

2018 Status Report

Task Force on Climate-related Financial Disclosures: Status Report

September 17, 2018

Mr. Mark Carney
Chairman
Financial Stability Board
Bank for International Settlements
Centralbahnplatz 2
CH-4002 Basel
Switzerland

Dear Chairman Carney,

It is my pleasure to provide to you a status report of The Task Force on Climate-related Financial Disclosures (TCFD). The report reviews our efforts to promote adoption of the TCFD disclosure framework and reviews the disclosures that hundreds of companies have already made, demonstrating that it is both practical and useful for companies to do so. This report also provides perspectives from users that we believe will prove very helpful in guiding companies that are just beginning the process of disclosing climate risks.

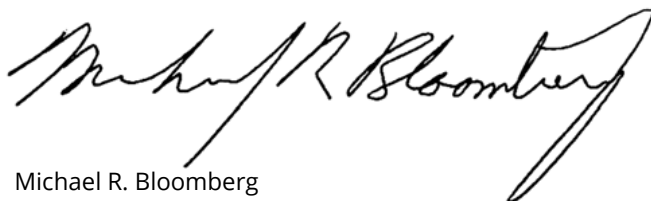
Since the release of the TCFD recommendations in June 2017, the Task Force has worked extensively with global companies, NGOs, and industry groups to encourage implementation. More than 500 public- and private-sector organizations have now indicated their support for our recommendations, including global companies, banks, insurers, asset managers, stock exchanges, and governments. Your continued leadership, as well as the dedication of our Task Force members and the TCFD Secretariat, has been crucial to the progress we've made.

However, as this report indicates, there's still much work to do. While many companies report on environmental issues, most have yet to specifically provide the market with consistent information on the financial implications of climate change for their businesses. In the coming year, we will vigorously support further implementation efforts.

Ultimately, we aim for the implementation of the TCFD recommendations to become commonplace in financial disclosure. The more adoption increases, the more transparent the markets will become, the more secure and stable the economy will be, and the faster we can make progress against the harmful effects of climate change.

Thank you for your continued support of the Task Force. We look forward to continuing this critical work, and to providing you with another progress report in 2019.

Sincerely,

A handwritten signature in black ink, reading "Michael R. Bloomberg". The signature is fluid and cursive, with a large, sweeping flourish at the end of the name.

Michael R. Bloomberg

Executive Summary

In June 2017, The Task Force on Climate-related Financial Disclosures (Task Force or TCFD) released its final recommendations (2017 report), which provide a framework for companies to develop more effective climate-related financial disclosures through their existing reporting processes.¹ In its 2017 report, the Task Force emphasized the importance of transparency in pricing risk—including risk related to climate change—to support informed, efficient capital-allocation decisions.² The Task Force also recognized the challenges associated with measuring and disclosing information on risks related to climate change, but underscored that moving climate-related issues into mainstream annual financial filings would allow practices and techniques to evolve more rapidly.

Improved practices and techniques would further improve the quality of climate-related financial disclosures and, ultimately, support more appropriate pricing of risks and allocation of capital in the global economy.

For many investors, climate change poses significant financial challenges and opportunities. The expected transition to a lower-carbon economy is estimated to require around \$3.5 trillion, on average, in energy sector investments a year for the foreseeable future, generating new investment opportunities.³ At the same time, the risk-return profile of companies exposed to climate-related risks may change significantly because of physical impacts of climate change, climate policy, or new technologies. In fact, one study estimated the value at risk to the total global stock of manageable assets because of climate change ranges from \$4.2 trillion to \$43 trillion between now and the end of the century.⁴ The study highlights that “much of the impact on future assets will come through weaker growth and lower asset returns across the board.” This suggests investors may not be able to avoid climate-related risks by moving out of certain asset classes as a wide range of asset types could be affected.

Both investors and the companies in which they invest, therefore, should consider their longer-term strategies and most efficient allocation of capital. Companies that invest in activities that are susceptible to climate-related risks may be less resilient to the transition to a lower-carbon economy; and their investors may experience lower returns. Compounding the effect on longer-term returns is the risk that present valuations do not adequately factor in climate-related risks because of insufficient information. As such, long-term investors need adequate information on how companies are preparing for a lower-carbon economy; and those companies that meet this need may have a competitive advantage over others.

