Task Force on Climate-related Financial Disclosures

2022 Status Report

TCFD
TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

October 2022

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

September 15, 2022

Dear Chair Knot,

It is my pleasure to present the fifth annual status report of the Task Force on Climate-related Financial Disclosures (TCFD), which reflects on milestones related to the implementation of our recommendations since they were released in 2017 and other encouraging developments in climate-related disclosure since our last report in October 2021.

While global ambition to address climate change has increased over the last five years, recent extreme weather events around the world have amplified the need for even greater concerted action and faster progress. It is encouraging to see that consideration of the implications of climate change has become far more mainstream throughout financial markets since 2017, and that an increasing number of companies are publicly committing to net-zero emissions transition plans.

Over the last five years, the Task Force has made great contributions toward its goal of bringing better understanding of the impacts of climate-related risks and opportunities to the global financial system. Since 2017, the Task Force has seen significant momentum around adoption of and support for its recommendations as detailed in previous status reports as well as in this report.

Since our last report, our number of supporters has increased to more than 3,800, companies have continued to increase their TCFD-aligned reporting, and there have been important actions by regulators, jurisdictions, and international standard-setters to use the TCFD recommendations in developing climate-related reporting requirements and standards — including but not limited to proposals released earlier this year by the U.S. Securities and Exchange Commission, the International Sustainability Standards Board, and the European Financial Reporting Advisory Group. This public sector action is vital to reinforce the importance and urgency of climate action guided by data.

To help make comparable and reliable data available to all, I joined French President Macron to form a new Climate Data Steering Committee that will bring together international organizations, regulators, policy makers and data service providers. We are working to create a public open data platform that will collect, aggregate, and standardize certain elements of companies' climate-related disclosures. I look forward to updating you as this collaboration continues.

Even with the significant progress made over the past five years, this report makes clear that more urgent progress is needed. Supporting market efficiency and stability is paramount as we look to build a more sustainable and resilient future. We are grateful for your continued commitment to this work.

Sincerely,

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 (see Figure ES1).[1,2] 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.

Since the release of its 2017 report and at the request of the Financial Stability Board (FSB), the Task Force has issued five annual status reports — including this report — describing the alignment of companies' reporting with the TCFD recommendations. Recognizing this year marks five years since its final recommendations were published, the Task Force reflected on significant developments and progress made in terms of climate-related financial disclosures broadly and relative to milestones included in its 2017 report. These milestones — developed when the Task Force was finalizing its recommendations but still relevant today — were based on the Task Force's view of success of its recommendations over a five-year period, as summarized in Figure ES2.

Figure ES1

The Task Force's Remit

In April 2015, the G20 Finance Ministers and Central Bank Governors asked the Financial Stability Board (FSB) to convene public- and private-sector participants to review how the financial sector can take account of climate-related issues. As part of its review, the FSB identified the need for better information to support informed investment, lending, and insurance underwriting decisions and improve understanding of climate-related risks.

To help identify the information needed to assess and price climate-related risks, the FSB established an industry-led task force — the TCFD. The FSB asked the TCFD to develop voluntary climate-related financial disclosures that would be useful to investors and others in understanding material risks.

Over the past five years, the Task Force has seen significant momentum around adoption of and support for its recommendations as detailed in previous status reports as well as in this report. In particular, the percent 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.[3]

Figure ES2

Success of the TCFD Recommendations and Milestones from 2017

View of Success

"Through widespread adoption, financial risks and opportunities related to climate change will become a natural part of companies' risk management and strategic planning processes. As this occurs, companies' and investors' understanding of the potential financial implications associated with climate change will grow, information will become more decision-useful, and risks and opportunities will be more accurately priced, allowing for the more efficient allocation of capital."

— 2017 Report

Milestones Over Five-Year Period

1. Companies increasingly disclose climate-related information in financial filings
2. Preparers and users of disclosure increasingly view climate-related issues as mainstream business and investment considerations
3. The number of companies implementing the recommendations grows, and the types of information disclosed are further developed
4. Disclosures become more complete, and there is more appropriate pricing of climate-related issues

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 Financial Stability Board, "FSB to Establish Task Force on Climate-related Financial Disclosures," December 4, 2015.
3 The percent of companies disclosing information in line with the Task Force's 11 recommended disclosures (see Table A1, p. 11) is based on a sample of large companies drawn from eight industries as described in Section A.1. TCFD-Aligned Reporting by Public Companies.

In addition, since the publication of the 2021 status report, there have been further significant actions by regulators and international standard setters to use the TCFD recommendations in developing climate-related reporting requirements and standards — including but not limited to proposals released earlier this year by the U.S. Securities and Exchange Commission, the International Sustainability Standards Board, and the European Financial Reporting Advisory Group.[4,5] The Task Force considers these positive developments as entirely consistent with views expressed in its 2017 report, as follows:

> *"The Task Force's recommendations provide a common set of principles that should help existing disclosure regimes come into closer alignment over time. 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 encourages standard setting bodies to support adoption of the recommendations and alignment with the recommended disclosures."*

The Task Force believes a key driving factor of this momentum is the continuing growth in investor demand for companies to report information in line with the TCFD recommendations. For example, as part of Climate Action 100+, 700 investors with over $68 trillion in assets under management are engaging the world's largest corporate greenhouse gas emitters to strengthen their climate-related disclosures by implementing the TCFD recommendations.[6] In addition, earlier this year, CDP announced that over 680 financial institutions with more than $130 trillion in assets have asked over 10,000 companies to disclose through CDP, which has aligned its climate change disclosures with the TCFD recommendations.[7]

Even with the significant progress made over the past five years, the Task Force believes *more urgent progress* is needed in improving transparency on the actual and potential impact of climate change on companies, especially when considered within the broader global focus on climate change.

GLOBAL FOCUS ON CLIMATE CHANGE

In December 2015, nearly 200 governments agreed to address climate change by holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the increase to 1.5°C (referred to as the Paris Agreement).[8] Subsequent to the Paris Agreement, the Intergovernmental Panel on Climate Change (IPCC) issued a report in 2018 indicating the global temperature increase needs to be limited to 1.5°C above pre-industrial levels to avoid long-lasting or irreversible consequences of global warming.[9]

In its April 2022 report, the IPCC indicated limiting global warming to around 1.5°C requires greenhouse gas (GHG) emissions to peak before 2025 at the latest and be reduced by 43% by 2030 to reach "net zero" by 2050.[10,11] The press release announcing the report emphasized that "without immediate and deep emissions reductions across all sectors, limiting global warming to 1.5°C is beyond reach."[12] Despite this warning, the world is heading to a warming of well above 2°C based on current policies and commitments — even when taking into account the nearly 130 countries and self-governing territories and close to 8,000 companies making commitments to achieve net zero GHG emissions by 2050.[13]

Furthermore, the recent IPCC report highlighted concerns that directly tie to climate-related financial disclosure. The report highlighted

4 See Section D. Initiatives Supporting TCFD for additional developments since October 2021.
5 U.S. Securities and Exchange Commission, "Press Release: SEC Proposes Rules to Enhance and Standardize Climate-Related Disclosures for Investors," March 21, 2022; International Sustainability Standards Board, "Press Release: ISSB Delivers Proposals That Create Comprehensive Global Baseline of Sustainability Disclosures," March 31, 2022; and European Financial Reporting Advisory Group, "Press Release: EFRAG Launches a Public Consultation on the Draft ESRS EDs," April 29, 2022.
6 See Climate Action 100+.
7 CDP, "More than 680 Financial Institutions with US $130+ Trillion in Assets Call on Nearly 10,400 Companies to Disclose Environmental Data through CDP," March 14, 2022.
8 United Nations Framework Convention on Climate Change, "The Paris Agreement," December 12, 2015.
9 The IPCC is a group convened by the United Nations to assess the science related to climate change. See IPCC, *Summary for Policymakers: Global Warming of 1.5°C*, October 8, 2018.
10 IPCC, *Climate Change 2022: Mitigation of Climate Change-Working Group III Contribution to the IPCC Sixth Assessment Report*, April 4, 2022
11 Net zero refers to a state in which the greenhouse gases going into the atmosphere are balanced by removal out of the atmosphere. The term net zero is important because this is the state at which global warming stops. See Net Zero Climate, "What is Net Zero?," June 28, 2020.
12 IPCC, "Press Release: Climate Change 2022-Mitigation of Climate Change," April 4, 2022.
13 See Climate Action Tracker, *Despite Glasgow Climate Pact 2030 Climate Target Updates Have Stalled*, June 3, 2022; Net Zero Tracker, Net Zero Stocktake 2022, June 12, 2022; and Race to Zero, "Who's In?," July 13, 2022.

that finance is a critical enabling factor for the low carbon transition, but progress on aligning financial flows with low GHG emissions pathways remains slow. The report further indicated that climate-related financial risks remain greatly underestimated by financial institutions and markets — limiting the capital reallocation needed for the low-carbon transition — and noted that support and guidance for enhancing transparency could promote capital markets' climate financing by providing quality information to price climate-related risks and opportunities. Notably, the IPCC report referenced the TCFD as an example of such guidance.

> *"There is a climate financing gap which reflects a persistent misallocation of global capital."*[14]

Now more than ever it is critical for companies to consider the impact of climate change and associated mitigation and adaptation efforts on their strategies and businesses and disclose related material information. Last year, in recognition of the growing emphasis on companies setting net-zero targets and the demand by investors and others for decision-useful information on companies' plans and progress to meet such targets, the Task Force published *Guidance on Metrics, Targets, and Transition Plans.*[15] The guidance outlines considerations for developing a transition plan and highlights key information from such plans to include in climate-related financial disclosures.

CLIMATE-RELATED FINANCIAL DISCLOSURE PRACTICES

Similar to previous status reports, this report provides an overview of current disclosure practices in terms of their alignment with the Task Force's recommendations. It also highlights progress associated with implementation of the TCFD recommendations over the past five years — including progress relative to key milestones identified in 2017, implementation trends and challenges that may be useful for companies beginning to implement the recommendations, and investors and other users' views on the usefulness of climate-related financial disclosures and improvements needed.

To better understand current climate-related financial disclosure practices and how they have evolved, the Task Force reviewed — using artificial intelligence technology — publicly available reports for over 1,400 large companies in specific sectors around the world over a three-year and five-year period. In addition, the Task Force conducted two surveys in 2022 — one to gain insight on asset managers and asset owners' TCFD-aligned reporting practices and the other on companies' efforts to implement the TCFD recommendations as well as investors and other users' views on the usefulness of climate-related financial disclosures for decision-making. The Task Force found the results of its disclosure review and surveys encouraging but believes *more urgent progress* is necessary to achieve the milestones identified in the Task Force's 2017 report. Table ES1 (p. 5) summarizes the key themes and findings from the Task Force's disclosure review, survey results, and other analyses. Additional themes and findings are included in Box ES1 (p. 6).

14 IPCC, *Climate Change 2022: Mitigation of Climate Change-Working Group III Contribution to the IPCC Sixth Assessment Report*, April 4, 2022.
15 TCFD, Guidance on Metrics, Targets, and Transition Plans, October 14, 2021.

Table ES1

Key Takeaways and Findings

AI Review[1]	**The percent of companies disclosing TCFD-aligned information continues to grow, but more urgent progress is needed.** For fiscal year 2021 reporting, 80% of companies disclosed in line with at least one of the 11 recommended disclosures; however, only 4% disclosed in line with all 11 recommended disclosures and only around 40% disclosed in line with at least five.
	All regions have significantly increased their levels of disclosure over the past three years. In particular, the average level of disclosure across the 11 recommended disclosures for European companies was 60% for fiscal year 2021, growing 23 percentage points since fiscal year 2019; 36% for Asia Pacific companies — an increase of 11 percentage points; and 29% for North America companies — an increase of 12 percentage points.
Reporting Practices Survey[2]	**A majority of asset managers and asset owners report to their clients and beneficiaries.** Over 60% of asset managers and over 75% of asset owners surveyed indicated they currently report climate-related information to their clients and beneficiaries, respectively. The majority of asset managers report through sustainability reports or directly to clients, while the majority of asset owners report through annual, sustainability, or climate-specific reports.
	Nearly 50% of asset managers and 75% of asset owners reported information aligned with at least five of the 11 recommended disclosures. Based on survey responses, 60% of asset managers and nearly 80% of asset owners indicated they report information aligned with at least one recommended disclosure; and 10% of asset managers and 36% of asset owners indicated they report on all 11 recommended disclosures.◆
TCFD Survey[3]	**The percent of companies disclosing the TCFD recommendations in financial filings or annual reports has increased each year.** Based on the TCFD survey, over 70% of companies implementing the TCFD recommendations disclosed climate-related information in financial filings or annual reports (including integrated reports) for fiscal year 2021 compared to 45% for fiscal year 2017.
	The availability and quality of climate-related financial disclosures has increased since June 2017. Ninety-five percent (95%) of survey respondents saw an increase in the availability of climate-related financial disclosures since the release of the TCFD recommendations, with 88% of respondents citing improvements in the quality of disclosures.
	Investors and others use disclosures in decision-making and pricing. Based on the TCFD survey, 90% of investors and other users incorporate climate-related financial disclosures in financial decision-making, and 66% of these indicated such disclosures factor into the way they price financial assets.[16] In addition, based on a literature review, there is a growing body of evidence that climate-related risks are beginning to affect prices for certain types of assets.

1 *Based on the AI review of disclosure practices.*

2 *Based on the survey of asset managers and asset owners' TCFD-aligned reporting practices.*

3 *Based on the TCFD implementation and use survey. Given the composition and number of survey respondents, the Task Force cautions readers on extrapolating these results to broader populations of companies disclosing climate-related financial information and users of such disclosures.*

◆ *On November 3, 2022, the TCFD Secretariat revised the end of this sentence to correct an error in the calculation of the percent of asset managers and asset owners that indicated they report on all 11 recommended disclosures.*

CONCLUSION AND NEXT STEPS

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 regulators and standard setters 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 not enough companies are disclosing *decision-useful* climate-related financial information, 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 as well as broader assessments on the state of climate change, including those in the IPCC's April 2022 report.

Over the next several months, the Task Force will continue to monitor companies' progress in disclosing climate-related financial information aligned with the TCFD recommendations and will prepare another status report for the Financial Stability Board in October 2023.

16 The Task Force received 42 survey responses from investors and other users of climate-related financial disclosures. Given the relatively small sample size, the Task Force recognizes the results may not be representative of the broader population of users of climate-related financial disclosures.

Box ES1

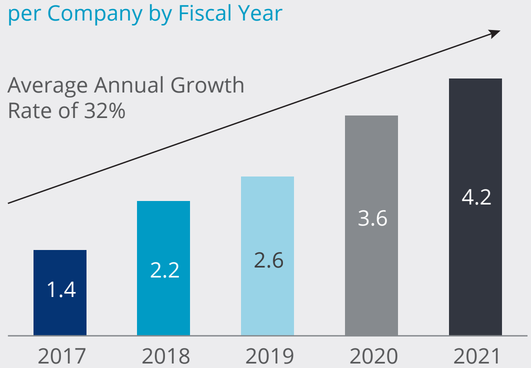
2022 TCFD Status Report: Additional Themes and Findings

TCFD-Aligned Disclosure Practices

Findings from AI Review of Public Company Reports

Based on the AI review, the average number of recommended disclosures addressed per company has increased over the past five years.

Average Number of Recommended Disclosures per Company by Fiscal Year



Base size: 1,370

Findings from Survey of Asset Managers and Asset Owners

Percent of Asset Managers Surveyed	
Implementing the TCFD recommendations	95%
Reporting TCFD-Aligned Information	
Currently report to clients	62%
Plan to report to clients	37%
Do not plan to report to clients	1%

Base size: 151

Percent of Asset Owners Surveyed	
Implementing the TCFD recommendations	93%
Reporting TCFD-Aligned Information	
Currently report to beneficiaries	77%
Plan to report to beneficiaries	20%
Do not plan to report to beneficiaries	3%

Base size: 78

Implementation of the TCFD Recommendations and Use of Climate-Related Disclosures

The Task Force received **399** ***survey responses***, including **226** from ***companies*** preparing disclosures, **42** from ***investors and other users*** of climate-related financial disclosure, and **131** from ***other*** organizations. The **226** ***companies*** identified several challenges in implementing TCFD.

- *Conducting **climate-related scenario analysis**, including selecting relevant scenarios and identifying key inputs and parameters*
- ***Estimating Scope 3 GHG emissions**, including challenges with data collection across the value chain*
- ***Developing processes for identifying, assessing, and managing climate-related risks** and integrating such risks into existing processes*

Top Survey Findings for Preparers Implementing TCFD

Have ***implemented*** or are implementing the ***TCFD recommendations***	91%
Implement because climate related ***issues are material*** for company	85%
Implement because ***investors are requesting*** such information	77%
Implement because TCFD is ***required by law or regulation***	26%

Base size: 226

The **42** ***users*** identified specific improvements companies could make to increase the usefulness of climate-related financial disclosures.

- *Disclose the **actual and potential financial impacts** of climate-related issues on their businesses, strategies, or financial planning*
- *Use a **standard scenario to assess the resilience** of their strategies to climate change*
- *Report climate-related **targets in a consistent way** across companies*
- ***Increase the number of companies disclosing** climate-related financial information*

Top Survey Findings for Users and Other Respondents[1]

Cited an ***increase in the availability*** of climate related financial disclosures (173)	95%
Use climate-related financial disclosures ***in decision-making*** (42)	90%
Cited ***improvements in quality*** of disclosures (173)	88%
Use disclosures to ***price assets*** or determine rates (42)	66%

1 *The numbers in parentheses represent the base size.*

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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.[17] 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, particularly as many companies have now had five full reporting cycles to implement the TCFD recommendations since their release in June 2017. To assess the current state and evolution of climate-related financial disclosures, the Task Force reviewed the reports of over 1,400 public companies over a three-year period — fiscal years 2019, 2020, and 2021 — as described in Section A.1. TCFD-Aligned Reporting by Public Companies. In addition, to support the Task Force's assessment of progress in the disclosure of climate-related financial information over the past five years, the AI technology was also applied to a subset of companies included in the three-year review (see Box A1, p. 19).[18]

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 on these organizations' climate-related reporting practices. The results of the survey are described in Section A.2. 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 2019, 2020, and 2021 with the Task Force's 11 recommended disclosures as well as the results and key findings from the review.

Key Takeaways

- The percent of companies disclosing TCFD-aligned information continues to grow, but more urgent progress is needed. For fiscal year 2021 reporting, 80% of companies disclosed in line with at least one of the 11 recommended disclosures; however, only 4% disclosed in line with all 11 recommended disclosures and only around 40% disclosed in line with at least five.
- Public companies remain more likely to disclose information on their climate-related risks and opportunities (*Strategy a*) than on any other recommended disclosure, with just over 60% of companies reviewed including such information in their 2021 fiscal year reports.
- Disclosure of the resilience of companies' strategies under different climate-related scenarios (*Strategy c*) continues to have the lowest level of disclosure across the 11 recommended disclosures.
- Several industries covered by the AI review have average levels of disclosure of over 40%. For fiscal year 2021 reporting, industries with average disclosure levels across the 11 recommended disclosures of more than 40% include energy companies (43%), materials and buildings companies (42%), banks (41%), and insurance companies (41%).
- All regions have significantly increased their levels of disclosure over the past three years. In particular, the average level of disclosure across the 11 recommended disclosures for European companies was 60% for fiscal year 2021, growing 23 percentage points since fiscal year 2019; 36% for Asia Pacific companies — an increase of 11 percentage points; and 29% for North America companies — an increase of 12 percentage points.

17 The Task Force gratefully acknowledges the work of Richard Cantor, Burcu Guner, Ashit Talukder, Sankalp Gaur, Pablo Pastore, Hasan Cerhozi, Amanda Lebic, Mariia Moriashova, and Alexis Petrovski from Moody's Corporation on the AI technology review. Moody's contribution has been prepared only for the TCFD. Moody's accepts no liability (including for negligence) to anyone else in connection with the Moody's contents of this report.

18 The population of companies used in the five-year review is smaller than the population used in the three-year review because not all companies included in the three-year review had annual reports for fiscal years 2017 and 2018.

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Scope and Approach

The Task Force reviewed financial filings, annual reports, integrated reports, sustainability reports, and other related reports of 1,434 public companies from five regions in eight industries (Figure A1). 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.[19] To incorporate other large companies that may be exposed to climate-related risks, two additional industries — Technology and Media and Consumer Goods — are also included.

Figure A1

AI Review Population Size

Industry	Number
Banking	248
Insurance	118
Energy	223
Materials and Buildings	353
Transportation	136
Ag., Food, and Forest Products	123
Technology and Media	96
Consumer Goods	137
Total	**1,434**

For this status report and the previous one, the Task Force sought to maintain as much consistency as possible with the final review population used in the 2020 status report.[20] As such, the Task Force began with an initial review population of 1,651 companies that were included in the AI review for the 2021 status report.[21] The final population used for this year's AI review was reduced to 1,434 after accounting for companies that no longer existed or did not have reports available in English for all three years.[22] More information on the Task Force's methodology is provided in Appendix 2: Company Selection and AI Review Methodology. To maintain consistency in its review of climate-related financial disclosures, the Task Force used the same AI technology that was used for the 2021 status report.[23] The AI technology was used to review over 15,000 reports from the 1,434 companies and determine whether the reports included information that appeared to align with one or more of the Task Force's 11 recommended disclosures (see Table A1, p. 11). Importantly, this approach 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.[24]

Summary of AI Review Results and Findings

This subsection summarizes the results and findings from the Task Force's AI review of public companies' reports for fiscal years 2019, 2020, and 2021 in terms of alignment with the Task Force's 11 recommended disclosures.[25] The AI review results and findings are discussed for four different categorizations of the AI review population as follows: across all companies, by the eight industries from which companies were pulled, by region based on companies' headquarters, and by size using market capitalization. It is important to note that while this year's AI review population was derived from the AI review population used last year, it has around 215 fewer companies. As a result, the AI review results in this report are not *directly* comparable to those included in the 2021 status report; however, they are directionally consistent, as expected.

19 TCFD, *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*, June 29, 2017.
20 TCFD, *2020 Status Report*, September 22, 2020.
21 TCFD, *2021 Status Report*, October 14, 2021.
22 Because the AI technology cannot process reports in languages other than English, the AI review population has a higher representation of international companies and companies 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 A5 (p. 16).
23 The Task Force used AI technology to perform an automated review of more than 1,400 companies' public reports. Performing such a review "manually" or through human reviewers would take thousands of hours, which would not be feasible for the Task Force.
24 It is important to recognize the confidence of the AI technology in identifying disclosures that align with the Task Force's 11 recommended disclosures varies for each recommended disclosure, as described in Appendix 2: Company Selection and AI Review Methodology.
25 In this report, the use of year(s) followed by a specific year(s) refers to fiscal year reporting unless the context indicates otherwise.

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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.

TCFD-Aligned Reporting Across All Companies Reviewed

The Task Force assessed the percentage of disclosure for each of the Task Force's 11 recommended disclosures for all companies in the review population. Figure A2 (p. 12) shows the AI review results across all companies by fiscal year as well as the percentage point change between fiscal year 2019 and fiscal year 2021 results. The trends and findings are broadly consistent with those included in the Task Force's previous status reports.

Disclosure of climate-related information has increased since 2019. The AI review found the levels of disclosure for all 11 recommended disclosures increased each year; however, the size of the increases varied significantly from 5 to 20 percentage points. On average across the 11 recommended disclosures, the percent of companies disclosing TCFD-aligned information increased by 14 percentage points between fiscal years 2019 and 2021.

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Figure A2

TCFD-Aligned Disclosures by Fiscal Year for 2019–2021

Recommendation	Recommended Disclosure	Pt. Change 2019–2021	Percent of Companies Disclosing: FY 2019	FY 2020	FY 2021
Governance	a) Board Oversight	16	13%	25%	29%
	b) Management's Role	12	10%	18%	22%
Strategy	a) Risks and Opportunities	19	42%	53%	61%
	b) Impact on Organization	16	31%	40%	47%
	c) Resilience of Strategy	10	6%	12%	16%
Risk Management	a) Risk ID and Assessment Processes	14	19%	29%	33%
	b) Risk Management Processes	17	17%	28%	34%
	c) Integration into Overall Risk Management	20	17%	27%	37%
Metrics and Targets	a) Climate-Related Metrics	5	42%	46%	47%
	b) Scope 1, 2, 3 GHG Emissions	10	34%	40%	44%
	c) Climate-Related Targets	18	27%	38%	45%

0% 20% 40% 60% 80% 100%

Legend: FY 2019 FY 2020 FY 2021

Base size: 1,434

As shown in Figure A2, the greatest increase in reporting from 2019 to 2021 — 20 percentage points — was for the integration of climate-related risks into overall risk management processes (*Risk Management* c). Disclosure of climate-related risks and opportunities (also referred to as climate-related issues) — *Strategy a)* — and climate-related targets — *Metrics and Targets c)* — increased by 19 and 18 percentage points, respectively. The smallest increase across the 11 recommended disclosures was for companies' disclosure of climate-related

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metrics (*Metrics and Targets a*), which increased by only 5 percentage points over the same time period. Notably, climate-related metrics are one of the top two most useful disclosure elements for decision-making identified by investors and other users based on a previous survey conducted by the Task Force, and 90% of user respondents from a more recent survey indicated such information is useful for decision-making.[26]

Reporting on climate-related risks and opportunities (*Strategy a*) is higher than any other recommended disclosure. Just over 60% of the companies reviewed included information on climate-related issues in their fiscal year 2021 reports, and the 19 percentage points in growth between 2019 and 2021 indicates that reporting in line with *Strategy a)* continues to be an area of focus for preparers.

Reporting on risk management processes is below average but steadily improving. While companies increasingly disclosed their climate-related risks and opportunities, the processes through which they manage such risks are disclosed at a much lower rate. The level of disclosure on *Risk Management a)* — processes for identifying and assessing climate-related risks — was 33% for 2021 reporting; *Risk Management b)* — processes for managing climate-related risks — was 34%; and *Risk Management c)* — whether processes are integrated into overall risk management — was 37%. Despite the relatively low levels of disclosure for all three of these recommended disclosures, they have shown strong growth compared to the other recommended disclosures, ranging between 14 and 20 percentage points between 2019 and 2021.

Disclosure of the resilience of companies' strategies under different climate-related scenarios (*Strategy c*) increased from 6% to 16% over the three-year period. The percent of companies disclosing *Strategy c)* continues to be the lowest of all recommended disclosures. The Task Force recognizes the challenges associated with making such disclosures as described in previous reports as well as in Section B.1. Adoption and Use of TCFD Recommendations, where over 80% of TCFD implementation survey respondents rated *Strategy c)* as somewhat difficult or very difficult to implement. Given the challenges associated with this disclosure and the relatively low starting point, the 10 percentage point growth in disclosure represents an encouraging improvement.

While the levels of disclosure of climate-related metrics and targets is relatively high, growth related to metrics has slowed. The levels of disclosure on *Metrics and Targets a), b), and c)* for 2021 reporting range from 44% to 47%. While reporting on climate-related targets increased by more than 15 percentage points since 2019 to 45%; the year-over-year increase in disclosure of climate-related metrics (*Metrics and Targets a*) was four percentage points between 2019 and 2020, dropping to just one percentage point between 2020 and 2021. This represents the slowest growth of any of the recommended disclosures over the last year.

Governance remains the least disclosed recommendation. The two Governance recommended disclosures were the second and third least disclosed of the Task Force's 11 recommended disclosures, with 29% of companies reviewed disclosing information on board oversight of climate-related issues (*Governance a*), and 22% disclosing information on the role of management on such issues (*Governance b*). Notably — as discussed in Section B.1. Adoption and Use of TCFD Recommendations, nearly three quarters of the approximately 200 preparers that responded to the Task Force's implementation survey indicated that both (*Governance a*) and (*Governance b*) are very or relatively easy to disclose, which seems inconsistent with their relatively low levels of disclosure. While it is unclear why these disclosures are relatively low, possible reasons might be difficulty gaining support from the board and senior management on including these disclosures in publicly available reports or the way in which the AI technology identifies relevant text for these recommended disclosures.

The majority of companies do not disclose information on specific scenarios. Given generally low levels of disclosure around the resilience of a company's strategy to climate-related issues (*Strategy c*), this year the Task Force used the AI technology to better understand whether companies are discussing different climate-related scenarios in their reporting. The Task Force believes it is important for companies to include multiple scenarios when assessing their resilience to climate-related issues. While only 20% of companies mentioned a below 2°C scenario in their fiscal year 2021 reporting, the Task Force recognizes this was higher than the 16% that described information aligned with *Strategy c)*. The percentage of companies referencing below 2°C scenarios more than doubled with 12 percentage point growth

26 TCFD, *2020 Status Report*, October 29, 2020, pp. 29-32, and Section B.1. Adoption and Use of TCFD Recommendations.

between 2019 and 2021. Only 9% of companies mentioned a 2°C scenario in 2021, and the review found even fewer references to scenarios with a trajectory exceeding 2°C, with only 3% and 4% of companies referencing 2°C to 3°C scenarios and greater than 3°C scenarios, respectively.

TCFD-Aligned Reporting by the Eight Industries

This section summarizes the AI review results for fiscal year 2021 for companies in each of the eight industries reviewed. To better compare reporting across the eight industries, the Task Force averaged the percentage of disclosure in 2021 across the 11 recommended disclosures for each industry. The industries were then ranked from highest to lowest average percentage of disclosure. A higher average percentage of disclosure indicates that an industry generally disclosed at a higher rate across the 11 recommended disclosures. Figure A3 shows the average percentage of disclosure across the 11 recommended disclosures by industry for fiscal year 2021 reporting. The AI review results for each industry for the past three reporting cycles are provided in Appendix 3: AI Review Results by Industry.

Figure A3

Average Percentage of Disclosure by Industry

Industry	Percent
Energy	43%
Materials and Buildings	42%
Banking	41%
Insurance	41%
Ag., Food, and Forest Products	37%
Consumer Goods	33%
Transportation	32%
Technology and Media	15%

Several industries covered by the AI review now have average levels of disclosure of over 40%. For fiscal year 2021 reporting, industries with average disclosure levels across the 11 recommended disclosures of more than 40% include energy companies (43%), materials and buildings companies (42%), banks (41%), and insurance companies (41%). Notably, the increase between 2019 and 2021 reporting for banks was 20 percentage points. The increase for materials and buildings and insurance companies was 16 percentage points and 10 percentage points for energy companies.

Leading industry varies by recommended disclosure. As shown in Figure A4 (p. 15), companies reviewed in the Energy industry had the highest levels of disclosure for three of the recommended disclosures — 73% for information on climate-related risks and opportunities in fiscal year 2021, 54% on the impact of climate-related issues on the company, and 40% on board oversight. Companies in the Insurance industry had the highest levels of disclosure on the Risk Management recommendation, closely followed by banks. This may be attributable to insurance and banking regulators' general emphasis on risk management processes. In terms of climate-related metrics and targets, companies in the Materials and Buildings industry have the highest levels of disclosure on all three recommended disclosures under the Metrics and Targets recommendation, with *Metrics and Targets a) and b)* at 58% and *Metrics and Targets c)* at 57%.

Companies in the Technology and Media industry disclose less than other groups reviewed. These companies had the lowest average level of disclosure in fiscal year 2021 at 15% and the lowest level of disclosure for each of the 11 individual recommended disclosures. In addition, companies in the Technology and Media industry had the smallest increase — at four percentage points — in the average level of disclosure across the 11 recommended disclosures between fiscal years 2019 and 2021. Transportation companies had the second lowest average level of disclosure at 32% — nearly double the rate of companies in Technology and Media.

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Figure A4

Disclosure by Industry: 2021 Fiscal Year Reporting

Recommendation	Recommended Disclosure	Banking (248)[1]	Insurance (118)	Energy (223)	Materials & Buildings (353)
Governance	a) Board Oversight	33%	36%	40%	32%
	b) Management's Role	28%	31%	21%	25%
Strategy	a) Risks and Opportunities	64%	58%	73%	67%
	b) Impact on Organization	54%	46%	54%	51%
	c) Resilience of Strategy	19%	25%	18%	16%
Risk Management	a) Risk ID and Assessment Processes	47%	45%	37%	31%
	b) Risk Management Processes	47%	49%	36%	31%
	c) Integration into Overall Risk Management	49%	52%	42%	36%
Metrics and Targets	a) Climate-Related Metrics	42%	38%	51%	58%
	b) Scope 1, 2, 3 GHG Emissions	35%	33%	48%	58%
	c) Climate-Related Targets	32%	33%	56%	57%

Recommendation	Recommended Disclosure	Trans-portation (136)	Ag., Food & Forest (123)	Technology & Media (96)	Consumer Goods (137)
Governance	a) Board Oversight	21%	22%	6%	23%
	b) Management's Role	18%	20%	4%	20%
Strategy	a) Risks and Opportunities	54%	61%	31%	54%
	b) Impact on Organization	39%	45%	22%	43%
	c) Resilience of Strategy	12%	17%	6%	11%
Risk Management	a) Risk ID and Assessment Processes	24%	30%	10%	27%
	b) Risk Management Processes	24%	30%	8%	28%
	c) Integration into Overall Risk Management	24%	32%	7%	36%
Metrics and Targets	a) Climate-Related Metrics	43%	51%	24%	49%
	b) Scope 1, 2, 3 GHG Emissions	41%	51%	22%	39%
	c) Climate-Related Targets	49%	49%	27%	38%

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

Legend:

Low to high percentage of reporting

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TCFD-Aligned Reporting by Region

Companies in the AI review population were categorized into one of five regions based on the location of their headquarters to consider potential regional differences. Similar to the approach taken for industries, Figure A5 shows the average percentage of disclosure across the 11 recommended disclosures by region for fiscal year 2021 reporting. Figure A6 shows the percentage of disclosure by region for each of the 11 recommended disclosures for fiscal year 2021 reporting.

Figure A5

Average Percentage of Disclosure by Region

Region	Percent
Europe	60%
Asia Pacific	36%
North America	29%
Latin America	28%
Middle East and Africa	25%

Europe remains the leading region for disclosure. The European companies included in the AI review disclosed at 60% on average across the 11 recommended disclosures, which is 24 percentage points higher than the next highest region (Asia Pacific). In addition, the European companies reviewed have the highest level of disclosure for each of the 11 recommended disclosures as shown in Figure A6. In particular, 81% of European companies disclosed their climate-related metrics (*Metrics and Targets a*), 75% disclosed information on their climate-related risks and opportunities (*Strategy a*) and GHG emissions (*Metrics and Targets b*), and 74% disclosed their climate-related targets (*Metrics and Targets c*), which is 37 percentage points higher than the next closest region. Europe's leadership is likely driven by increasing public sector attention to climate-related issues and requirements for climate-related reporting, as outlined in Section D. Initiatives Supporting TCFD.

Figure A6

Disclosure by Region: 2021 Fiscal Year Reporting

Recommendation	Recommended Disclosure	Asia Pacific (273)[1]	Europe (359)	Latin America (42)	Middle East and Africa (73)	North America (687)
Governance	a) Board Oversight	30%	42%	29%	15%	24%
	b) Management's Role	23%	40%	14%	18%	14%
Strategy	a) Risks and Opportunities	51%	75%	52%	36%	61%
	b) Impact on Organization	38%	63%	33%	30%	45%
	c) Resilience of Strategy	16%	35%	14%	10%	7%
Risk Management	a) Risk ID and Assessment Processes	35%	59%	26%	34%	20%
	b) Risk Management Processes	34%	55%	29%	29%	23%
	c) Integration into Overall Risk Management	35%	58%	31%	27%	29%
Metrics and Targets	a) Climate-Related Metrics	56%	81%	33%	26%	30%
	b) Scope 1, 2, 3 GHG Emissions	46%	75%	24%	26%	30%
	c) Climate-Related Targets	36%	74%	24%	26%	37%

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

Legend: Low to high percentage of reporting

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There has been encouraging growth in other regions. In North America, the average level of disclosure for the companies reviewed was 29% for fiscal year 2021 reporting, growing 12 percentage points since 2019. Notably, the number of North American companies was much larger than the number of companies in other regions (687, versus 42 in Latin America for example) and incorporated a higher percentage of smaller companies and Media and Technology companies compared to other regions. The highest area of disclosure for North American companies was on information on their climate-related risks and opportunities (*Strategy a*) at 61%, which was higher than all other regions except Europe. In addition, North American companies disclosed their climate-related targets at a higher rate than climate-related metrics, which was the opposite of most other regions where metrics were disclosed at a higher rate than targets.

The average level of disclosure across the 11 recommended disclosures for Asia Pacific was 36% for fiscal year 2021 reporting, growing 11 percentage points since 2019. Over half of the companies in the Asia Pacific region disclosed their climate-related metrics (*Metrics and Targets a*), but only 36% disclosed their climate-related targets (*Metrics and Targets c*), which is 20 percentage points lower than climate-related metrics. The average level of disclosure by companies in Latin America and the Middle East and Africa increased 9 percentage points (each) since 2019, bringing the average levels of disclosure to 28% and 25%, respectively. The highest level of disclosure for companies in Latin America and the Middle East and Africa was on *Strategy a)* at 52% and 36%, respectively.

TCFD-Aligned Reporting by Company Size

To assess reporting results by company size, the Task Force divided the AI review population into thirds based on market capitalization as follows: those with a market capitalization of less than $3.4 billion, those with a market capitalization between $3.4 billion and $12.2 billion, and those with a market capitalization of more than $12.2 billion. Figure A7 shows the average percentage of disclosure across the 11 recommended disclosures by company size for 2021 reporting. Figure A8 (p. 18) shows the percentage of disclosure by company size for each of the 11 recommended disclosures for fiscal year 2021 reporting.

Figure A7

Average Percentage of Disclosure by Company Size

Market Capitalization	Percent
<$3.4B	29%
$3.4-12.2B	37%
>$12.2B	49%

Larger companies are more likely to disclose TCFD-aligned information than smaller ones. Forty-nine percent (49%) of the companies reviewed with a market capitalization greater than $12.2 billion disclosed information aligned with the TCFD recommendations for fiscal year 2021. Meanwhile, 29% of companies with a market capitalization in the bottom third (less than $3.4 billion) disclosed in line with the TCFD recommendations.

Disclosure from larger companies grew the fastest, with a 16 percentage point increase between 2019 and 2021 reporting. There has also been encouraging growth in reporting by companies with a market capitalization between $3.4 billion and $12.2 billion and those with less than $3.4 billion at 15 and 14 percentage points, respectively.

Figure A8

Disclosure by Company Size: 2021 Fiscal Year Reporting

Recommendation	Recommended Disclosure	<$3.4B Market Capitalization (507)[1]	$3.4–12.2B Market Capitalization (455)	>$12.2B Market Capitalization (472)
Governance	a) Board Oversight	21%	27%	41%
	b) Management's Role	20%	20%	27%
Strategy	a) Risks and Opportunities	50%	61%	73%
	b) Impact on Organization	38%	44%	60%
	c) Resilience of Strategy	9%	16%	24%
Risk Management	a) Risk ID and Assessment Processes	25%	32%	43%
	b) Risk Management Processes	25%	36%	40%
	c) Integration into Overall Risk Management	26%	37%	49%
Metrics and Targets	a) Climate-Related Metrics	38%	45%	60%
	b) Scope 1, 2, 3 GHG Emissions	32%	43%	58%
	c) Climate-Related Targets	32%	43%	61%

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

Legend: Low to high percentage of reporting

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Box A1

Review of Five Years of TCFD-Aligned Disclosures

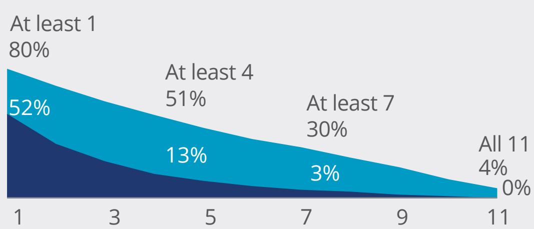
To support the Task Force's assessment of companies' progress in disclosing climate-related financial information over the past five annual reporting cycles, the AI technology was applied to a subset of the 1,434 companies included in the three-year review. Overall, companies have made progress in disclosing TCFD-aligned information; however, the majority of companies reviewed disclosed less than five of the 11 recommended disclosures.

In its 2017 report, the Task Force recommended companies disclose the five recommended disclosures related to governance and risk management independent of a materiality assessment.[1] For FY 2017, only 9% of companies disclosed at least five recommended disclosures compared to 43% for FY 2021. Similarly, the average number of recommended disclosures addressed per company increased from 1.4 in 2017 to 4.2 in 2021. While this growth is encouraging, the Task Force believes more urgent progress is needed.

Disclosure of TCFD-aligned information increased by 26 percentage points, on average, across the 11 recommended disclosures between fiscal years 2017 and 2021. In addition, progress was incremental in each of the intermediate years — consistent with the three-year AI review results.

Reporting Aligned with the 11 Recommended Disclosures

Percent of Companies Disclosing

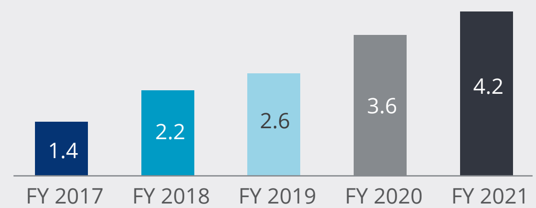


Number of Recommended Disclosures

Legend: FY 2017 FY 2021

Base size: 1,370

Average Number of Disclosures Per Company



Average Number of Recommended Disclosures

Base size: 1,370

TCFD-Aligned Disclosures for Fiscal Years 2017 and 2021

Recommendation	Recommended Disclosure	Pt. Change	Percent of Companies Disclosing: FY 2017	Percent of Companies Disclosing: FY 2021
Governance	a) Board Oversight	25	5%	30%
	b) Management's Role	18	5%	23%
Strategy	a) Risks and Opportunities	35	27%	62%
	b) Impact on Organization	29	19%	48%
	c) Resilience of Strategy	14	2%	16%
Risk Management	a) Risk ID and Assessment Processes	25	9%	34%
	b) Risk Management Processes	26	8%	34%
	c) Integration into Overall Risk Management	32	6%	38%
Metrics and Targets	a) Climate-Related Metrics	23	25%	48%
	b) Scope 1, 2, 3 GHG Emissions	26	18%	44%
	c) Climate-Related Targets	30	16%	46%

0% 20% 40% 60% 80% 100%

Legend: FY 2017 FY 2021

Base size: 1,370

1 *In 2021, the Task Force updated its Annex to indicate disclosure of Scope 1 and Scope 2 GHG emissions should be independent of a materiality assessment.*

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Examples of Climate-Related Financial Disclosures

This section includes examples of disclosure that provide information aligned to one of the 11 recommended disclosures. The Task Force sought to include examples from a geographically diverse set of companies and cover all 11 recommended disclosures. The examples included are not intended to represent "best practice" nor demonstrate disclosures that fully meet the associated recommended disclosure.[27] 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. Figure A9 describes the board's roles and responsibilities related to climate-related issues at a transportation company.

Figure A9

Board Oversight

Governance GRI 102-29,102-30,102-32,102-33

a) Board's Oversight of Climate-related Risks and Opportunities

Toyota addresses climate-related issues at its Board of Directors' Meeting. Through this Toyota assures effective strategy formulation and implementation in line with latest societal trends. Furthermore, the board is guiding and reviewing relevant action and business plans together with monitoring progress for qualitative and quantitative targets addressing climate issues.
As part of the monitoring, the Board considers climate-related issues, including risks/opportunities related to products, such as fuel efficiency/emission regulations, and risks/opportunities related to low-carbon technology development, as well as the financial impact thereof. We use these governance mechanisms in formulating its long-term strategy, including the Toyota Environmental Challenge 2050, and in formulating and reviewing its medium- to long-term targets and action plans.

Cases of decision making at the Board of Directors Meeting in 2021 include the following. The Board decided to invest in Toyota Green Energy, which was established jointly by Toyota, Chubu Electric Power Co., Inc. and Toyota Tsusho Corporation. Toyota Green Energy is a new company that will obtain and manage renewable energy sources in Japan. It is expected to supply electric power to the Toyota Group in the future.

