology (256)	Comm. Services (107)
Acute	49%	50%	59%	53%	63%	57%	64%
Chronic	46%	25%	29%	49%	26%	23%	28%

1. Includes companies that identified substantive climate-related risks and provided estimates of potential financial impacts of these risks.

Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Legend: Low to high percentage of companies

Figure A4-4 shows further detail on the types of substantive climate-related opportunities companies identified by sector. Seventy percent (70%) of companies identified substantive opportunities related to products and services — ranging from 65% to 80% across sectors. Fewer companies identified other climate-

related opportunities such as opportunities in new markets (24%) — which ranged from 13% for consumer discretionary companies to 52% for insurance companies — and resilience at 11%, with a range from 3% for companies in the energy sector to 20% for companies in the real estate sector.

Figure A4-4
Types of Substantive Climate-Related Opportunities Identified by Sector
Percent of Companies¹

	Total (2,675)	Banks (145)	Insurance (63)	Other Financial Services (83)	Energy (96)	Utilities (172)	Materials (366)
Resource Efficiency	38%	32%	24%	30%	34%	22%	34%
Energy Source	35%	16%	13%	20%	46%	50%	36%
Products & Services	70%	80%	70%	67%	65%	69%	72%
Markets	24%	39%	52%	35%	20%	27%	24%
Resilience	11%	5%	16%	14%	3%	10%	10%

	Real Estate (127)	Industrials (589)	Consumer Discretionary (327)	Consumer Staples (238)	Health Care (124)	Information Technology (242)	Comm. Services (103)
Resource Efficiency	52%	34%	40%	53%	60%	40%	47%
Energy Source	50%	29%	35%	49%	49%	31%	36%
Products & Services	65%	74%	73%	59%	40%	77%	68%
Markets	31%	27%	13%	17%	17%	17%	19%
Resilience	20%	8%	13%	17%	14%	11%	12%

1. Includes companies that identified substantive climate-related risks and provided estimates of potential financial impacts of these risks.
Source: CDP, Responses to CDP Climate Change 2022 Questionnaire

Legend:  Low to high percentage of companies

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Appendix 5: Glossary

Glossary

ANNUAL OR INTEGRATED REPORTS refer to reports that describe companies' activities for the preceding year (annual reports) or the broader range of measures that contribute to companies' long-term value and the role they play in society (integrated reports).

BOARD OF DIRECTORS (OR BOARD) refers to a body of elected or appointed members who jointly oversee the activities of a company or organization. Some countries use a two-tiered system where "board" refers to the "supervisory board" while "key executives" refers to the "management board."²²³

CLIMATE-RELATED OPPORTUNITY refers to the potential positive impacts related to climate change on a company. Efforts to mitigate and adapt to climate change can produce opportunities for companies, such as through resource efficiency and cost savings; the adoption and utilization of low-emission energy sources; the development of new products and services; and building resilience along the supply chain.

CLIMATE-RELATED RISK refers to the potential negative impacts of climate change on a company. Physical risks emanating from climate change can be event driven (acute) such as increased severity of extreme weather events (e.g., cyclones, droughts, floods, and fires). They can also relate to longer-term shifts (chronic) in precipitation and temperature and increased variability in weather patterns (e.g., sea level rise). Climate-related risks can also be associated with the transition to a low-carbon global economy, the most common of which relate to policy and legal actions, technology changes, market responses, and reputational considerations.

FINANCIAL FILINGS refer to the annual reporting packages in which companies are required to deliver their audited financial results under the corporate, compliance, or securities laws of the jurisdictions in which they operate. While reporting requirements differ internationally, financial filings generally contain

financial statements and other information such as governance statements and management commentary.²²⁴

FINANCIAL PLANNING refers to a company's consideration of how it will achieve and fund its objectives and strategic goals. The process of financial planning allows companies to assess future financial positions and determine how resources can be used in pursuit of short and long-term objectives. As part of financial planning, companies often create "financial plans" that outline the specific actions, assets, and resources (including capital) necessary to achieve these objectives over a one-to-five-year period. However, financial planning is broader than the development of a financial plan as it includes long-term capital allocation and other considerations that may extend beyond the typical three-to-five-year financial plan (e.g., investment, research and development, manufacturing, and markets).

GOVERNANCE refers to the system by which a company is directed and controlled in the interests of shareholders and other stakeholders.²²⁵ Governance involves a set of relationships between a company's management, its board, its shareholders, and other stakeholders. Governance provides the structure and processes through which the objectives of the company are set, progress against performance is monitored, and results are evaluated.²²⁶

GREENHOUSE GAS (GHG) EMISSIONS SCOPE LEVELS²²⁷

- Scope 1 refers to all direct GHG emissions.
- Scope 2 refers to indirect GHG emissions from consumption of purchased electricity, heat, or steam.
- Scope 3 refers to other indirect emissions not covered in Scope 2 that occur in the value chain of the reporting company, including both upstream and downstream emissions. Scope 3 GHG emissions could include: the extraction and production of purchased materials and fuels, transport-related activities in vehicles not

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²²³ Organization of Economic Cooperation and Development (OECD), *G20/OECD Principles of Corporate Governance*, November 30, 2015, OECD Publishing, Paris.

²²⁴ Based on CDSB, *CDSB Framework for Reporting Environmental Information, Natural Capital and Associated Business Impacts*, April 1, 2018.

²²⁵ Cadbury, A., *Report of the Committee on the Financial Aspects of Corporate Governance*, December 1, 1992.

²²⁶ OECD, *G20/OECD Principles of Corporate Governance*, November 30, 2015, OECD Publishing, Paris.

²²⁷ World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD), *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)*, March 2004.

owned or controlled by the reporting entity, electricity-related activities (e.g., transmission and distribution losses), outsourced activities, and waste disposal.²²⁸

MANAGEMENT refers to those positions a company views as executive or senior management positions.

RISK MANAGEMENT refers to a set of processes that are carried out by a company's board and management to support the achievement of its objectives by addressing its risks and managing the combined potential impact of those risks.

SCENARIO ANALYSIS is a process for identifying and assessing a potential range of outcomes of future events under conditions of uncertainty. In the case of climate change, for example, scenarios allow a company to explore and develop an understanding of how the physical and transition risks of climate change may impact its businesses, strategy, and financial performance over time.

SECTOR refers to a segment of companies performing similar business activities in an economy. A sector generally refers to a

large segment of the economy or grouping of business types, while "industry" is used to describe more specific groupings of companies within a sector.

STRATEGY refers to a company's desired future state. A company's strategy establishes a foundation against which it can monitor and measure its progress in reaching that desired state. Strategy formulation generally involves establishing the purpose and scope of the company's activities and the nature of its businesses, considering the risks and opportunities it faces and the environment in which it operates.

SUSTAINABILITY REPORT is a report that describes a company's impact on society, often addressing environmental, social, and governance issues.

TRANSITION PLAN refers to an aspect of a company's overall business strategy that lays out a set of targets and actions supporting its transition toward a low-carbon economy, including actions such as reducing its GHG emissions.

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²²⁸ WRI and WBCSD, *The Corporate Value Chain (Scope 3) Accounting and Reporting Standard*, April 16, 2013.

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