Climate-Related Financial Disclosure Review

As part of its efforts to promote adoption of the recommendations, the Task Force prepared this status report to provide an overview of current disclosure practices related to core elements of the TCFD recommendations as well as additional information to support preparers in implementing the recommendations. It is important to note that the Task Force has not attempted to assess the level of adoption of its recommendations for this report nor whether

¹ For purposes of 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 In December 2015, the Financial Stability Board established the Task Force on Climate-related Financial Disclosures to develop voluntary, consistent climate-related financial disclosures that would be useful in understanding material risks related to climate change.

³ International Energy Agency, “Chapter 2 of Perspectives for the Energy Transition-Investment Needs for a Low-Carbon Energy System,” 2017.

⁴ The Economist Intelligence Unit, “The Cost of Inaction: Recognising the Value at Risk from Climate Change,” 2015. Value at risk measures the loss a portfolio may experience, within a given time horizon, at a particular probability, and the stock of manageable assets is defined as the total stock of assets held by non-bank financial institutions. The study focused on the asset management industry and excluded bank assets as they are largely managed by banks themselves.

existing climate-related financial disclosures fully meet the TCFD recommendations. Companies implementing the recommendations in their 2017 reports had a very limited amount of time between the release of the Task Force's 2017 report and the start of their internal processes to prepare their 2017 financial filings. As a result, in its review of disclosures, the Task Force focused on how many companies, in eight specific groups, included information in recent reports that addressed the core elements of the Task Force's recommended disclosures (Figure 2, p. 2).⁵

The Task Force's disclosure review found disclosing information in alignment with its recommendations is possible for preparers and helpful to users.

While the Task Force found some of the results of its disclosure review encouraging, it also recognized further work is needed for disclosures to contain more *decision-useful* climate-related information. The majority of companies reviewed disclosed information that is aligned with at least one of the recommended disclosures in their financial filings, annual reports, or sustainability reports. In addition, the Task Force found several instances of disclosures addressing the core element of each of the 11 recommended disclosures. These results demonstrate that it is both possible and practicable for companies to disclose certain baseline climate-related information today. Key takeaways from the review are summarized in Figure E1.

Figure E1

Key Takeaways

The majority disclose some climate-related information. The majority of companies reviewed disclosed information aligned with at least one recommended disclosure, usually in sustainability reports.

Financial implications are often not disclosed. While many companies disclose climate-related information, few disclose the financial impact of climate change on the company.

Information on strategy resilience under different climate-related scenarios is limited. Few companies describe the resilience of their strategies under different climate-related scenarios, including a 2°C or lower scenario, which is a key area of focus for the Task Force.

Disclosures vary across industries and regions. Companies' areas of focus in terms of climate-related financial disclosures vary significantly. For example, a higher percentage of non-financial companies reported information on their climate-related metrics and targets compared to financial companies; but a higher percentage of financial companies indicated their enterprise risk management processes included climate-related risks. In terms of regional differences, a higher percentage of companies in Europe disclosed information aligned with the recommendations compared to companies in other regions.

Disclosures are often made in multiple reports. Companies often provided information aligned with the TCFD recommendations in multiple reports—financial filings, annual reports, and sustainability reports.

The review results also indicate that climate-related financial disclosures are still in early stages. This is consistent with the Task Force's view 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. The Task Force encourages more companies to use its recommendations as a framework for reporting on climate-related risks and opportunities

⁵ The eight groups include the financial sector, divided into four industries (Banks, Insurance Companies, Asset Managers, and Asset Owners), and four groups of non-financial industries (Energy, Transportation, Materials and Buildings, and Agriculture, Food, and Forest Products).

during the next reporting cycle, especially companies with material climate-related risks. Companies in early stages of evaluating the impact of climate change on their businesses and strategies and those that have determined climate-related issues are not material are encouraged to disclose information on their governance and risk management practices.⁶

The Task Force believes the results of its climate-related financial disclosures review highlight the need for continued efforts to support implementation of the recommendations. To this end, companies supporting the Task Force's work have undertaken many initiatives to encourage implementation in different industries and with different areas of focus. The [TCFD Knowledge Hub](#), with more than 400 resources, offers a starting place for companies working on implementing the TCFD recommendations. In addition, industry working groups are tackling industry-specific implementation challenges, including scenario analysis. These and many other efforts are critical for achieving climate-related financial disclosures that provide decision-useful information for investors and others.