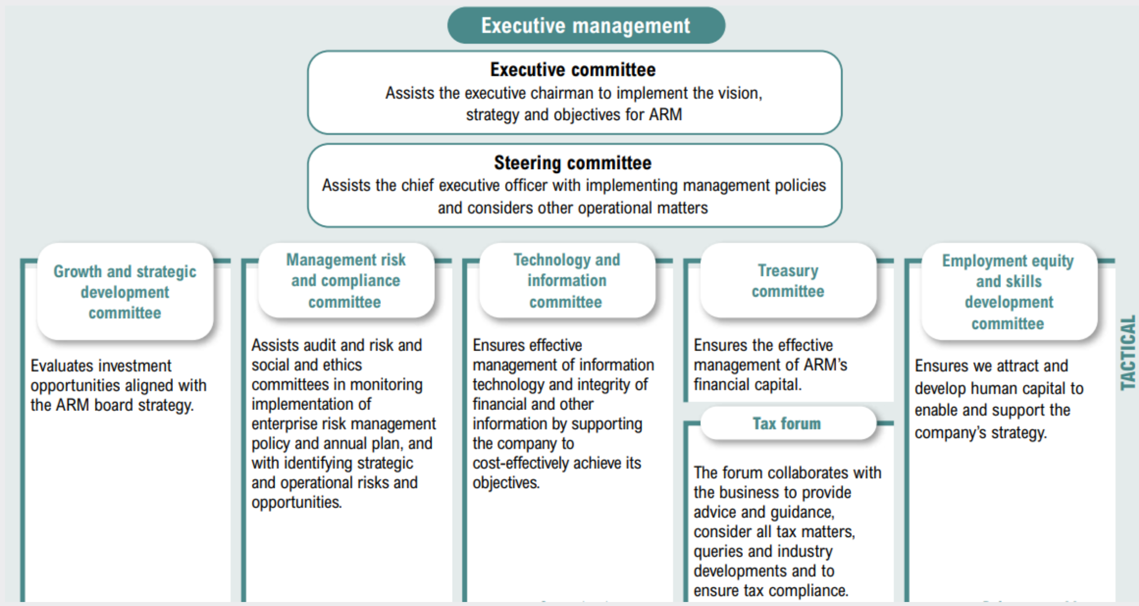
Toyota, Sustainability Data Book 2022, p. 10

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

Governance b) asks companies to describe management's role in assessing and managing climate-related risks. Figure A10 describes a materials and buildings company's management committee structure as well as each committee's role in assessing and managing climate-related risks.

Figure A10

Management's Role



African Rainbow Minerals, Report on Climate Change and Water 2021, p. 14

Strategy Recommendation

Strategy a) asks companies to describe the climate-related risks and opportunities they have identified over the short, medium, and long term. Figure A11 describes a bank's climate-related risks, including risk types, risk drivers, and time horizons.

Figure A11

Climate-Related Risks and Opportunities

Climate Risk Type	Climate Drivers		Main affected Time Horizon
Transition Risk	Market & Customers	→ Change in consumer behaviours including deliberate move to more sustainable products → Potential loss of competitive advantage with our green product proposition or pricing risks → Increased market volatility and cost, sourcing restrictions for carbon heavy raw materials	Short - Medium Term
	Policy-Making	→ More demanding policy environment affecting our customer's business operations → Increased green house gas (GHG) emissions pricing to foster movement to renewable sources	Short - Medium - Long Term
	Technology & Data	→ Investment in technology to reduce emissions or improve energy efficiency ratings → Lack of procedures and systems to obtain and store reliable data for risk assessments and disclosure	Medium Term
	Regulatory Pressure	→ New public disclosure products which increase the risk of misrepresentation, increased regulatory requirements which increases the potential of non-compliance, increased use of external analytics providers which increases the potential for data privacy breaches, all of which could result in fines, payment of damages and the voiding of contracts → Increasingly demanding banking regulation (disclosure, stress testing, taxonomies, etc) → Inefficiencies as consequence of different climate regulations, with special attention in those financial entities with international scope	Short - Medium Term
	Reputational	→ Risk of slow, lack or not sufficient reaction from financial entities impacting its reputation; extreme events that would cause damages to financial entities and employees own sites could challenge, if readiness response plans fail, the ability of the banks to prompt react to restoration of service and customers attention in vulnerable situations due to the damages → Increased scrutiny from different stakeholders (e.g. supervisors, regulators, media, NGO's, shareholders, investors, etc) → Perceived not to be meeting, sufficiently progressing, or providing transparency on climate-related commitments and transitioning → Liability implications as an intermediary in several value chain (e.g. data, products, financial services) → Reputational impact from potential misalignment of emissions reduction commitments with performance in specific portfolios	Short - Medium - Long Term
Physical Risk	Acute	→ More frequent and severe climate events such as flooding, drought, etc, that could affect financed assets and the value of the collaterals	Short - Medium - Long Term
	Chronic	→ Alterations in weather patterns and stability of local ecosystems affecting food production and living environment. → Rising temperatures affecting working conditions, living conditions and local infrastructure. → Rising sea levels affecting local ecosystems, increasing subsidence and flood risks	Long Term

Banco Santander, Annual Report 2021, p. 500

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Strategy b) asks companies to describe the impact of climate-related risks and opportunities on their businesses, strategies, and financial planning. Figure A12 describes the financial impact of climate-related risks under different climate-related scenarios for a technology hardware company. It also describes the company's achievements in terms of climate-related opportunities.

Figure A12

Impact of Climate-Related Risk and Opportunities

Risks from climate change and Ricoh's actions

Transition risks: Analysis based on 2°C and 1.5°C scenarios **Physical risks: Analysis based on 4°C scenario**

	Impact on Ricoh Group's business		Financial impact	Urgency	Ricoh's actions
Transition risks	**Carbon taxes and emissions trading systems applied to suppliers**	● Carbon pricing (carbon tax emissions trading) will be applied mainly to material suppliers with high GHG emissions. The price will be passed on to raw materials, and procurement costs will increase.	Medium	Medium	● Reducing virgin materials by sales of recycled machines and utilization of recycled materials ● Actively supporting suppliers' decarbonization activities and addressing the risk of procurement cost increase
	Response to accelerated transition to a decarbonized society by consumers and investors	● Due to the advance demands for achieving the target of 1.5°C and achieving RE100, additional costs for implementing measures such as energy-saving/renewable energy facility investment and switching to renewable energy are incurred.	Small	Medium	● Active development of energy-savings and renewable energy measures that contributes to the SBT 1.5°C ● Financing by sustainability linked loans
Physical risks	**Rapid increase of natural disasters**	● Due to climate change, extreme weather has become more severe, causing production stops and sales opportunity losses due to disruption of the supply chain, etc.	Medium	High	● Supply chain risk addressing ● Strengthen risks response at Japanese sites
	Regional epidemics of infectious diseases	● Impact on production plan due to parts supply disruption ● Insufficient inventory due to lower operating rates at production sites ● Decrease in sales opportunities due to difficulty of face-to-face business	Medium	Low	● Strengthening business continuity plans against infectious diseases IT-based operation and negotiation, decentralization of production bases/automation of processes, additional stock of parts and products
	Declining forest resources	● Global warming has led to an increase in forest damage caused by wildfires, insects, etc., which has worsened the stable supply of raw materials for paper.	Small	Low	● Reducing use of base paper with Environmentally Friendly Paperless Labels ● Promoting forest preservation activities

Opportunities for climate change

Contribution areas related to climate change	Achievements in fiscal 2020		
Contributions to climate change mitigation	**Approx. ¥960 billion**	● Sales of products contributing to decarbonization (with eco-label certifications): ● Sales of major business negotiations based on ESG performances: ● Sales in the products and parts recycling business: ● Sales in energy creation and energy saving business: ● Creating and developing new businesses; Sales of eco-friendly products such as Silicone-top linerless labels and Foamed PLA sheets:	Approximately ¥900 billion Approximately ¥10 billion Approximately ¥30 billion Approximately ¥20 billion —
Contributions to climate change adaptation	**Approx. ¥70 billion**	● Solution sales to support new ways of work (Scrum packages, Scrum assets*1 and WTA*2): * Includes approximately 35 billion yen in sales of non-face-to-face infectious disease countermeasure solutions such as the Telework All-in Package ● Creating and developing new business; Sales of dye-sensitized solar cells:	Approximately ¥70 billion — —

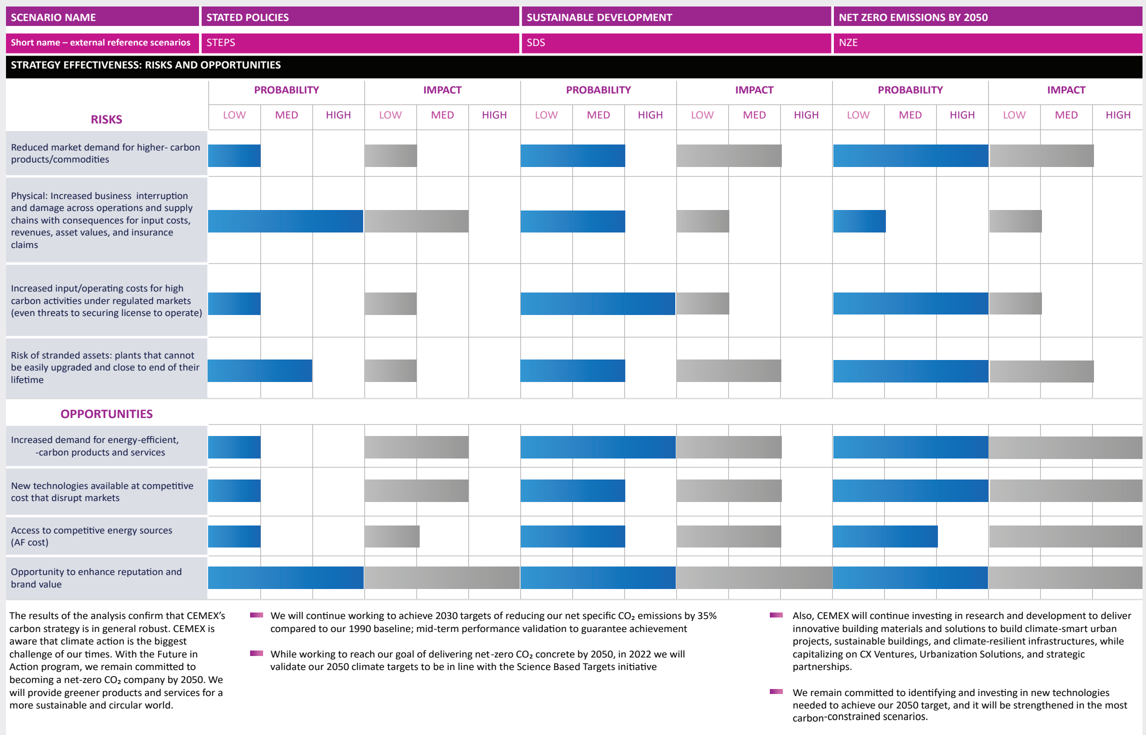
*1 Packaged solutions sold to small and medium-sized companies in Japan *2 Work Together, Anywhere: Packaged solutions in Europe

Ricoh, Integrated Report 2021, p. 43

Strategy c) asks companies to describe the resilience of their strategies under different climate-related scenarios, including a 2°C or lower scenario. Figure A13 provides the results of a materials and buildings company's scenario analysis under three different scenarios — including two scenarios under 2°C. It provides a summary of the probabilities and impact of certain climate-related risks and opportunities based on three scenarios.

Figure A13

Resilience of Strategy under Different Climate-Related Scenarios



CEMEX, Integrated Report 2021, p. 268

Risk Management Recommendation

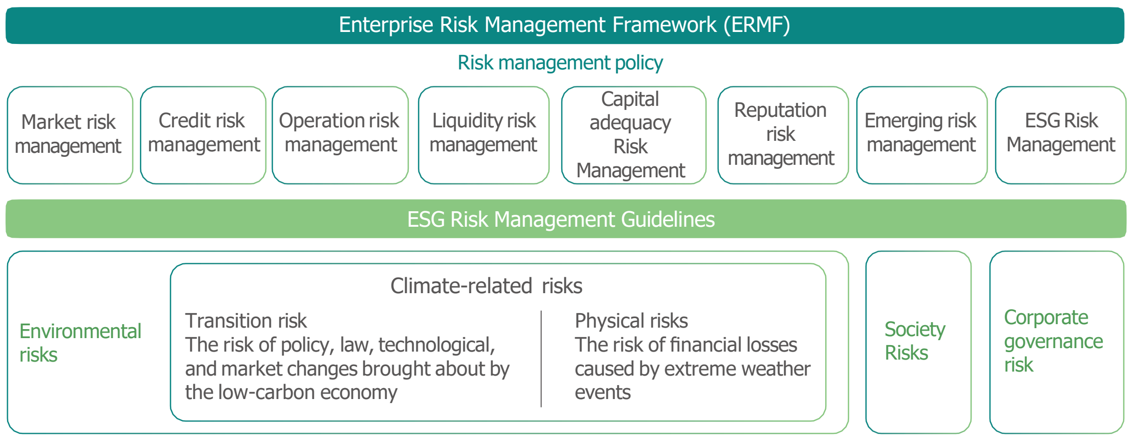
Risk Management a) asks companies to describe their processes for identifying and assessing climate-related risks. Figure A14 describes the processes an insurance company uses to identify and assess climate-related risks.

Figure A14

Risk Identification and Assessment

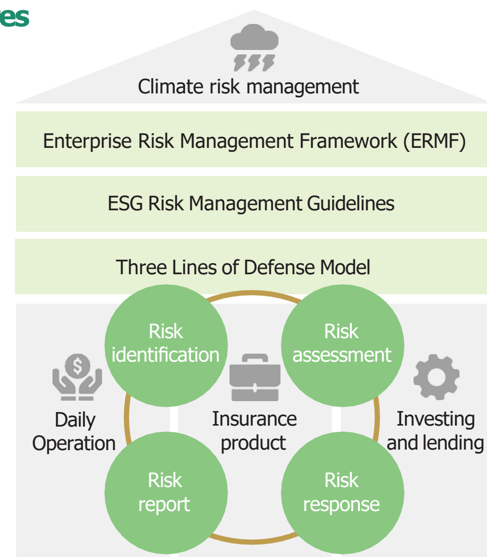
• Climate risk management framework

Cathay established the ESG Risk Management Policy and Guidelines in 2020, and integrated it with its Enterprise Risk Management Framework (ERMF) to enhance its ESG and climate-related risk management abilities.



• Basis for climate risk management and measures

Cathay integrated climate-related risk management with its existing risk management framework, and adopted the Three Lines of Defense Model. Each line of defense performs its duties by identifying and assessing climate-related risks, analyzing the relevance of risks, evaluating the impact on the Company's operations and business, and formulating control measures and response strategies. Cathay continues to strengthen the management of climate-related risks associated with its investment, loan, and insurance products, and developed Business Continuity Management (BCM), obtaining ISO 22301 Business Continuity Management System Certification to strengthen emergency response abilities for major contingencies such as natural disasters. Please see Chapter 2 Sustainable Finance and Chapter 6 Sustainable Operation Management for details.



Cathay Financial Holdings, Sustainability Report 2021, p. 59

Risk Management b) asks companies to describe their processes for managing climate-related risks. The example shown in Figure A15 describes an energy company's processes for managing climate-related risks, including the different levels at which risk management occurs as well as the use of mandatory standards and manuals. It also discusses how the company manages climate-related risks at the project level, specifically in setting GHG-intensity standards for proposed projects.

Figure A15

Risk Management

Classifications of risks

We identify and assess risks across the Group in terms of three distinct categories:

- strategic risks: we consider current and future portfolio issues, examining parameters such as country concentration or exposure to higher risk countries. We also consider long-range developments in order to test key assumptions or beliefs in relation to energy markets.
- operational risks: we consider material operational exposures across Shell's entire value chain which provides a more granular assessment of key risks that the organisation is facing.
- conduct and culture risks: we consider alignment of our policies, practices and behaviours against our purpose and core values.

The four sub-components of risk related to climate change and GHG emissions commercial, regulatory, societal including litigation, and physical risk – are assessed using the above categories to ensure that we maintain strategic resilience, have robust day-to-day operational risk responses and that responses align with Shell's purpose and core values.

SHELL'S PROCESSES FOR MANAGING CLIMATE-RELATED RISKS

Our climate-related risk management process is carried out at Group level, at business, function and asset level which includes projects.

We apply the Shell Control Framework to ensure that we effectively manage our climate-related risks at all these levels. The framework includes:

- mandatory risk standards and manuals;
- project-level risk management processes;
- management and Board review;
- internal audits and investigations; and
- annual attestation processes.

Mandatory risk standards and manuals

We have mandatory standards and manuals which establish the requirements on how to effectively manage material risks including the operation of appropriate controls. Our standards and manuals also provide guidance on how to monitor, communicate and report changes in the risk environment. These documents aim to:

- ensure consistent management and assessment of climate risk across Shell;
- clarify expectations for risk management and reporting, including roles and responsibilities of the risk owners;
- clarify types of assurance activities that may be applicable;
- strengthen decision-making by ensuring that businesses have better awareness and understanding of climate risks (including their likelihood and potential impact) and mitigation plans; and
- enable integration of Shell's reporting.

We periodically review and, if necessary, update our standards and manuals in light of developments in risks associated with climate change. Our approach continues to evolve as we increase our understanding of changing policies and the differing pace of energy transition in different regions.

Project-level risk management processes

At a project level, assessing climate-related risks is an important part of making initial investment decisions. To support project-level risk management, projects of a certain size or which carry unusual risks are required to follow Shell's Opportunity Realisation Standard, which sets out the rules for managing and delivering opportunities in the organisation. Each project is assisted by experts from our global subject matter groups during their development, implementation and operation.

Projects under development that are expected to have a material greenhouse gas impact must meet our internal carbon performance standards or industry benchmarks. This indicates that they will be able to compete and prosper in a future where society aims to limit overall carbon emissions.

Our performance standards are used for measuring a project's average lifetime GHG-intensity or energy efficiency per asset type. Applying these criteria ensures that our projects can compete and prosper in the energy transition. An exception process is in place to manage specific incidental cases. The reporting year 2021 was the first full year of implementation of performance standards across our Upstream and Transition pillars. The performance standards for the Growth businesses are under development.

The performance standards are approved by the Executive Vice President accountable for implementation in the relevant businesses, and by the Executive Vice President Safety, Environment and Asset Management.

Projects with a material greenhouse gas footprint that meet the performance standards or industry benchmarks will often set more ambitious emissions targets for themselves that then are approved by the Executive Vice President Safety, Environment and Asset Management at certain defined stages. The respective project's GHG abatement plan helps to determine the nature of these targets, and we assess the effects of a project's emissions alongside economic and technical design factors.

We estimate the future GHG emissions of projects in two ways. We apply the performance standards, and we consider the GHG emissions from the use of the products that are to be manufactured. These assessments can lead to projects being stopped or designs being changed.

We expect the performance standards to evolve as our portfolio changes in the energy transition.

Management and Board reviews

Management and the Board perform regular reviews of the risk of climate change and GHG emissions to ensure awareness of emerging issues that impact our strategy and to ensure the effectiveness of our responses in managing this risk at a more granular, operational level. For example, as part of the annual strategic planning cycle, the Executive Committee and the Board assess how climate and GHG emissions may affect the pace of the energy transition and the long-term implications for Shell's current portfolio.

Shell, Annual Report 2021, p. 87

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Risk Management c) asks companies to describe how processes for identifying, assessing, and managing climate-related risks are integrated into the company's overall risk management.

Figure A16 describes an energy company's enterprise risk management process and its inclusion of climate-related risks.

Figure A16

Integration of Climate-Related Risks into Overall Risk Management

Enterprise Risk Management Process

The ERM process identifies and assesses both enterprise risks and opportunities, including those relating to the emerging impacts of climate change.

The ERM process is centered on five key components as depicted in the graphic below:

- Ensure appropriate risk governance across all levels of our organization;
- Promote a risk-aware culture where all employees have a responsibility in identifying and communicating risks;
- Enable risk-informed decision-making and objective-setting;
- Manage execution risk through regular identification and assessment of risks, as well as risk response review and monitoring; and
- Report and communicate risks appropriately.

PSEG enterprise risk management process components and top risk categories

ERM process

Risk Governance	Risk-Aware Culture	Risk-Informed Decision-Making	Managing Execution Risk	Risk Reporting and Communication

PSEG risk categories

Illustrative examples of risks associated with climate change for each risk category

Operational	Environment Health & Safety	Strategic	Legal & Compliance	Reputational	Financial
• Ability to maintain reliable service despite more extreme and frequent weather events	• Environmental or safety impacts from operational incidents caused climate change (e.g., flooding, storms)	• Difficulties aligning regulatory constructs with climate goals	• Evolving liability landscape for climate events	• Ability to meet customer and stakeholder clean energy expectations	• Energy and capacity price impacts due to changing climate policies and generation mix

PSEG, Sustainability and Climate Report 2021, p. 33

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 A17 shows the metrics disclosed by a consumer goods company.

Figure A17

Climate-Related Metrics

Metric	Unit	2019	2020
Environmental Stewardship			
Energy			
Total energy consumption*	MWh	4,996,720	4,956,351
Energy use intensity	kWh per Metric Ton of Product	643	629
Total purchased electricity	MWh	1,565,580	1,546,046
Total consumption of fuel (excluding feedstock)	MWh	3,262,568	3,285,281
Greenhouse Gas Emissions			
Gross scope 1 emissions*	Metric Tons CO2e	595,918	592,463
Gross scope 2 emissions (location-based)*	Metric Tons CO2e	713,955	697,565
Gross scope 2 emissions (market-based)*	Metric Tons CO2e	Not reported	704,689
Outside of scopes (biogenic emissions)	Metric Tons CO2e	77,186	92,955
Scope 1 & 2 intensity	Metric Tons CO2e per Metric ton of product	0.17	0.16
Total scope 3 emissions*	Metric Tons CO2e	23,277,493	25,026,531
Category 1: Purchased goods and services*	Metric Tons CO2e	18,282,750	18,537,494
Category 2: Capital goods*	Metric Tons CO2e	397,604	351,878
Category 3: Fuel and energy-related activities*	Metric Tons CO2e	717,229	711,945
Category 4: Upstream transportation and distribution*	Metric Tons CO2e	1,366,415	1,748,423
Category 5: Waste generated in operations*	Metric Tons CO2e	52,066	55,658
Category 6: Business travel*	Metric Tons CO2e	18,988	4,383
Category 7: Employee commuting*	Metric Tons CO2e	105,897	93,618
Category 9: Downstream transportation and distribution*	Metric Tons CO2e	1,307,392	1,339,067
Category 11: Use of sold products*	Metric Tons CO2e	Not Reported	1,102,744
Category 12: End of life treatment of sold products*	Metric Tons CO2e	1,029,152	1,081,321
Water			
Total water withdrawals*	Thousand Cubic Meters	41,598	41,253
Total water withdrawals at water-stressed manufacturing sites	Thousand Cubic Meters	12,956	12,329
Water use intensity	Cubic Meters Per Metric Tons of Product	5.39	5.24
Water use intensity at water-stressed manufacturing sites	Cubic Meters Per Metric Tons of Product	7.70	7.30
Waste			
Waste to landfill*	Metric Tons	100,595	96,450
Waste to landfill intensity	Metric Tons Waste per Metric Tons of Product	0.013	0.012

The Kraft Heinz Company, 2021 ESG Report, p. 72

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Metrics and Targets b) asks companies to disclose their Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions. The example shown in Figure A18 provides a materials and buildings company's disclosure of Scope 1, Scope 2, and Scope 3 GHG emissions over a three-year period based on location and market. It also provides a breakdown of Scope 3 GHG emissions by category.

Figure A18

Scope 1, Scope 2, and Scope 3 GHG Emissions

		Location-based emissions			Market-based emissions		
Emissions	**Unit**	**2018/19**	**2019/20**	**2020/21**	**2018/19**	**2018/19**	**2020/21**
Scope 1	tCO_2e	11,490	9,158	7,554	9,879	9,158	7,554
Scope 2	tCO_2e	30,518	25,382	18,434	3,517	3,719	2,079
Scope 1 and 2	tCO_2e	42,008	34,540	25,988	13,396	12,878	9,633
Intensity							
Scope 1 and 2	$kgCO_2e/m^2$	22.54	18.56	14.23	8.00	6.11	5.27

		2018/19		2019/20		2020/21	
GHG scope	**Category**	**Emissions ($t CO_2e$)**	**% of total value chain**	**Emissions ($t CO_2e$)**	**% of total value chain**	**Emissions ($t CO_2e$)**	**% of total value chain**
Scope 1	Scope 1	11,490	3.6%	9,158	3.4%	7,554	3.3%
Scope 2	Scope 2	30,518	9.7%	25,382	9.4%	18,434	8.0%
Scope 3	Scope 3	272,937	86.7%	235,031	87.2%	205,235	88.8%
	1. Purchased goods and services (PG&S)	48,123	15.3%	48,787	18.1%	34,004	14.7%
	2. Capital goods	89,149	28.3%	69,123	25.6%	84,261	36.4%
	3. Fuel- and energy-related activities	8,764	2.8%	6,919	2.6%	5,052	2.2%
	4. Upstream transportation and distribution	Grouped under PG&S	0.0%	Grouped under PG&S	0.0%	Grouped under PG&S	0.0%
	5. Waste generated in operations	785	0.2%	770	0.3%	284	0.1%
	6. Business travel	324	0.1%	270	0.1%	33	0.0%
	7. Employee commuting	180	0.1%	166	0.1%	168	0.1%
	8. Upstream leased assets	n/a	0.0%	n/a	0.0%	n/a	0.0%
	9. Downstream transportation and distribution	n/a	0.0%	n/a	0.0%	n/a	0.0%
	10. Processing of sold products	n/a	0.0%	n/a	0.0%	n/a	0.0%
	11. Use of sold products	n/a	0.0%	n/a	0.0%	n/a	0.0%
	12. End-of-life treatment of sold products	n/a	0.0%	n/a	0.0%	n/a	0.0%
	13. Downstream leased assets	125,612	39.9%	108,996	40.4%	81,433	35.2%
	14. Franchises	n/a	0.0%	n/a	0.0%	n/a	0.0%
	15. Investments	n/a	0.0%	n/a	0.0%	n/a	0%
Total emissions		314,945		269,571		231,223	

Landsec, Sustainability Performance and Data Report 2021, pp. 21 and 22

Metrics and Targets c) asks companies to describe the targets used to manage climate-related risks and opportunities and performance against such targets. The example shown in Figure A19 describes an energy company's climate-related targets and associated time frames along with the company's 2021 performance against those targets.

Figure A19

Targets and Progress against Targets

Aim	2021 performance	2025 target	2030 aim	2050, or sooner, aim
① Net zero operations*	35%[a]	20%[a]	50%[a,b]	Net zero*
② Net zero production*	16%[a]	20%[a]	35-40%[a]	Net zero*
③ Net zero sales*	0%[c]	5%[d]	15-20%[d,e]	Net zero*[f]
④ Reducing methane	0.07%[g]	0.20%[h]	50% reduction[h]	
⑤ More $ for new energies	$2.2bn[i]	$3-4b[n]	~$5b[n]	

a Cumulative reductions against the 2019 baseline on an absolute basis.
b Previously 30-35%.
c Cumulative impact on average emissions intensity of marketed energy products* against the 2019 baseline
d Cumulative reduction in the carbon intensity of the energy products we sell* against the 2019 baseline.
e Previously >15%.
f Previously 50% cumulative reduction in the average emissions intensity of marketed energy products* against the 2019 baseline.
g The 2021 methane intensity is calculated using existing methodology and,
i In 2021, capital expenditure against our aim 5 activities has increased from $750 million in 2020 to nearly $2.2 billion, the majority of which related to investments in offshore wind, electric vehicle charging infrastructure and solar.

BP, Annual Report 2021, p. 51

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2. TCFD-ALIGNED REPORTING BY ASSET MANAGERS AND ASSET OWNERS

When the Task Force published its recommendations in 2017, it highlighted the important role large asset managers and asset owners play in the investment chain in terms of influencing the companies in which they invest to provide better climate-related financial disclosures.[28] It also recognized reporting by asset managers and asset owners is intended to satisfy the needs of clients, beneficiaries, regulators, and oversight bodies and follows a format that is generally different from corporate financial reporting (see Figure A20). For purposes of adopting the recommendations, the Task Force focused on these organizations' reporting to their clients and beneficiaries, respectively, and recommended they use their existing channels of financial reporting, where relevant and feasible.

While the Task Force focused on asset managers and asset owners' reporting to their clients and beneficiaries, respectively, it also recognized these organizations may have a broader range of stakeholders to whom they report climate-related financial information.[29] In particular, the Task Force recognized an asset manager that is a public company has two distinct audiences for its climate-related financial disclosures. The first audience is its shareholders, who need to understand enterprise-level risks and opportunities and how these are managed; and the second is its clients, for whom 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 owner's investment considerations and approach to climate change. The Task Force strongly encouraged asset owners to make climate-related financial disclosures, so as to provide beneficiaries and other stakeholders with information to better understand exposures to climate-related risks and opportunities. Further, climate-related financial disclosures by asset owners may encourage better disclosures across the investment chain — from asset owners to asset managers to underlying companies — thus enabling a wide range of stakeholders to make better-informed investment decisions.

Figure A20

Asset Managers and Asset Owners

Asset Managers

Asset managers, also known as investment managers, are hired by clients to invest assets on their behalf. In this role, asset managers act as fiduciaries. Asset managers invest within the guidelines specified by their clients for a given mandate set out in an investment management agreement or product specification. Importantly, the investment results, whether positive or negative, belong to the client.

Asset managers' reporting to clients takes different forms depending on a client's requirements and the types of investments made. For example, a mutual fund investor might receive (or download from a website) a "fund fact sheet" that reports, among other information, the top holdings by value, the top performers by returns, and the carbon footprint of the portfolio against a stated benchmark. An investor in a segregated account might receive more detailed, climate-related information, including the aggregate carbon intensity of the portfolio compared with a benchmark and insight into portfolio positioning under different climate scenarios.

Asset Owners

Asset owners are a diverse group that include public- and private-sector pension plans, re-/insurance companies, endowments, and foundations and invest assets on their own behalf or on behalf of their beneficiaries. Asset owners invest according to a mandate or investment strategy set out by their oversight body or their beneficiaries. Asset owners have various investment horizons that influence their risk tolerance and investment strategies. Many asset owners have broadly diversified investment portfolios across investment strategies, asset classes, and regions and portfolios with thousands of underlying individual company and government exposures. Asset owners may hire asset managers to invest on their behalf.

The financial reporting requirements and practices of asset owners vary widely and differ from what is required of companies with public debt or equity. Some asset owners have no public reporting, while others provide extensive public reporting.

28 TCFD, *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*, June 29, 2017.
29 TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, October 14, 2021, pp. 37 and 41-42.

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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. In its previous status reports, the Task Force has used reporting by asset manager and asset owner signatories to the Principles for Responsible Investment (PRI) as a proxy for these organizations' TCFD-aligned reporting.[30] For the 2021 reporting period, the PRI piloted a new reporting framework on which it received significant signatory feedback. PRI decided to delay the opening of the next reporting period until 2023 to allow sufficient time to address the feedback on the pilot.[31] As a result, the latest aggregate TCFD-aligned reporting to the PRI is for the 2021 reporting period, which is summarized in the Task Force's 2021 status report.[32] To gain insight on asset managers and asset owners' current reporting of climate-related financial information to their clients and beneficiaries, respectively, as well as a broader range of stakeholders, the Task Force conducted a survey in the first quarter of 2022. This subsection describes the survey's scope and approach, summarizes the survey results, and highlights key findings related to the results.

Key Takeaways

- The vast majority — 93% — of asset managers and asset owners responding to the survey indicated they had implemented the TCFD recommendations or planned to in the future.
- Over 60% of asset managers and over 75% of asset owners indicated they currently report climate-related information to their clients and beneficiaries, respectively.
- Nearly 50% of asset managers and 75% of asset owners indicated they report information aligned with at least five of the 11 recommended disclosures. In addition, 60% of asset managers and nearly 80% of asset owners indicated they report information aligned with at least one recommended disclosure; and 10% of asset managers and 36% of asset owners report on all 11.◆
- Asset managers and asset owners report to their clients and beneficiaries, respectively, through multiple channels. Most asset managers report through sustainability reports or directly to clients, while most asset owners report through annual, sustainability, or climate-specific reports.

◆ *On November 3, 2022, the TCFD Secretariat revised the end of this sentence to correct an error in the calculation of the percent of asset managers and asset owners that indicated they report on all 11 recommended disclosures.*

Scope and Approach

In February 2022, the Task Force issued a survey to better understand TCFD-aligned reporting practices by asset managers and asset owners.[33] The Task Force believes it is important to highlight the survey was distributed primarily to companies that signed up for updates on the Task Force's website, which means most survey respondents were familiar with the Task Force's work.[34] 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 3,000 financial institutions, resulting in 229 responses.[35] The survey asked asset managers and asset owners about their reporting to clients and beneficiaries, respectively, as well as their reporting practices in general 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, the survey incorporated specific metrics that are included

30 PRI signatories are required to report on their responsible investment activities on an annual basis by responding to "indicators" in the PRI reporting framework. A subset of those indicators is aligned with the Task Force's 11 recommended disclosures.
31 PRI, "Reporting Framework Pilot: Next Steps for Signatories," August 2, 2021.
32 TCFD, 2021 Status Report, October 14, 2021, pp. 50-54.
33 The Task Force recognizes asset owners represent a wide range of organizations with different types of stakeholders. For ease of reference, we refer to these stakeholders as beneficiaries.
34 In addition to distributing the survey to companies 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.
35 The TCFD Secretariat recognized many of the companies and organizations receiving the survey were not asset managers or asset owners and included a gating question so that only organizations identifying as asset managers or asset owners received the survey questions.

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in the Task Force's guidance for all sectors and supplemental guidance for asset managers and asset owners.[36] Other topics covered included the types of reports in which asset managers and asset owners report climate-related financial information, when these organizations began such reporting, their assets under management, and the types of assets held. In addition, interviews with industry practitioners — including Task Force members — were conducted to gather additional insights and context for the survey results. Box A2 provides an overview of the composition of the asset managers and asset owners that responded to the survey.

Box A2

Composition of Asset Manager and Asset Owner Survey Respondents

Percent of Respondents[1]

Implementing TCFD

Legend: Yes (212) No (17)

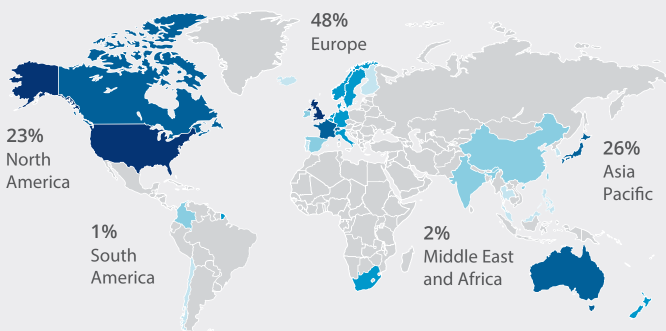
Base size: 229

Organization Type

Legend: Asset Managers (151) Asset Owners (78)

Base size: 229

Geographic Distribution of Respondents



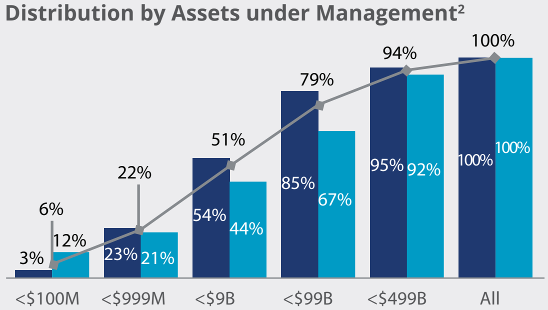
Legend: 1 | 2–3 | 4–9 | 10–19 | 20–39 | >40

Number of respondents by country

Top 5 Countries by Number of Respondents

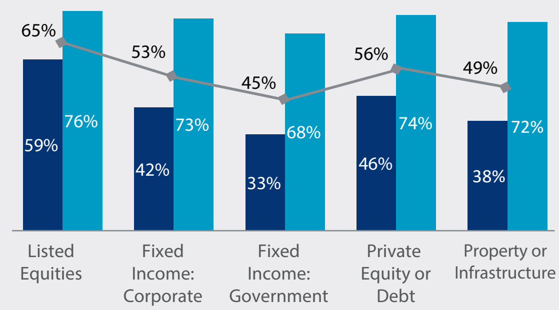
United Kingdom	46
United States of America	32
Canada	16
Japan	15
Australia	12

Distribution by Assets under Management[2]



Legend: Asset Managers (151) Asset Owners (78)
— All Respondents (229)

Types of Assets[3]



Legend: Asset Managers (151) Asset Owners (78)
— All Respondents (229)

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 assets.*

36 In addition to GHG emissions and climate-related targets — which are part of the 11 recommended disclosures, the survey asked about five other specific metrics as follows: weighted-average carbon intensity, the extent to which assets under management or assets owned are aligned with a well below 2°C scenario, metrics used to assess climate-related physical risks, metrics used to assess climate-related transition risks, and metrics used to assess climate-related opportunities.

Asset managers represented 66% (151) of the responses, and asset owners represented 34% (78). The geographic distribution of the survey respondents — as shown in Box A2 (p. 32) — spans five regions and 38 countries. Nearly a majority (48%) of respondents were headquartered in Europe while 26% were headquartered in Asia Pacific and 23% in North America. In addition, over 50% of respondents were headquartered in five countries, with 46 respondents headquartered in the United Kingdom and 32 in the United States. In terms of the size of survey respondents overall, 79% held $99 billion or less in assets under management. When viewed by organization type, a different picture emerges where 85% of asset manager respondents held $99 billion or less in assets compared to 67% of asset owner respondents. The survey also asked respondents to indicate the types of assets they held based on a list of five types — listed in the bottom right chart in Box A2 (p. 32). Respondents could select more than one type; and, on average, asset manager respondents indicated holding two types of assets while asset owner respondents, on average, indicated holding four types.

Summary of Reporting to Clients and Beneficiaries[37]

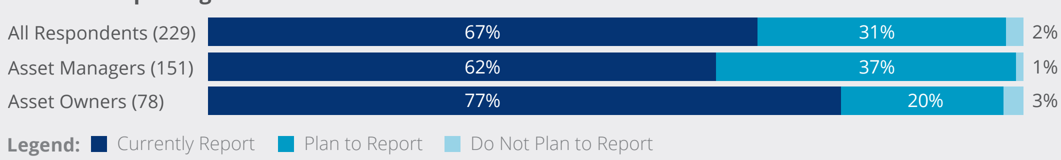
With the Task Force's focus on asset manager and asset owner reporting to their clients or beneficiaries, respectively, respondents were asked whether they currently report, plan to report, or do not plan to report to their clients or beneficiaries. As shown in the top charts in Box A3, the majority of respondents indicated they currently report to their clients and beneficiaries — 62% of asset managers and 77% of asset owners, and most of the remainder indicated they plan to report.

Box A3

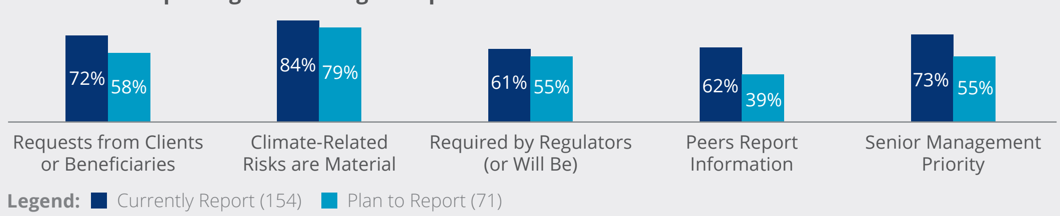
Reporting of Climate-Related Information to Clients and Beneficiaries

Percent of Respondents[1]

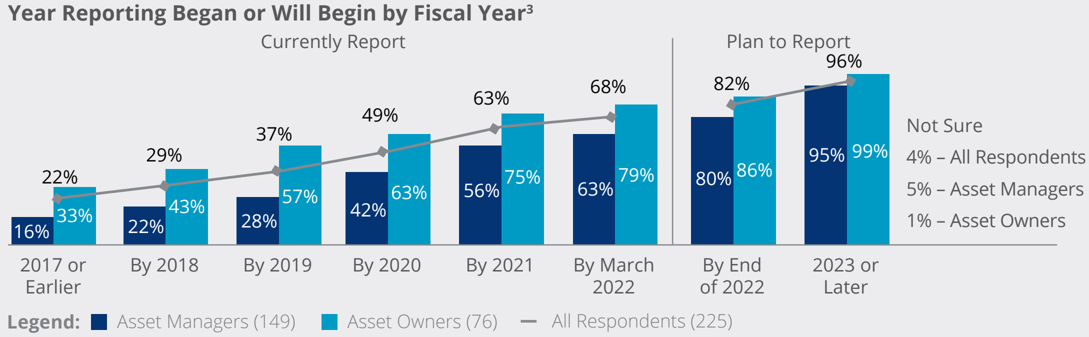
Status of Reporting



Reasons for Reporting or Planning to Report[2]



Year Reporting Began or Will Begin by Fiscal Year[3]



1 The numbers in parentheses represent the number of respondents.
2 Respondents could select multiple reasons.
3 The percentages in this chart are cumulative percentages.

37 The summary of survey results is based on the 149 asset managers and 76 asset owners that indicated they currently report or plan to report climate-related information to their clients and beneficiaries, respectively.

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Respondents that indicated they do not plan to report climate-related financial information to their clients and beneficiaries (2%) were not asked to complete questions about their reporting practices on information aligned with the Task Force's 11 recommended disclosures. When asked what would lead these organizations to report climate-related financial information in the future, all of them indicated regulatory requirements to report climate-related information and half of them indicated requests from clients or beneficiaries or if their peers were reporting such information. For the respondents currently reporting climate-related information or planning to report such information, the most often cited reason for reporting was that climate-related risks are material followed by senior management made it a priority for asset managers and requests from beneficiaries for asset owners, as shown in the middle right chart in Box A3 (p. 33).

The bottom chart in Box A3 (p. 33) shows the year respondents began or plan to begin reporting climate-related financial information. Overall, 22% of respondents indicated they began reporting such information for fiscal year 2017 or earlier; and 63% of all respondents began reporting before fiscal year 2022. When viewed by organization type, 16% of asset managers and 33% of asset owners began reporting for fiscal year 2017 or earlier, and 56% of asset managers and 75% of asset owners began reporting before fiscal year 2022. Note that the year 2022 shows up twice in the chart — once under the "currently report" section of the chart and once under the "plan to report" section. This reflects whether respondents indicated they were currently reporting or planning to report this year. Once these organizations have reported for fiscal year 2022, the Task Force anticipates an additional 19% of all respondents will have reported to their clients or beneficiaries, which brings the overall total to 82% of respondents. When viewed by organization type, an additional 24% of the asset managers and 11% of the asset owners will have reported, bringing the overall totals to 80% and 86%, respectively.

Asset Managers

To better understand the level at which respondents report climate-related financial information, the survey asked asset managers that currently report to their clients (94) to indicate the level — entity or aggregate portfolio level, fund level, asset class level, or mandate level — at which they report publicly and directly to their clients.[38] The survey also asked asset managers that indicated they report directly to their clients (58) about the frequency of such reporting. As shown in Figure A21, asset managers generally disclose climate-related information at an entity or aggregate portfolio level publicly (64%), with reporting directly to clients often done at a fund level (66%).

Figure A21

Asset Managers: Reporting of Climate-Related Information to Clients

Percent of Respondents Currently Reporting

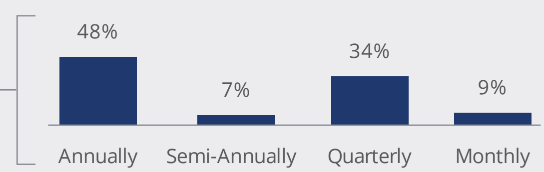
Level of Reporting Publicly and Directly to Clients[1]

	Do Not Report at Level	Publicly	Directly to Clients
Total Portfolio	**15%**	**64%**	**48%**
Fund	**10%**	**44%**	**66%**
Asset Class	**54%**	**28%**	**26%**
Mandate	**51%**	**10%**	**45%**

Base size: 94

Legend: Low to high percentage of reporting

Frequency of Reporting Directly to Clients[2]



Base size (respondents that report directly to clients): 58

1 *On the level of reporting, respondents could select multiple levels under publicly and directly to clients.*

2 *The sum across reporting frequencies equals 98% because 2% of respondents indicated they report on an ad hoc basis.*

38 In Figure A21 and other figures in this subsection, "entity or aggregate portfolio" is referred to as "total portfolio" for ease of reference.

In terms of frequency of reporting, public reporting tends to occur on an annual basis while 34% of the asset managers reporting directly to clients indicated they report on a quarterly basis, 9% on a monthly basis and 7% on a semi-annual basis.[39,40] In addition, 45% of asset manager respondents indicated they disclose climate-related information at a mandate level directly to their clients, and 10% do so publicly. Nearly 70% of the asset managers that disclose climate-related information at a mandate level publicly also disclose at that level directly to clients. In interviews, industry practitioners indicated the type of climate-related information disclosed may depend on whether the disclosure is made publicly or directly to clients. For instance, climate-related metrics are often reported directly to clients at levels specified in an investment management agreement or product specification, while other climate-related information, such as governance, is generally disclosed publicly at an enterprise level.

Asset Owners

As discussed above for asset managers, Figure A22 provides asset owners' responses on the levels — entity or aggregate portfolio level, fund level, or asset class level — at which they report publicly and directly to their beneficiaries. The majority of asset owner respondents indicated they report at a total portfolio and asset class level publicly — at 87% and 72%, respectively. In addition, industry practitioners interviewed indicated most reporting from asset owners to their beneficiaries is done publicly. In terms of the frequency of reporting directly to beneficiaries, 58% of the asset owners that do such reporting indicated it occurs on an annual basis, 17% indicated a quarterly basis, and 17% indicated a monthly basis.[41] The Task Force recognizes these percentages are based on a relatively small number of asset owners (12) and may not be representative of a broader population. Notably, industry practitioners indicated certain types of asset owners — especially those that are large, those with specific investing activities such as bond issuance, or those directly or indirectly related to government entities — are facing additional scrutiny on their exposure to climate-related risks and tend to disclose climate-related information publicly.

The next subsection describes the survey responses primarily tied to the Task Force's 11 recommended disclosures, including several specific climate-related metrics. These questions did not ask respondents to indicate whether they reported each of the recommended disclosure elements to their clients or beneficiaries. Nevertheless, the Task Force believes providing this level of detail for each of the recommended disclosures may be useful for other asset managers and asset owners as they implement the TCFD recommendations.

Figure A22

Asset Owners: Reporting of Climate-Related Information to Beneficiaries

Percent of Respondents Currently Reporting

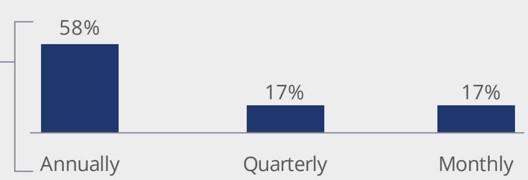
Level of Reporting Publicly and Directly to Beneficiaries[1]

	Do Not Report at Level	Publicly	Directly to Beneficiaries
Total Portfolio	5%	87%	17%
Fund	32%	32%	15%
Asset Class	12%	72%	20%

Base size: 60

Legend: Low to high percentage of reporting

Frequency of Reporting Directly to Beneficiaries[2]



Base size (respondents that report directly to beneficiaries): 12

1 *On the level of reporting, respondents could select multiple levels under publicly and directly to beneficiaries.*

2 *The sum across reporting frequencies equals 92% because 8% of respondents indicated they report on an ad hoc basis.*

39 Two percent (2%) of asset managers responded that they report directly to clients on an ad-hoc basis.

40 While some asset managers indicated they report directly to clients multiple times a year, the Task Force recognizes some climate-related information included in such reports may be updated on only an annual basis.

41 While some asset owners indicated they report directly to beneficiaries multiple times a year, the Task Force recognizes some climate-related information included in such reports may be updated on only an annual basis.

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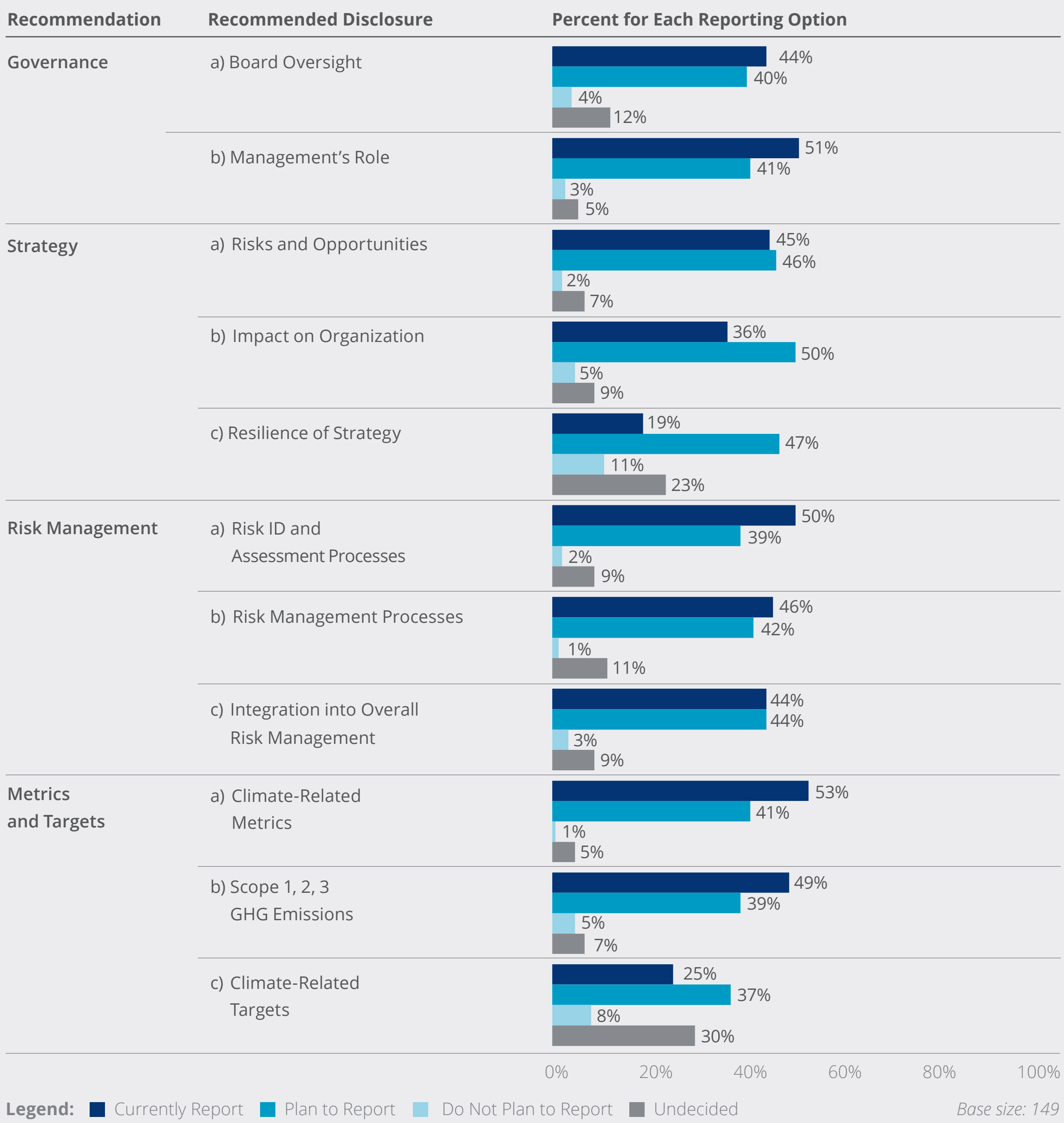
Summary of TCFD-Aligned Reporting

Asset Managers

Figure A23 provides asset managers' responses for each of the 11 recommended disclosures. Of those currently reporting, the highest level of reporting — at 53% — is for the metrics used to assess climate-related risks and opportunities (*Metrics and Targets a*), which is closely followed by reporting on *Governance b)* at 51% and *Risk Management a*) at 50%. The lowest level of reporting — at 19% — is for the resilience of strategy under different climate-related scenarios (*Strategy c*), which is followed by *Metrics and Targets c*) at 25%.[42]

Figure A23

Asset Managers: Status of TCFD-Aligned Reporting



42 See Table A1 (p. 11) for descriptions of each of the Task Force's 11 recommended disclosures

Notably, 11% of asset managers indicated they do not plan to report information related to *Strategy c*), and 23% indicated they are undecided. For *Metrics and Targets c)*, 8% of asset managers indicated they do not plan to report such information, and 30% indicated they are undecided. It is unclear why nearly one third of asset managers are undecided on reporting information on climate-related targets but may relate to concerns about data availability and methodologies for calculating metrics as highlighted in Figure A26 (p. 38), which describes the top challenges for asset managers in reporting climate-related information.

The survey also included a few additional questions related to *Strategy c)* to gain additional insight on whether asset managers conduct climate-related scenario analysis and, if so, whether they use such analysis in their decision-making. Figure A24 shows that 28% of asset manager respondents indicated they conduct scenario analysis and use the results in decision-making, which is nine percentage points higher than those that indicated they disclose *Strategy c*). It also shows that another 23% indicated they conduct scenario analysis but are not using the results in decision-making. The table on the right in Figure A24 provides additional information from the subset of asset managers indicating they conduct scenario analysis on whether they report the results of their scenario analyses. Forty-four percent (44%) of asset managers that conduct scenario analysis responded that they report the results, with 25% reporting qualitative results, 7% reporting quantitative results, and 12% reporting both qualitative and quantitative results. Additionally, 46% of the same subset of asset managers mentioned that they do not currently report their scenario analysis results, but plan to do so.

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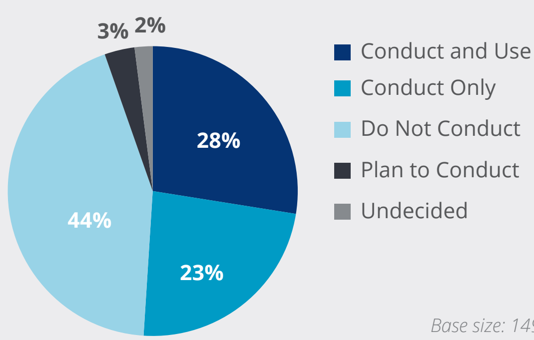
Figure A24

Asset Managers: Using Scenario Analysis and Reporting on Results

Percent of Respondents

Conduct Scenario Analysis and Use Results in Decision-Making



Base size: 149

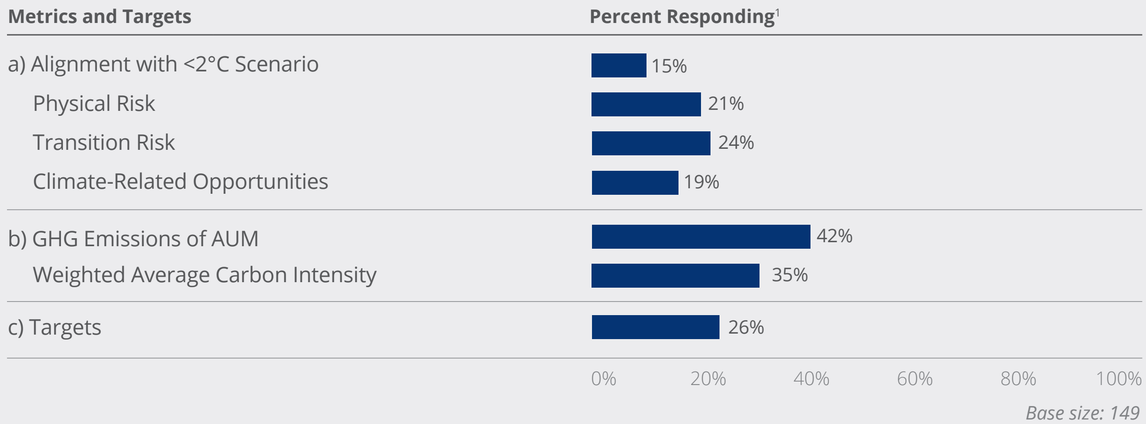
Status of Reporting on Scenario Analysis Results	
Report qualitative results	**25%**
Report quantitative results	**7%**
Report qualitative and quantitative results	**12%**
Plan to report scenario analysis results	**46%**
Do not plan to report scenario analysis results	**10%**

Base size (respondents that conduct scenario analysis): 76

The survey also asked respondents about specific climate-related metrics. In addition to GHG emissions and climate-related targets — which are part of the 11 recommended disclosures, the survey asked about five other specific metrics. Figure A25 (p. 38) lists all seven metrics along with the percent of asset managers that indicated they currently report on these metrics. The most reported is GHG emissions associated with assets under management at 42%, and the least reported at 15% is the extent to which assets under management, products, and investment strategies align with a well below 2°C scenario. Respondents were also asked how they handle reporting when they are missing data for specific assets or asset classes. Over half indicated they report metrics based on available data and acknowledge any gaps in their reports. See Appendix 4: Asset Manager and Asset Owner Metrics Reporting for more information on asset managers' reporting on metrics.

Figure A25

Asset Managers: Currently Report on Select Metrics

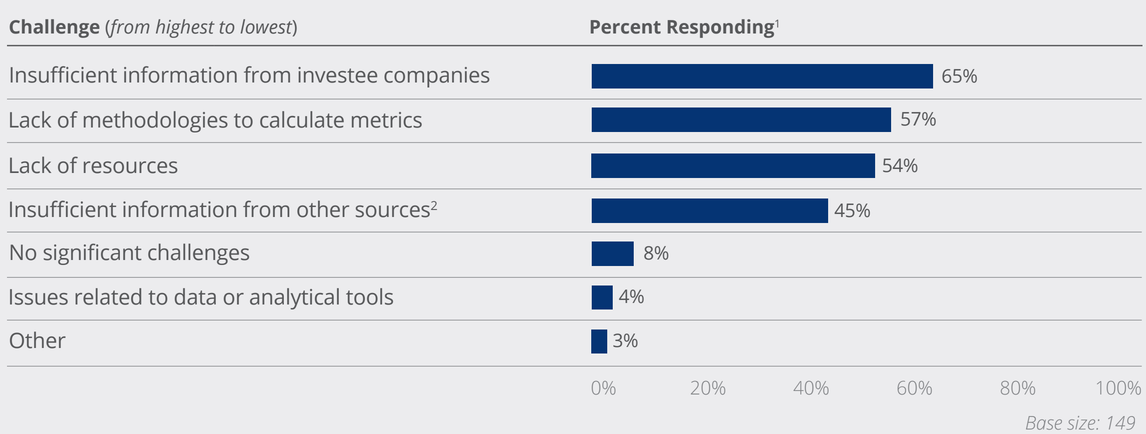


1 The percentages for Metrics and Targets a) and b) in Figure A23 (p. 36) are higher than the percentages for specific metrics associated with Metrics and Targets a) and b) in this figure because respondents were identified as currently reporting if they indicated reporting at least one of the metrics listed.

In addition to asking respondents about how they handle reporting of metrics when they are missing data for specific assets or asset classes, the survey asked respondents about general challenges they face in reporting climate-related information. Figure A26 provides the results in order of the most often selected challenge to the least. Two thirds of asset manager respondents indicated that obtaining sufficient information from the companies in which their clients invest is a significant challenge for their reporting; and over 50% identified the lack of methodologies for calculating climate-related metrics and the lack of resources as significant challenges.

Figure A26

Asset Managers: Challenges Reporting Climate-Related Information



1 Respondents could select multiple options.
2 Insufficient information from sources other than investee companies.

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The Task Force also reviewed asset managers' reporting on information aligned with the 11 recommended disclosures based on their assets under management (AUM). Asset manager respondents were divided into four categories based on their size; and Figure A27 shows the percent of asset managers in each category that indicated they currently report the associated recommended disclosure. The largest asset managers — those with more than $100 billion in AUM — have the highest percentage of reporting for each of the 11 recommended disclosures, which is generally consistent with the AI review results for public companies where 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 the percentage of the smallest asset managers — those with less than $1 billion in AUM — reporting TCFD-aligned information is generally consistent, and in some cases higher, than that of asset managers with between $10 and $99 billion in AUM and higher for all 11 recommended disclosures compared to asset managers with between $1 and $9 billion in AUM.

Figure A27

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

Percent of Respondents

Recommendation	Recommended Disclosure	> $100B (23)[1]	$10-99B (46)	$1-9B (46)	< $1B (34)
Governance	a) Board Oversight	52%	48%	37%	44%
	b) Management's Role	65%	52%	43%	50%
Strategy	a) Risks and Opportunities	61%	43%	35%	50%
	b) Impact on Organization	52%	35%	26%	41%
	c) Resilience of Strategy	39%	15%	13%	18%
Risk Management	a) Risk ID and Assessment Processes	65%	54%	41%	47%
	b) Risk Management Processes	57%	48%	37%	47%
	c) Integration into Overall Risk Management	61%	43%	35%	47%
Metrics and Targets	a) Climate-Related Metrics	70%	50%	50%	53%
	b) Scope 1, 2, 3 GHG Emissions	65%	46%	43%	53%
	c) Climate-Related Targets	39%	22%	17%	32%

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

Legend: Low to high percentage of reporting

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Figure A28 provides a breakdown of the types of reports for fiscal years 2017 through 2021 in which asset managers indicated they report climate-related information. With the exception of 2017, a plurality of respondents reported in sustainability reports, followed by client reports and annual or integrated reports. Beginning with 2019 reporting, the majority of asset managers reported in sustainability reports; and, for the past two reporting cycles, a majority reported in sustainability reports and client reports. Interestingly, the largest growth during the period — at 35 percentage points — was for reporting in climate-specific reports, closely followed by reporting in sustainability reports at 31 percentage points. For other types of reports, asset managers' responses were varied and included reporting to the PRI, CDP, GRESB, and a few other reporting frameworks as well as reporting through websites and fund factsheets.

Figure A28

Asset Managers: Location of Reporting for Fiscal Years 2017-2021

Percent of Respondents

Report Type[1]	FY2017 (24)[2]	FY2018 (33)	FY2019 (41)	FY2020 (62)	FY2021 (84)
Financial Filing	13%	12%	12%	8%	11%
Annual Report or Integrated Report	38%	36%	37%	39%	35%
Sustainability Report	42%	48%	59%	66%	73%
Climate-Specific Report	8%	9%	15%	26%	43%
Client Report	46%	39%	49%	56%	62%
Other	13%	12%	15%	15%	17%
Average # of Reports per Respondent	1.6	1.6	1.9	2.1	2.4

1 Respondents could select multiple report types.

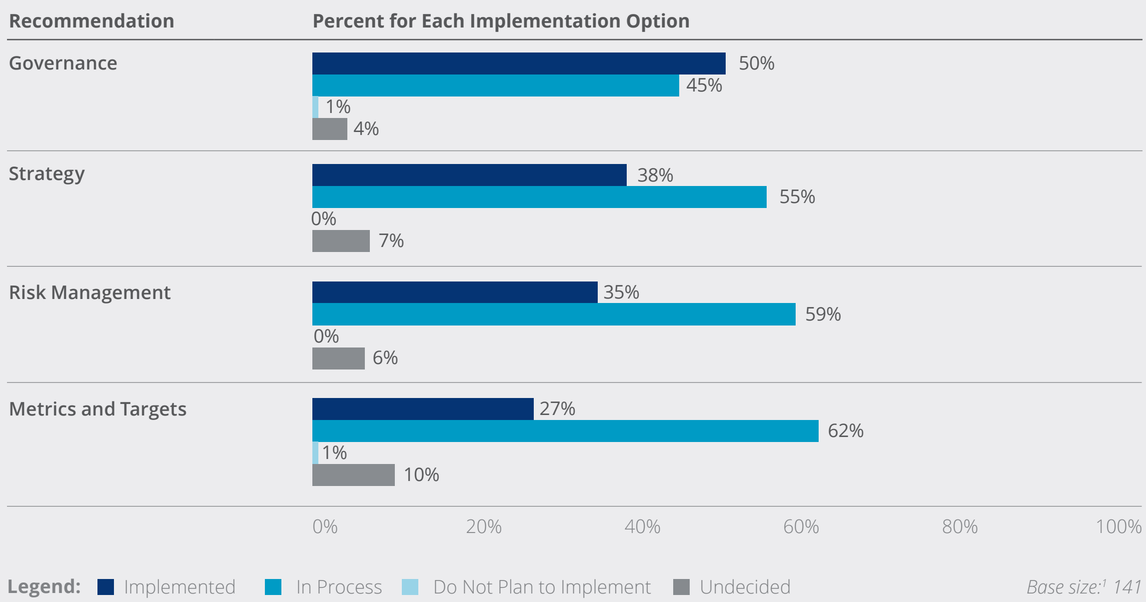
2 The numbers in parentheses represent the number of respondents.

Legend: Low to high percentage of reporting

While most of the survey questions asked respondents about their reporting practices in terms of their alignment with the TCFD recommendations, the survey also specifically asked respondents about their implementation of the four TCFD recommendations. Figure A29 provides the percent of asset managers that indicated they have implemented the recommendations, are in the process of implementing the recommendations, do not plan to implement the recommendations, and are undecided. With the exception of the Governance recommendation, over 50% of asset managers responding indicated they were *in the process of implementing* the recommendations.

Figure A29

Asset Managers: Implementation of the TCFD Recommendations



1 *The base size represents the number of asset managers implementing or planning to implement the TCFD recommendations.*

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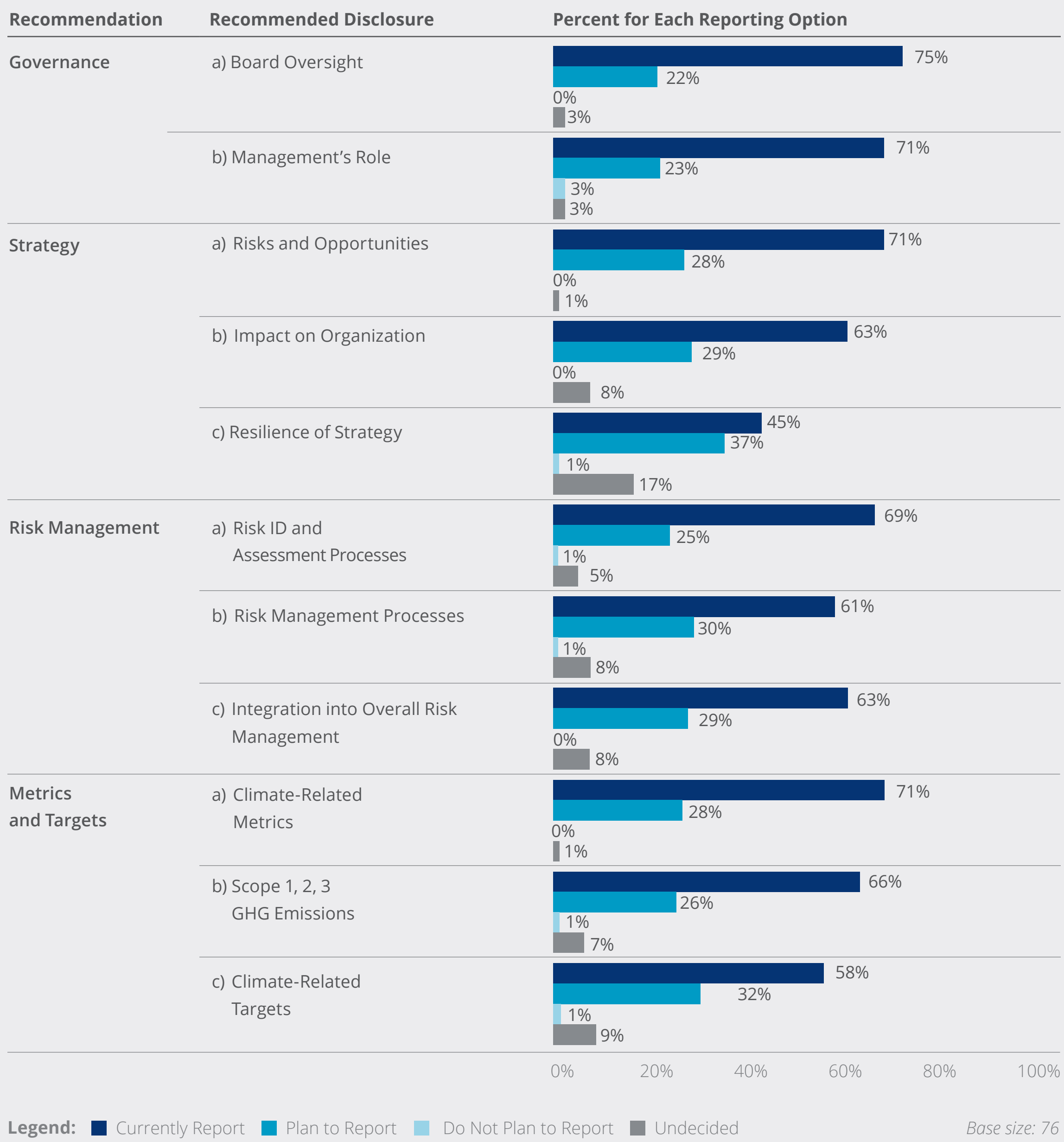
Asset Owners[43]

The Task Force applied the same approach to asset owners' responses to the survey as it did to asset managers' responses. As such, the figures included below follow the same structure and order as those above. Figure A30 provides asset owners' responses for each of the 11 recommended disclosures. Of those currently reporting, the highest level of reporting — at 75% — is for *Governance a)*, which is closely followed by reporting on *Governance b), Strategy a)* and *Metrics and Targets a)* at 71%. The lowest level of reporting — at 45% — is for *Strategy c).* Notably, the level of reporting on ten of the 11 recommended disclosures was over 50%. In addition, very few asset owners indicated they are not planning to report on the recommended disclosures.

Figure A30

Asset Owners: Status of TCFD-Aligned Reporting



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

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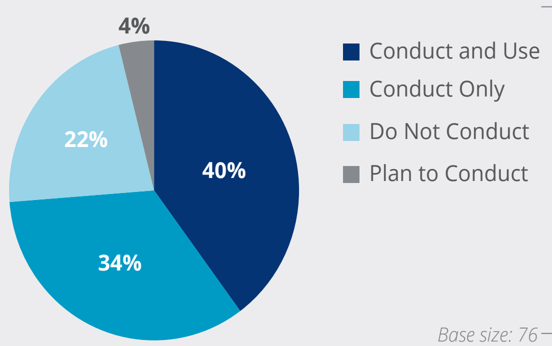
The Task Force included a few additional questions on the resilience of strategy under different climate-related scenarios (*Strategy c*) to gain additional insight on whether asset owners conduct climate-related scenario analysis and, if so, whether they use such analysis in their decision-making. Figure A31 provides the percent of asset owners that indicated they conduct scenario analysis and use the results in decision-making (40%). It also shows that another 34% indicated they conduct scenario analysis. The table on the right in Figure A31 shows how asset owners that indicated they conduct scenario analysis responded to a question on whether they report on the results of their scenario analysis. Sixty-eight percent (68%) of asset owners that conduct scenario analysis responded that they report the results, with 38% reporting qualitative results, 9% reporting quantitative results, and 21% reporting both qualitative and quantitative results. Furthermore, only 2% of this group mentioned that they do not plan to report their scenario analysis results.

Figure A31

Asset Owners: Using Scenario Analysis and Reporting on Results

Percent of Respondents

Conduct Scenario Analysis and Use Results in Decision-Making



Base size: 76

Status of Reporting on Scenario Analysis Results	
Report qualitative results	**38%**
Report quantitative results	**9%**
Report qualitative and quantitative results	**21%**
Plan to report scenario analysis results	**30%**
Do not plan to report scenario analysis results	**2%**

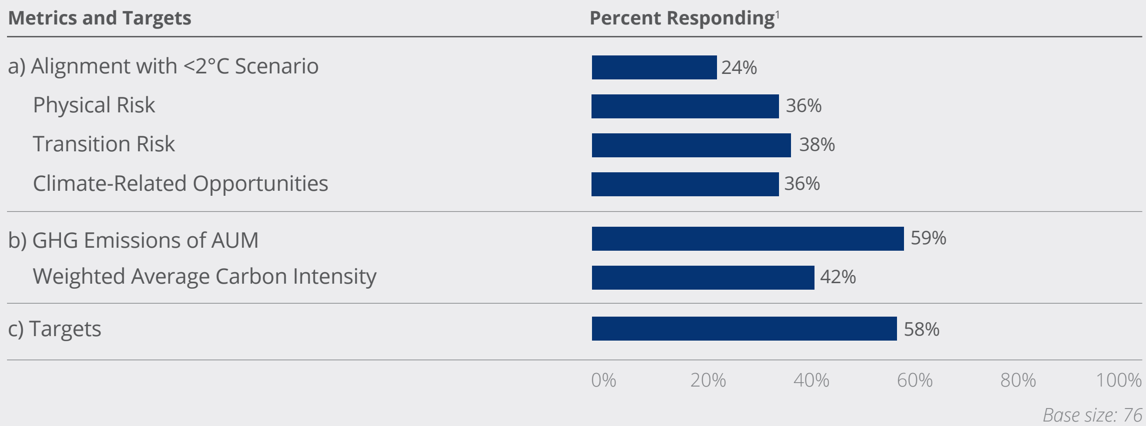
Base size (respondents that conduct scenario analysis): 56

Figure A32 (p. 44) provides the percent of asset owners that indicated they currently report on specific metrics.[44] The most reported is GHG emissions associated with assets they own at 59% closely followed by climate-related targets at 58%; and the least reported at 24% is the extent to which assets they own and their funds and investment strategies, where relevant, align with a well below 2°C scenario. Respondents were also asked how they handle reporting when they are missing data for specific assets or asset classes. Over 60% indicated they report metrics based on available data and acknowledge any gaps in their reports. See Appendix 4: Asset Manager and Asset Owner Metrics Reporting for more information on asset owners' reporting on metrics.

44 In addition to GHG emissions and climate-related targets — which are part of the 11 recommended disclosures, the survey asked asset owners about five other specific metrics as follows: 1) weighted-average carbon intensity, 2) the extent to which assets they own and their funds and investment strategies, where relevant, are aligned with a well below 2°C scenario, 3) metrics used to assess climate-related physical risks, 4) metrics used to assess climate-related transition risks, and 5) metrics used to assess climate-related opportunities.

Figure A32

Asset Owners: Currently Report on Select Metrics

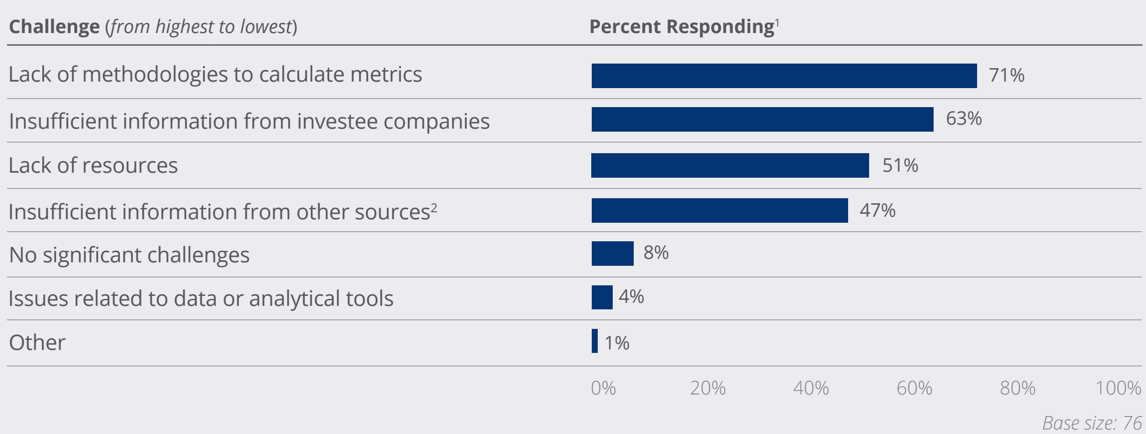


1 The percentages for Metrics and Targets a) and b) in Figure A30 (p. 42) are higher than the percentages for specific metrics associated with Metrics and Targets a) and b) in this figure because respondents were identified as currently reporting if they indicated reporting at least one of the metrics listed.

In terms of significant challenges that asset owners face in reporting climate-related information, 71% identified the lack of methodologies for calculating climate-related metrics, which was followed by obtaining sufficient information from the companies in which they invest at 63% (see Figure A33). Several asset owners that indicated the lack of methodologies for calculating climate-related metrics is a challenge specifically mentioned the lack of consensus on existing methodologies as a challenge. As part of updates made last year to the annex to its 2017 report, the Task Force acknowledged that data and methodologies for certain metrics for asset owners are in early stages of development and that these organizations will need time before such metrics are disclosed to their stakeholders.[45]

Figure A33

Asset Owners: Challenges Reporting Climate-Related Information



1 Respondents could select multiple options.
2 Insufficient information from sources other than investee companies.

45 TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures* (Annex), October 14, 2021, p. 81.

The Task Force also reviewed asset owners' reporting on information aligned with the 11 recommended disclosures based on their assets under management (AUM). Asset owner respondents were divided into three categories based on their size; and Figure A34 shows the percent of asset owners in each category that indicated they currently report the associated recommended disclosure.

Figure A34

Asset Owners: Currently Report TCFD-Aligned Information by Size (AUM)

Percent of Respondents

Recommendation	Recommended Disclosure	> $100B (26)[1]	$1–99B (35)	<$1B (15)
Governance	a) Board Oversight	92%	74%	47%
	b) Management's Role	88%	69%	47%
Strategy	a) Risks and Opportunities	85%	69%	53%
	b) Impact on Organization	81%	57%	47%
	c) Resilience of Strategy	69%	34%	27%
Risk Management	a) Risk ID and Assessment Processes	92%	66%	33%
	b) Risk Management Processes	81%	54%	40%
	c) Integration into Overall Risk Management	77%	57%	53%
Metrics and Targets	a) Climate-Related Metrics	85%	69%	53%
	b) Scope 1, 2, 3 GHG Emissions	81%	66%	40%
	c) Climate-Related Targets	77%	51%	40%

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

Legend: Low to high percentage of reporting

The largest asset owners — those with more than $100 billion in AUM — have the highest percentage of reporting for each of the 11 recommended disclosures, followed by asset owners with between $1 and $99 billion in AUM. Overall, these results are broadly consistent with the AI review results for public companies where the percentage of companies disclosing TCFD-aligned information tends to increase with company size. Notably, the level of reporting by asset owners with more than $100 billion in AUM on each of 11 recommended disclosures ranged from 69% to 92%.

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Figure A35 provides a breakdown of the types of reports for fiscal years 2017 through 2021 in which asset owners indicated they report climate-related information. Similar to asset managers, asset owners were more likely to report in sustainability reports than in other types of reports. Notably, for all five years, a majority of asset owners reported in sustainability reports and annual or integrated reports. In addition, there has been significant growth in the percentage of asset owners reporting in climate-specific reports during this period.

Figure A35

Asset Owners: Location of Reporting for Fiscal Years 2017-2021

Percent of Respondents

Report Type[1]	**FY2017** (25)[2]	**FY2018** (33)	**FY2019** (43)	**FY2020** (48)	**FY2021** (57)
Financial Filing	**22%**	**19%**	**15%**	**17%**	**15%**
Annual Report or Integrated Report	**56%**	**54%**	**57%**	**62%**	**66%**
Sustainability Report	**67%**	**73%**	**70%**	**75%**	**69%**
Climate-Specific Report	**22%**	**24%**	**40%**	**50%**	**56%**
Beneficiaries Report	**22%**	**19%**	**19%**	**17%**	**18%**
Other	**26%**	**24%**	**19%**	**17%**	**18%**
Average # of Reports per Respondent	**2.2**	**2.2**	**2.2**	**2.4**	**2.4**

1 *Respondents could select multiple report types.*
2 *The numbers in parentheses represent respondents reporting for the year.*

Legend: Low to high percentage of reporting

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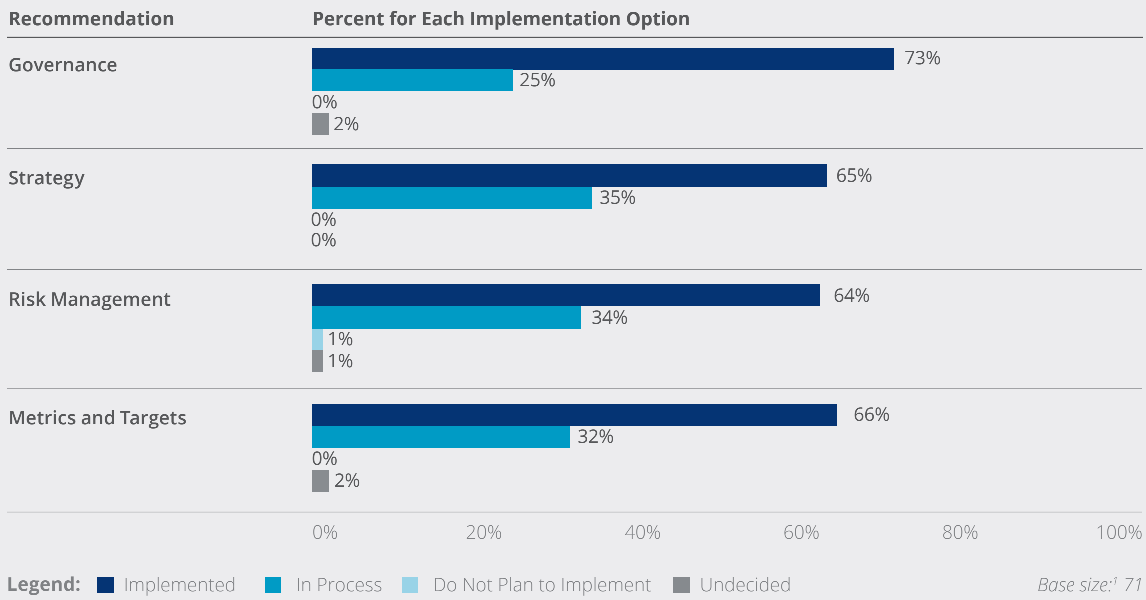
In terms of implementing the TCFD recommendations, over 73% of asset owners indicated they have implemented the Governance recommendation, followed by Metrics and Targets at 66%, then Strategy at 65%, and finally Risk Management at 64% (see Figure A36). Notably, very few asset owners indicated they are undecided or do not plan to implement the TCFD recommendations.

Figure A36

Asset Owners: Implementation of the TCFD Recommendations



Base size:[1] 71

1 *The base size represents the number of asset owners implementing or planning to implement the TCFD recommendations.*

CONCLUSION

Overall, the Task Force is encouraged by asset manager and asset owner responses to its survey on climate-related reporting practices. In particular, over 60% of asset managers and over 75% of asset owners indicated they currently report climate-related information to their clients and beneficiaries, respectively. In addition, 42% of asset managers and 65% of asset owners, on average, currently report information aligned with the 11 recommended disclosures. These levels jump to 84% for asset managers and 93% for asset owners when considering those indicating they currently report as well as those indicating they plan to report. The Task Force recognizes the organizations responding to its survey may not represent the overall population of asset managers and asset owners but, nevertheless, believes the survey results are a positive sign of growing transparency on climate-related issues in the investment industry.

The Task Force also recognizes the significant challenges faced by asset managers and asset owners in reporting TCFD-aligned information. Nearly two thirds of asset managers and asset owners identified insufficient information from investee companies as a significant challenge in reporting climate-related information. Despite this challenge, almost 60% of asset managers and over 60% of asset owners indicated they report on the information they have and acknowledge gaps in their reports. The second biggest challenge — identified by nearly 60% of the survey respondents — was the lack of methodologies for calculating climate-related metrics. The Task Force recognizes the data and methodologies for certain metrics, such as the impact of climate change on investment income

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or asset valuations, are very much in the early stages of development; and it may take time before methodologies have been developed and can be applied in practice. The Task Force also recognizes the methodological challenges of calculating GHG emissions associated with certain asset classes (e.g., sovereign bonds) and accepts research is ongoing. Asset managers and asset owners may find the following resources on metrics useful:

- The PRI's *Introduction to Responsible Investment - Climate Metrics* and its "Providers of Scenario Analysis and Climate Risk Metrics" website.[46]
- Basel Committee on Banking Supervision's Climate-Related Financial Risks – Measurement Methodologies.[47]
- The Institutional Investors Group on Climate Change's "Paris Aligned Investment Initiative."[48]

Asset Manager and Asset Owner Survey Results in Context

With the vast majority of the asset manager and asset owner respondents to the Task Force's survey already implementing or planning to implement its recommendations, the Task Force expected the survey results would show higher levels of reporting for TCFD-aligned information than would be the case if the survey population encompassed a wider range of asset managers and asset owners. To gauge whether this was the case, the Task Force compared the survey results to TCFD-aligned reporting to the PRI by asset manager and asset owner signatories — on a *directional* basis.

As mentioned previously, asset manager and asset owner signatories' reporting to the PRI on TCFD-aligned information is not yet available for the current reporting cycle. As such, the Task Force reviewed the survey results relative to PRI reporting from the 2021 cycle.[49] The Task Force recognizes direct comparisons of the two sets of results would not be appropriate given the composition of survey respondents and the difference in time periods covered. Nevertheless, the Task Force was interested in understanding whether the survey results would show higher levels of reporting for each of the 11 recommended disclosures when compared to PRI reporting and whether the two sets of results would be aligned in terms of the most and least disclosed recommended disclosures.

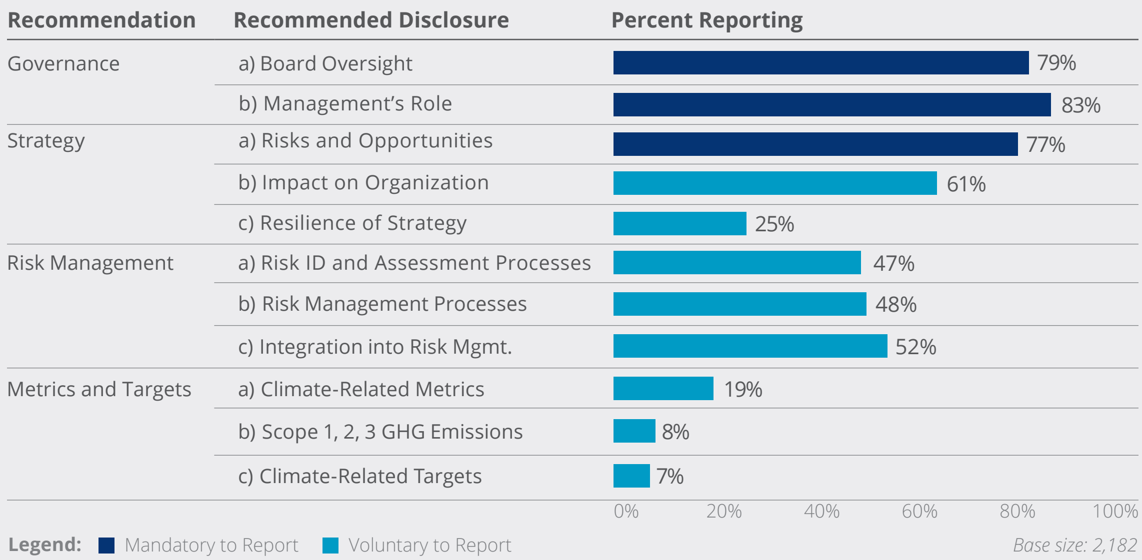
In comparing the survey results of asset manager respondents that indicated they currently report information aligned with the 11 recommended disclosures (the dark blue bar in Figure A23, p. 28) to TCFD-aligned reporting to the PRI by asset manager signatories for the 2021 reporting cycle (Figure A37, p. 49), the Task Force made the following observations:

- For seven of the 11 recommended disclosures, the survey results showed lower levels of reporting (rather than higher).
- The survey results show *Metrics and Targets a)* as having the highest level of reporting, closely followed by reporting on *Governance b),* whereas TCFD-aligned reporting to PRI shows *Governance b)* as the highest, closely followed by *Governance a)* and *Strategy a)*. Notably, the three recommended disclosures with the highest levels of reporting in PRI mapped to PRI "indicators" that were mandatory to report for signatories.
- The survey results show *Strategy c*) as having the lowest level of reporting whereas TCFD-aligned reporting to PRI shows *Metrics and Targets c*) as the lowest.

46 PRI, *Introduction to Responsible Investment - Climate Metrics*, June 27, 2022 and PRI, "Providers of Scenario Analysis and Climate Risk Metrics," December 7, 2021.
47 Basel Committee on Banking Supervision, *Climate-Related Financial Risks – Measurement Methodologies*, April 14, 2021.
48 The Institutional Investors Group on Climate Change, "Paris Aligned Investment Initiative," September 19, 2019.
49 For more information on TCFD-aligned reporting to the PRI by asset manager and asset owner signatories for the 2021 reporting cycle, please see the *2021 Status Report*, pp. 50-54.

Figure A37

Asset Managers: TCFD-Aligned Reporting to PRI in 2021



Based on a similar review for asset owners, the Task Force made the following observations:

- For eight of the 11 recommended disclosures, the survey results (the dark blue bar in Figure A30, p. 42) showed higher levels of reporting compared to TCFD-aligned reporting to the PRI (Figure A38, p. 50).
- Both the survey results and TCFD-aligned reporting to PRI show *Governance a), Governance b),* and *Strategy a)* as having the highest level of reporting.[50]
- The survey results show *Strategy c)* as having the lowest level of reporting whereas TCFD-aligned reporting to PRI shows *Metrics and Targets* c) as the lowest.

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50 In the survey results for asset owners, *Governance a*) had the highest level of reporting at 75% followed by *Governance b*), *Strategy a*), and *Metrics and Targets a*) at 71%.

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Figure A38

Asset Owners: TCFD-Aligned Reporting to PRI in 2021

Recommendation	Recommended Disclosure	Percent Reporting
Governance	a) Board Oversight	85%
	b) Management's Role	83%
Strategy	a) Risks and Opportunities	77%
	b) Impact on Organization	56%
	c) Resilience of Strategy	35%
Risk Management	a) Risk ID and Assessment Processes	42%
	b) Risk Management Processes	47%
	c) Integration into Risk Mgmt.	49%
Metrics and Targets	a) Climate-Related Metrics	21%
	b) Scope 1, 2, 3 GHG Emissions	12%
	c) Climate-Related Targets	10%

0% 20% 40% 60% 80% 100%

Legend: Mandatory to Report Voluntary to Report

Base size: 538

Examples of Climate-Related Financial Reporting

This section includes an example of reporting aligned with one of the 11 recommended disclosures for an asset owner and another for an asset manager. The examples included are not intended to represent "best practice" nor demonstrate disclosures that fully meet the associated recommended disclosure.[51] Instead, the examples are provided because they may help asset managers and asset owners generate ideas for their own reporting.

Figure A39

Climate-Related Targets

04.6.1 Climate-related targets

Allianz investment portfolio targets, as part of Asset Owner Alliance

Target layer	Measure	Base year (2019)	Current year (2021)	Target year (2024)	Description
Sub-portfolio Listed Equity; **Sub-portfolio** Corporate Bonds	-25 % absolute owned GHG emissions, Scopes 1 and 2	24.9mn t of CO_2e[1]	18.7 mn t CO_2e	18.7mn t of CO_2e	
Sub-portfolio Real Estate	• Fully owned real estate portfolio aligned with 1.5 degree pathways of CRREM[2] • Reach 52.2 $kgCO_2e/sqm$[2]	67.5 $kgCO_2e/sqm$	n/a[3*]	52.2 $kgCO_2e/sqm$	
Sub-portfolio Infrastructure	• Full transparency on financed emissions latest by 2023 for all investments • For direct equity investments an absolute carbon reduction of -28 % by year-end 2025 (base year 2020) • New direct (equity and debt) investments in high emitting assets only in case a 1.5°C aligned decarbonization plans in place • Phase in of net-zero targets for new fund investments by year-end 2024	n/a*	n/a*	n/a*	
Sector Utilities	• Coal phase out in line with 1.5°C pathway • Increase direct and indirect exposure to renewable energy by 5.85 % per year (IRENA[4] global pathway)	n/a	n/a*	increase by 5.85% annually	Indirect
		€ 2.9 bn	€ 3.14 bn	€ 3.9 bn	Direct – debt renewables
		€ 4.3 bn	€ 3.88 bn	€ 5.7 bn	Direct – equity renewables
Sector Oil and Gas	• Scopes 1 and 2 20 $kgCO_2e/boe$[5] in line with OGCI[6] • 50 % of AuM to set net-zero by 2050 targets for Scope 1 and 2 greenhouse gas emissions	n/a*	n/a*	20 $kgCO_2e/boe$	Scopes 1 and 2 upstream GHG emissions intensity
		~40 %	n/a*	~50%	Share of AuM with net-zero 2050 target for Scopes 1 and 2 emissions
Engagement	• Engagement coverage of at least Top 30 (non-aligned) emitters in portfolio. Top 30 means new engagement with 8 companies, others are covered by existing bilateral or collaborative engagements already • Full participation in all available AOA organized sector and asset manager engagements • Increase overall engagement activities by at least 100 %				
Financing Transition	• 4 to 5 new blended finance vehicles • Climate-positive solutions: Start investing into Forestry, Hydrogen and other	**Blended Finance:** 2020: Africa Grow 2021: Emerging Market Climate Action Fund **Climate-positive solutions:** 2021: Investment in BTG Core US Timberland Fund			

1 CO_2e refers to carbon dioxide equivalent, which includes CO_2 and other greenhouse gases.
2 CRREM: Carbon Risk Real Estate Monitor.
3* Where n/a is displayed most recent and/or comprehensive data is not yet available.
4 IRENA: The International Renewables Agency is an intergovernmental organization supporting countries in their transition to a sustainable energy future.
5 BOE: barrel of oil equivalent.
6 OGCI: Oil & Gas Climate Initiative; a CEO-led consortium of industry leading O&G companies.

Allianz SE, Sustainability Report 2021, p. 85

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

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The example shown in Figure A39 (p. 50) provides an asset owner's climate-related targets for its investment portfolios. It includes the base year against which targets are measured and the time frames over which the targets apply. The example shown in Figure A40 provides an asset manager's description of its board oversight of climate-related issues. It details the board's primary responsibilities and provides examples of the main topics discussed by and reported to the board in fiscal year 2020.

Figure A40

Board Oversight

The Board of Directors' Supervision of MUFG's Climate Change Measures

At MUFG, the Sustainability Committee, which operates under the Executive Committee, is charged with periodically deliberating policies on and determining the status of the Group's response to opportunities and risks arising from climate change and other environmental and social concerns.

MUFG has positioned climate change-related risk as one of the Top Risks that it must pay close attention to. Accordingly, these risks are discussed by the Credit & Investment Management Committee, the Credit Committee and the Risk Management Committee, all of which are under the direct supervision of the Executive Committee.

Conclusions reached by the above committees are reported to the Executive Committee—which is tasked with deliberating and making decisions on important matters regarding business execution—and, ultimately, reported to and discussed by the Board of Directors.

In addition, matters discussed by the Credit & Investment Management Committee and the Risk Management Committee are also examined by the Risk Committee, which mainly consists of outside directors, and then reported to the Board of Directors.

In these ways, the Board of Directors exercises supervision over MUFG's climate change-related initiatives. Specifically, the Board of Directors handles issues requiring a groupwide perspective and, to this end, identifies important themes deserving intensive discussion, thereby managing these issues based on a PDCA cycle in accordance with an annual schedule. Also, sustainability management is considered an important theme. The Board of Directors actively addresses matters related to this theme through dedicated sessions in addition to deliberations at regular Board meetings.

External Advisors Supporting MUFG's Initiatives to Address Environmental and Social Issues

MUFG maintains two advisor positions to which it appoints external specialists representing the environmental and social fields to engage in the exchange of opinions with members of the Board (for more details, please refer to page 90). By doing so, we incorporate insights from outside experts into our climate change-related initiatives.

Revision of the MUFG Environmental Policy Statement

In line with the MUFG Way, which provides guidelines for all activities, we uphold the MUFG Environmental Policy Statement, which serves as a set of specific action principles for ensuring that due consideration is given to environmental concerns.

In May 2021, we made it a rule that any changes in the MUFG Environmental Policy Statement require a resolution by the Board of Directors. Simultaneously, we revised this statement, incorporating new clauses that clarify our commitment to proactively disclosing information regarding our environmental initiatives, including climate change measures.

Executive Compensation Reflecting External ESG Evaluation

To advance our sustainability management, in fiscal 2021, we revised performance-linked indices used for the determination of executive compensation. The revised indices incorporate the degree of improvement in external ESG evaluation granted to MUFG by ESG rating agencies (for more details, please refer to page 95).

Main Items Discussed by and Reported to the Board of Directors (Fiscal 2020)

- MUFG's approach to sustainability management
- Promotion of sustainable businesses via financing for renewable energy projects, the underwriting of green, social and sustainability bonds and the pursuit of responsible investment
- Carbon neutrality initiatives
- MUFG's approach to transition finance and its in-house promotion structure
- Revision of the MUFG Environmental and Social Policy Framework
- Prioritization of various risks arising from climate change and future initiatives

Mitsubishi UFG Financial Group, Integrated Report 2021, p. 79

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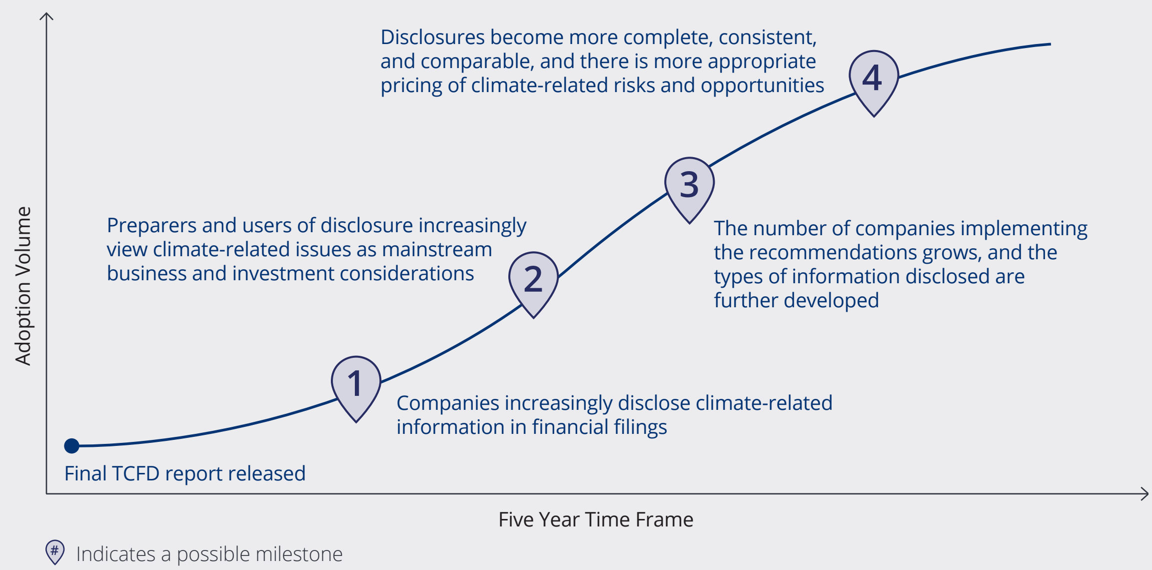
In its 2017 report, the Task Force indicated the success of its recommendations depended on near-term, widespread adoption by financial and non-financial companies. It noted that through widespread adoption, financial risks and opportunities related to climate change would become a natural part of companies' risk management and strategic planning processes. As that occurred, companies and investors' understanding of the potential financial implications associated with climate change would grow, information would become more decision-useful, and risks and opportunities would be more accurately priced, allowing for the more efficient allocation of capital. The Task Force incorporated these concepts as milestones associated with increasing implementation of its recommendations over a five-year period. Figure B1 summarizes the key milestones included in the 2017 report.[52]

Figure B1

Milestones Associated with TCFD Implementation from 2017 Report



Recognizing this year marks five years since its final recommendations were published, the Task Force reflected on these milestones in developing this status report. In particular, the Task Force sought to evaluate progress associated with implementation of its recommendations over the past five years — including progress relative to the key milestones identified in 2017.[53] It also sought to identify possible implementation trends that may be useful for companies beginning to implement the recommendations, better understand current challenges associated with implementation, and understand investors and other users' views on the usefulness of climate-related financial disclosures and improvements needed.

52 In its 2017 report, the Task Force included an illustrative five-year implementation path that described milestones associated with the adoption of the TCFD recommendations.

53 The Task Force recognizes that companies implementing the recommendations in their 2017 fiscal year reports had a limited amount of time between the release of the Task Force's final recommendations in June 2017 and the start of their internal processes to prepare their 2017 fiscal year reports.

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Progress Relative to Milestones

1. Based on a survey of companies implementing the TCFD recommendations (TCFD survey), over 70% disclosed climate-related information in financial filings, annual reports, or integrated reports for fiscal year 2021 compared to 45% for fiscal year 2017.[1]

2. Continued growth in jurisdictions using the recommendations as a basis for climate-related financial disclosure requirements and investor requests for companies to disclose in line with the recommendations are driving preparers and users of disclosures to increasingly view climate-related issues as mainstream business and investment considerations.[2]

3. Based on the TCFD survey, the number of companies disclosing against the TCFD recommendations for fiscal year 2021 was nearly five times higher than those disclosing in fiscal year 2017.[1]

4. Based on the TCFD survey, companies, investors, and others indicated they see climate-related issues affecting the prices and valuations of financial assets.[1] In addition, based on a literature review, there is a growing body of evidence that climate-related risks are beginning to affect prices of certain types of assets.

1 *Given the composition and number of survey respondents, the Task Force cautions readers on extrapolating these results to broader populations of companies disclosing climate-related financial information and users of such disclosures.*

2 *See Section D. Initiatives Supporting TCFD and Climate Action 100+.*

Overall, the Task Force is encouraged by companies' progress in disclosing the TCFD recommendations and by the support of regulators and standard setters 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 not enough companies are disclosing *decision-useful* climate-related financial information, which may hinder investors, lenders, and insurance underwriters' efforts to appropriately assess and price climate-related risks.

1. ADOPTION AND USE OF THE TCFD RECOMMENDATIONS

To assess progress against key milestones associated with increasing implementation of the TCFD recommendations — as shown in Figure B1 (p. 53) — and better understand companies' implementation of the TCFD recommendations over the past five years as well as investors and others' views on the usefulness of climate-related financial disclosures, the Task Force conducted a survey in the first half of 2022.[54] It is important to highlight the survey was distributed to companies and other organizations that signed up for updates on the Task Force's website, which means that most survey respondentswere familiar with the Task Force's work. In fact, 98% of respondents indicated they were familiar with the TCFD recommendations. Given the composition of survey respondents, the Task Force recognizes the survey results should not be extrapolated to a broader population of companies. This subsection summarizes the results of the survey and highlights key findings based on the Task Force's analysis.

Scope and Approach

The Task Force's analysis of the adoption and use of its recommendations is based on responses to a survey conducted between late March and early May of 2022. Through its survey, the Task Force sought to better understand the status of companies' implementation of its recommendations over the past five years and associated challenges and to obtain views from users of climate-

54 For each of its status reports, the Task Force has used AI technology to review hundreds of companies' reports for information aligned with its recommendations to assess the current state and evolution of climate-related financial disclosures for a defined set of industries (see Section A.1. TCFD-Aligned Reporting by Public Companies for more information). Importantly, the AI technology looks for specific types of information that align with the Task Force's recommended disclosures but does not attempt to identify whether companies have adopted the TCFD recommendations.

related financial disclosures on the usefulness, availability, and quality of such disclosures. The Task Force distributed the survey to just over 4,500 organizations, resulting in 399 responses.

The survey directed respondents to specific questions based on how they described their role or responsibilities in the context of climate-related financial disclosure. The chart on the top left in Box B1 (p. 56) describes the six options respondents could choose to describe their roles or responsibilities along with the percent of survey respondents that selected each option. The majority of respondents — 57% — indicated they contribute to producing climate-related financial disclosures for their companies (referred to as preparers), and 10% indicated they make financial decisions or allocate capital based on disclosure from other companies (referred to as users).

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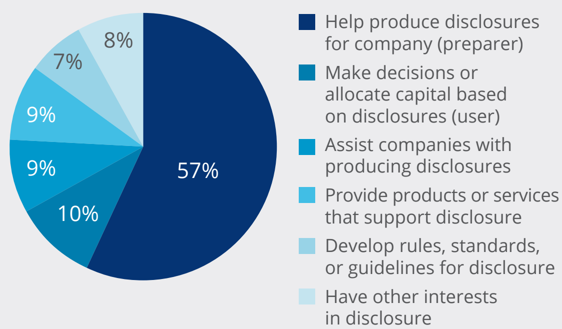
Box B1

Composition of Implementation Survey Respondents

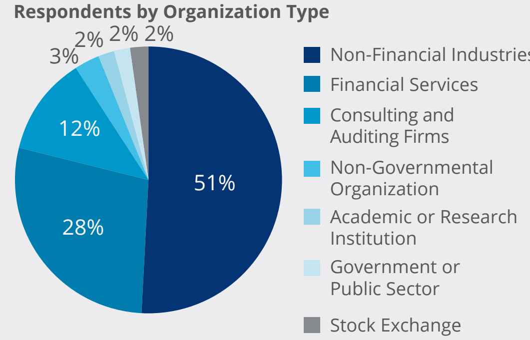
Percent or Number of Respondents[1]

Respondents by Role or Responsibility



Base size: 399

Respondents by Organization Type



Base size: 399

Geographic Distribution of Respondents and Top 5 Countries by Number of Respondents

Geographic Distribution by Region

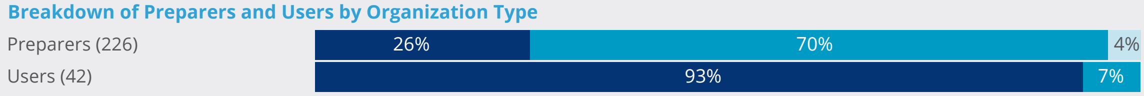
Europe	40%
Asia Pacific	35%
North America	17%
Middle East and Africa	5%
South America	3%

Base size: 399

Top 5 Countries by Number of Respondents

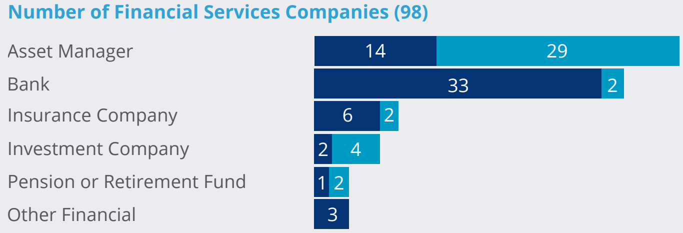
Japan	87
United States of America	43
United Kingdom	38
Australia	19
Canada	19

Breakdown of Preparers and Users by Organization Type

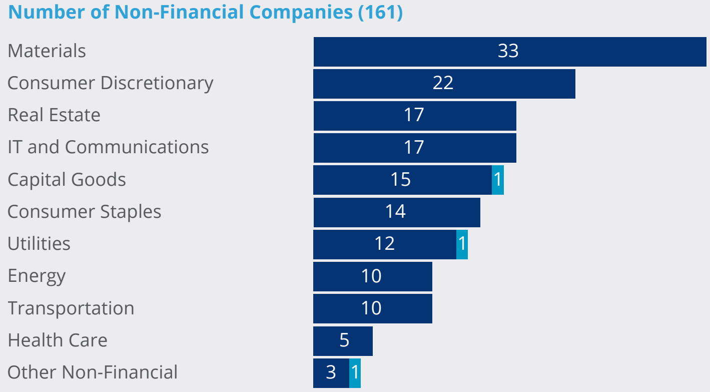


Legend: Financial Non-Financial Other

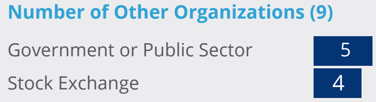
Number of Financial Services Companies (98)



Number of Non-Financial Companies (161)



Number of Other Organizations (9)



Legend: Preparers Users

Average Size of Preparer and User Respondents

$413B
average asset size for banks and insurance companies

$112B
average assets under management for asset managers

$11B
average annual revenue for non-financial companies

These averages are based on a subset of the 268 respondents that identified as preparers or users. Specifically, the averages are based on the 54% of respondents that provided their companies' names and for which public information was available.

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

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Box B1 (p. 56) also provides information on the composition of survey respondents. In terms of the types of organizations respondents represented, just over 50% came from non-financial industries, 28% were in financial services, and 12% were consulting and auditing firms. In terms of geographic distribution of survey respondents, 40% indicated their companies' headquarters were in Europe and 36% indicated Asia Pacific. Over half of those that indicated their headquarters were in Asia Pacific were based in Japan. In addition, with the survey primarily aimed at preparers and users of climate-related financial disclosures, the charts on the lower left of Box B1 (p. 56) provide a breakdown of these respondents by the types of organizations they represented, with the majority coming from non-financial industries.

Overview of Results

Overall, the Task Force was pleased with the number of responses it received to its survey, especially in light of the consultations on proposed rules in the U.S. and international standards in Europe on climate-related disclosures based on the TCFD recommendations, which occurred shortly before and immediately following the distribution of the survey.[55] In reviewing the survey results, the Task Force identified progress relative to the key milestones identified in 2017 (see Figure B1, p. 53) as well as several signs of progress and continuing challenges associated with implementing the TCFD recommendations and using climate-related financial disclosures.

Signs of Progress

- **TCFD Implementation.** Ninety-one percent (91%) of preparer respondents indicated their companies have implemented or are implementing the TCFD recommendations, with 86% of these respondents currently disclosing in line with at least one of the 11 recommended disclosures and the remaining 14% planning to disclose in the future.

- **Use of Climate-Related Financial Disclosures.** Ninety percent (90%) of respondents that identified as users have incorporated climate-related financial disclosures in their financial decision-making processes, and 66% of these respondents indicated such disclosures factor into the way they price financial assets.

- **Availability and Quality of Climate-Related Financial Disclosures.** Ninety-five percent (95%) of all respondents other than those identified as preparers saw an increase in the availability of climate-related financial disclosures since the release of the TCFD recommendations in June 2017, with 88% of such respondents citing improvements in the quality of disclosures.

Continuing Challenges

Survey respondents also highlighted several challenges related to implementing the TCFD recommendations and areas where climate-related financial disclosures need to be improved.

- **Resilience of Strategy.** Over 50% of preparer respondents indicated implementing *Strategy c)* — the resilience of their strategies under different climate-related scenarios — is very difficult, and another 36% indicated it was somewhat difficult.

- **Scope 3 GHG Emissions.** Over 20% of preparer respondents noted challenges related to Scope 3 GHG emissions, including data collection and methodology issues.

- **Industry-Specific Metrics.** The biggest improvement identified by investors and other user respondents was for companies to included standardized, industry-specific climate-related metrics in their disclosures.

Implementation of the TCFD Recommendations

The Task Force received 226 survey responses from individuals that identified themselves as preparers, and the vast majority — 91% or 206 — indicated their companies have decided to implement the TCFD recommendations (see Figure B2, p. 58). These 206 respondents were asked a series of questions designed to elicit information on their companies' efforts to implement the TCFD recommendations, including in which years companies disclosed or are planning to disclose each of the 11 recommended disclosures that support the recommendations, the types of reports in which companies disclosed information in line with the recommendations over the past five years, issues related to implementing the recommendations, and a few other topics.

55 The Task Force distributed its survey on March 30, which was preceded by the U.S. Securities and Exchange Commission's publication of proposed rules on climate-related disclosures on March 21, 2022, and followed by the International Sustainability Standards Board's proposed standards for climate-related disclosure on March 31, 2022.

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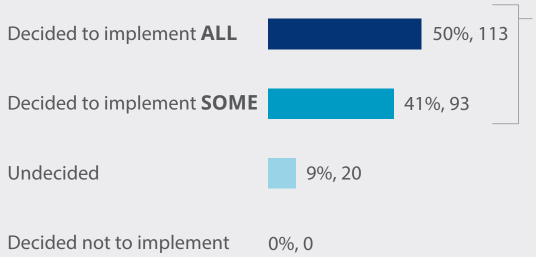
Figure B2

Implementation of the TCFD Recommendations

Percent and Number of Respondents

Decision on Implementing the TCFD Recommendations



Base size: 226

Reasons for Implementing[1]

Climate-related issues are material for company	**85%**
Investors are requesting climate-related information	**77%**
Corporate citizenship/reputational benefits	**59%**
Senior management made it a priority	**53%**
Peers are implementing the recommendations	**40%**
TCFD reporting is required by law or regulation	**26%**

Base size: 206 (respondents implementing all or some)

1 Respondents could select multiple reasons.

Figure B2 also shows the reasons why companies decided to implement the TCFD recommendations, with the top two reasons being that climate-related issues are material for the companies (85%) and investors are requesting climate-related information (77%). In addition, over 25% indicated TCFD reporting is required in their jurisdictions. The survey also asked whether companies currently disclose climate-related financial information publicly. Of the 206 preparer respondents, 86% indicated they currently disclose such information publicly, and the remaining 14% indicated they plan to disclose such information in the future. The primary reason, cited by 38% of respondents, for not currently disclosing climate-related information publicly was a lack of resources, followed by 29% of respondents that indicated their companies are working toward disclosing climate-related information.

Disclosure and Sequencing of the 11 Recommended Disclosures

One of the key goals of the survey was to understand the progression of companies' implementation of the TCFD recommendations over the past five years. The Task Force believes such information is useful for companies considering and in the process of implementing the TCFD recommendations. As a starting point, the Task Force reviewed the levels of disclosure — as indicated by respondents — for each of the 11 recommended disclosures over the past five years, as shown in Figure B3 (p. 59). The percent of companies disclosing against the 11 recommended disclosures increased significantly between fiscal years 2017 and 2021, with the average percentage point increase across the 11 recommended disclosures at 61 points. Furthermore, based on the survey responses, over 70% of companies disclosed information on at least seven of the 11 recommended disclosures. The largest increases occurred between fiscal years 2019 and 2020 and 2020 and 2021 with increases of 19 and 32 percentage points, respectively, on average.

The highest level of reporting — in all five fiscal years — was for Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions (*Metrics and Targets b*). In the survey, the Task Force asked respondents about reporting on Scope 3 GHG emissions separately from Scope 1 and Scope 2 GHG emissions, recognizing the challenges associated with calculating Scope 3 GHG emissions. Based on the survey responses, the percent of companies disclosing Scope 3 GHG emissions is significantly lower than the percent disclosing Scope 1 and 2 GHG emissions and is roughly in line with the disclosure levels for *Metrics and Targets c).*

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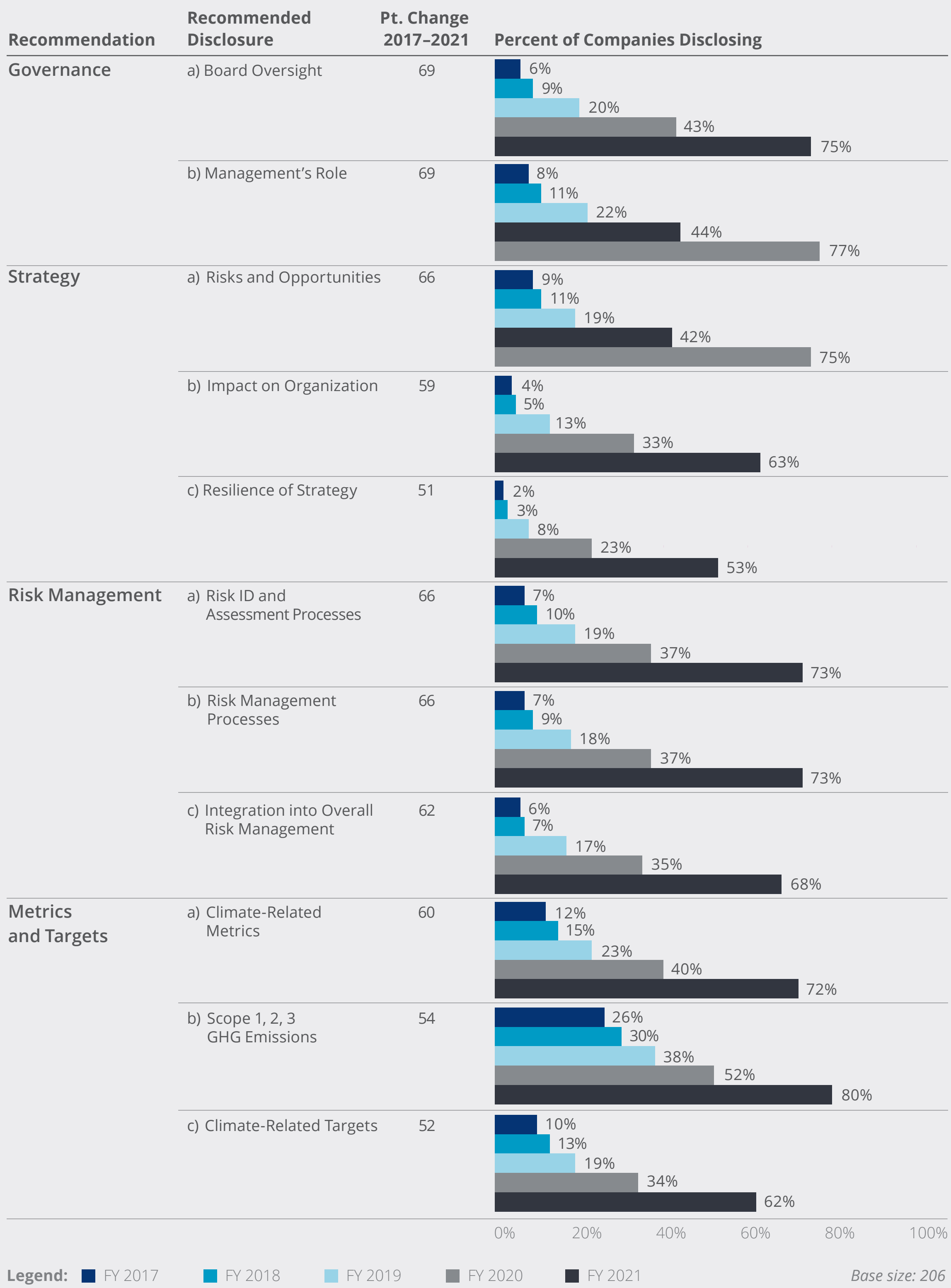
Figure B3

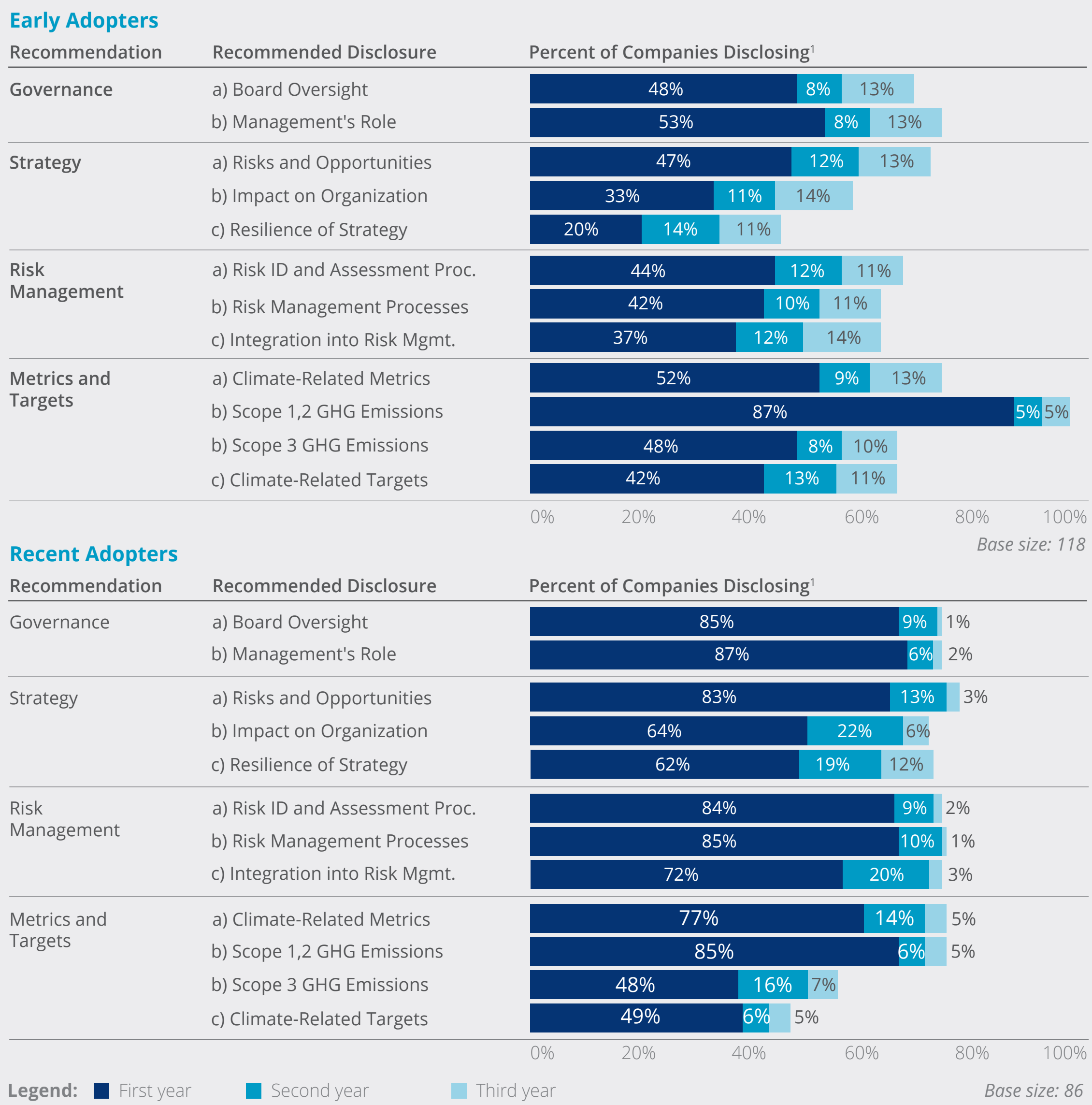
Disclosure of the TCFD Recommendations by Year for Fiscal Years 2017-2021



To better understand whether companies implementing the TCFD recommendations begin by disclosing certain types of information first, the Task Force asked respondents to indicate in which fiscal years they disclosed each of the 11 recommended disclosures.[56] The charts in Figure B4 provide the percent of companies that disclosed each of the recommended disclosures *for the first time* in their first, second, or third fiscal year of TCFD reporting. The top chart provides these percents for "early adopters" of the TCFD recommendations — those that began disclosing in fiscal years 2017, 2018, 2019, or 2020, while the bottom chart provides the results for "recent adopters" of the TCFD recommendations — those that began or plan to begin disclosing in fiscal year 2021 or later.[57]

Figure B4

Sequencing in Disclosing the TCFD Recommendations



1 *The total for each recommended disclosure is less than 100% because respondents could indicate reporting will begin after the third year or they were undecided on if or when to report.*

56 While *Metrics and Targets b)* asks companies to disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions, the survey asked respondents about reporting on Scope 1 and Scope 2 GHG emissions and Scope 3 GHG emissions separately. As a result, some figures include survey responses on Scope 1 and Scope 2 GHG emissions and Scope 3 GHG emissions separately.

57 The total number of respondents represented in the charts in Figure B4 is 204 rather than 206 as two of the respondents did not indicate a specific year for when they planned to disclose any of the recommended disclosures.

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Most notably, the percent of companies disclosing on the recommended disclosures for the Governance, Strategy, and Risk Management recommendations and on *Metrics and Targets a)* in their first year of reporting is significantly higher for recent adopters than early adopters. In addition, early adopters, on average, disclosed information on five of the 11 recommended disclosures in their first year of TCFD reporting compared to eight recommended disclosures for recent adopters. The Task Force believes there could be various reasons for the higher number of recommended disclosures being reported by recent adopters, including increased demand by investors for climate-related financial disclosures and developments in various jurisdictions over the past fiscal year to require or propose requirements for TCFD-aligned reporting.[58]

The results for *Metrics and Targets c)* are also worth highlighting as this recommended disclosure had the highest percentage of companies indicating they had no plans or were undecided on whether to disclose this information at 11% for early adopters and 16% for recent adopters. Somewhat surprisingly given feedback from companies on the challenges associated with implementing *Strategy c)*, only 3% of early adopters and 6% of recent adopters indicated they had no plans or were undecided on whether to disclose the resilience of their strategies under different climate-related scenarios.

Ease or Difficulty of TCFD Implementation

The Task Force also asked respondents implementing the TCFD recommendations to rate the ease or difficulty of implementing each of the 11 recommended disclosures — with *Metrics and Targets b)* divided into two questions (one on Scope 1 and Scope 2 GHG emissions and the other on Scope 3GHG emissions) and to identify specific implementation issues. As shown in Figure B5 (p. 62), the majority of respondents rated *Governance a), Governance b),* and Scope 1 and Scope 2 GHG emissions under *Metrics and Targets b)* as very easy or relatively easy to implement. When asked about specific issues related to implementing the Governance recommendation, 80% of respondents indicated they had not identified any issues, and the most often cited issue by the remaining 20% was a lack of expertise within the board and senior management on climate-related issues.

Over 80% of respondents rated *Strategy b)* and *Strategy c)* as somewhat difficult or very difficult to implement. In addition, 51% of respondents identified specific issues related to implementing the Strategy recommendation, with 36% of those respondents highlighting issues related to conducting climate-related scenario analysis such as selecting relevant scenarios and identifying key inputs and parameters (see Figure B6, p.63) for additional information).

Around 70% of respondents rated Scope 3 GHG emissions under *Metrics and Targets b)* and *Metrics and Targets c)* as somewhat difficult or very difficult to implement. In addition, of the 52% of respondents that identified specific

58 For example, in the past two years, the number of investors supporting Climate Action 100+ has grown from 500 investors with $47 trillion in AUM to over 700 investors with more than $68 trillion in AUM. Part of supporting Climate Action 100+ includes engaging the world's largest corporate greenhouse gas emitters to strengthen their climate-related disclosures by implementing the TCFD recommendations.

issues related to implementing the Metrics and Targets recommendation, 41% of them highlighted issues related to Scope 3 GHG emissions, including challenges with data collection across the value chain. In terms of risk management, around 60% of respondents rated *Risk Management b)* and *Risk Management c)* as somewhat difficult or very difficult to implement, but only about 30% noted specific issues related to implementation. The most common issues cited were challenges with developing processes for identifying, assessing, and managing climate-related risks and integrating climate-related risks into existing risk management processes.

Figure B5

Implementation Rating by TCFD Recommendation

Percent of Respondents[1]

Recommendation	Recommended Disclosure	Very Easy	Relatively Easy	Somewhat Difficult	Very Difficult
Governance	a) Board Oversight	13%	59%	24%	2%
	b) Management's Role	13%	57%	26%	3%
Strategy	a) Risks and Opportunities	4%	36%	47%	12%
	b) Impact on Organization	2%	12%	51%	32%
	c) Resilience of Strategy	1%	8%	36%	52%
Risk Management	a) Risk ID and Assessment Processes	4%	44%	41%	9%
	b) Risk Management Processes	4%	36%	49%	10%
	c) Integration into Overall Risk Management	3%	34%	43%	17%
Metrics and Targets	a) Climate-Related Metrics	5%	36%	39%	18%
	b) Scope 1, 2, 3 GHG Emissions	15%	49%	28%	7%
	b) Scope 3 GHG Emissions	4%	18%	28%	43%
	c) Climate-Related Targets	4%	23%	43%	26%

1 The total for each recommended disclosure may be less than 100% because respondents could select "not applicable."

Base size: 206

Legend: Low to high percentage of responses

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Location of Reporting on the TCFD Recommendations

As described in its 2017 report, the Task Force recommended that companies include climate-related financial disclosures in their annual financial filings but recognized companies may include such information in other types of reports.[59] To better understand the types of reports in which companies disclose climate-related financial information and how that may have changed over the past five years, the Task Force asked preparer respondents to indicate the types of reports in which they disclosed information related to the TCFD recommendations for fiscal years 2017 through 2021. As shown in Figure B7, the percent of companies — based on the total number of companies reporting in each year — that disclosed information in financial filings, annual reports, or integrated reports increased from 45% in fiscal year 2017 to 71% in fiscal year 2021. In addition, over 60% of companies disclosed information in line with the TCFD recommendations in their sustainability or similar types of reports in each of the five years reviewed.

Figure B6

Climate-Related Scenario Analysis

For more information on conducting climate-related scenario analysis, including selecting relevant scenarios and identifying key inputs and parameters, the Task Force encourages non-financial companies to review its *Guidance on Scenario Analysis for Non-Financial Companies*. This guidance is intended to assist non-financial companies interested in using climate-related scenarios analysis as part of their efforts to implement the Task Force's recommendations. Financial companies should review the resources available on the Network for Greening the Financial System's "Scenarios Portal."

Figure B7

Location of TCFD Disclosures by Year for Fiscal Years 2017-2021

Percent of Respondents

Report Type[1]	FY2017 (33)[2]	FY2018 (37)	FY2019 (53)	FY2020 (94)	FY2021 (153)
Financial Filing, Annual Report, or Integrated Report	45%	49%	64%	65%	71%
Sustainability Report	67%	62%	70%	66%	70%
Climate-Specific Report	9%	22%	21%	33%	33%
Other	15%	14%	13%	9%	9%
Average # of Reports per Respondent	1.5	1.6	1.9	2.0	2.1

1 *Respondents could select multiple report types.*
2 *The numbers in parentheses represent the number of respondents reporting for the year.*

Legend: Low to high percentage of responses

59 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.

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Use of Climate-Related Financial Disclosures

The Task Force received 42 survey responses from user respondents — those indicating they have responsibility for making financial decisions related to investing, lending, or insurance underwriting or allocating capital based on climate-related disclosures from other companies. The survey presented a series of questions to these respondents related to their use of climate-related disclosures in financial decision-making, including the types of decisions, decision-useful elements of disclosures, and desired improvements to disclosures. Given the relatively small sample size of user respondents, the Task Force cautions that the results may not be representative of the broader population of users of climate-related financial disclosures.

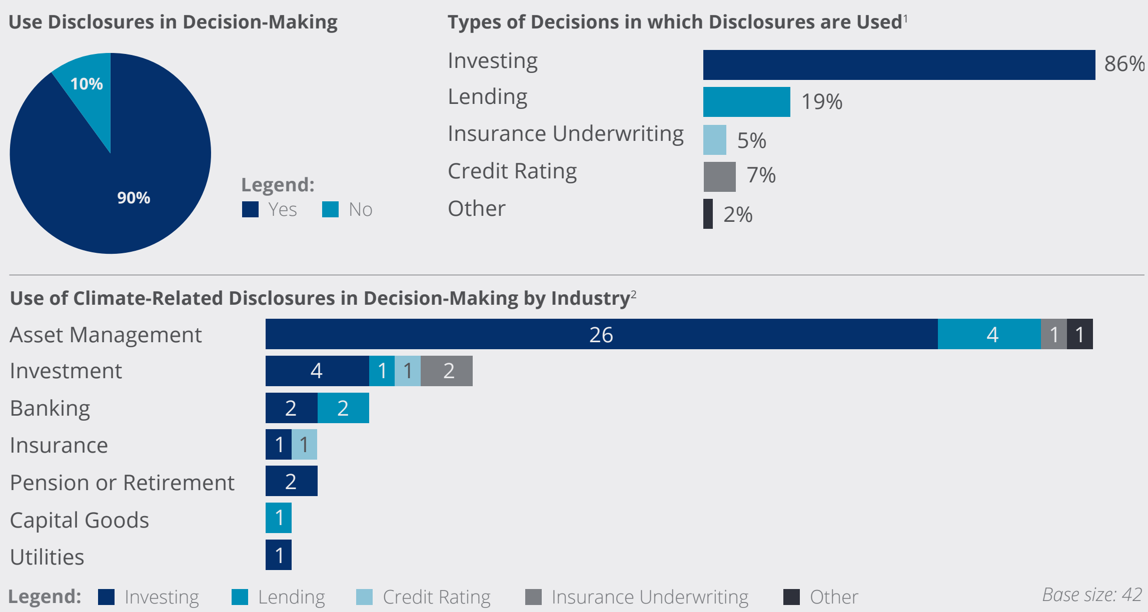
As shown in the upper left chart in Figure B8, 90% of user respondents indicated they use climate-related financial disclosures in making financial decisions. Of those respondents, 66% indicated such disclosures factor into the way they price financial assets. In addition, as shown in the upper right chart, 86% of respondents use such disclosures in making investing decisions, and 19% use them in lending decisions. The bottom chart in Figure B8 provides a breakdown by industry of the types of decisions in which climate-related financial disclosures are used.

The Task Force also asked user respondents to rate the usefulness of information disclosed in alignment with its 11 recommended disclosures for financial decision-making as very useful, somewhat useful, not very useful, or not at all useful. In response, the majority of users rated the information aligned with the recommended disclosures as very useful with the exception of *Strategy c)* and Scope 3 GHG emissions under *Metrics and Targets b)*, as shown in Figure B9 (p. 65). For these two, 38% of user respondents rated them as very useful. When combining responses for very useful and somewhat useful, 98% of user respondents indicated *Strategy b)* — the impact of climate-related issues on a company's businesses, strategy, and financial planning — is useful for making financial decisions. These results are consistent with a survey conducted for the 2020 status report, in which users were nearly unanimous in identifying

Figure B8

Use of Climate-Related Disclosure in Decision-Making by Industry

Percent or Number of Respondents



1 Since respondents could select multiple options, the sum across decision types is greater than 100%.
2 Respondents could select multiple types of uses (investing, lending, etc.).

the actual impact of climate-related issues on a company's businesses and strategy — out of 60 specific disclosure elements they were asked to rate — as the most useful for decision-making.[60] In terms of information that users rated as the least useful across the 11 recommended disclosures, 17% identified *Governance a),* Scope 3 GHG emissions under *Metrics and Targets b)*, and *Metrics and Targets c)* as not very useful, and an additional 2% identified the latter two as not at all useful for decision-making.

To gain insight on improvements needed in climate-related financial disclosures, the survey asked user respondents how companies could improve the usefulness of their disclosures. Nearly 80% indicated including standardized, industry-specific climate-related metrics in disclosures would improve their usefulness for decision-making. In addition, around 70% of user respondents identified the following improvements companies could make to increase the usefulness of climate-related financial disclosures:

- disclose the actual and potential financial impacts of climate-related issues on their businesses, strategies, or financial planning;
- use a standard scenario to assess the resilience of their strategies to climate change;
- report climate-related targets in a consistent way across companies; and
- increase the number of companies disclosing climate-related financial information.

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Figure B9

Usefulness Rating by Recommendation

Percent of Respondents

Recommendation	Recommended Disclosure	Very Useful	Somewhat Useful	Not Very Useful	Not at all Useful
Governance	a) Board Oversight	55%	28%	17%	0%
	b) Management's Role	60%	33%	7%	0%
Strategy	a) Risks and Opportunities	55%	38%	7%	0%
	b) Impact on Organization	50%	48%	2%	0%
	c) Resilience of Strategy	38%	48%	12%	2%
Risk Management	a) Risk ID and Assessment Processes	64%	26%	10%	0%
	b) Risk Management Processes	67%	26%	5%	2%
	c) Integration into Overall Risk Management	62%	29%	7%	2%
Metrics and Targets	a) Climate-Related Metrics	57%	33%	10%	0%
	b) Scope 1, 2 GHG Emissions	64%	24%	10%	2%
	b) Scope 3 GHG Emissions	38%	43%	17%	2%
	c) Climate-Related Targets	52%	29%	17%	2%

Base size: 42

Legend: Low to high percentage of responses

60 TCFD, *2020 Status Report*, October 29, 2020, pp. 27-33.

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On the issue of standardized, industry-specific climate-related metrics, the Task Force recognizes these are fundamental inputs for investors and other users to evaluate companies' material climate-related risks and opportunities. The Task Force also recognizes — as noted in previous reports — that industry associations, standard setters, and similar organizations are best positioned to identify and define relevant, industry-specific metrics and notes the International Sustainability Standards Board's inclusion of industry-specific climate-related metrics in its proposed standards on climate-related disclosures.[61,62] In addition, the European Financial Reporting Advisory Group (EFRAG) is in the process of developing sector-specific standards.[63]

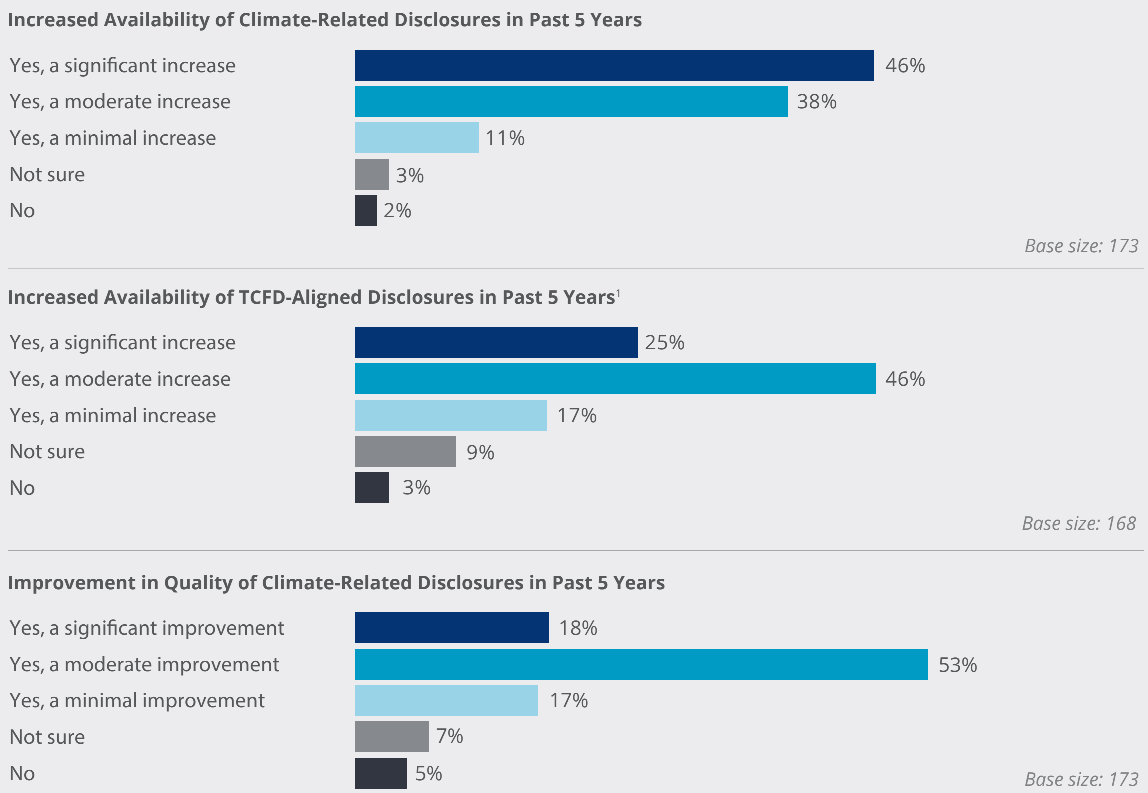
Additional Survey Insights

The survey asked a few additional questions that the Task Force believes are worth highlighting. The Task Force was interested in understanding the views of users and other organizations (non-preparer respondents) on the availability and quality of climate-related financial disclosures over the past five years. As shown in Figure B10, 84% of respondents saw a significant or moderate increase in the *availability* of climate-related financial disclosures over the past five years, and 71% saw a significant or moderate improvement in the *quality*.

Figure B10

Trends in Climate-Related Financial Disclosures

Percent of Respondents



1 This question was asked of respondents that indicated they were familiar with the TCFD recommendations.

61 TCFD, *2020 Status Report*, October 29, 2020 and TCFD, *Guidance on Metrics, Targets, and Transition Plans*, October 14, 2021.
62 International Sustainability Standards Board, *Exposure Draft: IFRS S2 Climate-related Disclosures*, March 31, 2022.
63 The European Financial Reporting Advisory Group (EFRAG), *Cover Note for Public Consultation: Draft European Sustainability Reporting Standards*, April 29, 2022, p. 10.

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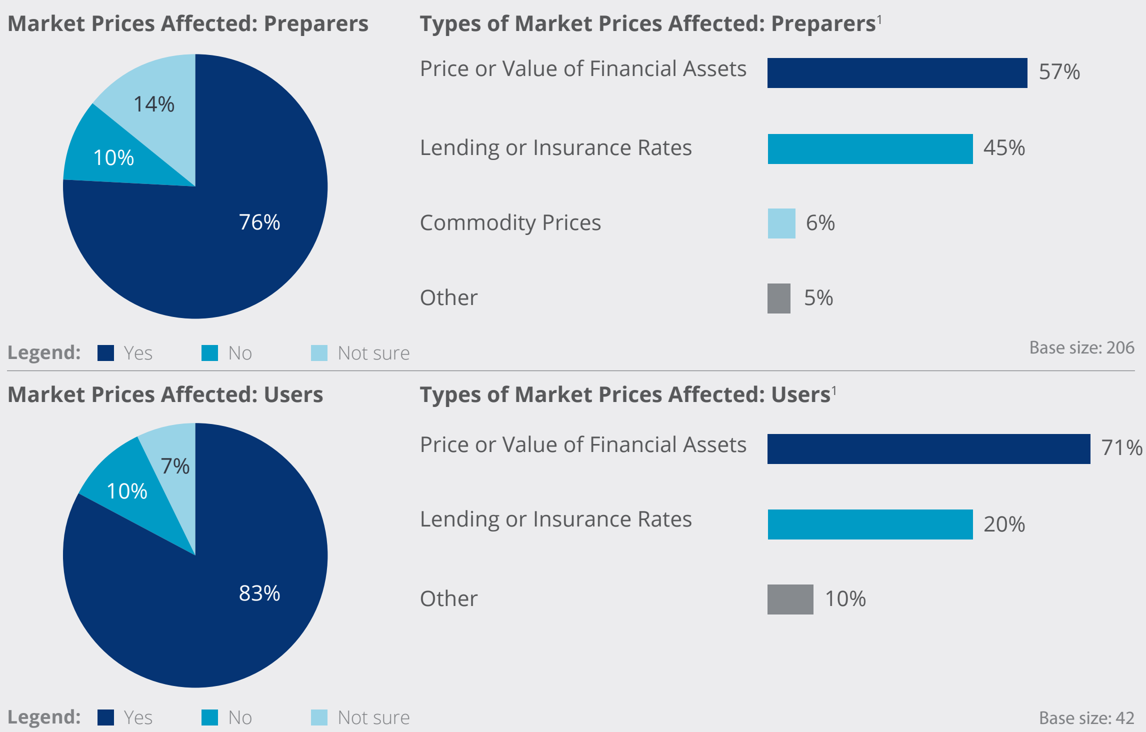
With one of the key milestones from the Task Force's 2017 report relating to more appropriate pricing of climate-related risks and opportunities, the survey asked both preparer respondents and user respondents whether they see climate-related issues affecting market prices — specifically in the prices or values of financial assets or as a differential in lending rates or insurance rates. Figure B11 provides the responses of preparers (in the top half of the figure) and users (bottom half of the figure). Seventy-six percent (76%) of companies implementing the TCFD recommendations indicated they see climate-related issues affecting market prices, with 57% seeing an effect in the prices or values of financial assets and 45% seeing an effect in lending or insurance rates. In addition, 6% of preparer respondents specifically highlighted effects on commodity and energy prices. In terms of user respondents, 83% indicated they see climate-related issues affecting market prices, with 71% seeing an effect in the prices or values of financial assets but only 20% seeing an effect in lending or insurance rates. The significant difference between the percent of users seeing an effect in prices or values of financial assets compared to lending or insurance rates may be driven by the composition of user respondents as 69% came from the asset management industry.

Figure B11

Climate-Related Issues Affecting Market Prices

Percent of Respondents



1 Since respondents could select multiple options, the sum is greater than 100%.

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2. IMPLEMENTATION PATHS OVER TIME

As part of its evaluation of progress associated with the milestones identified in 2017 related to the further development and completeness of companies' climate-related financial disclosures (see milestones in Figure B1, p. 53), the Task Force reviewed five fiscal years of reports for a small group of companies. The purpose of the review was to understand whether companies' disclosure of TCFD-aligned information became more complete and comprehensive since the publication of the TCFD recommendations. The Task Force also sought to identify possible themes in the types, comprehensiveness, and locations of TCFD-aligned disclosures that may be useful for companies in the early stages of implementing the TCFD recommendations.

Scope and Approach

Since the primary purpose of the review was to better understand the evolution of TCFD-aligned disclosures over the past five fiscal years, the Task Force used a review population of large public companies that indicated support for the TCFD recommendations in 2017 or 2018.[64] The largest companies were selected because they were more likely to disclose climate-related information than smaller companies based on findings from the AI review this year and in previous years; and early TCFD supporters were chosen based on an assumption that they were more likely to disclose TCFD-aligned information than companies that had not indicated their support for the TCFD.[65]

The Task Force reviewed the same types of reports used in the AI review — financial filings, annual reports, integrated reports, and sustainability (or equivalent) reports — for each of the five fiscal years. Since the number of reports that would need to be reviewed for each company would likely be somewhere between ten and 15 over the five-year period, the Task Force limited the number of companies to be reviewed to 12. The 12 companies were drawn from six industries that align with groups highlighted in the Task Force's 2017 report.[66] The review was structured to identify the types and comprehensiveness of information disclosed in line with each of the Task Force's 11 recommended disclosures in each fiscal year and for each report type.

Summary of Findings

While the analyses of larger populations of companies in other sections of this report address broader developments on climate-related financial disclosure, this review provided several insights into the paths individual companies committed to TCFD implementation have taken. The Task Force's observations over the five-year period show progress in line with the implementation milestones identified in 2017. Consistent with the expectation that disclosures would develop and become more complete over time, the review found that all 12 companies improved the completeness (i.e., more types of information in line with the TCFD recommendations) and comprehensiveness (i.e., level of detail) of their disclosures since 2017. Major themes from the review are summarized in this subsection.

General Themes

In its 2018 status report, the Task Force noted that "implementation of its recommendations is a journey and companies are in different places in terms of their exposure to climate-related risks and opportunities and their reporting capabilities."[67] As noted in that same report, the Task Force believes it is important for companies to begin disclosing as soon as practicable and enhance their disclosures over time. Consistent with this approach, the 12 companies reviewed generally started with some baseline information related to the Task Force's four recommendations in their 2017 fiscal year reporting but often did not address all elements of the 11 recommended disclosures. Their disclosures were not a one-time or static exercise, as evidenced by changes in completeness, comprehensiveness, format, content, and location of individual companies' disclosures over the five years of reporting. By the end of the review period, all companies had addressed more elements of the recommended disclosures and provided additional detail in their disclosures. However, even these 12 large, TCFD-supporting companies do not appear to have completed their disclosure journeys, as information gaps remain. In addition, future

64 A few of the companies became TCFD supporters after 2018, but all companies reviewed reported TCFD-aligned information for fiscal year 2017 reporting.
65 The Task Force identified the largest companies based on total assets for financial institutions and total revenue for non-financial companies. All companies reviewed reported some level of TCFD-aligned information.
66 The six industries include Banking, Insurance, Energy, Materials and Buildings, Transportation, and Agriculture, Food, and Forest Products.
67 TCFD, *2018 Status Report*, September 26, 2018, p. iii.

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disclosures will likely be influenced by new and evolving climate-related disclosure requirements, tools, methodologies, and investor expectations.

Regarding the location of disclosures, several companies integrated additional TCFD-aligned information into their mainstream reports — including financial filings — over the five-year period. While several of the reviewed companies did not include TCFD-aligned information in 2017 financial filings, all 12 companies implemented the TCFD recommendations in their financial filings to some extent by 2021. The majority of climate-related disclosures were located in sustainability reports in all five fiscal years, but the review found that over time there was a notable increase in disclosure in annual and integrated reports. A few of the companies did not describe any significant actual or potential impacts from climate-related issues, but still worked toward disclosing in line with the other TCFD recommended disclosures in sustainability or annual reports by 2021. This may be an indication that those companies view climate-related issues as mainstream business and investment considerations even if they do not consider those issues directly material to their business today.

In terms of the structure of disclosures, some companies disclosed in a consistent format year-to-year while others changed the format of their reporting over the five years of review. Most companies also incorporated indices or signposting pointing to the specific location of certain climate-related information across multiple reports. Several companies reviewed consolidated their climate-related disclosures more heavily in one type of report and further consolidated the disclosures *within* that report. For example, one common approach was the addition of a TCFD section addressing each of the Task Force's recommended disclosures. One company moved from releasing an annual sustainability report to presenting most information on a webpage with links to other relevant documents. The Task Force observed significant variation in different companies' presentation of climate-related information across all years, making the information difficult to compare across companies or, in some cases, even between years for the same company.

Implementation Paths by Recommendation

In addition to the general themes, the Task Force identified several trends for how disclosures related to the four recommendations evolved over the five-year period. Each of the following sections includes a high level, aggregate mapping of the completeness and comprehensiveness of the 12 companies' disclosures in 2017 compared to 2021. Completeness relates to the number of different disclosure elements addressed and comprehensiveness relates to the amount of detail provided for each disclosure element.

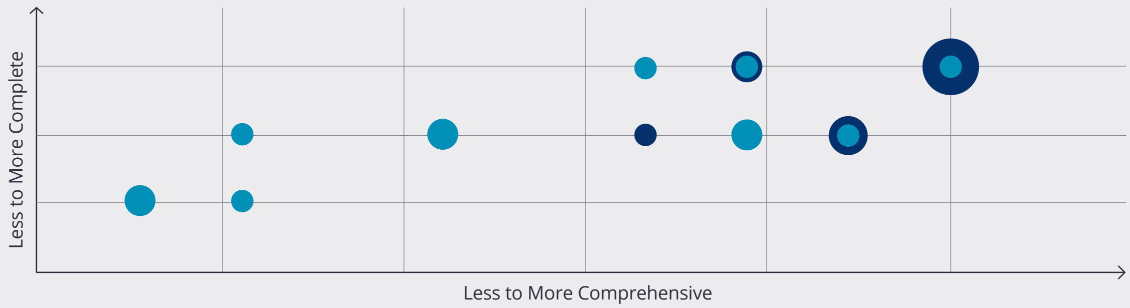
Governance

The companies' early disclosures on governance around climate-related issues varied more in their completeness and comprehensiveness than disclosures for any of the other three TCFD recommendations. As shown in Figure B12, around half of the companies reviewed disclosed fairly complete and comprehensive information

Figure B12

Governance Implementation

Disclose the company's governance around climate-related risks and opportunities



Legend: 2017 2021 The larger the circle, the more companies it represents (from one to six)

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on governance in their fiscal year 2017 reports, while others provided very little information. However, by 2021, all 12 companies disclosed relatively complete and comprehensive information in line with the two Governance recommended disclosures.

In particular, *Governance a)*, information on the board's oversight of climate-related risks and opportunities, was often one of the first recommended disclosures the companies addressed. Over time, several companies shifted from describing their board's oversight of broad sustainability topics to providing information on the board's oversight of climate-related issues specifically. The types of information disclosed included the titles of board committees or roles that oversaw climate-related issues, discussion topics or decisions from board meetings focused on climate-related issues, and board members' competencies and experience related to climate.

Similarly, most companies gradually increased the level of detail in their disclosures related to *Governance b)*, management's role in assessing and managing climate-related risks and opportunities. In 2017, most companies disclosed high-level information on *Governance b)*. However, by 2021, all 12 companies disclosed relatively detailed information on *Governance b)* compared to their 2017 reporting. In particular, the companies described more detail on relevant management positions and their responsibilities related to specific processes or climate-related initiatives. Examples of details provided on management's role include: setting strategic climate-related targets, overseeing the effective implementation of climate-related risk management, responsibility for relationships with external advisors on climate-related topics, and incorporating climate considerations into financing activities.

As the companies disclosed more information related to the TCFD's Governance recommendation, several began to use organizational charts to communicate their governance structure around climate-related issues. In the reports reviewed, organizational charts on climate-related roles also evolved to become more comprehensive over time, with added detail such as descriptions of responsibilities for each position shown or information on external resources that contribute expertise on climate-related issues.

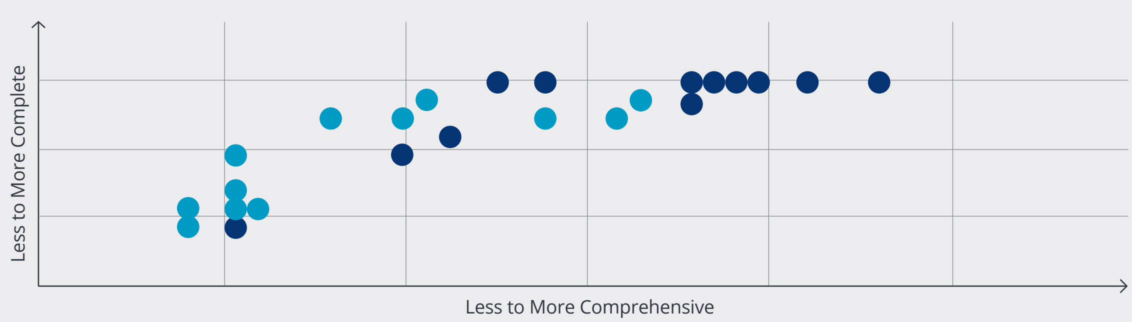
Strategy

All companies reviewed increased the comprehensiveness of information they disclosed over the past five fiscal years related to the Task Force's Strategy recommendation and most increased their completeness, as shown in Figure B13. However, there was significant variation in the way different companies described how climate-related issues have impacted their businesses, strategies, and financial planning — likely due to the complex and company-specific nature of such issues. The Task Force also observed opportunities for further evolution in disclosures to provide additional decision-useful information in future years.

Figure B13

Strategy Implementation

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



Legend: 2017 2021 The larger the circle, the more companies it represents (from one to six)

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For *Strategy a)*, climate-related risks and opportunities the organization has identified over the short, medium, and long term, many of the companies started by disclosing climate-related opportunities relevant to certain areas of their business along with broad, industry-wide climate-related risks. Early disclosures often did not include information on time horizons associated with risks and opportunities. Over the five-year period, most of the 12 companies began to describe specific climate-related risks that had impacted or could impact their strategy, business, or financial planning. In terms of location of disclosure, *Strategy a)* was one of the recommended disclosures most commonly addressed in financial filings. Other improvements in the comprehensiveness of disclosures included new information on time horizons and estimated likelihoods associated with a company's risks.

The Task Force also observed changes in how companies disclose information on *Strategy b),* the impact of climate-related risks and opportunities on the company's businesses, strategy, and financial planning, with many of the companies reviewed increasing the comprehensiveness of such information over the review period.

Most of the 12 companies also disclosed more comprehensive information on the impact of climate-related issues on their strategies compared to the impact on their financial planning. For example, most companies disclosed information on how they plan to address specific climate-related risks as well as current and planned actions to reduce GHG emissions. The few companies that disclosed information on financial planning focused on topics such as investments in research and development, acquisitions or divestments, and access to capital. While these disclosures generally became more quantitative over time, only a few companies disclosed estimates on the actual or potential financial impact of climate-related risks and opportunities.

In 2021, the Task Force released *Guidance on Metrics, Targets, and Transition Plans* (2021 metrics and targets guidance), noting that organizations that have made GHG emissions reduction commitments, operate in jurisdictions that have made such commitments, or have agreed to meet investor expectations regarding GHG emissions reductions should describe their plans for transitioning to a low-carbon economy.[68] More than half of the companies reviewed included information on transition plans in their fiscal year 2021 disclosures, with a few releasing comprehensive dedicated transition plan reports.

Early disclosure on *Strategy c)*, the resilience of the company's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario, tended to be limited to listing the scenarios that companies used to assess resilience, with little to no mention of the results or their application. Relative to other recommended disclosures, detailed information on *Strategy c)* was disclosed at a slower pace. However, in recent years of reporting, the Task Force saw several companies provide more comprehensive descriptions of the resilience of their strategies. In the Task Force's review, disclosures on *Strategy c)* were gradually supported by more quantitative findings from scenario analysis as well as quantitative targets related to resilience. By 2021, approximately half of the companies reviewed included some quantitative information in their description of the resilience of their strategy.

Risk Management

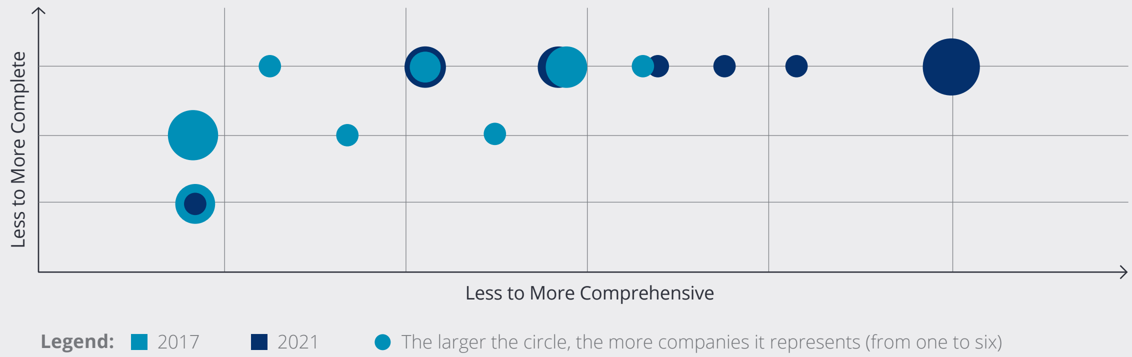
Similar to the other recommendations, disclosures related to the Risk Management recommendation generally became more complete and comprehensive over time. As shown in Figure B14 (p. 72), disclosure related to the Risk Management recommendation was less complete in 2017. However, by 2021, all but one company reviewed disclosed information in line with all three of the risk management recommended disclosures. Despite the disclosures becoming more complete, there were still significant differences in how comprehensive companies were in describing their risk management processes.

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

Figure B14

Risk Management Implementation

Disclose how the company identifies, assesses, and manages climate-related risks



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Over the five years reviewed, nearly all companies provided more complete and comprehensive disclosure on *Risk Management a)* — processes for identifying and assessing climate-related risks. In particular, most companies enhanced their descriptions of processes for assessing climate-related risks, including new information on tools used to assess the severity of their climate-related risks and determine how to respond to those risks. Multiple companies began to group their risks in line with the categories described in the Task Force's 2017 report, such as transition (including market and regulatory) and physical climate-related risks. Several companies described how they tailored their risk management approaches based on their risk groupings.

While companies' disclosures of their processes for identifying and assessing climate-related risks became more comprehensive over time, their disclosures related to *Risk Management b)* — processes for managing climate-related risks — remained high-level. The several companies that provided more comprehensive information over time most often focused on the governance and escalation processes surrounding climate-related risks. Examples of additional detail provided for *Risk Management b)* include processes for tracking certain key performance indicators or employing internal audits to test whether internal controls are effectively managing climate-related risks.

Of all of the Task Force's recommended disclosures, *Risk Management c)* — how processes for identifying, assessing, and managing climate-related risks are integrated into the company's overall risk management — was addressed most similarly across the companies reviewed. In general, the Task Force has observed reporting on *Risk Management c)* tends to be fairly high-level compared to the other recommended disclosures, which is consistent with the disclosures of the companies reviewed. A majority of the companies disclosed information in line with *Risk Management c)* in all years.

Notably, in its *2020 Guidance on Risk Management Integration and Disclosure,* the Task Force addressed a concern raised by companies on disclosures related to *Risk Management c)*.[69] Companies with climate-related issues integrated into existing risk management processes indicated making a separate or explicit climate-related financial disclosure is challenging. To address companies' concerns, the Task Force emphasized it did not intend for companies with comprehensive risk management processes that include climate-related risks to create separate processes or duplicate existing disclosures. It further noted that if a company's disclosures clearly describe its risk management processes and it is clear those processes cover climate-related risks, then no further disclosure may be needed.

Metrics and Targets

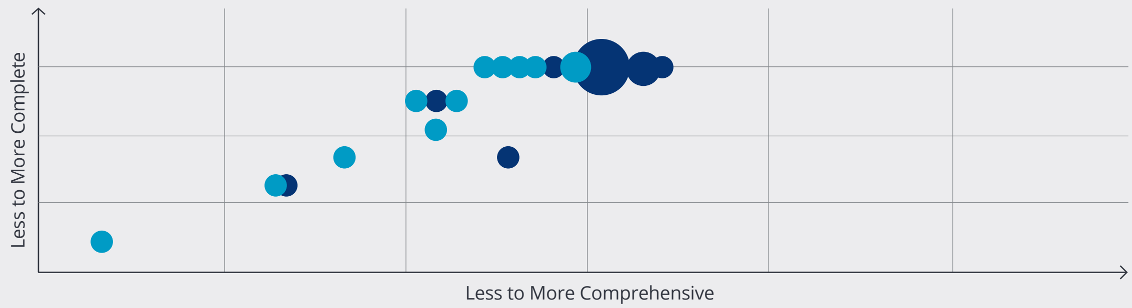
Most companies' early disclosures on metrics and targets were relatively complete compared to their disclosures related to the three other TCFD recommendations. Most of the 12 companies disclosed some climate-related metrics and targets in their fiscal year 2017 reporting. However, the review found that most companies added new metrics and targets or new detail to their original metrics and targets over the five-year period, as shown in Figure B15 (p. 73).

69 TCFD, *2020 Guidance on Risk Management Integration and Disclosure*, October 29, 2020, p. 19.

Figure B15

Metrics and Targets Implementation

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material



Legend: 2017 2021 The larger the circle, the more companies it represents (from one to six)

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For *Metrics and Targets a)*, disclosure of metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process, over half of the companies reviewed disclosed new metrics between fiscal years 2018 and 2021 compared to their fiscal year 2017 reporting. In the Task Force's 2021 metrics and targets guidance, the Task Force identified seven categories of climate-related metrics that all companies should disclose. Out of the seven categories, companies tended to incorporate metrics related to transition risks, climate-related opportunities, and capital deployment over the five fiscal years of reports reviewed. Furthermore, the Task Force observed that most companies started with more qualitative descriptions in those areas and provided more specific, quantified information by 2021.

Metrics and Targets b), Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions, and the related risks, was one of the most common disclosures in all years of reporting. In fiscal year 2017, nearly all companies disclosed at least Scope 1 and Scope 2 GHG emissions, and around half disclosed information on all three Scopes of emissions. By fiscal year 2021, all 12 companies disclosed Scope 1 and Scope 2 emissions, and all but one company disclosed Scope 3 emissions. Over time, the companies also provided more detail by reporting emissions across different categories, such as by region, business, or product.

However, most reports only included single year of GHG emissions information rather than presenting multiple years of GHG emissions using a consistent emissions calculation methodology, in a single report. As mentioned in the Task Force's 2021 metrics and targets guidance, presenting historical GHG emissions helps users better understand an organization's exposure to climate-related issues and the potential need to make stronger GHG emissions reductions in later years if earlier interim targets are not met.

In 2017, most companies reviewed disclosed on *Metrics and Targets c)*, targets used by the company to manage climate-related opportunities and performance against targets. However, several targets appeared to increase in size and strategic importance to the company over time. The most commonly disclosed targets across the five-year period of review were targets related to GHG emissions — particularly commitments to achieve net-zero emissions by a selected year — and capital deployment. Over the five-year period, companies tended to provide more comprehensive, quantified reporting on their progress towards targets. Additionally, a few companies incorporated figures in their reports showing historical performance against their targets.

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3. SUMMARY OF RESEARCH ON PRICING OF CLIMATE-RELATED RISKS

When the FSB created the Task Force in late 2015, there was growing concern that the physical and transition effects of climate change might contribute to changes in the value of financial assets and, depending on how those changes developed, raise financial stability concerns. For instance, inadequate information about climate-related risks could lead to a mispricing of assets and misallocation of capital, potentially giving rise to abrupt corrections leading to market vulnerabilities.[70] The FSB, therefore, highlighted the need for better information to improve understanding and analysis of climate-related financial risks and support more informed financial decision-making, in order to promote a smoother process of adjustment in asset prices in response to climate change.[71]

As part of the Task Force's review of progress associated with TCFD implementation over the past five fiscal years and relative to the key milestones identified in 2017, the Task Force reviewed various studies of climate-related risks and their effects on the market prices of financial assets, lending rates, and insurance rates.[72]

Scope and Approach

The Task Force reviewed over 100 peer-reviewed academic papers as well as other "grey" literature and articles to better understand the following:[73]

- whether *climate-related risks* are being factored into the prices of financial assets and products, and
- whether *climate-related disclosure* influences investment, lending, and insurance underwriting decisions regarding risk premia and prices paid for financial assets and products.

The Task Force reviewed studies looking at several types of financial assets and products including equities, bonds, real estate, bank loans, and insurance policies. Most of the studies focused on observed effects over the last ten to 15 years. This summary should be read as indicative and directional of the growing body of evidence of how markets are pricing climate-related risks, keeping in mind two contextual factors. First, the scope and methodologies used by the studies varied in how they accounted for and isolated the effects of climate-related risk from other price factors. Second, the relevant time-series data for pricing studies continues to evolve and deepen. Over the last couple of decades, this evolution has resulted in a gradually increasing level of information and disclosure for researchers to use, particularly over the last five years. Table B1 (p. 75) summarizes the studies referenced in this section. Appendix 5: References on Pricing of Climate-Related Risks contains the full list of studies reviewed, for further reference.

70 Carney, M., "Breaking the Tragedy of the Horizon — Climate Change and Financial Stability," September 29, 2015.
71 See FSB, "Proposal for a Disclosure Task Force on Climate-Related Risks," November 9, 2015.
72 The Task Force also surveyed preparers and users' experiences and perceptions about whether climate-related risks appear to be affecting market prices, valuations of financial assets, lending rates, and insurance rates by conducting a survey (see Section B.1. Adoption and Use of TCFD Recommendations for a description of survey results).
73 Grey literature is information produced outside of traditional academic publishing and distribution channels, and can include reports, policy literature, working papers, newsletters, government documents, speeches, white papers, etc. Grey literature (usually) does not go through a peer review process.

Table B1

Summary of Select Studies Reviewed

Study	Focus of Review	Time Frame	Geographic Focus	Type of Risk Studied	Effect on Pricing
Chen, L. and Gao, L.S. *The Pricing of Climate Risk.*	Stocks and Equities	Before 2016	U.S.	Transition Risk	Strong Evidence
Alessi et al. *The Geranium Matters: Evidence on the Pricing of Climate Risk.*	Stocks and Equities	Before 2016; 2016–2022	Europe	Transition Risk	Strong Evidence
Berkman et al. *Firm-Specific Climate Risk and Market Valuation.*	Stocks and Equities	Before 2016	U.S.	Physical Risk	Strong Evidence
Faccini et al. *Dissecting Climate Risks: Are they Reflected in Stock Prices?*	Stocks and Equities	Before 2016; 2016–2022	U.S.	Transition Risk: Short term Transition Risk: Long term Physical Risk	Strong Evidence No Evidence No Evidence
Allman, E. *Pricing Climate Change Risk in Corporate Bonds.*	Corporate Bonds	Before 2016 2016–2022	U.S.	Physical Risk	Mixed Evidence Strong Evidence
Anginer et al. *Climate Reputation and Bank Loan Contracting.*	Bank Loans and Credit Ratings	Before 2016; 2016–2022	U.S.	Transition Risk	Strong Evidence
Carbone et al. *The Low-Carbon Transition, Climate Commitments, and Firm Credit Risk.*	Bank Loans and Credit Ratings	Before 2016; 2016–2022	E.U. and U.S. Non-U.S. and non-E.U.	Transition Risk	Strong Evidence Some Evidence
Beirne et al. *Feeling the Heat: Climate Risks and the Cost of Sovereign Borrowing.*	Sovereign Bonds	2016–2022	Global	Transition Risk; Physical Risk	Strong Evidence
Clayton et al. *Climate Risk and Commercial Property Values: A Review and Analysis of the Literature.*	Real Estate	Before 2016; 2016–2022	Australia, Europe, and North America	Physical Risk	Mixed Evidence
Bakkensen, L. and Barrrage, L. *Flood Risk Belief Heterogeneity and Coastal Home Price Dynamics: Going Under Water?*	Real Estate	Before 2016; 2016–2022	U.S.	Physical Risk	Mixed Evidence
Geneva Association. *Climate Change Risk Assessment for the Insurance Industry.*	Insurance Premiums	2016–2022	Global	Transition Risk; Physical Risk	Some Evidence
Kolbel et al. *Does the CDS Market Reflect Regulatory Climate Risk Disclosures?*	Derivatives (Credit Default Swaps)	Before 2016 2016–2022 Before 2016; 2016–2022	U.S.	Transition Risk Transition Risk Physical Risk	Some Evidence Strong Evidence No Evidence

Legend:

Time frame
- Before 2016 (pre–Paris Agreement)
- 2016–2022

Type of Risk Analyzed
- Physical Risk
- Transition Risk

Evidence of Pricing of Climate–Related Risk
- Strong Evidence
- Some Evidence
- Mixed Evidence
- No Evidence

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Summary of Findings

Many of the reviewed studies found evidence suggesting that climate-related risks are increasingly being factored into prices for different types of products and services, particularly since the adoption of the Paris Agreement in 2015. The extent to which climate-related risks affect prices, however, varies based on the type of financial asset or product and the type of climate-related risk (e.g., transition versus physical).

In reviewing the literature, three themes emerge about climate-related risk and asset prices, as follows:

- First, climate-related risks that are expected to materialize in the near term are more likely to be incorporated into prices than those expected to materialize in the medium to longer term. Transition risk, therefore, seems to be more likely to be priced into financial markets than physical risk given its near-term potential materialization.
- Second, the effect of transition risk on prices has generally increased since the Paris Agreement in 2015 but varies over time with news and election cycles as new information emerges.
- Third, prices are a function of not only the specific climate-related risks of a company (as measured by some proxy such as GHG emissions), but also the uncertainties surrounding a company's future cash flows — uncertainty tends to raise risk premia.[74]

However, while the literature is directionally suggestive that asset prices underestimate climate-related risks rather than overestimate them, it does not present a uniform or unequivocal view.[75] Results differ along three major lines. First, some differences stem from the time frame of the study. Consideration of climate-related risk is a relatively recent phenomenon in asset markets. It is only in the last three to five years that a consensus seems to be emerging in the literature, and as such, it is important to take note of the timeframe analyzed by particular studies — more recent studies may be more indicative of the financial dynamics than earlier studies.[76] Second, studies take different approaches to measure climate-related risk exposure of companies. Some use indicators such as GHG emissions, environmental scores, or geographic proximity to physical risks such as sea level rise or wildfire risk. Other studies use companies' issuance of green bonds as an indicator of relative risks or construct portfolios of "carbon-efficient" assets to test investment returns. Third, other differences arise from the type of the climate-related risk studied. Assets are differentially exposed to physical and transition climate-related risk factors and these different types of risk often do not materialize at the same time.

Variation in Evidence by Asset Class and Other Variables

Most studies focus on the effects of climate-related risk on stock and bond pricing. Several studies found that stock prices tended to exhibit a price differential or risk premium due to the issuer's degree of climate-related risk.[77] Other studies found that corporate and sovereign bond prices showed evidence of yield differences and differences in credit ratings due to climate-related risk.[78] These results are consistent with an interpretation that investors are differentiating among companies on the basis of climate risks and demanding compensation for their exposure to climate-related risk.

74 Ilhan et al. *Carbon Tail Risk*, 2021, Review of Financial Studies, 34, pp. 1540-1571; Blyth et al., "Investment Risks Under Uncertain Climate Change Policy," November 2007, Energy Policy, 35, pp. 5766-5773; Avramov et al., ***Sustainable Investing with ESG Rating Uncertainty***, August 2022, Journal of Financial Economics; Chen, L. and Gao, L.S., *The Pricing of Climate Risk*, October 7, 2011, Journal of Financial and Economic Practice; and Jiang et al., *Information Uncertainty and Expected Returns*, 2005, Review of Accounting Studies, 10, pp. 185-221.

75 Stroebel, J. and Wurgler, J., *What do you Think About Climate Finance?*, November 2021, Journal of Financial Economics, 142, pp. 487-498.

76 Giglio et al., *Climate Finance*, June 18, 2021, Annual Review of Financial Economics, 13, pp. 15-36.

77 Chen, L. and Gao, L.S., *The Pricing of Climate Risk*, October 7, 2011, Journal of Financial and Economic Practice; Alessi et al., *The Geranium Matters: Evidence on the Pricing of Climate Risk*, October 2019; Berkman et al., *Firm-Specific Climate Risk and Market Valuation*, March 26, 2021; Bolton, P. and Kacperczyk, M., *Do Investors Care About Carbon Risk?*, April 2020, NBER Working Paper 266968; Bolton, P. and Kacperczyk, M., *Global Pricing of Carbon-Transition Risk*, February 2021, NBER Working Paper 28510; Karydas, C. and Xepapadeas, A, *Climate Change Financial Risks: Pricing and Portfolio Allocation*, November 2019, Working Paper 19/327, Economics Working Paper Series, ETH Center of Economic Research; and Trinks et al., *Greenhouse Gas Emissions Intensity and the Cost of Capital*, 2017, Working Paper 2017-017-EEF, University of Groningen, Faculty of Economics and Business.

78 Allman, E., *Pricing Climate Change Risk in Corporate Bonds*, March 31, 2021; Kling et al., "The Impact of Climate Vulnerability on Firms' Cost of Capital and Access to Finance," January 2021, World Development, 137, 105131; Seltzer et al., "Climate Regulatory Risks and Corporate Bonds," April 25, 2022, Federal Reserve Bank of New York Staff Reports, no. 1014; Beirne et al., "Feeling the Heat: Climate Risks and the Cost of Sovereign Borrowing," November 2021, International Review of Economics & Finance, 76, pp. 920-936; Painter, M., "An Inconvenient Cost: The Effects of Climate Change on Municipal Bonds," February 2020, Journal of Financial Economics, 135(2), pp. 468-482; Hauser, A., "From Hot Air to Cold Hard Facts: How Financial Markets are Finally Getting a Grip on How to Price Climate Risk and Return- and What Needs to Happen Next," October 16, 2020, Speech given by Andrew Hauser, Executive Director, Markets, Bank of England, to Investment Association, London; Cevik, S. and Jalles, J., *This Changes Everything: Climate Shocks and Sovereign Bonds*, June 2020, IMF Working Paper WP/20/79; and Baker et al., *Financing the Response to Climate Change: The Pricing and Ownership of US Green Bonds*, November 13, 2018.

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Studies focusing on real estate and insurance, however, had more mixed results in terms of pricing effects of climate-related risk. For real estate, climate news and the climate beliefs of buyers were found to affect the prices paid for real estate, and residential valuation practices that did not take climate-related risks into account often failed to generate strong pricing effects for residential properties.[79,80] Other studies looking at the effects of sea level rise on coastal real estate prices also found mixed results.[81]

Specific academic studies of climate-related risk pricing for insurance are limited. Many insurers, however, have acknowledged the rising climate-related costs of insurance claims and are beginning to raise premiums and deductibles, and limiting coverage.[82] One clear development, though, is the strong growth in insurance-linked bonds that allow insurance companies to transfer the underwriting risks of catastrophic climate events of a defined magnitude.[83] On the investment side, however, studies indicate that the industry response to climate-related investment risk has been more muted.

There is also some evidence that climate-related risk is affecting the pricing and terms of bank loans and other types of credit provision. For example, borrowers with higher climate-related risks bear significantly higher spreads, shorter loan maturities, more covenant restrictions, and a higher likelihood of collateral requirements.[84] Climate-related risk in the form of high emissions has also been attributed to higher credit risk, but disclosing emissions and setting a forward-looking target to cut emissions (particularly more ambitious targets) are both associated with lower credit risk.[85] One study found the magnitude of these effects to be economically meaningful and comparable to the effect of other standard determinants of credit risk such as firm leverage.[86]

Variation in Evidence by Physical and Transition Risk

Some studies attempt to disaggregate the effects of transition and physical climate-related risks on asset prices.[87] In general, this research found that those climate-related risks expected to materialize in the short-term were more likely to be factored into prices than those expected to materialize in the long-term.

These studies have generally found that transition risk is being priced into the market, especially following the 2015 Paris Agreement, but that physical risk was not being priced to the same extent in all cases. One reason proposed in the literature is that physical climate-related risks are sometimes perceived to be more remote. For example, rising sea levels are risks that appear less imminent and materialize in the long-term, hence they might not be factored into pricing to the same extent as short-term transition risks. The pricing of physical risks also may be affected by data quality and data gap problems as assessments often require detailed information on the location of company assets, their nature (type, vulnerability, adaptations), the use of localized or regional climate models, and challenges with acute event attribution to climate change.

Some studies have also found a difference within the transition risk category depending on when a particular risk is expected to be realized. For example, short-term transition risks, such as those influenced by a new government's political intentions and actions on climate change, require a much faster response compared to long-term transition risks such as implementation of a global climate policy, which would take much longer for a wider set of countries to reach a consensus.

79 Bakkensen, L. and Barrage, L., *Flood Risk Belief Heterogeneity and Coastal Home Price Dynamics: Going Under Water?*, February 2021, NBER Working Paper No. 23854; Baldauf et al., *Does Climate Change Affect Real Estate Prices? Only if You Believe in It*, February 14, 2020, The Review of Financial Studies, 33(3), pp. 1256-1295; and Clayton et al., *Climate Risk and Commercial Property Values: A Review and Analysis of the Literature*, UNEP FI, August 2021.
80 Clayton et al., *Climate Risk and Commercial Property Values: A Review and Analysis of the Literature*, UNEP FI, August 2021.
81 Baldauf et al., *Does Climate Change Affect Real Estate Prices? Only if you Believe in it*, February 14, 2020, The Review of Financial Studies, 33(3), pp. 1256-1295; Murfin, J. and Speigel, M., *Is the Risk of Sea Level Rise Capitalized in Residential Real Estate?*, February 14, 2020, Journal of Financial Studies, 33(3), pp. 1217-1255; Bernstein et al., *Disaster on the Horizon: The Price Effect of Sea Level Rise*, November 2019, Journal of Financial Economics, 134, pp. 253-272; and Giglio et al., *Climate Change and Long-Run Discount Rates: Evidence from Real Estate*, March 25, 2021, Review of Financial Studies, 34(8), pp. 3527-3571.
82 Marketplace, "The Changing Climate is Driving Up Home Insurance Claims, and Rates," October 28, 2021; Reuters, "Natural Disasters Cost Insurers $120 Billion in 2021, Munich Re Says," January 10, 2022; Vox, "The $5 Trillion Insurance Industry Faces a Reckoning. Blame Climate Change," October 15, 2021; and Geneva Association, *Climate Change Risk Assessment for the Insurance Industry*, February 2021.
83 NAIC, "Insurance-linked Securities," October 19, 2021.
84 Anginer et al., *Climate Reputation and Bank Loan Contracting*, November 15, 2021 and Jiang et al., "Can Firms Run Away from Climate-change Risk? Evidence from the Pricing of Bank Loans," September 2019.
85 Carbone et al., *The Low-carbon Transition, Climate Commitments, and Firm Credit Risk*, 2021.
86 Ibid. The study covered approximately 560 European and U.S. listed non-financial institutions observed over the period 2010 to 2019.
87 Faccini et al., *Dissecting Climate Risks: Are They Reflected in Stock Prices?*, Mar 3, 2021, (Revised Oct 1, 2021); Campiglio et al., *Climate Risks in Financial Assets*, November 2019, Discussion Note 2019/2, Council on Economic Policies; Bolton, P. and Kacperczyk, M., *Do Investors Care About Carbon Risk?*, April 2020, NBER Working Paper 266968; Bolton, P. and Kacperczyk, M., *Global Pricing of Carbon-Transition Risk*, February 2021, NBER Working Paper 28510; and Kolbel et al., *Does the CDS Market Reflect Regulatory Climate Risk Disclosures?*, June 2, 2020.

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For U.S. equities, one study found that only short-term transition risk is priced into U.S. stock returns, while physical risks, which may take longer to materialize, are typically not.[88] Similarly, for derivatives, another study found that transition risk increased credit default swap spreads, though it did not find such an effect related to physical risk.[89] The study also noted that this trend in factoring in transition risk was particularly evident following the Paris Agreement in 2015.

Transition risks appear to affect companies' credit ratings as well. One study found that high-emitting companies, implicitly exposed to transition risk, tended to have higher credit risk.[90] The study also noted that following the Paris Agreement, firms most exposed to climate-related transition risk saw their ratings deteriorate whereas other comparable firms did not. While these studies predominantly highlight the effect of transition risks, there is some indication that physical risk does affect certain assets classes. One study found that U.S. corporate bonds bearing physical risk in the form of sea level rise are issued at higher yields.[91]

Continued Refinement of Disclosure Standards is Important for Risk Pricing

The academic literature looking at climate-related risks and capital markets has been growing over the last ten years and covers most major asset classes. While these studies use different theoretical and empirical approaches, analytical techniques, and data sets to test whether climate-related risks are being incorporated into asset prices, many, if not most, of the studies reviewed point to evidence that climate-related risk may be increasingly incorporated into asset prices. Some experts, however, continue to believe that climate-related risks are underestimated rather than overestimated in the market.

Disclosure plays a necessary and crucial role in this pricing process.[92] Many of the reviewed studies note that inadequate disclosure — and thereby a lack of complete information — is one of the primary reasons that markets are not accounting for climate-related risks sufficiently.[93] But critically, such disclosures need to contain decision-useful information. One study cautioned that "while general information on the negative impact of climate-related risk on the economy is not in short supply, many investors believe the current generic language used in the limited climate-related risk disclosure of firms is uninformative, insufficient, and imprecise for investors, regulators, and policymakers to assess this risk."[94]

Attaining more complete and specific information on a company's climate-related financial risks calls for continued refinement of disclosure standards, development of comparable and efficacious risk metrics, and improved data quality and data management. Several initiatives are underway to address some of these challenges. For example, the International Sustainability Standards Board (ISSB) is working on a climate disclosure standard to serve as a global baseline, building on the TCFD framework. A number of regulators are also mandating climate-related disclosure related to the TCFD framework. The Task Force has also issued several technical guidance reports over the last two years to help improve disclosures. In particular, the TCFD's *Guidance on Metrics, Targets, and Transition Plans* describes a set of cross-industry, climate-related metric categories to support convergence in the disclosure of key climate-related risk metrics.

88 Faccini et al., *Dissecting Climate Risks: Are They Reflected in Stock Prices?*, March 3, 2021, (Revised October 1, 2021).
89 Kolbel et al., *Does the CDS Market Reflect Regulatory Climate Risk Disclosures?*, June 2, 2020.
90 Carbone et al., *The Low-carbon Transition, Climate Commitments, and Firm Credit Risk*, December 2021, European Central Bank Working Paper No. 2631.
91 Allman, E., *Pricing Climate Change Risk in Corporate Bonds*, March 31, 2021.
92 Alberti-Alhaybat et al., *Mapping Corporate Disclosure Theories*, June 29, 2012, Journal of Financial Reporting & Accounting, Vol. 10 No. 1, pp. 73-94; Francis et al., *Does Corporate Transparency Contribute to Efficient Resource Allocation?*, September 2009, Journal of Accounting Research, 47(4), pp. 943-989; Healy, P.M. and Palepu, K.G., *Information Asymmetry, Corporate Disclosure, and the Capital Markets: A Review of the Empirical Disclosure Literature*, September 2001, Journal of Accounting and Economics, 31, pp. 405-440; Leuz, C. and Verrechia, R.E, The Economic Consequences of Increased Disclosure, 2000, Journal of Accounting Research, 38, pp. 91-124; Stulz, R.M., *Securities Laws, Disclosure, and National Capital Markets in the Age of Financial Globalization*, August 2008, NBER Working Paper Series, Working Paper 14218, National Bureau of Economic Research; and Javidi, S. and Masum, A-A., *The Impact of Climate Change on the Cost of Bank Loans*, August 2021, Journal of Corporate Finance, 69, 102019.
93 Several studies also point to other weaknesses, barriers, or impediments to effective climate risk disclosure. See Bolstad et al., *Flying Blind: What do Investors Really Know About Climate Change Risks in the U.S. Equity and Municipal Debt Markets?*, September 16, 2020, Brookings, Hutchins Center on Fiscal and Monetary Policy; Monasterolo et al., *Vulnerable Yet Relevant: The Two dimensions of Climate-related Financial Disclosure*, November 27, 2017, Climate Change, 145, pp. 495-507; and O'Dwyer, B. and Unerman, J., *Shifting the Focus of Sustainability Accounting from Impacts to Risks and Dependencies: Researching the Transformative Potential of TCFD Reporting*, July 10, 2020, Accounting, Auditing, & Accountability Journal, 33(5), pp. 1113-1141.
94 Alberti-Alhaybat et al., *Mapping Corporate Disclosure Theories*, June 29, 2012, Journal of Financial Reporting & Accounting, Vol. 10 No. 1, pp. 73-94.

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C. Case Studies on Board Oversight

This section includes case studies from seven companies — three from the financial sector and four from non-financial industries. In the case studies, the companies describe their respective experiences in implementing the Task Force's Governance recommendation, specifically related to the board's oversight of climate-related issues (*Governance a*). In its 2017 report, the Task Force indicated climate-related financial disclosures should be subject to internal governance processes that are the same or substantially similar to those used for financial reporting, likely involving review by the audit committee (or a comparable board committee).[95] As such, the Task Force was interested in understanding companies' experiences implementing the recommendations in terms of board oversight. The case studies are intended to provide practical insights on and considerations for implementing governance around climate-related issues.

Key Takeaways from Case Studies

- Effectively managing climate-related issues generally requires engaging a wide range of stakeholders across the company. Defining key roles and responsibilities early in the process is important when engaging multiple functions.
- Companies should consider leveraging public disclosures of peers and other types of companies when developing and enhancing their climate-related financial disclosures.
- Companies in jurisdictions where climate-related financial disclosures may or will become mandatory should begin preparing as early as possible and disclosing available information (noting areas where further work is needed).

1. CASE STUDY BY A TELECOMMUNICATIONS COMPANY

Introduction

The Singtel Group is a leading telecommunications company, providing telecommunications and technology services to both consumers and businesses, predominantly in Singapore, Australia, and across Asia. We were an early adopter of TCFD and officially endorsed TCFD in 2017, the year the framework and recommendations were launched. We felt that the framework would be impactful for Singtel to adopt early on as it would further guide our rigor and approach to climate action. Our major stakeholders were also investors, lenders, and insurers who would eventually use and apply the framework to their portfolio companies and clients. Our adoption of the TCFD recommendations built on the earlier climate scenario analysis and network adaptation exercise we undertook in 2016. In addition, our use of the TCFD recommendations built on the Singtel Group's science-based emissions targets which were approved by the Science Based Targets initiative (SBTi) in 2017, the first company in Asia (ex-Japan) to receive such approval.

Evolution of Board Oversight of Climate-Related Issues

The TCFD recommendations were useful for us, as they provided a solid governance, strategy, risk management, and metrics and targets framework to organize our thinking and help us identify areas in which we could enhance our company's climate-related response. Specifically, in the context of board governance, our board was less involved in the formal oversight of climate-related issues prior to adopting the TCFD recommendations in 2017. Over time, and with the guidance of the TCFD recommendation framework, we increased the rigor of our board oversight of climate-related issues.

Since 2014, a few years prior to adopting the TCFD recommendations, we undertook formal stakeholder engagement and materiality assessments for sustainability topics, including

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

climate. This exercise was used to prioritize environmental, social, and governance (ESG) issues that were important to stakeholders and had high potential business impact in the medium to longer term if left unaddressed. Prior to 2017, the materiality matrix was approved by the Management Committee which comprised the C-level suite and not by the board. Subsequent to TCFD and since 2017, the board reviews and approves all material ESG items, commitments, and associated mid- to long-term targets including climate-related targets. Finally, the board also reviews and approves the performance against our climate-related targets and signs off on disclosures, including climate-related disclosures, made in the sustainability report.

Furthermore, after adopting the TCFD recommendations, the Risk Management Committee, which reports directly to the Board Risk Committee (as shown in Figure C1), began to bring climate-related risk into their agenda. Subsequently, the Executive Resource and Compensation Committee started to tie formal climate-related KPIs to top executives' short- and long-term incentives. For all of our top executives, 10% and 20% of their short- and long-term incentives, respectively, are tied to ESG KPIs. Within those percentages, one-fifth of the KPIs are climate-related. The Finance and Investment Committee of the board also approves our ESG targets for sustainability linked loans and bonds as these are tied to climate- and GHG emissions-related targets.

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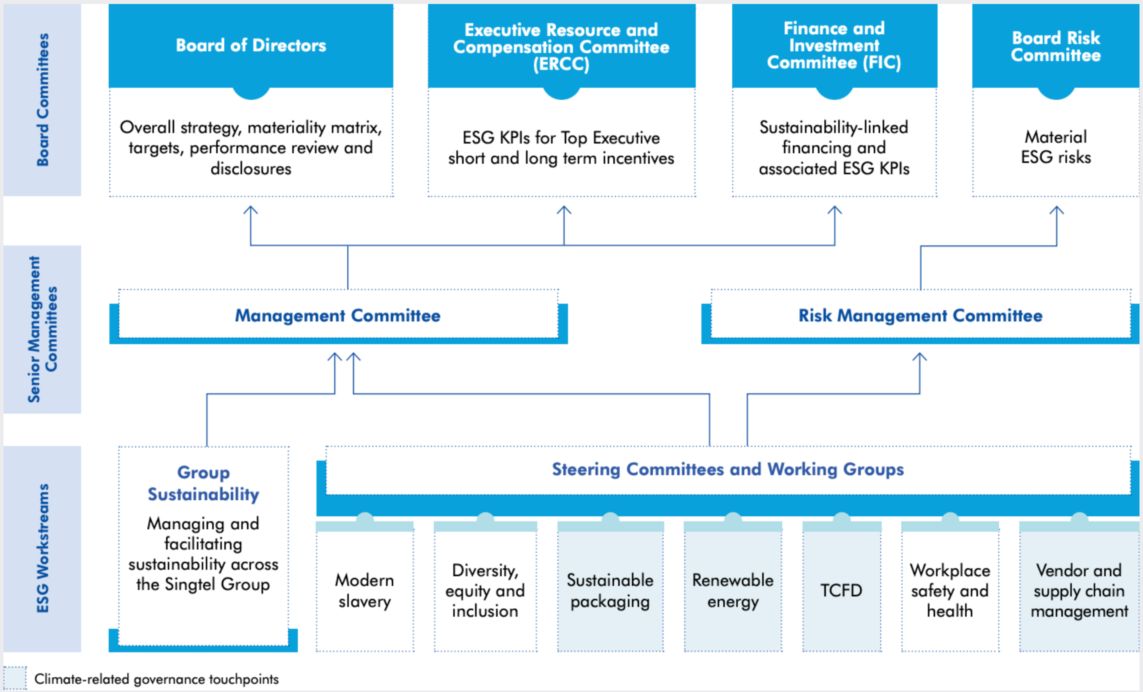
Figure C1

Sustainability Governance Structure



Singtel Group, Task Force on Climate-related Financial Disclosures 2022 for Singtel Group Operations in Singapore and Optus Operations in Australia, p.10

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Lessons Learned from TCFD Implementation

Singtel was an early adopter of the TCFD recommendations and started our climate journey relatively early. While we had some initial challenges operationalizing the TCFD recommendations in the early years as it was new and had little precedence, we probably face less challenges today compared to companies now rushing into TCFD and only beginning to think about their climate-related strategy due to regulations, mandatory disclosures, and investor pressure. Below are five perspectives and lessons we would like to share about climate change response and disclosures, based on lessons learned from our own challenges and anecdotal experiences from peers.

Firstly, companies should start building up their governance and response to climate-related issues proactively even if progressively, and before it is made mandatory by your government, stock exchange, or regulator. Companies need to begin developing their governance and climate-related analytical processes as early as possible as it is an iterative process of improvement. In our own example, our board had progressively taken a more formalized oversight role across different committees since we have adopted the TCFD framework. These changes were implemented incrementally, across multiple years. Some companies have shared with us that they found themselves caught off guard when the stock exchange and financial regulator introduced guidelines and expectations around climate-related disclosures as these cannot be established overnight. For example, company boards and management cannot set GHG emissions reduction targets before even undergoing an GHG emissions baselining exercise, and this took us several years to refine to the point it could be externally assured. While we had our Scope 1 and Scope 2 GHG emissions tracked and externally assured for many years, we only recently completed in 2022 a full analysis of all 15 categories of our Scope 3 GHG emissions with external assurance. The financial analysis of climate-related impact also takes time to model against different scenarios, test, and refine assumptions.

Secondly, as we were implementing the TCFD recommendations, we realized that it was not effective for boards and management to think in terms of climate jargon. Board members and top management are used to thinking about issues in terms of the financial drivers of the business. TCFD helped us think through how we could formally map climate-related physical and transition risks to the income and balance sheet impacts on the business. Specifically, we identified which of our existing financial drivers were indirectly and directly impacted from climate-related risk. This formal mapping exercise was instrumental to the subsequent financial impact modelling exercise undertaken by the business as it helped us identify existing financial information that can be leveraged.

Thirdly, companies at all points of their climate-related disclosure journey now do not need to reinvent the wheel of learning and start from ground zero. This was something we had to go through as an early adopter of TCFD. They can leverage the proliferation of public disclosures of other companies to leapfrog what is needed and how they approach climate-related issues and disclosures. We continue to read other leading companies' climate-related disclosures to identify areas that we can enhance our internal processes, actions, and disclosures.

Fourthly, we have gained a lot of climate-related knowledge from collective learning and sharing of information among companies. In the past we had run closed door business roundtables in Singapore with other Singaporean corporates, the Singapore Exchange, and climate experts to discuss how to best approach issues such as setting SBTi targets and implementing the TCFD recommendations. We have also contributed to TCFD articles and case studies with the Governance Institute of Australia and Singapore Institute of Directors. Climate change is a complex and systemic issue, and all companies are on similar journeys in figuring out how to manage climate-related issues. We strongly feel that these knowledge-sharing sessions help inform more impactful climate-related response. Corporates are also in a position to shape government policy for climate-related action, and in Australia we have joined forces with other leading Australian banks, insurers, and NGOs since 2013 to support research into the impact of climate change and natural disasters on economy, communities, advocating for policies that focus on building resilience, and not just disaster recovery.

Finally, even as corporates may be grappling with TCFD, there is the ISSB's proposed climate-related disclosure standards which are going through global consultation and will likely become the de facto integrated sustainability and financial disclosure standards. Going through the TCFD journey will help companies understand what is needed with the ISSB as it will leverage the same principles of having a

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company link the material impact of all their key sustainability issues to financial disclosures, and the same good governance required in scenario planning, risk management and having clear disclosures on targets, metrics, and performance.

2. CASE STUDY BY AN INSURANCE COMPANY

Introduction

Aviva plc (Aviva) is a multinational insurance, wealth, and retirement business headquartered in the UK. We first began disclosing in alignment with the TCFD recommendations in 2017 based on the TCFD draft recommendations and have since aimed to be a leader in climate-related disclosures. For instance, we are the first major insurer worldwide to target net zero by 2040 and have been at the forefront of publishing our portfolio warming, climate-related risk analysis, and transition plan.

Evolution of Board Oversight of Climate-Related Issues

To support implementing the TCFD recommendations, we developed a set of key metrics using the TCFD framework as guidance: climate value at risk, absolute operation carbon emissions, weighted average carbon intensity, investment in green assets, portfolio warming potential, monitoring sovereign holdings, and weather-related losses. This development was an important activity towards advancing our climate change response. As reflected in Figure C2 (p. 84), we leveraged these metrics to create our Climate Transition Plan, define and monitor our climate-related risk appetite, and set targets such as our net zero by 2040 goal. The development of these metrics, and the subsequent plans and targets, has also enabled us to implement a remuneration metric. Now, 5% of Aviva's 2021–2023 Long Term Incentive Plan is linked to the percent reduction in carbon intensity of shareholder assets.

All these advancements have led to more engaged board discussions over the past two to three years about how climate change and its related risks fits into Aviva's strategic business planning. The board has been increasingly engaged because our climate-related response is an important part of our strategy and because public disclosure of climate-related information requires a level of robustness similar to that of disclosed financial figures.

Now that we have brought in climate-related risks and opportunities into our business strategy, in line with our net zero by 2040 plan, climate is being discussed alongside topics such as customer growth, and the increased board focus on climate permeates all the way down.

Lessons Learned from TCFD Implementation

The main barrier for many companies towards disclosing climate-related information is that the data and methodologies for producing climate-related metrics over extended time horizons are still relatively immature compared to traditional financial metrics and there is considerable uncertainty in the underlying assumptions. There is a lack of standardized methodologies for calculating metrics, and the level of assurance is relatively low. Understandably, boards get nervous when it comes to new disclosures without the usual level of assurance. Our primary piece of advice for companies beginning to address climate related risks and opportunities is that they cannot wait until the data and methodologies are perfect to begin their disclosure journey.

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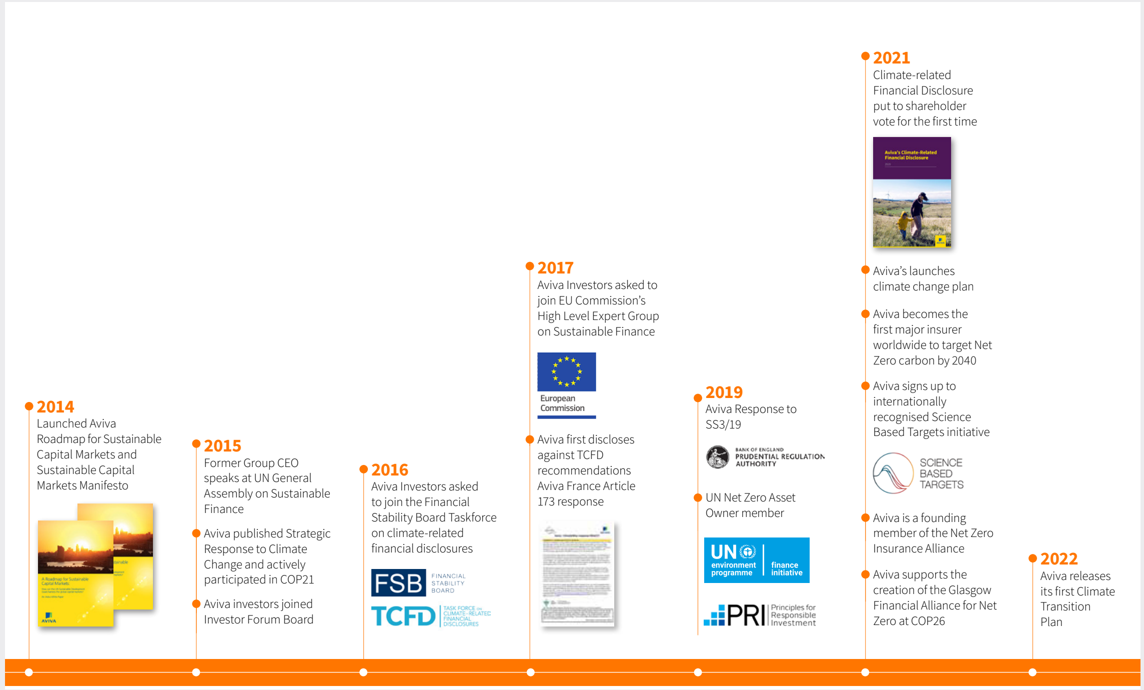
Figure C2

Climate Journey 2014–2022



Aviva plc, Climate-related Financial Disclosure, p. 4

We would advise others to provide transparency from the get-go by disclosing their climate-related plans, challenges, and areas where further work is needed. At Aviva, we recognize that some of our processes for producing climate-related disclosures are imperfect. For such areas, we are actively collaborating with others to find the answers collectively and to encourage more standardized disclosures across companies.

For companies in jurisdictions where TCFD-aligned reporting is not yet mandated, we would still recommend starting as soon as possible where practicable. For instance, all companies should be able to start disclosing their governance of climate-related risks and opportunities, or at least how they are changing their governance structure to encompass the topic of climate. As a second step, companies can disclose how they are capturing or plan to capture climate-related risks in their risk management framework. These disclosures can start off as qualitative rather than quantitative by disclosing areas which a company can expect high climate-related risk exposure. After doing that initial exercise, companies can start thinking about their strategy and transition plans.

Companies do not need to start disclosing all the 11 recommended disclosures all at once. They can begin by thinking about the things they can do, even if imperfectly, and focus on those initially. In Aviva's case, one of the first steps we took was developing our climate-related metrics for planning and progress tracking purposes. Since taking that first step, we have progressively expanded our oversight of climate-related issues to the point where climate is a core pillar in our business strategy.

Finally, from our experience, we believe that comprehensive climate-related disclosures benefit companies beyond just regulatory preparedness. The process of implementing climate-related disclosures can also help companies to start thinking of their response to climate change not just from a risk management perspective but also from a strategic perspective. Furthermore, based on Aviva's experience offering climate-conscious products, transparency and leadership in publishing climate-related disclosures can help companies to attract additional business.

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3. CASE STUDY BY A FINANCIAL SERVICES COMPANY

Introduction

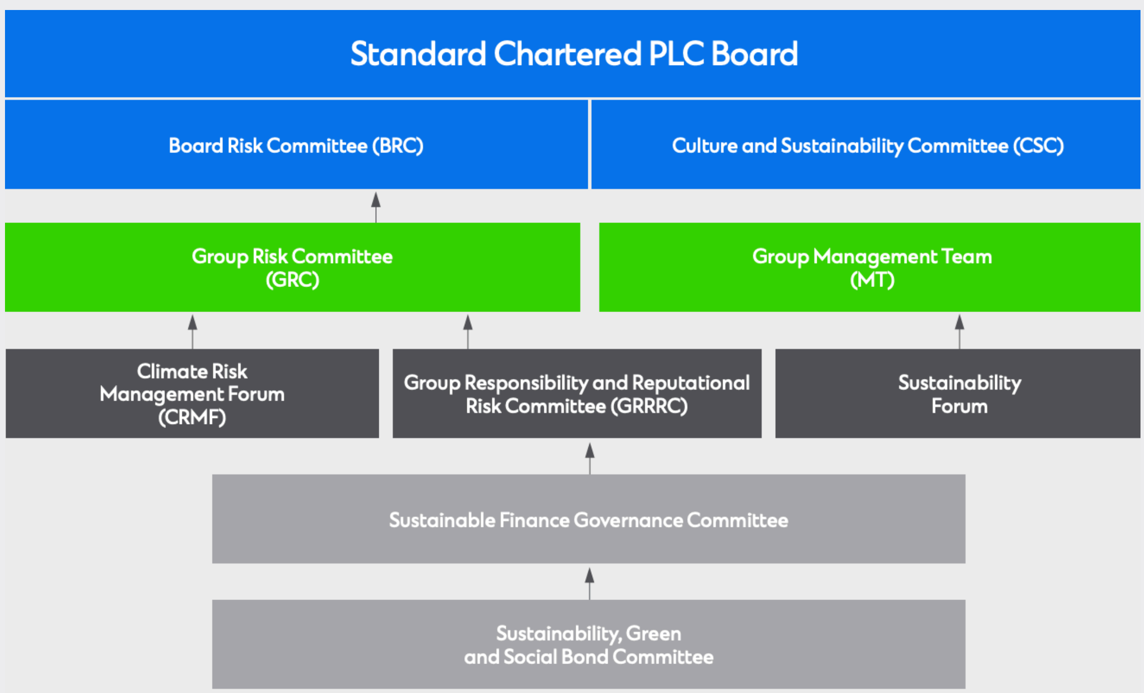
Standard Chartered PLC (SCB) is a leading international bank with a presence in 59 markets. We were an early supporter of TCFD and publicly committed to the recommendations of the TCFD in 2017 and have subsequently been reporting in alignment with the TCFD recommendations since 2018. SCB has made substantial progress in embedding climate-related issues throughout its organization, and our TCFD reporting has become more sophisticated over time. There are four themes that have come out of this evolution. First, by being an earlier adopter we spurred the development of other capabilities such as climate stress testing and establishing baselines for the financed emissions impact from our banking activities. Second, the level of governance and challenge has improved with each successive report. Third, we have worked with our clients to improve the availability of real economy climate data, especially in emerging markets. Fourth, we have emphasized the importance of seeing climate as both a potential financial risk and a business opportunity to help finance the transition.

Evolution of Board Oversight of Climate-Related Issues

SCB has several internal committees which support the board and management team in managing and monitoring climate change and its associated impacts, as shown in Figure C3 and as fully detailed in our TCFD Report. Over time, as climate-related risks and opportunities formed part of SCB's strategy and our climate risk oversight was enhanced, additional committees were formed to embed governance of climate-related issues into SCB.

Figure C3

Overview of Governance Structure



Standard Chartered PLC, Climate-related Financial Disclosures Report 2021, p. 11

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For example, our board formally elevated sustainability to become a strategic pillar in SCB's core strategy and integrated our climate-related strategy fully in SCB's Stand of Accelerating Zero, with a focus on three pillars: accelerating sustainable finance, reducing SCB's direct and financed emissions, and managing the financial and non-financial risks from climate change. SCB has focused on the importance of treating climate-related risk and sustainable finance as part of the same journey. This integrated climate and sustainability strategy was overseen and approved by our board which in turn is supported by our Culture and Sustainability Committee (CSC). The CSC is a board subcommittee which oversees SCB's overall sustainability strategy and monitors the implementation of the sustainability framework to align with SCB's net-zero goals. In addition, SCB's Sustainable Finance Governance Committee was set up in early 2019 to provide leadership, governance, and oversight in delivering SCB's sustainable finance offerings. The committee reviews and endorses sustainable finance products and guides SCB in identifying and embracing opportunities. It also guides SCB in reviewing the reputational risks relating to sustainable finance, including any greenwashing risks on sustainable finance products. As SCB's coverage of climate-related considerations and sustainable finance product offerings expanded across markets, we developed robust governance measures that escalate all the way to the board level. Over time, we have built a governance approach to managing climate and sustainable finance that is based upon transparency, expertise, governance, review, challenge, and verification.

When it comes to climate, a large part of SCB's focus has been in the context of net-zero alignment and how that translates through to business risks and business opportunities. For example, we have focused on the tradeoffs between more climate-focused opportunities versus more traditional opportunities. We have also worked with clients to focus on investment in low-carbon methods and technologies via transition opportunities. Moreover, in 2021 our board signed off on SCB's net-zero financed emissions by 2050 plan and approved our published net-zero methodology and roadmap via SCB's net zero white paper.

Modelling the impact of climate-related risk and SCB's net zero roadmap over long periods and across multiple dimensions was a challenge. This challenge was due to limitations in scenario data and pathways, client-specific data, and modelling review, among other reasons.

Estimating the impact has required SCB to take several new approaches, such as working with our clients to understand their climate-related risk preparations, sourcing new external data sources and models, and working with external consultants and academics to formulate credible plans and methodologies.

The SCB board is very involved in reviewing, overseeing, and monitoring the net zero roadmap. This process presents an opportunity for further education for our executives and board regarding the complexity of aligning to net zero. Overall, our board is increasingly aware of and interested in climate-related issues, especially given board members' connections to emerging markets, particularly across Asia, Africa, and the Middle East. These regions are at risk of being most impacted by climate change, where there is the most significant investment gap, and where investment would have the biggest impact.

As shown through these examples, over time, SCB's governance of climate-related issues has become increasingly embedded throughout the entire organization as climate and sustainability become a core strategic pillar.

Lessons Learned from TCFD Implementation

A key challenge of building rigorous internal governance of climate-related issues is bringing different teams together to embed climate-related considerations throughout the entire company. Among many companies, climate-related analysis often starts within risk teams. At SCB, climate-related risk was initially embedded in our governance, risk management, and scenario analysis processes and was incorporated into SCB's enterprise risk management framework. Climate-related risk is also designated as an integrated risk type, as the risks from climate change manifest through other existing risk types. To further enhance comprehensive climate-related risk management, SCB's view is that companies need to find a way to equally involve teams such as finance, risk, legal, compliance, and operations to help ensure the climate-related considerations are factored in holistically. SCB has dedicated a significant amount of time towards carving out the specific climate-related responsibilities across various teams and developing processes to transfer data between teams. For example, climate-related disclosures are developing with plans to be factored in as a core part of the financial reporting suite. By developing responsibilities across risk teams and formulating data sharing processes, SCB's finance team is able to have greater insight and contribute more effectively to climate-related financial planning and reporting, even though most of SCB's climate-related analysis emanates with the climate risk team.

For companies at the beginning of their journey to enhance their response to climate-related issues, SCB recommends that they spend a substantial amount of time and effort upfront towards defining key climate-related roles, responsibilities, and data transfer processes.

Finally, SCB's most fundamental piece of advice is that companies just need to get started. It is easy for companies to have a long list of reasons why climate-related risk management and disclosures will be difficult. Unless companies really start and get all the relevant people and teams involved, no significant progress can be made. There is a risk of "the perfect being the enemy of the good" when it comes to governance of climate-related issues and climate-related disclosure. SCB recommends starting by reporting baseline information and including the appropriate caveats on the need to evolve disclosures as data, knowledge, and frameworks become more sophisticated. Thus, transparency on the approaches taken to build up climate-related response and the associated challenges is helpful to move the collective state of knowledge forward. We encourage companies to leverage the increasing amount of external support available, from organizations such as the Net-Zero Banking Alliance, the Global Investors for Sustainable Development Alliance, the Taskforce for Scaling the Voluntary Carbon Markets, and the Glasgow Financial Alliance for Net Zero.

4. CASE STUDY BY AN ENERGY COMPANY

Introduction

INPEX CORPORATION (INPEX) is a global energy supply company headquartered in Japan. Our operations focus on research, exploration, development, production, and sales of oil, natural gas, renewable energy, and other related energy. We began disclosing climate-related information aligned with the TCFD recommendations in 2018. Over the past few years, we have adjusted our board-level governance of climate-related issues, a move that was in part influenced by the TCFD recommendations.

Evolution of Board Oversight of Climate-Related Issues

Prior to 2017, our Health, Safety, and Environment unit oversaw climate-related issues and raised significant issues to the board in collaboration with the Corporate Strategy & Planning unit as needed. In early 2017, we transferred responsibility for overseeing climate-related issues to the Corporate Strategy & Planning unit, within which we established a dedicated Climate Change Strategy Group in 2018. We also established the Climate Change Strategy Working Group (working group), composed of approximately 30 CEO-approved managers from each business and corporate division of the company. The working group assesses and manages climate-related risks and opportunities on an annual cycle and acts as an advisory body to the Sustainability Committee, which is chaired by the CEO (see Figure C4).

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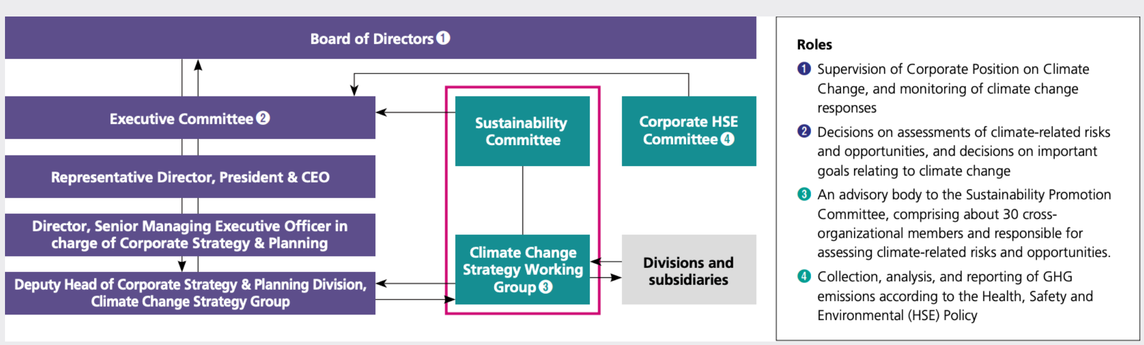
Figure C4

Governance Framework for Climate Change Response



INPEX, Sustainability Report 2022, p. 55

This change in governance was made because we thought it was important to factor climate-related issues into INPEX's main business planning and governance processes. Since the working group members are cross-divisional and sensitive to climate-related issues among their own business operations, establishing the working group helped enable the integration of company-wide inputs into our climate-related risk and opportunity assessment processes. In addition, our efforts to implement the TCFD recommendations further complemented this shift given the emphasis on involving and disclosing board oversight of climate-related issues as well as the impact of such issues on companies' businesses and strategies.

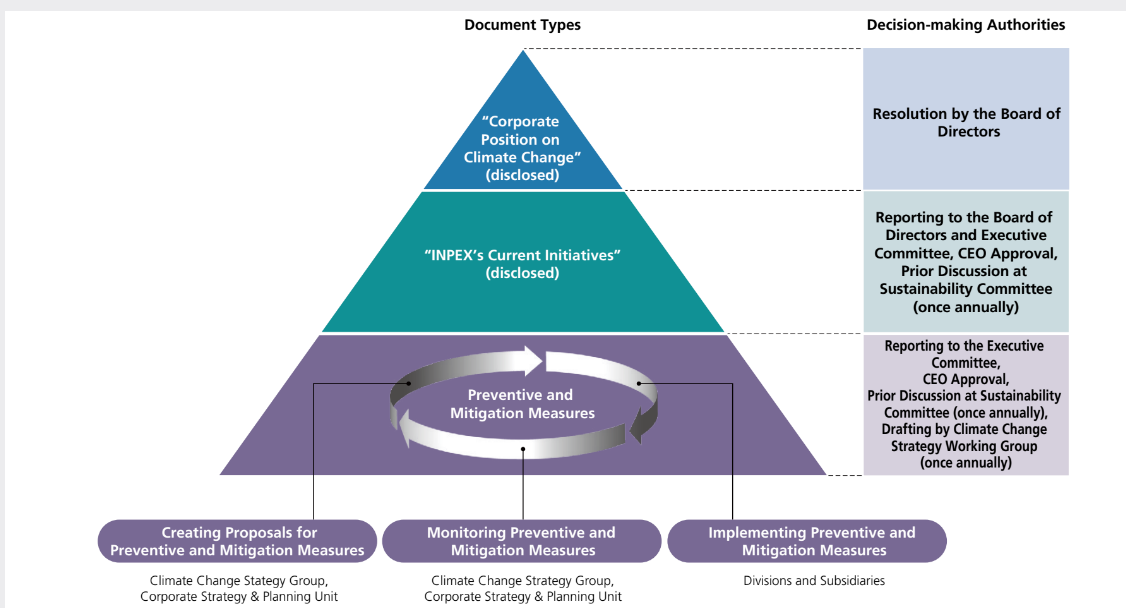
INPEX's progress against the company's overarching climate-related goals, risks, and opportunities have been annually reviewed by Corporate Strategy & Planning Unit. These overarching climate-related measures are outlined in our "Corporate Position on Climate Change" report, which was first released in 2015 and was recently revised in 2022 after approval by the board. The outcomes of this annual review are shared in our "INPEX's Current Initiatives" publication on a yearly basis, after being approved and/or reported to Sustainability Committee chaired by the CEO, Executive Committee, and the board (see Figure C5). Included in this annual review by the Corporate Strategy & Planning Unit is an evaluation of INPEX's progress against Scope 1 and Scope 2 net zero GHG emissions targets by 2050.[96]

In 2022, the climate-related opportunities that were captured in the process outlined in Figure C5 have been set as the basis of INPEX Vision @2022, our long-term strategy and medium-term business plan. Accordingly, our board began to oversee climate-related issues in a more cross-divisional and systematic basis. Our board reviews quarterly the progress of five net zero businesses strategies INPEX developed to achieve net zero by 2050. These five net zero business strategies include the following:

- developing a hydrogen business;
- reducing CO_2 emissions from oil and gas operations (promoting carbon capture utilization and storage);
- enhancing and emphasizing renewable energy initiatives;
- promoting carbon recycling and cultivating new business opportunities; and
- promoting forest conservation.

Figure C5

Process of Assessing and Managing Climate-Related Issues



INPEX, Sustainability Report 2022, p. 57

96 In January of 2021, INPEX's board approved these targets and receives annual progress updates from the company's relevant business units.

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In addition, we revised our compensation system to incorporate climate-related targets into bonuses for all of the company's representative directors and other internal directors. Specifically, we adopted GHG emissions intensity as a key performance indicator for stock-based compensation, which serves as a medium- to long-term form of incentive.

Lessons Learned from TCFD Implementation

While implementing the TCFD recommendations, we determined that climate-related risks and opportunities are not limited to discrete parts of INPEX's business but rather have significant implications to the company as a whole. As a result of the changes we made around governance, our board-level oversight of climate-related issues has become more embedded across our entire business. The establishment of the cross-divisional working group made clear the importance of a centralized and dedicated climate function with systematic processes in place. To effectively manage climate-related risks and opportunities, discussions should not be held in silos, but should include inputs from many divisions of the company.

Additionally, it was critical that we actively promoted climate-related response from the top. Our company's mindset around climate change shifted at all levels after we established our "Corporate Position on Climate Change" at the board level and culminated its momentum by announcing our medium- and long-term strategy under the leadership of a director and the CEO. Along with this mindset shift, we had the driver needed to continuously improve our internal governance of climate-related issues.

5. CASE STUDY BY AN ENERGY COMPANY

Introduction

Shell is a global group of energy and petrochemical companies with a presence in over 70 countries. Shell's Powering Progress strategy is to accelerate the transition of their business to net-zero emissions, purposefully and profitably.[97] Shell began publicly supporting and disclosing against the TCFD recommendations in 2017. While Shell previously included a mapping on their website of TCFD disclosures which could be found across various publications, in 2021 Shell integrated the TCFD reporting framework into their Annual Report and Accounts in accordance with UK listing rule requirements and to further enhance transparency and comprehensiveness of climate-related disclosures. This disclosure transformation for the 2021 Annual Report and Accounts was done in parallel with disclosures reflecting Shell's Powering Progress strategy which were communicated in early 2021. The transformation also paralleled the internal governance shift made in 2021, where Shell reshaped their organization to support delivery of the energy transition strategy.

Board Oversight of Climate-Related Issues

At Shell, transparency in climate-related disclosures, the shifts in the external landscape of reporting requirements, and the net zero target are all key factors in driving towards the rigorous oversight needed to execute an ambitious decarbonization strategy.

At the highest level, the board approves Shell's energy transition strategy and provides oversight of its implementation and delivery. Throughout the year, the board considers climate-related matters from assessing climate-related risk management policies, challenging and endorsing business plans and budgets, among other areas. Under the board, there are also the following three committees that play a key role in the governance of climate-related issues:

- The Safety, Environmental and Sustainability Committee reviews sustainability policies and practices including climate change and provides oversight of technical delivery in driving reduction of carbon emissions.
- The Remuneration Committee links compensation policies to climate-related targets to challenge and support management in their decarbonization efforts.
- The Audit Committee provides oversight of the effectiveness of Shell's internal controls and risk management framework, which include climate-related controls and risks, to ensure that the company's financial statements reflect the risks and opportunities associated with Shell's energy transition strategy and climate-related matters.

97 The companies in which Shell plc directly and indirectly owns investments are separate legal entities. In this report "Shell" is sometimes used for convenience where references are made to Shell plc and its subsidiaries in general.

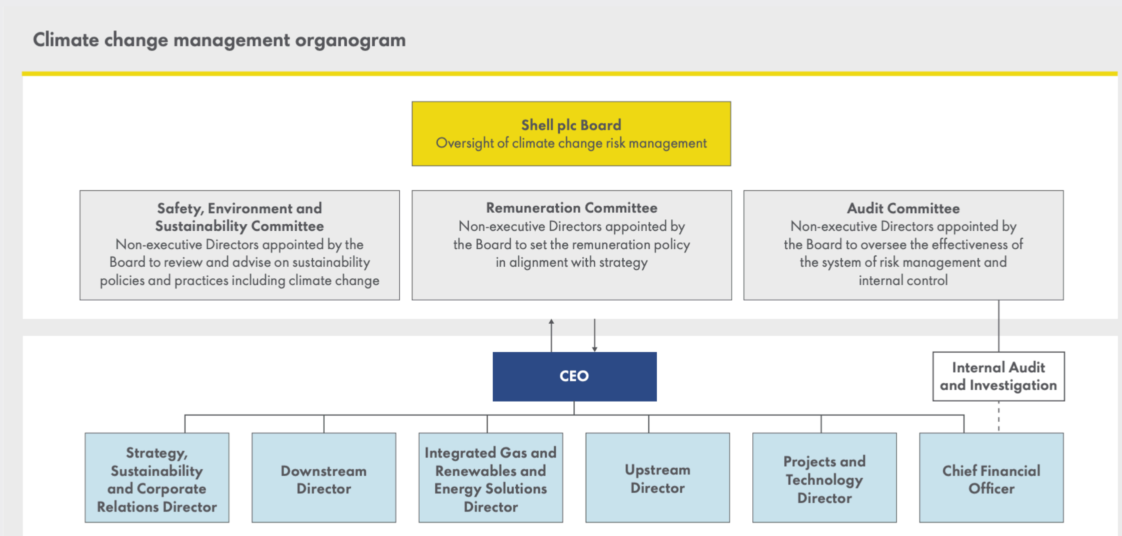
In addition to the executive board and three sub-committees in Figure C6, Shell has two supporting management committees: the Capital Investment Committee (CIC) and the Carbon Reporting Committee (CRC). In addition, a Carbon Management Framework (CMF) has been developed.

The CIC comprises senior executives including the CEO, CFO, and business directors and they facilitate portfolio management decisions ensuring climate risks and opportunities are embedded in investment decision-making.

The CRC is a cross-functional group that includes senior management representatives from the business, group strategy, finance, legal, and projects and technology. This committee is responsible for standards and methodologies for measuring and reporting GHG emissions-related metrics and ensuring that the company's external reporting complies with the many regulatory requirements relevant to Shell. In addition, the reporting output of the CRC supports management in internal decision-making.

Figure C6

Structure for Assessing and Managing Climate-Related Risks and Opportunities



Shell plc, Annual Report and Accounts 2021, p. 76

The CMF seeks to implement an approach to managing and reducing emissions similar to how Shell uses it's financial framework. The CMF helps set carbon budgets in Shell's operating plan and supports assessment of trade-offs which helps inform portfolio decisions.

Governance of climate-related risks and opportunities can be complex in that climate-related issues span the entire organization and touch everything that Shell does. Thus, Shell's governance structure aims to address this inherent complexity. Over the past years, Shell has created this cross-business and cross-functional governance structure for climate-related issues which spans multiple layers of the organization.

Lessons Learned from TCFD Implementation

A key challenge regarding climate-related disclosures today is the lack of one global standard and managing the current external fragmented disclosure requirements that companies need to comply with. Shell engaged externally to understand investor and stakeholders needs. Those engagements, for example, allowed Shell to understand the investors' focus on the risk of stranded assets, and the impact on asset values under different long-term oil and gas price parameters of various external climate-related scenarios. From engaging stakeholders extensively, Shell was able to navigate the many disclosure

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requirements while also focusing on providing informative disclosures to address investor and stakeholder requests.

When companies start their journey in designing governance of climate-related issues and climate-related disclosures, it is important to start with a clear strategy and board oversight but also to create dedicated, cross-functional, management groups early on. For Shell, the creation of the CRC and CMF enabled the integration needed across the organization to set targets, and then measure, report, and monitor progress against those targets. In addition, the formation of a cross-functional group with business, technical, strategy, finance, and legal involved helps enhance expertise across the organization and ensure Shell provide robust, transparent data and insights in internal and external disclosures.

6. CASE STUDY BY A MATERIALS AND BUILDINGS COMPANY

Introduction

Holcim is a Switzerland-based building materials company with four core business segments: Cement, Ready-Mix Concrete, Aggregates, and Solutions & Products. We began supporting the TCFD in 2017 and have since worked to become a global leader in innovative and sustainable building solutions.

Evolution of Board Oversight of Climate-Related Issues

Over the past few years, Holcim has undergone an acceleration in the robustness of our governance of climate-related issues, which has been integral in supporting the implementation of the TCFD recommendations. The acceleration stems from a key event: the board's creation of the Chief Sustainability and Innovation Officer (CSIO) position at the Executive Committee level.

While many companies have created sustainability positions recently, there is a key difference in creating this position *at the executive level*, as we did at Holcim. We decided to create the CSIO position at the highest level to ensure that climate change issues remained at the top of the company's agenda.

The creation of the CSIO position meant that climate and sustainability issues would now be embedded into the governance processes of the company. These issues are part of every core decision-making and strategy conversation. For instance, the CSIO is present at board meetings and frequently interacts with the board to discuss climate and sustainability topics, including ones related to the TCFD recommendations. The Executive Committee meets quite often, and with the CSIO as a member, climate and sustainability are part of the key discussion topics during these meetings. As such, while we previously undertook many efforts focused on climate and sustainability, the awareness of and focus on these topics has increased enormously in the last two to three years.

Beyond the new position, the board oversees climate-related issues primarily through the Health, Safety, and Sustainability Committee (HSSC), which was formed in 2017 to advise the board on all matters related to sustainable development. In addition, the Nomination, Compensation & Governance Committee (NCGC) is responsible for developing our Long-Term Incentive Plan, which incorporates metrics on the reduction of GHG emissions and waste recycled, among others. See Figure C7 (p. 92) for further detail on Holcim's governance structure.

Lessons Learned from TCFD Implementation

As Holcim has worked to embed climate and sustainability issues into our governance over the last several years, we have also improved how we communicate our progress as a company to our stakeholders. We have used the TCFD recommendations to help frame how we disclose such progress.

The building materials industry is relatively careful and conservative around making and announcing major changes. However, we believe it is important for Holcim to be a leader in our industry, which is part of why we made significant changes to our governance structure for climate and sustainability issues and why we were one of the earliest TCFD supporters. Holcim was also first mover on disclosing forward-looking net-zero targets and transition plans. With that came the challenge of balancing the desire to move quickly in defining our climate strategy while ensuring that we took a science-based and rigorous approach to support our public statements.

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Figure C7

Overview of Governance Structure[1]

The Board of Directors has the ultimate responsibility for the Group strategy and overall governance of the company, including Holcim's climate strategy.

Through the Audit Committee (AC) and the Health, Safety and Sustainability Committee (HSSC), the Board of Directors oversees Holcim risk management and Internal Control process, including sustainability and climate change-related risks and opportunities.

The entire Board of Directors is included in the Risk Management process and is thus regularly updated on climate-related risks and opportunities, as well as potential scenarios in carbon price regulation systems such as EU Emissions Trading System (EU ETS). The Holcim process for approval of major climate-related capital expenditures acquisitions and/ or divestitures, includes climate and other environmental and societal considerations in the assessment and ultimately requires the approval of the Board.

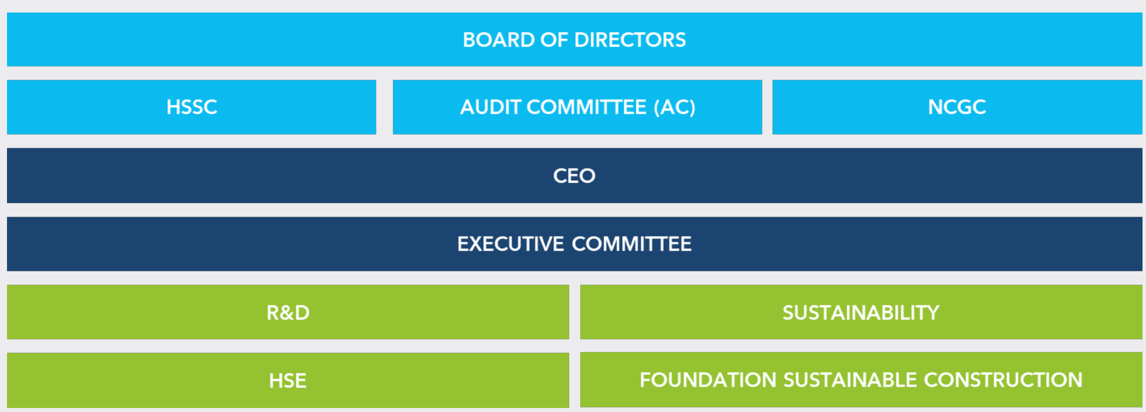
The Nomination, Compensation & Governance Committee (NCGC) proposes the objectives for the Long-Term Incentive Plan, which alongside financial metrics, also includes metrics related to the reduction of specific net CO_2, waste recycled and the reduction of specific cement freshwater withdrawals. These objectives are then approved by the Board of Directors.

The HSSC advises the Board of Directors on all matters related to sustainable development.

The HSSC reviews and approves the company's climate-related plans and targets. The HSSC consists of five Board members. The Chairman of the Board of Directors (unless they are a member of the HSSC), the Vice Chairman, the Group CEO, the Group Chief Sustainability and Innovation Officer (CSIO), the Group General Counsel, the Group Head of Security and the Group Head of Health, Safety and Environment participate as invited guests. The HSSC meets at least quarterly.

The HSSC supports and advises the Board of Directors on the development and promotion of a healthy and safe environment for employees and contractors, as well as on sustainable development and social responsibility.

In 2021, the HSSC held four meetings. The average duration of the meetings was approximately two hours. The president of the HSSC then reports to the Board on the conclusions of the meeting. In addition, as a member of the Executive Committee, the CSIO attends part of all Board meetings and presents the sustainability strategy at the Board strategy workshop.



Holcim, Climate Report 2022, p. 48

1 Some content was reformatted in order to fit the page.

At Holcim, prior to disclosing our net-zero targets, we built a bottom-up and top-down transition model to demonstrate to internal stakeholders that we had the capability to deliver on an ambitious pledge. This took considerable time and effort, as we involved over a hundred people from each of Holcim's key geographies and functions. The effort was successful, however, as our net-zero commitment received a highly positive response from both internal and external stakeholders. A key learning from this process was that senior level support and company-wide cooperation are critical in setting and disclosing public climate commitments.

We recommend that companies disclose information beyond just high-level net zero targets. Along with targets, companies should aim to disclose details on their underlying transition plan to achieve those targets. In particular, we advise companies with high GHG emissions exposure to back their climate-related commitments with credible and robust decarbonization strategies, developed prior to

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making any public commitments. If companies seek to announce targets while they are still in the process of developing their decarbonization roadmap, we recommend the inclusion of transparent caveats in their disclosures on what is still in progress. As transition plans continue to evolve, it is critical to follow up on these caveats in subsequent reporting cycles by disclosing progress and new details around the developed transition plan.

Thanks to our efforts in developing transition plans to support our net-zero targets, Holcim's transition pathway plan has cascaded down to a plant level, where each plant has in place a portfolio transition plan to meet internal targets and KPIs. With regards to strategic planning, we have learned that it is important to have both leading and lagging KPIs to track performance and react proactively. These plant-level KPIs are now integrated in our managers' and directors' bonuses to ensure our climate-related goals are embedded into our long-term incentives.

There are many resources to help companies get started. For example, at the start of our disclosure journey, we worked very closely with CDP on how to translate the TCFD recommendations into the most effective disclosures. Additionally, companies can leverage existing TCFD-aligned disclosures from their peers to understand what type of internal analysis others are undertaking and how they report on climate-related issues. Companies should take advantage of the many resources available to improve their climate strategy and associated disclosures. Most companies have a strong understanding of their GHG emissions impacts and just need to get started in building out a rigorous, science-based climate transition plan, and communicate that plan through effective and transparent disclosures.

7. CASE STUDY BY A PENSION PLAN INVESTOR

Introduction

CPP Investments is the professional investment management organization that invests the Canada Pension Plan (CPP) funds not currently needed to pay benefits. Our public purpose is to help provide a foundation upon which the CPP's 21 million contributors and beneficiaries can build their financial security in retirement. CPP Investments is one of two global pension plan investors represented on the TCFD and has been a strong supporter of the TCFD since its inception. Since joining the TCFD, we have worked to improve our own climate-related decision-making and associated disclosures, as well as those of our portfolio companies. A case study describing our approach to incorporating climate change into investment decisions and how the TCFD recommendations have helped informed this process is included in the Task Force's 2020 status report.[98]

As governments around the world continue to align their economies to net zero through Nationally Determined Contributions, companies operating in this landscape will increasingly be required to decarbonize. Against this backdrop, we believe that board of directors now have a responsibility to see that management teams have appropriately considered and integrated a transition strategy to decarbonize their business.

Evolution of Board Oversight of Climate-Related Issues

As described in our 2020 case study, CPP Investments' efforts to understand the financial impacts of climate change started more than a decade ago and will continue to accelerate in the coming years. The evolution of our journey toward decision-useful climate disclosure goes back to the strong tone from the top set by our CEO and board when we launched the Climate Change Program more than four years ago. At that time, climate change was defined in our corporate business plan as a leading issue facing our organization as a long-term investor — one that must be considered and fully integrated into our investment process and decision-making.

Implementing the TCFD recommendations has helped us define and develop our internal efforts and provided a common framework for engaging with portfolio companies. In particular, we focus significant time and attention toward disclosure by companies of their material climate-related factors and boards' oversight of these risks and opportunities. This focus is a key component of the TCFD's Governance pillar and is increasingly important as the global economy transitions to net zero. Engagement on companies' reporting has also led us to refine our metrics

98 TCFD, *2020 Status Report*, October 29, 2020, p. 59.

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and approaches to integrating climate-related information into our decision-making for CPP Investments.

As we continue to expand our own climate reporting, both in public disclosure and when reporting to our board, we value and advocate for clear, standardized methods and disclosures for understanding the decarbonization capacity of our portfolio companies. While initiatives like the Science Based Targets Initiative provide an objective appraisal of whether the plans are sufficiently ambitious and use appropriate levers to decarbonize, the market currently has no convention for issuers to report the economic feasibility of delivering against their commitments. We identified this gap as a new risk for issuers and investors relying on this forward-looking guidance.

To help address this gap, we developed an Abatement Capacity Assessment Framework (ACA Framework) to aid the boards and management teams of our portfolio companies in better understanding their current capacity to decarbonize, how to prioritize decarbonization levers as a catalyst for developing decarbonization strategies, measuring the financial impacts of decarbonization efforts, and in turn improving their climate-related disclosures.

The proposed ACA framework was published in 2021 and seeks to complement existing disclosures by providing additional critical information for directors and investors (see Figure C8, p. 95), who require concrete disclosure from management about a company's ability to abate GHG emissions under current state and possible future scenarios.[99]

CPP Investments is piloting use of the ACA Framework with select portfolio companies and on our own operational emissions. Our portfolio companies' use of this framework will also enable us, among other investors, to standardize the information we receive and help us track and disclose the climate-related impacts of our portfolio.

We have conducted this analysis for one of our U.K. portfolio companies. In less than two months, we were able to quantify the projected abatement capacity of the business, providing the board and executive team of that portfolio company with insights to help them develop a robust transition plan, and providing us confidence in the low risk of value impairment for this asset. While some of the emissions were deemed uneconomic to abate, the benefit of conducting this exercise is that management now has line of sight on where these emissions come from, which allows them to engage with technology providers to solution ways to reduce the cost of abatement overtime. See Box C1 (p. 95) for more information.

99 The proposal suggests that companies conduct Abatement Capacity Assessments in order to calculate and report Projected Abatement Capacity. The former is the process of allocating current GHG emissions to specific decarbonization drivers, e.g., efficiency, greening of power supplies and deployment of technology economic to abate under current and future carbon price assumptions. Once 100% of GHG emissions have been attributed, they are translated into a pro forma matrix of "projected abatement capacity." This matrix can provide a clear view of which emissions are economically viable to abate now, which emissions would become economic to abate at higher carbon prices, and lastly those emissions currently uneconomic to abate even at US$150/t$CO_2$e.

Figure C8

Template for Reporting Projected Abatement Capacity

Illustrative Example		Scope 1	Scope 2	Scope 3	Total	Scope 1	Scope 2	Scope 3	Total	
GHGs ($tGHG_e$)	G	G_1	G_2	G_3	G_t	1,500	800	2,500	4,800	
Efficiency	E	E_1	E_2	E_3	E_t	400	100	1,100	1,600	**33%**
Investment	I	I_1	I_2	I_3	I_t	200	100	1,100	500	**10%**
Renewables	R	R_1	R_2	R_3	R_t	100	200	100	1,300	**27%**
Current (proven) PAC	C	C_1	C_2	C_3	C_t	700	400	2,300	3,400	**71%**
as % of total		C_1 / G_1	C_2 / G_2	C_3 / G_3	C_t / G_t	47%	50%	92%	71%	
Economic @ $75 tCO_2e	Ec@75	EC_{75-1}	EC_{75-2}	EC_{75-3}	EC_{75-t}	50	200	–	250	**5%**
Economic @150 tCO_2e	Ec@150	EC_{150-1}	EC_{150-2}	EC_{150-3}	EC_{150-t}	400	200	100	700	**15%**
Long-term (probable) PAC	L	L_1	L_2	L_3	L_t	450	400	100	950	**20%**
as % of total		L_1 / G_1	L_2 / G_2	L_3 / G_3	L_t / G_t	30%	50%	4%	20%	
Closure/Abandonment	A	A_1	A_2	A_3	A_t	150	–	100	250	**5%**
Transformative Technology	T	O_1	T_2	T_3	T_t	150	–	–	150	**3%**
Removal of Offsets	O	O	O_2	O_3	O_t	50	–	–	50	**1%**
Uneconomic to Abate	U	U_1	U_2	U_3	U_t	350	–	100	450	**9%**
as % of total		U_1 / G_1	U_2 / G_2	U_3 / G_3	U_t / G_t	23%	–	4%	9%	

CPP Investments, Insights Institute

Box C1

Case Example: The Abatement Capacity Assessment Framework in Action

In 2022, we identified the opportunity to assess the decarbonization potential of one of our portfolio companies in order to create value and thus potential exit optionality. CPP Investments has a 100% ownership interest in this company which is part of our Real Assets portfolio.

This decarbonization exercise included piloting the application of our proposed ACA Framework on the company's operations. The results were promising. The company found that currently at least 64% of Scope 1 and Scope 2 GHG emissions could be removed using economically viable measures that exist today, like the replacement of elevators, the installation of more energy-efficient lights, smart lighting controls, and rooftop solar power systems. While 100% of Scope 1 and Scope 2 GHG emissions from the company's operations can be abated based on technological measures that exist today, not all of these measures are economically viable. The Abatement Capacity Assessment provided the company's board with concrete data and information to proceed with confidence along its decarbonization pathway. The company will look to accelerate the abatement of GHG emissions by taking a holistic view of revenue opportunities resulting from the decarbonization process and aligning its renewable energy strategy as it reflects on its ambition to achieve net zero for Scope 1 and Scope 2 GHG emissions by 2030.

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The ACA Framework could provide users with proven, probable, and still to be determined GHG abatement capacity for any issuer, in any sector with operations in any geography. By providing standardized disclosure about a company's current and projected ability to abate its GHG emissions, based on current pricing, technology, and regulations, the ACA Framework would help us and other investors have a greater degree of confidence in a company's commitment and ability to transition to a low-carbon future. The ACA Framework also provides us with robust and standardized rationale to push for action from the boards of our portfolio companies who use this framework.

Lessons Learned from TCFD Implementation

In its 2017 report the Task Force noted it expected that "reporting of climate-related risks and opportunities will evolve over time as organizations, investors, and others contribute to the quality and consistency of the information disclosed." We believe the ACA Framework is a new and valuable tool in this evolution. Similar to the TCFD recommendations, in developing the ACA Framework, we also aimed to create an approach that could be applied across industries and geographies with common assumptions.

We have spent over a year piloting and refining the ACA Framework and have acquired many additional lessons along the way. Specifically, we gained more insight on the types of information boards and management teams need to decarbonize their company more effectively and thus produce transparent, decision-useful climate-related disclosures in line with the goals of the TCFD.

Earlier this year, the CPP Investments Insights Institute convened various stakeholders, including other asset owners, asset managers, accountants, academics, consultants, and index providers, to socialize the proposed ACA Framework and to develop steps to refine and improve this novel idea to be useful for all organizations. We found widespread agreement that the majority of companies and boards of directors need more information to determine a company's ability to transition to a low-carbon future. More specifically, boards and management could benefit greatly from having the relevant information in a decision-useful framework to help drive business decisions. Within our pilot assessments, we found that the data from this ground-up assessment catalyzed subsequent decarbonization efforts by helping boards and executive teams prioritize both the highest impact and most economic opportunities. In addition, the use of the ACA Framework for decision-making also facilitated reporting of such decisions to the broader stakeholder community.

By enabling boards and management to better understand the levers for decarbonization of their companies, the Abatement Capacity Assessment could be a valuable addition and complement to the TCFD recommendations and other existing or proposed climate-reporting initiatives and regulations. It is our hope that other market participants will also adopt and pilot the ACA Framework for their own GHG emissions and those of their portfolio companies. The updated ACA Framework is publicly available on our website.

Using the lessons learned from developing and piloting the TCFD recommendations and the ACA Framework, we continue to seek opportunities to further improve the quality of climate-related financial disclosures for all and, ultimately, support more appropriate pricing of climate-related risks and allocation of capital. It is also our hope that reading about and implementing our ACA Framework will inspire others to develop new techniques to contribute to the quality and consistency of climate-related disclosures.

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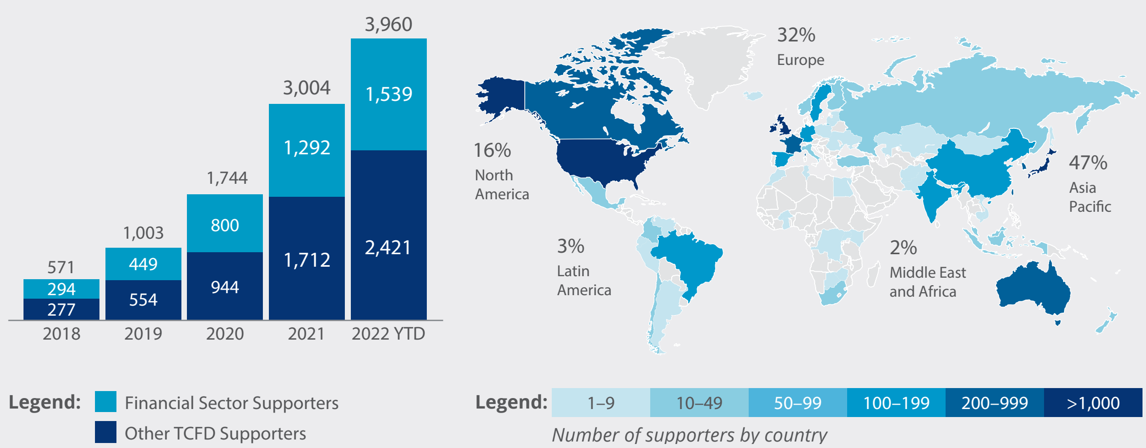
Amid continued momentum behind the Task Force's recommendations, over 1,300 additional companies and other organizations have become supporters since the Task Force released its 2021 status report, bringing the total number of supporters to 3,960, as shown on the left in Figure D1.[100,101] Of these supporters, 3,723 are companies and 237 are other organizations (e.g., industry associations, governments). As shown on the right in Figure D1, these supporters come from around the world, but the Asia Pacific region has the highest percentage of supporters at 47%, largely driven by supporters in Japan. Companies supporting the TCFD represent a broad range of sectors with a combined market capitalization of $26 trillion. This includes over 1,500 financial institutions, responsible for assets of $220 trillion. In addition, 92 of the 100 largest public companies support the TCFD, report in line with the TCFD recommendations, or both.[102]

Over the past five years, the Task Force has seen significant growth in the number of companies and other organizations that support the TCFD and report information aligned with its recommendations.[103] In addition, governments, regulators, and stock exchanges continue toincorporate the TCFD recommendations — in full or in part — into laws, rules, and guidance on climate-related financial disclosure or reference the recommendations as a basis for their disclosure requirements. Table D1 (p. 99) provides a summary of climate-related financial disclosure *requirements and proposed requirements* that incorporated or drew from the TCFD recommendations (referred to as TCFD-aligned disclosure requirements) in various jurisdictions. Furthermore, the International Sustainability Standards Board issued proposed standards on general sustainability-related disclosure and climate-related disclosure that build upon the TCFD recommendations. The Task Force attributes the global spread of the TCFD framework to the support and willingness of thousands of companies to implement the TCFD recommendations on a voluntary basis and the FSB's work to promote use of the TCFD recommendations as a basis for climate-related financial disclosures.[104,105]

Figure D1

Number and Geographic Distribution of TCFD Supporters



100 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.

101 There were just over 2,600 supporters when the Task Force released its 2021 status report.

102 Forbes, *The World's Largest Public Companies*, May 12, 2022. In reviewing the 100 largest public companies, the Task Force identified whether a company indicated it reported in line with the TCFD recommendations.

103 See Section A.1. TCFD-Aligned Reporting by Public Companies for information on the increase in the number of companies reporting in line with the TCFD recommendations.

104 The Task Force recognizes — and appreciates — the significant efforts of companies in implementing the recommendations and industry associations, nongovernmental organizations, and others in supporting implementation through workshops, guidance, and other means.

105 In the FSB's *Report on Promoting Climate-Related Disclosures*, it recommends financial authorities use a framework based on the TCFD recommendations across all sectors for climate-related financial disclosures, in line with jurisdictions' regulatory and legal requirements. The FSB's report also indicated using the TCFD recommendations as the basis for disclosure would contribute to a more common approach among national and regional financial authorities.

Table D1

TCFD-Aligned Disclosure Requirements and Proposals in Select Jurisdictions

Final Requirements

Jurisdiction: Authority	Scope	Threshold	Time Frame	Report Type
Brazil: Securities and Exchange Commission	Listed Companies	Regulated issuers	FY 2022	Financial Filing/Annual Report
Brazil: Central Bank of Brazil	Financial Institutions	Regulated institutions except Segment 5[106]	FY 2022	Sustainability Report
Egypt: Egyptian Financial Regulatory Authority	Listed Companies	Issued capital or net ownership >E£500M	FY 2022	Financial Filing/Annual Report
New Zealand: New Zealand Government	Listed Companies	Issuers: securities >NZ$60M	FY 2023	Financial Filing/Annual Report
	Financial Institutions	Banks: assets >NZ$1B	FY 2023	Financial Filing/Annual Report
	Financial Institutions	Asset managers: AUM >NZ$1B	FY 2023	Financial Filing/Annual Report
	Financial Institutions	Insurers with premium income >NZ$250M	FY 2023	Financial Filing/Annual Report
Singapore: Singapore Exchange	Listed Companies	Specific industries[107]	FY 2023	Financial Filing/Annual Report; Sustainability Report
	Listed Companies	Specific industries[108]	FY 2024 and Later	Financial Filing/Annual Report; Sustainability Report
Switzerland: Financial Market Supervisory Authority	Financial Institutions	Assets >CHF100B or AUM >CHF500B	In Effect	Financial Filing/Annual Report
United Kingdom: UK Parliament	Other	Specific UK companies and Limited Liability Partnerships >500 employees[109]	FY 2022	Financial Filing/Annual Report; Other
	Financial Institutions	Occupational pension schemes: assets >£5B	In Effect	Other
	Financial Institutions	Occupational pension schemes: assets >£1B	FY 2023	Other
United Kingdom: Financial Conduct Authority	Listed Companies	Issuers of standard-listed shares and GDR	FY 2022	Other
	Financial Institutions	Asset managers: AUM >£50B Asset owners: AUM >£25B	FY 2022	Other
	Financial Institutions	Asset managers and asset owners: AUM >£5B	FY 2023	Other

Proposed Requirements

Jurisdiction: Authority	Scope	Threshold	Time Frame	Report Type
Canada: Canadian Securities Administrators	Listed Companies	Regulated issuers[110]	P	Financial Filing/Annual Report
European Union: European Commission	Listed Companies	Specific issuers on EU regulated markets	FY 2024 and Later	Financial Filing/Annual Report
	Other	Large non-listed companies	FY 2024 and Later	Financial Filing/Annual Report
European Union: Parliament and Council	Financial Institutions	Specific issuers on EU regulated markets[111]	FY 2022	Other
Switzerland Federal Council	Other	Assets >CHF20M or revenues >CHF500B	FY 2023	Financial Filing/Annual Report
United States: Securities and Exchange Commission	Listed Companies	All registrants	P	Financial Filing/Annual Report; Other

Legend:

Scope
- Listed Companies
- Financial Institutions
- Other

Time Frame
- In Effect
- FY 2022
- FY 2023
- FY 2024 and Later
- **P** Phased in Based on Effective Date

Report Type
- Financial Filing/Annual Report
- Sustainability Report
- Other

106 The requirements address qualitative aspects of governance, strategy, and risk management. Segment 5 includes institutions whose size is less than 0.1% of GDP and that 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.
107 All issuers required to report on a comply or explain basis for the year beginning on January 1, 2022. Issuers in the financial; agriculture, food, and forest products; and energy industries subject to mandatory reporting beginning on January 1, 2023.
108 Issuers in the transportation and materials and buildings industries subject to mandatory reporting beginning on January 1, 2024.
109 See the UK Companies Act 2006 s414(CA) and the UK Limited Liability Partnerships (Accounts and Audit) (Application of Companies Act 2006) Regulations 2008 part 5 and 5a.
110 See *Proposed National Instrument 51-107 Disclosure of Climate-related Matters*, part 6.
111 See article 449a of the Capital Requirements Regulation (CRR). While the CRR does not mention TCFD, the European Banking Authority published final draft implementing standards on uniform disclosure formats — as required under Article 434a of the CRR — that incorporate several TCFD elements.

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Key Takeaways

Support for the TCFD has increased significantly since the 2021 status report was issued — around 1,300 new organizations have indicated their support for the TCFD, an increase of over 50%.

The Task Force continues to see governments and regulators incorporate the TCFD recommendations into rules and guidance on climate-related financial disclosure.

The subsections below provide brief descriptions of government and regulatory developments as well as developments related to international and regional standard setting, stock exchanges, and private-sector initiatives that support implementation of the TCFD recommendations. The Task Force primarily focused on developments since its previous status report was published in October 2021.[112]

1. GOVERNMENTAL AND REGULATORY EFFORTS

While the TCFD remains a voluntary, market-led initiative, many governments and regulators are taking steps to require or encourage disclosures based on the TCFD recommendations. Over 120 regulators and governments from around the world are TCFD supporters, including Belgium, Canada, Chile, Denmark, France, Ireland, Japan, New Zealand, Sweden, and the United Kingdom (UK). This subsection summarizes developments in various jurisdictions that are driving disclosure of information in line with the Task Force's recommendations, including requirements, proposed requirements, and guidance.

Australia: In November 2021, the Australian Prudential Regulation Authority (APRA) published guidance for banks, insurers, and superannuation trustees on managing financial risks associated with climate change. The guidance includes a section on climate-related disclosure in which APRA indicates it "considers it better practice for any disclosures to be produced in line with the framework established by the TCFD."

Brazil: In December 2021, the Brazilian Securities and Exchange Commission amended its rules — effective January 2, 2023 — to require securities issuers to indicate 1) whether they disclose environmental, social, and corporate governance information in their annual reports or other specific documents; 2) whether the report or document considers the TCFD recommendations or recommendations for financial disclosures from other recognized entities; and 3) an explanation if the securities issuers have not adopted the TCFD recommendations or ones from other recognized entities.

Canada

- In October 2021, the Canadian Securities Administrators issued proposed disclosure requirements for all reporting issuers aligned with the four TCFD recommendations. As described in the proposal, the requirements would be phased-in over a one-year period for non-venture issuers and over a three-year period for venture issuers and are not anticipated to come into force prior to December 31, 2022.

- In April 2022, the Canadian Government released its 2022 budget in which it indicated the "federal government is committed to moving towards mandatory reporting of climate-related financial risks across a broad spectrum of the Canadian economy, based on the [TCFD] framework." The budget also indicated the Office of the Superintendent of Financial Institutions (OSFI) would consult on climate-related disclosure guidelines in 2022 and require financial institutions to publish TCFD-aligned climate disclosures using a phased approach, starting in 2024.

- In May 2022, OSFI released a draft guideline for consultation on federally regulated financial institutions' management of climate-related risks. As part of the draft guideline, OSFI introduced mandatory climate-related financial disclosures that incorporate the TCFD recommendations.

112 Given the significant number of references included in this section (denoted in light blue), footnote citations are not included. However, each of the references is included in Appendix 7: References.

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Egypt: In July 2021, the Egyptian Financial Regulatory Authority announced the issuance of resolutions requiring companies listed on the Egyptian Stock Exchange and companies operating in non-bank financial activities to submit disclosure reports related to sustainability and the financial impacts of climate change in line with the TCFD recommendations.[113] These reports are to be included in annual board of directors' reports and attached to the annual financial statements beginning with fiscal year 2022.

European Union

- In April 2021, the European Commission (EC) issued a proposed Corporate Sustainability Reporting Directive (CSRD) that would amend existing reporting requirements to include a broader range of companies.[114] As part of its proposed CSRD, the EC asked the European Financial Reporting Advisory Group to develop reporting standards that consider existing standards and frameworks, including the TCFD framework.[115] In late June 2022, the European Parliament and the Council of the European Union (EU) reached a provisional agreement on the CSRD, which further expands the scope of companies covered and describes the phase in of reporting requirements beginning with financial year 2024.

- In January 2022, the European Banking Authority published final draft implementing technical standards on disclosing environmental, social, and governance or ESG risks — including physical and transition risks related to climate change — for large financial institutions that have issued securities admitted to trading on a regulated market of any EU member state. The standards were developed in alignment with various initiatives, including the TCFD recommendations, and incorporate metrics included in the Task Force's supplemental guidance. Under the EU's Capital Requirements Regulation, large financial institutions are required to disclose information on their ESG risks, including climate-related risks, beginning June 28, 2022.

Hong Kong: In November 2021, the Mandatory Provident Fund Schemes Authority issued a circular with high-level principles for mandatory provident fund trustees on integrating ESG factors into their investment and risk management processes. One of the principles focuses on disclosing metrics and targets and references the TCFD recommendations. In December 2021, the Hong Kong Monetary Authority issued a supervisory policy manual for banks, restricted license banks, and deposit-taking companies (authorized institutions) on key elements of managing climate-related risk. The manual indicates authorized institutions should "take actions to prepare climate-related disclosures in accordance with TCFD recommendations as soon as practicable and make their first disclosures no later than mid-2023."

India: In July 2022, the Reserve Bank of India (RBI) released a *Discussion Paper on Climate Risk and Sustainable Finance* to seek feedback on several topics, including climate-related financial disclosure. In the discussion paper, the RBI highlights the TCFD recommendations "as a desirable framework [for regulated entities] to rely upon, at least at the initial stage."

Japan: In November 2021, the Japan Financial Services Agency published its strategic priorities for July 2021-June 2022 in which it indicated it would encourage companies listed on the "Prime Market" segment of the Tokyo Stock Exchange to enhance the quality and quantity of disclosure based on the TCFD recommendations or an equivalent framework. In May 2022, the Bank of Japan issued a report that describes its initiatives related to climate change in line with the TCFD recommendations. The report indicates the Bank is encouraging financial institutions to enhance their disclosures, both qualitatively and quantitatively, based on the TCFD framework.

Malaysia: In June 2022, the Joint Committee on Climate Change published a guide to support implementation of climate-related disclosures aligned with TCFD recommendations.[116] The guide is aimed at financial institutions regulated by the Bank Negara Malaysia and the Securities Commission Malaysia and includes commercial banks, investment banks, insurance and reinsurance companies, and fund management companies.

113 The Egyptian Financial Regulatory Authority's announcement is in Arabic; however, the Sustainable Stock Exchanges Initiatives provides a summary of the announcement in English.
114 See the European Commission's "Corporate Sustainability Reporting" webpage for more information.
115 In November 2021, the European Financial Reporting Advisory Group published a status report on the development of the reporting standards, noting that the [...] reporting areas are "totally compatible with the approach of the [TCFD] in terms of content."
116 The JC3 is a platform established in September 2019 to pursue collaborative actions for building climate resilience within the Malaysia financial sector. The JC3 is co-chaired by the Deputy Governor Bank Negara Malaysia and the Deputy Chief Executive Securities Commission Malaysia, with members comprising senior officials from Bursa Malaysia and 21 financial industry players as well as relevant experts.

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New Zealand: In October 2021, the New Zealand Government passed legislation making climate-related disclosures mandatory for large publicly listed companies, insurers, banks, non-bank deposit takers, and investment managers. The new law is expected to come into effect in 2023, subject to the publication of climate standards that are based on the TCFD recommendations. The publication of draft climate-related disclosure standards are described in the subsection below.

Switzerland: In March 2022, the Swiss Federal Council initiated a consultation on the "implementing ordinance" on climate reporting for large Swiss companies. The ordinance provides for the binding implementation of the TCFD recommendations by large Swiss companies. The ordinance is expected to come into force at the beginning of the financial year 2023.

Thailand: In February 2022, the Bank of Thailand issued a consultation paper on the financial landscape that describes policies to support three objectives for the financial sector. One of the objectives relates to the financial sector helping businesses and households transition to a digital economy and effectively manage environmental risks. The consultation paper describes several potential policies to support this objective, one of which is to set disclosure standards for financial institutions that are consistent with international frameworks such as the TCFD.

United Kingdom

- In July 2021, the UK Parliament approved regulations — proposed by the Department for Works and Pensions — that came into force on October 1, 2021, requiring trustees of occupational pension schemes with more than £5 billion in relevant assets as well as all authorized master trust schemes and authorized collective money purchase schemes to make TCFD-aligned climate-related financial disclosures.[117] Trustees are required to produce and publish such disclosures on a publicly available website within seven months of the end of each scheme year. Occupational pension schemes with more than £1 billion in net assets are subject to the regulations as of October 1, 2022.
- In December 2021, the Financial Conduct Agency (FCA) published two policy statements on TCFD-aligned climate-related financial disclosures. One of the statements extends the application of the FCA's existing climate-related disclosure requirements to issuers of standard listed shares and global depositary receipts representing equity shares from January 1, 2022. The other statement applies to asset managers with more than £50 billion in AUM and asset owners (life insurers and FCA-regulated pension providers) with assets over £25 billion. These organizations are required to make disclosures consistent with the TCFD recommendations on an annual basis at both an entity-level and product-level beginning on or after January 1, 2022. Organizations with AUM or assets under the previously mentioned thresholds but above £5 billion are expected to disclose for accounting periods beginning on or after January 1, 2023.
- In January 2022, the UK Parliament approved two regulations requiring TCFD-aligned, climate-related financial disclosure of UK companies that were proposed by the Department for Business, Energy and Industrial Strategy in October 2021. One of the regulations applies to UK companies with more than 500 employees that are listed in section 414CA of the Companies Act 2006.[118,119] The other regulation applies to limited liability partnerships with more than 500 employees and turnover of more than £500 million.[120] Both regulations apply to reporting for financial years starting on or after April 6, 2022.

United States: In March 2022, the Securities and Exchange Commission proposed amendments to its rules under the Securities Act of 1933 and Securities Exchange Act of 1934 that would require securities issuers to include climate-related information — aligned with the TCFD recommendations — in their registration statements and annual reports.[121] The proposed rule amendments would be phased in over a three-year period based on the type of

117 See the explanatory memorandum to the regulation.
118 See the explanatory memorandum to the regulation.
119 The regulation applies to 1) companies currently required to produce a non-financial information statement, being companies with more than 500 employees and transferable securities admitted to trading on a UK regulated market, banking companies, or insurance companies; 2) registered companies with securities admitted to the Alternative Investment Market of the London Stock Exchange with more than 500 employees; or 3) registered companies not included in 1) or 2) and with more than 500 employees and turnover of more than £500 million.
120 See the explanatory memorandum to the regulation.
121 The SEC refers to securities issuers as registrants in the Securities Act, which are defined as issuers of securities for which a registration statement is filed.

registrant, with the first group of companies disclosing climate-related information under the rules for the first fiscal year following the effective date of the rules (e.g., fiscal year 2023). In addition, in June 2022, the U.S. Commodity Futures Trading Commission announced a Request for Information to gather public feedback on climate-related market risk, which includes questions about building requirements based on the TCFD recommendations.

2. INTERNATIONAL AND REGIONAL STANDARD SETTING

In November 2021, the International Financial Reporting Standards Foundation announced the establishment of the International Sustainability Standards Board (ISSB), with the aim to develop a comprehensive global baseline of sustainability disclosure standards to meet investors' information needs. In March 2022, the ISSB published two exposure drafts for consultation. One sets out general sustainability-related disclosure standards and the other specifies climate-related disclosure standards. Both exposure drafts build upon the TCFD recommendations, with the latter covering elements of all 11 recommended disclosures.

In April 2022, the European Financial Reporting Advisory Group released the draft *EU Sustainability Reporting Standards* for public comment. The related disclosure requirements correspond to the pillars of the TCFD recommendations and ISSB standards.

In July 2022, New Zealand's External Reporting Board (XRB) issued a final consultation document on climate-related disclosure standards that drew from and is largely consistent with the Task Force's four recommendations and 11 recommended disclosures. The final consultation document incorporates feedback received on the XRB's two previous consultations on proposed standards — one related to governance and risk management (published in October 2021) and the other related to strategy and metrics and targets (published in March 2022).

3. STOCK EXCHANGE DEVELOPMENTS

The UN Sustainable Stock Exchanges Initiatives launched a database that provides information on 78 stock exchanges that are taking actions to support enhancing climate-related financial disclosures in line with the TCFD recommendations in their markets. The database highlights five activities that stock exchanges are undertaking to support the TCFD, as reflected in Figure D2. The most common action taken — by 50 stock exchanges — is providing TCFD training, followed by referencing the TCFD recommendations in the stock exchange's ESG disclosure guidance.

In October 2021, the London Stock Exchange Group issued Guidance on Climate Reporting Best Practice and TCFD Implementation for companies listed on the London Stock Exchange's markets. The guidance is intended to help companies integrate and communicate climate-related information in alignment with TCFD recommendations.

Figure D2

Stock Exchange Activities that Support the TCFD Recommendations[1]

1 *Based on information included in the Sustainable Stock Exchanges Initiative's "TCFD Activities Database."*

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In November 2021, the Japan Exchange Group, Inc. published the "Survey of TCFD Disclosure in Japan," which summarizes TCFD-aligned disclosure practices of nearly 260 Japanese listed companies that declared support for TCFD as of the end of March 2021.

In November 2021, the Hong Kong Exchanges and Clearing published guidance to support listed companies in implementing the TCFD recommendations and developing climate-related disclosures. The guidance indicates that "[i]n light of the direction towards mandatory TCFD-aligned climate-related disclosures by 2025, we encourage our listed issuers to commence reporting in accordance with the TCFD recommendations."

In December 2021, the Singapore Exchange amended its rules requiring issuers to provide climate-related disclosures — based on TCFD — on a comply or explain basis for their financial year beginning on January 1, 2022. For the financial year beginning on January 1, 2023, issuers in the financial; agriculture, food, and forest products; and energy industries will be subject to mandatory climate-related reporting. For the financial year beginning on January 1, 2024, issuers from the industries mentioned previously as well as those from the materials and buildings and transportation industries will be subject to mandatory climate-related reporting.

In June 2022, the Johannesburg Stock Exchange issued two guidance documents that incorporate aspects of the TCFD recommendations — *Sustainability Disclosure Guidance* and *Climate Change Disclosure Guidance*. The guidance documents are intended to support issuers and investors with understanding the climate crisis and how disclosure can be used to anticipate risk and identify opportunities.

4. INDUSTRY-LED INITIATIVES

In November 2021, the Climate Disclosure Standards Board in collaboration with We Mean Business released the second edition of the TCFD Good Practice Guide.[122] The guide highlights examples of good practice disclosures that are aligned with the TCFD recommendations and included in companies' mainstream financial reports.

In December 2021, with support and participation from members of the Japan TCFD Consortium, Mexican industry leaders and the Central Bank of Mexico initiated efforts to establish a Mexican TCFD Consortium. The primary goal of the Consortium is "to promote an increase in the disclosure of financially material ESG risks, starting with climate risks in accordance with the recommendations of the TCFD."[123] Preliminary efforts to establish a pilot structure for the Mexican TCFD Consortium are currently underway.

In January 2022, the Cambridge Institute for Sustainability Leadership's Centre for Sustainable Finance, together with the United Nations Environment Programme Finance Initiative (UNEP FI), published a report on principles to assist financial institutions with integrating their assessments of physical and transition climate-related risks. The report explores the combined financial impact of physical and transition risks, building on UNEP FI's TCFD program and existing tools for climate-related risk assessment, including scenario analysis. One of the five principles in the report centers on alignment with the TCFD recommendations.

In March 2022, the World Business Council for Sustainable Development (WBCSD) published a report proposing a business-relevant climate scenario analysis reference approach for companies in the energy system, based on a request from the TCFD. The approach was designed to support corporate scenario analysis practice and companies' disclosures of the resilience of their strategies under different climate-related scenarios, consistent with the TCFD recommendations. WBCSD convened 12 companies — all TCFD supporters — from across energy supply and primary demand to develop the proposals.

In March 2022, the Center for Climate and Energy Solutions issued a report on emerging practices in climate-related risk and opportunity analysis and disclosure aligned with the TCFD recommendations. The report summarizes findings in four areas: current practices in conducting climate-related financial analysis, challenges of such analysis and related disclosures, views on future developments, and

122 The Climate Disclosure Standards Board (CDSB) was consolidated into the IFRS Foundation on January 31, 2022.
123 Speech of Bank of Mexico Governor Alejandro Díaz de León, "Lanzamiento del Consorcio TCFD," December 7, 2021.

case studies. A study of 19 companies in sectors considered to be “high greenhouse gas emitters and highly exposed to impacts of climate” was used to inform the findings of the report with a goal of helping companies conduct more in-depth and decision-useful analysis of climate-related risks and opportunities. The report also describes specific actions for how companies can enhance their TCFD-aligned disclosures and policy recommendations to improve such disclosure within U.S. financial markets.

In April 2022, Her Majesty’s Treasury launched the UK Transition Plan Taskforce (TPT) to support companies in developing and disclosing transition plans. The TPT has a two-year mandate to bring together British industry and academia with regulators and nongovernmental organizations and develop its view on best practice for transition plans and associated metrics. The TPT plans to develop a set of sectoral transition plan templates and guidance on metrics are targets for real economy sectors and financial services sub-sectors, drawing from the body of existing work, including the TCFD recommendations.

In June 2022, the Glasgow Financial Alliance for Net Zero proposed recommendations and guidance on net zero transition plans for financial institutions. The recommendations and guidance address elements of disclosure on transition plans, building on the Task Force’s 2021 metrics and targets guidance and referencing the TCFD recommendations and Principles of Effective Disclosure.

In July 2022, Chapter Zero, the Directors’ Climate Forum, released the Board Toolkit to help non-executive directors address climate change as a strategic business issue on their boards. The toolkit describes five steps boards can take for “timely, positive, and decisive climate action.” The toolkit references the TCFD as a resource, suggests that all companies can benefit by implementing the TCFD recommendations, and incorporates the Task Force’s tables on climate-related risks, opportunities, and financial impacts into one of the five steps.

In October 2022, the industry-led TCFD Consortium in Japan released an update to guidance first released in December 2018, which provided detailed commentary on how to implement the TCFD recommendations for five industrial sectors. The updated guidance — *Guidance on Climate-related Financial Disclosures 3.0* — incorporates updates the Task Force made to its annex in 2021 and the 2021 metrics and targets guidance.

In October 2022, the *Initiative Climat International* and the British Private Equity & Venture Capital Association published guidance to support private markets firms with implementing the TCFD recommendations. The publication builds on the TCFD guidance, focusing on the incorporation of climate change considerations into core business strategy, processes, and reporting. It is intended as a step-by-step guide for TCFD reporting, outlining actions for each recommendation to help private markets firms enhance their climate-related financial disclosures, regardless of their starting point.

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Michael Bloomberg
Chair
Founder
Bloomberg LP and Bloomberg Philanthropies

Denise Pavarina
Vice Chair
Senior Advisor
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Graeme Pitkethly
Vice Chair
Chief Financial Officer
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Yeo Lian Sim
Vice Chair
Special Advisor, Diversity
Singapore Exchange

Members

Jane Ambachtsheer
Global Head of Sustainability
BNP Paribas Asset Management

Andre Argenton
Chief Sustainability Officer and Vice President of Environment, Health, Safety and Sustainability
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David Blood
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Imre Guba
Director and Corporate Reporting Specialist
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Thomas Kusterer
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EnBW Energie Baden-Wurttemberg AG

Geraldine Leegwater
Chief Investment Management and Member of the Executive Committee
PGGM

Mark Lewis
Head of Climate Research
Andurand Capital Management

Ruixia Liu
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Managing Director, Head of ESG Investment
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Fiona Wild
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PwC

Special Advisor

Russell Picot
Chair, Trustee Board
HSBC Bank (UK) Pension Scheme
Former Group Chief Accounting Officer, HSBC

Deputy Chair, Chair of Investment Committee
Universities Superannuation Scheme Limited

Secretariat

Mary Schapiro
Vice Chair for Global Public Policy and
Special Advisor to the Founder and Chair
Bloomberg LP

Mara Childress
Director, Global Public Policy
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Stacy Coleman
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Rupert Thorne
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Kathy Huynh
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Sonia Boulad
Secretariat Member
(From August 2022)

This report was developed with the support of Bloomberg LP's Tom Coleman and Oliver Wyman's John Colas, Alban Pyanet, Ryan Singel, Julia Yang, Will Carter, and Nolwenn Cousineau.

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Appendix 2: Company Selection and AI Review Methodology

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 companies' public reports with the TCFD recommendations. This appendix describes the Task Force's process for selecting the companies included in the review, the types of documents reviewed, and the AI review methodology.

Companies Included in the Review

The AI methodology was used to review financial filings, annual reports, integrated reports, and sustainability reports of 1,434 public companies from five regions in eight industries Figure A2-1, (p. 111). 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 — are also included.

For this status report and the previous one, 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 included in the AI review using the methodology outlined below.

- Identified universe of public companies — companies with public debt or equity — in the eight selected industries using the 29 sub-industries listed in Figure A2-1, (p. 111). The 29 sub-industries are loosely based on the Global Industry Classification Standard sub-sectors 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). We followed this approach to avoid, as much as possible, removing 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. 110).
- 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. Importantly, not all disclosures for fiscal year 2019 were available by the date that documents were extracted for review (May 4, 2020).
- This methodology resulted in a final review population of 1,701 companies.

The *final* review population of 1,701 companies for the 2020 status report was used as the initial review population for the 2021 status report. The *final* review population used for the 2021 status report was reduced to 1,651 after accounting for companies that no longer existed in or did not have reports available in English for fiscal year 2020.

For this status report, the Task Force began with an *initial* review population of the 1,651 companies that were included in the AI review for the 2021 status report.

The *final* review population used for this year's AI review was reduced to 1,434 after accounting for companies that no longer existed in or did not have reports available in English for fiscal year 2021.[124]

Figure A2-1

Industry and Sub-Industry of Companies Selected for Review in 2020

Industries	Sub-Industries	
Banking *608 Companies*	• Regional Banks • Large, Diversified Banks	• Investment and Asset Management Firms
Insurance *246 Companies*	• Multi-line Insurance • Property and Casualty Insurance	• Life and Health Insurance • Reinsurance
Energy *483 Companies*	• Oil and Gas • Coal	• Utilities
Transportation *456 Companies*	• Air Freight • Passenger Air Transportation • Maritime Transportation	• Rail Transportation • Trucking Services • Automobiles
Materials and Buildings *1,580 Companies*	• Chemicals • Construction Materials • Capital Goods	• Metals and Mining • Real Estate Management and Development
Agriculture, Food, and Forest *325 Companies*	• Beverages • Agriculture	• Packaged Foods and Meats • Paper and Forest Products
Technology and Media *292 Companies*	• Technology Hardware and Equipment	• Interactive Media and Services
Consumer Goods *456 Companies*	• Consumer Retailing	• Textiles and Apparel

Total: 4,446 Companies

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124 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.

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Documents Reviewed

The Task Force focused primarily on companies' fiscal year 2017, 2018, 2019, 2020, and 2021 financial filings, annual reports, integrated reports, and sustainability reports. These documents were identified using the Bloomberg Terminal, and other relevant documents provided in the Terminal were reviewed as available. The Task Force only selected documents available in English and documents were categorized by the year of reporting.

- **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 society, often addressing environmental, social, and governance issues.
- **Other Relevant Documents:** Documents available in the Bloomberg Terminal that are associated with companies' annual reporting or sustainability.

AI-Based Review Methodology

The AI technology used to review companies' publicly available reports for this report was the same as was used for the Task Force's 2021 status report. The goal of the AI review was to automatically identify TCFD-aligned information in financial filings and other company reports. 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 understand meaning in context.[125]

Training the AI Models

The AI technology employed a set of language models that were trained to identify TCFD-aligned information. These language models used for classification were based on the Bidirectional Encoder Representations from Transformers (BERT) architecture.[126] BERT is a deep learning-based natural language processing model trained on a massive text document corpus that encodes text into mathematical representations while taking into account the context for a given word. For example, while other techniques might have encoded the word "running" in the two sentences, "the car is running great," and "the car is running out of gas," in the same way, BERT would take the context into account and provide different representations for "running" in the two sentences. This means that BERT-based models (and other similar architectures) can utilize the contextual meaning of words while making a classification decision.

A set of language models built on the BERT architecture were then trained using passages of text or excerpts identified as aligning with the Task Force's 11 recommended disclosures — referred to as labeled data. Subject matter experts labelled text as being aligned to the recommended disclosures based on a common standard that narrowed down each recommended disclosure to a single yes-no question as shown in Figure A2-2 (p. 112). In addition, in 2022 a new model was introduced to assess references to four categories of climate-related scenarios by temperature rating (below 2°C, 2°C, between 2°C and 3°C, and over 3°C).

125 Devlin et al., "Bert: Pre-training of Deep Bidirectional Transformers for Language Understanding," May 24, 2019.
126 Liu et al., "RoBERTa: A Robustly Optimized BERT Pretraining Approach," July 26, 2019.

Figure A2-2

AI Review Questions

#	Question	Recommended Disclosure
1	Does the company describe the board's or a board committee's oversight of climate-related risks or opportunities?	*Governance a)*
2	Does the company describe management's or a management committee's role in assessing and managing climate-related risks or opportunities?	*Governance b)*
3	Does the company describe the climate-related risks or opportunities it has identified?	*Strategy a)*
4	Does the company describe the impact of climate-related risks and opportunities on its businesses, strategy, or financial planning?	*Strategy b)*
5	Does the company describe the resilience of its strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario?	*Strategy c)*
6	Does the company describe its processes for identifying and/or assessing climate-related risks?	*Risk Management a)*
7	Does the company describe its processes for managing climate-related risks?	*Risk Management b)*
8	Does the company describe how processes for identifying, assessing, and managing climate-related risks are integrated into overall risk management?	*Risk Management c)*
9	Does the company disclose the metrics it uses to assess climate-related risks or opportunities?	*Metrics and Targets a)*
10	Does the company disclose Scope 1 and Scope 2, and, if appropriate Scope 3 GHG emissions?	*Metrics and Targets b)*
11	Does the company describe the targets it uses to manage climate-related risks or opportunities?	*Metrics and Targets c)*

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To increase the efficiency of the labeling effort, active learning techniques were used.[127] Active learning is an iterative, machine-driven annotation cycle for data labeling, where the AI model identifies ambiguous unlabeled samples that are most informative and provide the most useful information for improving its model performance. This technique is useful in resource-constrained environments where labeled data is limited and sufficient subject matter experts are not available to provide labels on large data volumes (which the AI deep learning models need to improve performance). A batch-based active learning process in which the AI models iteratively identified relevant batches of unlabeled informative data samples for human-annotation from large document collections was used. This resulted in a more efficient use of annotator effort and enabled the AI models to perform successfully on a limited number of annotated examples.

127 Settles, B., "Active Learning Literature Survey," January 9, 2009.

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Review of Company Reports

As part of the review process, text passages were first extracted from the various documents available for review. An AI model incorporating computer vision techniques — which enable the analysis and interpretation of visual information, including images, graphs, and charts — was used in this step to properly identify paragraph boundaries. Correct paragraph segmentation was important to allow the language models used in subsequent steps to correctly capture the context of sentences.

The paragraph segmentation technique identified thousands of paragraph passages across the various available documents for each company. To filter these passages down to only the ones relevant to climate-related disclosures, a language model-based information retrieval technique was then used to retrieve, score, and rank the passages in order of their relevance to a particular disclosure. The top ranked relevant passages were then selected as relevant to a particular disclosure. Finally, a language model fine-tuned for climate disclosure classification was used to determine if an entity's report aligned with each of the 11 TCFD recommended disclosures.

The AI technology was implemented and run on mlfabric™, a custom-designed modular, reusable, cloud-based platform developed at Moody's that operationalizes deep learning and machine learning models, allowing users to deploy and reuse AI models and AI workflows at scale. The disclosure review leveraged the mlfabric™ models-as-a-service platform to scale the processing of over 15,000 documents for the selected population of companies to produce the final results.

Performance Validation

The performance of the AI technology was assessed at a company level. A company was marked as having a TCFD-aligned disclosure if at least one passage was categorized as a positive result for the questions in Figure A2-2 (p. 112) in any of its reports. If a company was predicted to be making a particular disclosure and human annotators were also in agreement (based on annotated data) with that judgement, then that particular example was marked as correctly classified. The metric used to assess the final performance of the AI technology was the F1 Score.[128]

The F1 Scores for the 11 recommended disclosures and new information on scenario temperature ratings are presented in Figure A2-3.

Outcome

The AI technology was applied to the excerpts from the reports of the 1,434 companies, and the results were aggregated for analysis by the 11 recommended disclosures, the eight industries, the size of the companies, and the regions in which the companies were headquartered.

Figure A2-3

Paragraph-Level Model Performance

Recommended Disclosure	F1 Score
Governance a)	0.958
Governance b)	0.815
Strategy a)	0.857
Strategy b)	0.906
Strategy c)	0.820
Risk Management a)	0.900
Risk Management b)	0.882
Risk Management c)	0.897
Metrics and Targets a)	0.955
Metrics and Targets b)	0.957
Metrics and Targets c)	0.857
Scenario Temperature	0.942

128 In binary classification, precision measures the number of correct positive predictions out of the total number of positive predictions while recall measures the number of correct positive predictions out of the actual number of examples that were correct. The F1 Score is the harmonic mean of precision and recall. It is an indicator of the classification accuracy of a model and is commonly used in machine learning applications to judge performance.

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 fiscal years 2019-2021 public reports with the TCFD recommendations.

This appendix provides the results of the AI review for each of the eight industries included in the review — Banking; Insurance; Energy; Materials and Buildings; Transportation; Agriculture, Food, and Forest Products; Technology and Media; and Consumer Goods.

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Banking

The AI technology reviewed reports from 248 banks in three sub-industries: investment and asset management firms, large and diversified banks, and regional banks. The 248 banks ranged in size from about $430 million to $476 billion in assets, with a mean asset size of nearly $33 billion in assets. The AI review results for banks are shown in Figure A3-1. The largest increase in disclosure between 2019 and 2021 for the banking industry was 32 percentage points for *Risk Management c)*. In addition, banks had the largest increase in disclosure of *Strategy a)* between 2019 and 2021 for any industry of 28 percentage points.

Figure A3-1

Banking Review Results

Recommendation	Recommended Disclosure	Pt. Change 2019–2021	Percent of Companies Disclosing: FY 2019	FY 2020	FY 2021
Governance	a) Board Oversight	19	14%	24%	33%
	b) Management's Role	18	10%	18%	28%
Strategy	a) Risks and Opportunities	28	36%	45%	64%
	b) Impact on Organization	27	27%	38%	54%
	c) Resilience of Strategy	12	7%	11%	19%
Risk Management	a) Risk ID and Assessment Processes	26	21%	32%	47%
	b) Risk Management Processes	27	20%	31%	47%
	c) Integration into Overall Risk Management	32	17%	31%	49%
Metrics and Targets	a) Climate-Related Metrics	8	34%	38%	42%
	b) Scope 1, 2, 3 GHG Emissions	8	27%	27%	35%
	c) Climate-Related Targets	13	18%	23%	31%

0% 20% 40% 60% 80% 100%

Legend: FY 2019 FY 2020 FY 2021

Base size: 248

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Insurance

The AI technology reviewed reports from 118 insurance companies in four categories: multi-line insurance, property and casualty insurance, reinsurance, and life and health insurance. The 118 insurance companies reviewed ranged in size from about $118 million to $130 billion in assets, with a mean asset size of around $12 billion in assets. The AI review results for these companies are shown in Figure A3-2. In 2021, insurance companies most often disclosed information aligned with *Strategy a)* of 58%. Additionally, between 2019 and 2021, the percent of insurance companies reporting information aligned with the two Governance recommended disclosures increased by 20 percentage points, respectively.

Figure A3-2

Insurance Review Results

Recommendation	Recommended Disclosure	Pt. Change 2019–2021	Percent of Companies Disclosing: FY 2019	FY 2020	FY 2021
Governance	a) Board Oversight	20	16%	38%	36%
	b) Management's Role	20	11%	23%	31%
Strategy	a) Risks and Opportunities	18	40%	54%	58%
	b) Impact on Organization	13	33%	38%	46%
	c) Resilience of Strategy	15	10%	20%	25%
Risk Management	a) Risk ID and Assessment Processes	16	29%	38%	45%
	b) Risk Management Processes	15	34%	45%	49%
	c) Integration into Overall Risk Management	26	26%	40%	52%
Metrics and Targets	a) Climate-Related Metrics	8	30%	38%	38%
	b) Scope 1, 2, 3 GHG Emissions	12	21%	36%	33%
	c) Climate-Related Targets	10	23%	31%	33%

0% 20% 40% 60% 80% 100%

Legend: FY 2019 FY 2020 FY 2021

Base size: 118

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Energy

The AI technology reviewed reports from 223 energy companies in three categories: oil and gas, coal, and utilities. The 223 energy companies ranged in size from about $104 million to $307 billion in annual revenue, with a mean annual revenue of nearly $21 billion. The AI review results for these companies are shown in Figure A3-3.

In 2021, energy companies had the highest average percentage of disclosure of all industries (see Figure A3, p. 14). For all three years of reporting reviewed, the energy companies reviewed had the highest percent of disclosure across all industries for information aligned with *Strategy a)* and *Strategy b)*. While the percent of energy companies disclosing information on *Metrics and Targets a)* only increased one percentage point from 2019 to 2021, the percent of energy companies reporting information aligned with *Metrics and Targets c)* increased by 24 percentage points.

Figure A3-3

Energy Review Results

Recommendation	Recommended Disclosure	Pt. Change 2019–2021	Percent of Companies Disclosing: FY 2019	FY 2020	FY 2021
Governance	a) Board Oversight	13	27%	37%	40%
	b) Management's Role	5	16%	20%	21%
Strategy	a) Risks and Opportunities	10	63%	68%	73%
	b) Impact on Organization	10	44%	49%	54%
	c) Resilience of Strategy	4	14%	18%	18%
Risk Management	a) Risk ID and Assessment Processes	13	24%	35%	37%
	b) Risk Management Processes	13	23%	32%	36%
	c) Integration into Overall Risk Management	14	28%	33%	42%
Metrics and Targets	a) Climate-Related Metrics	1	50%	46%	51%
	b) Scope 1, 2, 3 GHG Emissions	9	39%	38%	48%
	c) Climate-Related Targets	24	32%	48%	56%

0% 20% 40% 60% 80% 100%

Legend: FY 2019 FY 2020 FY 2021

Base size: 223

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Materials and Buildings

The AI technology reviewed reports from 353 materials and buildings companies in five categories: capital goods, chemicals, construction materials, metals and mining, and real estate management and development. The 353 materials and buildings companies ranged in size from about $394 million to $291 billion in annual revenue, with a mean annual revenue of $16 billion. The AI review results for these companies are shown in Figure A3-4.

In 2021 reporting, materials and buildings companies most often disclosed information aligned with the *Strategy a)* and the Metrics and Targets recommended disclosures. In addition, the percent of materials and buildings companies disclosing information in alignment with each of the Metrics and Targets recommended disclosures was greater than that of any other industry. However, disclosure of *Metrics and Targets b)* remained constant between 2020 and 2021 after increasing by 13 percentage points between 2019 and 2020.

Figure A3-4

Materials and Buildings Review Results

Recommendation	Recommended Disclosure	Pt. Change 2019–2021	FY 2019	FY 2020	FY 2021
Governance	a) Board Oversight	20	12%	28%	32%
	b) Management's Role	14	11%	21%	25%
Strategy	a) Risks and Opportunities	21	46%	61%	67%
	b) Impact on Organization	18	33%	49%	51%
	c) Resilience of Strategy	12	4%	14%	16%
Risk Management	a) Risk ID and Assessment Processes	12	19%	31%	31%
	b) Risk Management Processes	15	16%	30%	31%
	c) Integration into Overall Risk Management	19	17%	29%	36%
Metrics and Targets	a) Climate-Related Metrics	4	54%	62%	58%
	b) Scope 1, 2, 3 GHG Emissions	13	45%	58%	58%
	c) Climate-Related Targets	23	34%	49%	57%

Percent of Companies Disclosing: 0% 20% 40% 60% 80% 100%

Legend: FY 2019 FY 2020 FY 2021

Base size: 353

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Transportation

The AI technology reviewed reports from 136 transportation companies in six categories: air freight, automobiles, maritime transportation, passenger air transportation, rail transportation, and trucking services. The 136 transportation companies ranged in size from $679 million to $204 billion in annual revenue, with a mean annual revenue of over $14 billion. The AI review results are shown in Figure A3-5.

In 2021, transportation companies most often disclosed information aligned with *Strategy a)* and *Metrics and Targets c)* — at 54% and 48%, respectively. Transportation companies least often disclosed information aligned with *Strategy c)* — at 12%. Between 2019 and 2021, the largest increase in disclosure of 20 percentage points was for *Strategy a)* and *Metrics and Targets c).*

Figure A3-5

Transportation Review Results

Recommendation	Recommended Disclosure	Pt. Change 2019–2021	Percent of Companies Disclosing: FY 2019	FY 2020	FY 2021
Governance	a) Board Oversight	12	9%	19%	21%
	b) Management's Role	8	10%	14%	18%
Strategy	a) Risks and Opportunities	20	34%	51%	54%
	b) Impact on Organization	14	25%	36%	39%
	c) Resilience of Strategy	10	2%	4%	12%
Risk Management	a) Risk ID and Assessment Processes	8	16%	22%	24%
	b) Risk Management Processes	13	11%	25%	24%
	c) Integration into Overall Risk Management	13	11%	17%	24%
Metrics and Targets	a) Climate-Related Metrics	4	39%	43%	43%
	b) Scope 1, 2, 3 GHG Emissions	6	34%	36%	40%
	c) Climate-Related Targets	20	28%	33%	48%

0% 20% 40% 60% 80% 100%

Legend: FY 2019 FY 2020 FY 2021

Base size: 136

Agriculture, Food, and Forest Products

The AI technology reviewed reports from 123 agriculture, food, and forest products companies in four categories: beverages, packaged foods and meats, agriculture, and paper and forest products. The 123 agriculture, food, and forest products companies ranged in size from about $845 million to $96 billion in annual revenue, with a mean annual revenue of over $11 billion. The AI review results for these companies are shown in Figure A3-6.

In 2021, agriculture, food, and forest products companies most frequently disclosed information on *Strategy a)*. Between 2019 and 2021, the largest increase in disclosure of 19 percentage points was for *Risk Management c)*.

Figure A3-6

Agriculture, Food, and Forest Products Review Results

Recommendation	Recommended Disclosure	Pt. Change 2019–2021	Percent of Companies Disclosing: FY 2019	FY 2020	FY 2021
Governance	a) Board Oversight	12	10%	18%	22%
	b) Management's Role	13	7%	15%	20%
Strategy	a) Risks and Opportunities	18	43%	52%	61%
	b) Impact on Organization	14	31%	33%	45%
	c) Resilience of Strategy	14	3%	11%	17%
Risk Management	a) Risk ID and Assessment Processes	10	20%	26%	30%
	b) Risk Management Processes	14	16%	25%	30%
	c) Integration into Overall Risk Management	19	13%	22%	32%
Metrics and Targets	a) Climate-Related Metrics	9	42%	52%	51%
	b) Scope 1, 2, 3 GHG Emissions	16	35%	46%	51%
	c) Climate-Related Targets	16	33%	50%	49%

0% 20% 40% 60% 80% 100%

Legend: FY 2019 FY 2020 FY 2021

Base size: 123

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Technology and Media

The AI technology reviewed reports from 96 technology and media companies in two categories: interactive media and services and technology hardware and equipment. The 96 technology and media companies ranged in size from about $807 million to $386 billion in annual revenue, with a mean annual revenue of $21 billion. The AI review results for these companies are shown in Figure A3-7.

In 2021, technology and media companies had the lowest average percentage of disclosure of all industries reviewed (see Figure A3, p. 14). Moreover, technology and media was the only industry where the percent of companies reporting TCFD-aligned information decreased for some recommended disclosures between 2019 and 2021, specifically for *Governance b)* and *Metrics and Targets a)*. Despite these decreases, the percent disclosing information aligned with *Metrics and Targets c)* increased by 18 percentage points over the same period.

Figure A3-7

Technology and Media Review Results

Recommendation	Recommended Disclosure	Pt. Change 2019–2021	Percent of Companies Disclosing		
			FY 2019	FY 2020	FY 2021
Governance	a) Board Oversight	4	2%	4%	6%
	b) Management's Role	-1	5%	9%	4%
Strategy	a) Risks and Opportunities	4	27%	26%	31%
	b) Impact on Organization	2	20%	31%	22%
	c) Resilience of Strategy	2	4%	4%	6%
Risk Management	a) Risk ID and Assessment Processes	3	7%	8%	10%
	b) Risk Management Processes	6	2%	5%	8%
	c) Integration into Overall Risk Management	3	4%	9%	7%
Metrics and Targets	a) Climate-Related Metrics	-1	25%	30%	24%
	b) Scope 1, 2, 3 GHG Emissions	1	21%	25%	22%
	c) Climate-Related Targets	18	9%	21%	27%

0% 20% 40% 60% 80% 100%

Legend: FY 2019 FY 2020 FY 2021

Base size: 96

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Consumer Goods

The AI technology reviewed reports from 137 consumer goods companies in two categories: consumer retailing and textiles and apparel. The 137 consumer goods companies ranged in size from $857 million to $576 billion in annual revenue, with a mean annual revenue of more than $25 billion. The AI review results for these companies are shown in Figure A3-8. In 2021, consumer goods companies most often disclosed information aligned with *Strategy a)* and *Metrics and Targets a)* at 54% and 47%, respectively. Notably, the percent of disclosure for *Risk Management c)* increased by 28 percentage points, from 8% in 2019 to 36% in 2021.

Figure A3-8

Consumer Goods Review Results

Recommendation	Recommended Disclosure	Pt. Change 2019–2021	Percent of Companies Disclosing: FY 2019	FY 2020	FY 2021
Governance	a) Board Oversight	17	6%	19%	23%
	b) Management's Role	13	7%	17%	20%
Strategy	a) Risks and Opportunities	24	30%	43%	54%
	b) Impact on Organization	23	20%	23%	43%
	c) Resilience of Strategy	8	3%	7%	11%
Risk Management	a) Risk ID and Assessment Processes	18	9%	22%	27%
	b) Risk Management Processes	21	7%	18%	28%
	c) Integration into Overall Risk Management	28	8%	18%	36%
Metrics and Targets	a) Climate-Related Metrics	12	35%	41%	47%
	b) Scope 1, 2, 3 GHG Emissions	7	31%	36%	38%
	c) Climate-Related Targets	12	26%	34%	38%

0% 20% 40% 60% 80% 100%

Legend: FY 2019 FY 2020 FY 2021

Base size: 137

Appendix 4: Asset Manager and Asset Owner Metrics Reporting

As described in Section A.2. TCFD-Aligned Reporting by Asset Managers and Asset Owners, the Task Force conducted a survey to better understand TCFD-aligned reporting practices by asset managers and asset owners. This appendix provides additional information on the reporting of specific climate-related metrics, as follows:

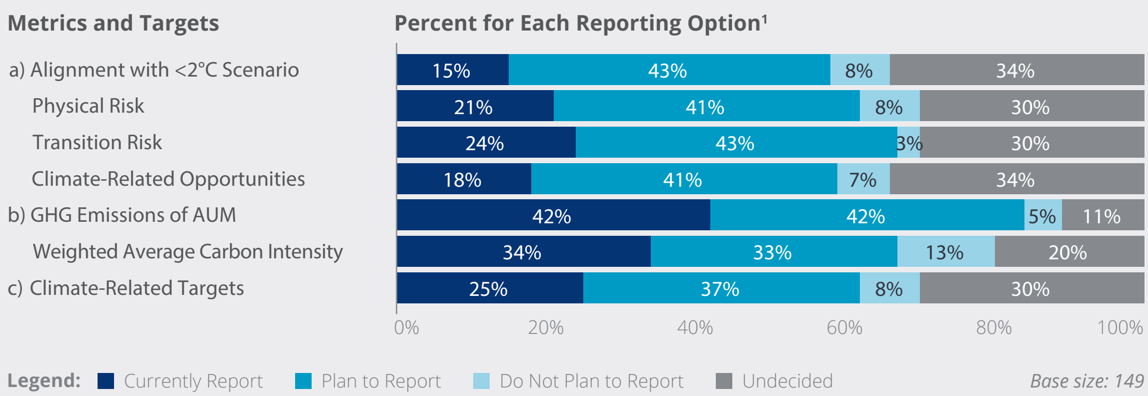
- the extent to which assets under management or assets owned are aligned with a well below 2°C scenario,
- metrics used to assess climate-related physical risks,
- metrics used to assess climate-related transition risks,
- metrics used to assess climate-related opportunities,
- GHG emissions of assets under management or assets owned,
- weighted-average carbon intensity or WACI, and
- climate-related targets.

These metrics are included in the Task Force's guidance for all sectors and supplemental guidance for asset managers and asset owners.[129] Figure A4-1 shows the current reporting status of each of the metrics as indicated by asset manager respondents. Respondents could select one of four options to describe the reporting status for each metric as follows: currently report, do not report currently, but plan to report, do not plan to report, or undecided.

For five of the metrics, the percent of asset managers currently reporting them is significantly lower than the percent that are planning to report. The two metrics where the percent of asset managers currently reporting is higher than — by just one percentage point — or the same as those planning to report are WACI at 34% and GHG emissions associated with assets under management at 42%, respectively. Notably, 13% of asset managers indicated they do not plan to report WACI, which is the metric the Task Force recommends asset managers and asset owners report to their clients and beneficiaries, respectively.

Figure A4-1

Asset Managers: Status of Reporting Select Metrics



1 *The percentages for Metrics and Targets a) and b) in Figure A23 (p. 36) are higher than the percentages for specific metrics associated with Metrics and Targets a) and b) in this figure because respondents were identified as currently reporting if they indicated reporting at least one of the metrics listed.*

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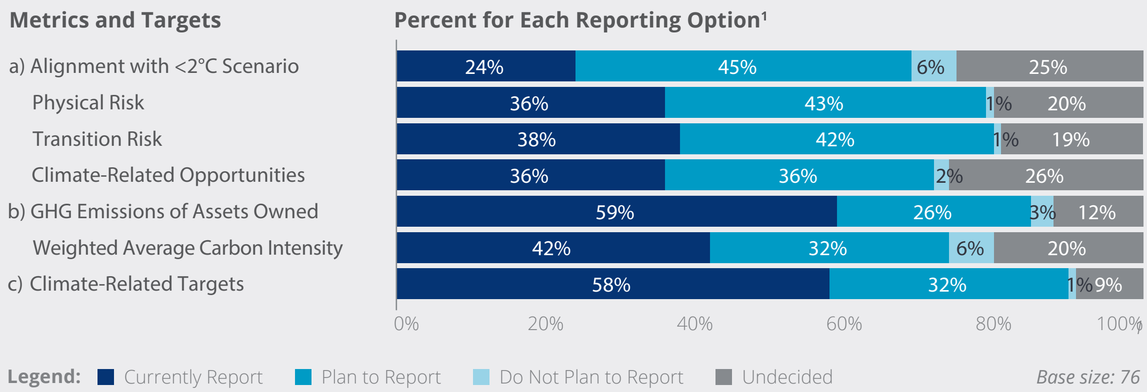
129 See the Task Force's *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*.

Similarly, Figure A4-2 shows the current reporting status of each of the metrics for asset owner respondents. Notably, nearly 60% of asset owners indicated they currently report GHG emissions associated with assets they own and their climate-related targets.

In addition, 6% of asset owners indicated they are not planning to report the extent to which assets they own and their funds and investment strategies are aligned with a well below 2°C scenario or the WACI metric.

Figure A4-2

Asset Owners: Status of Reporting Select Metrics



1 *The percentages for Metrics and Targets a) and b) in Figure A30 (p. 42) are higher than the percentages for specific metrics associated with Metrics and Targets a) and b) in this figure because respondents were identified as currently reporting if they indicated reporting at least one of the metrics listed.*

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Figure A4-3

Asset Managers: Currently Report on Select Metrics

By Level of Aggregation

Metric	Total Portfolio	Fund	Asset Class	Mandate[1]	Do Not Report
Alignment with <2°C Scenario	12%	16%	10%	2%	0%
Physical Risks	18%	18%	7%	4%	3%
Transition Risks	23%	21%	9%	9%	1%
GHG Emissions of AUM	50%	45%	18%	11%	0%
Weighted Average Carbon Intensity	30%	41%	15%	12%	1%
Climate-Related Targets	11%	15%	5%	5%	9%

By Investment Strategy

Metric	Active	Passive	Other	Do Not Report
Alignment with <2°C Scenario	21%	2%	1%	1%
Physical Risks	26%	5%	2%	4%
Transition Risks	32%	6%	3%	2%
GHG Emissions of AUM	60%	11%	3%	3%
Weighted Average Carbon Intensity	46%	11%	5%	1%
Climate-Related Targets	27%	2%	4%	7%

By Asset Class

Metric	Listed Equities	Fixed Income	PE[2] or Debt	Prop or Infra[2]	Do Not Report
Alignment with <2°C Scenario	15%	8%	6%	5%	0%
Physical Risks	16%	8%	7%	12%	4%
Transition Risks	22%	13%	7%	12%	2%
GHG Emissions of AUM	36%	17%	20%	23%	1%
Weighted Average Carbon Intensity	32%	20%	12%	14%	0%
Climate-Related Targets	17%	9%	8%	9%	8%

1 Refers to aggregation consistent with clients' investment mandates.

2 PE refers to private equity; Prop or infra refers to property or infrastructure.

Base size: 94

Legend: Low to high percentage of reporting

The survey also asked respondents whether they report select metrics by specific levels of aggregation (e.g., for the total portfolio, at a fund level), by investment strategy (e.g., active, passive), and by asset class. Figure A4-3 (p. 125) provides asset managers' responses, and Figure A4-4 provides asset owners' responses. The highest level of reporting for asset managers was for GHG emissions associated with assets under management for actively managed investments at 60%, followed by GHG emissions associated with assets under management at a total portfolio level at 50%. At the asset class level, a higher percentage of asset managers report metrics for listed equities than for fixed income.

For asset owners, the highest level of reporting was for GHG emissions associated with the assets they own for actively managed investments at 64%, closely followed by climate-related targets at the total portfolio level at 63%. In addition, 25% or more of the asset owner respondents indicated they report most of the metrics for listed equities, fixed income, and property or infrastructure.

Figure A4-4

Asset Owners: Currently Report on Select Metrics

By Level of Aggregation

Metric	Total Portfolio	Fund	Asset Class	Do Not Report
Alignment with <2°C Scenario	20%	5%	9%	6%
Physical Risks	33%	6%	20%	5%
Transition Risks	41%	5%	17%	2%
GHG Emissions of Assets Owned	56%	13%	50%	2%
Weighted Average Carbon Intensity	33%	13%	39%	0%
Climate-Related Targets	63%	9%	28%	0%

By Investment Strategy

Metric	Active	Passive	Other	Do Not Report
Alignment with <2°C Scenario	22%	11%	0%	9%
Physical Risks	38%	22%	0%	5%
Transition Risks	44%	23%	0%	3%
GHG Emissions of Assets Owned	64%	39%	3%	5%
Weighted Average Carbon Intensity	45%	34%	3%	3%
Climate-Related Targets	58%	30%	5%	8%

By Asset Class

Metric	Listed Equities	Fixed Income	PE[1] or Debt	Prop or Infra[2]	Do Not Report
Alignment with <2°C Scenario	16%	16%	6%	13%	6%
Physical Risks	31%	25%	11%	25%	3%
Transition Risks	33%	27%	11%	27%	5%
GHG Emissions of Assets Owned	59%	45%	17%	39%	2%
Weighted Average Carbon Intensity	44%	36%	11%	25%	0%
Climate-Related Targets	45%	31%	17%	33%	6%

1 PE refers to private equity.

2 Prop or infra refers to property or infrastructure.

Base size: 60

Legend: Low to high percentage of reporting

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Appendix 5: Studies Reviewed on Pricing of Climate-Related Risk

Author	Study	Year
Alberti-Alhaybat et al.	Mapping Corporate Disclosure Theories	2012
Alessi et al.	The Greenium Matters: Evidence on the Pricing of Climate Risk	2019
Allman, E.	Pricing Climate Change Risk in Corporate Bonds	2021
Allen et al.	Climate Change and Capital Markets	2015
Alvarez et al.	A New Framework for Assessing Climate Change Risk in Financial Markets	2021
Avramov et al.	Sustainable Investing with ESG Rating Uncertainty	2021
Ameli et al.	Higher Cost of Finance Exacerbates a Climate Investment Trap in Developing Economies	2021
Amel-Zadeh et al.	Why and How Investors Use ESG Information: Evidence from a Global Survey	2017
Anginer et al.	Climate Reputation and Bank Loan Contracting	2021
Atz et al.	Does Sustainability Generate Better Financial Performance? Review, Meta-Analysis, and Propositions	2021
Baker et al.	Financing the Response to Climate Change: The Pricing and Ownership of US Green Bonds	2018
Bakkensen, L. and Lint, B.	Flood Risk Belief Heterogeneity and Coastal Home Price Dynamics: Going Under Water?	2018
Baldauf et al.	Does Climate Change Affect Real Estate Prices? Only if You Believe in It	2020
Bank of New York-Mellon	Future 2024: Future-Proofing Your Asset Allocation in the Age of Mega Trends	2019
Basel Committee on Banking Supervision (BCBS)	Climate-Related Financial Risks – Measurement Methodologies	2021
BCBS	Climate-Related Risk Drivers and Their Transmission Channels	2021
Beirne et al.	Feeling the Heat: Climate Risks and the Cost of Sovereign Borrowing	2020
Berg et al.	Aggregate Confusion: The Divergence of ESG Ratings	2022
Berkman et al.	Firm-Specific Climate Risk and Market Valuation	2021
Bernstein et al.	Disaster on the Horizon: The Price Effect of Sea Level Rise	2019
Bloomberg	Why Green Stocks Are Slumping During an ESG Boom	2021
Blyth et al.	Investment Risks Under Uncertain Climate Change Policy	2007
Boffo, R. and Patalano, R.	ESG Investing: Practices, Progress and Challenges	2020
Bolstad et al.	Flying Blind: What Do Investors Really Know About Climate Change Risks in the U.S. Equity and Municipal Debt Markets?	2020
Bolton, P. and Kacperczyk, M.	Global Pricing of Carbon-Transition Risk	2021
Bolton, P. and Kacperczyk, M.	Do Investors Care About Carbon Risk?	2020
Breuer et al.	The Economics of Firms' Public Disclosure: Theory and Evidence	2020
Brookfield Insights	Powering the Transition to Net Zero	2021

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Author	Study	Year
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Cambridge Institute for Sustainability Leadership	Unhedgeable Risk: How Climate Sentiment Impacts Investment	2015
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Appendix 6: Glossary and Abbreviations

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."[130]

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.[131]

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 utilized 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 an organization is directed and controlled in the interests of shareholders and other stakeholders."[132] "Governance involves a set of relationships between an organization's management, its board, its shareholders, and other stakeholders. Governance provides the structure and processes through which the objectives of the organization are set, progress against performance is monitored, and results are evaluated."[133]

GREENHOUSE GAS (GHG) EMISSIONS SCOPE LEVELS[134]

- 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 emissions could include: the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g., transmission and distribution losses), outsourced activities, and waste disposal.[135]

MANAGEMENT refers to those positions a company or organization views as executive or senior management positions.

RISK MANAGEMENT refers to a set of processes that are carried out by a company or organization'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 an organization to explore and

130 Organization of Economic Cooperation and Development (OECD), *G20/OECD Principles of Corporate Governance*, November 30, 2015, OECD Publishing, Paris.
131 Based on CDSB, *CDSB Framework for Reporting Environmental Information, Natural Capital and Associated Business Impacts*, April 2018.
132 Cadbury, A., *Report of the Committee on the Financial Aspects of Corporate Governance*, December 1, 1992.
133 OECD, *G20/OECD Principles of Corporate Governance*, November 30, 2015, OECD Publishing, Paris.
134 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.
135 WRI and WBCSD, *The Corporate Value Chain (Scope 3) Accounting and Reporting Standard*, April 16, 2014.

develop an understanding of how the physical and transition risks of climate change may impact its businesses, strategies, 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 an organization’s desired future state. An organization’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 organization’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 or organization’s impact on society, often addressing environmental, social, and governance issues.

TRANSITION PLAN refers to an aspect of an organization’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.

Abbreviations

1.5°C — 1.5° Celsius

2°C — 2° Celsius

AI — Artificial intelligence

AUM — Assets under management

ERM — Enterprise risk management

ESG — Environmental, social, and governance

FCA — Financial Conduct Authority

FSB — Financial Stability Board

GDR — Global depositary receipt

GHG — Greenhouse gas

IFRS — International Financial Reporting Standards

IPCC — Intergovernmental Panel on Climate Change

ISSB — International Sustainability Standards Board

KPI — Key performance indicator

PRI — Principles for Responsible Investment

NGO — Non-governmental organization

TCFD — Task Force on Climate-related Financial Disclosures

UN — United Nations

UNEP FI — United Nations Environment Programme Finance Initiative

WACI — Weighted average carbon intensity

WBCSD — World Business Council for Sustainable Development

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For more information, please visit fsb-tcfd.org

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