Next Steps

In the nearly 15 months since the 2017 report was released, the Task Force has focused on promoting and monitoring adoption of its recommendations. During that time, the Task Force has seen significant momentum around and support for its work (Figure E2). When the report was issued, it was supported by just over 100 chief executive officers. Less than six months later, at President Emmanuel Macron's One Planet Summit in Paris, Michael Bloomberg announced the TCFD had over 230 supporters. Today, the TCFD has more than 500 supporters, including 457 companies and 56 other organizations (e.g., industry associations, governments). The companies represent a broad range of sectors with a combined market capitalization of over \$7.9 trillion. This includes over 287 financial firms, responsible for assets of nearly \$100 trillion. In addition to the 457 companies that support the TCFD, the Task Force's review identified another 104 companies that, in their financial filings or sustainability reports, stated they are already aligning their reporting with the TCFD or expressed intent to implement the recommendations. The TCFD has also received support from governments—Belgium, France, Sweden, and the United Kingdom—as well as financial regulators around the world, including in Australia, Belgium, France, Hong Kong, Japan, the Netherlands, Singapore, South Africa, Sweden, and the United Kingdom.

Over the next nine months, the Task Force will continue to promote and monitor adoption of its recommendations and will prepare a second status report for the Financial Stability Board in mid-2019. The Task Force believes the success of its recommendations depends on continued, widespread adoption by companies in the financial and non-financial sectors. Through widespread adoption, climate-related risks and opportunities will become a natural part of companies' risk management and strategic planning processes. As this occurs, companies' and investors' understanding of the financial implications associated with climate change will grow, information will become more useful for decision making, and risks and opportunities will be more accurately priced, allowing for the more efficient allocation of capital.

Figure E2

Number of TCFD Supporters



⁶ The Task Force understands many investors want insight into the governance and risk management context in which companies' financial and operating results are achieved. The Task Force believes disclosures that follow its Governance and Risk Management recommendations directly address this need for context.

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A Introduction

A Introduction

1. Background

In April 2015, the G20 Finance Ministers and Central Bank Governors asked the Financial Stability Board to convene public- and private-sector participants and review how the financial sector can take account of climate-related issues.⁷ As part of its review, the Financial Stability Board identified the need for better information to support informed investment, lending, and insurance underwriting decisions and improve understanding and analysis of climate-related risks and opportunities.⁸ To help identify the information needed by investors, lenders, and insurance underwriters to appropriately assess and price climate-related risks and opportunities, the Financial Stability Board established an industry-led task force: the Task Force on Climate-related Financial Disclosures (Task Force or TCFD).⁹ The Task Force was asked to develop voluntary, consistent climate-related financial disclosures that would be useful to investors, lenders, and insurance underwriters in understanding material risks. The 31-member Task Force is global; and its members were selected by the Financial Stability Board and come from various organizations, including large banks, insurance companies, asset managers, pension funds, large non-financial companies, accounting and consulting firms, and credit rating agencies. See [Appendix 1](#) for a list of current Task Force members.

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The Task Force's Recommendations

On June 29, 2017, the Task Force released its [Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures](#) (2017 report). The report is centered on four widely adoptable recommendations on climate-related financial disclosures that are applicable to both non-financial and financial companies across sectors and jurisdictions ([Figure 1](#)). Importantly, the Task Force believes asset managers and asset owners should implement the recommendations. Large asset owners and asset managers sit at the top of the investment chain and, therefore, have an important role to play in influencing the companies in which they invest to provide better climate-related financial disclosures.

Figure 1

Key Features of Recommendations

- Adoptable by all organizations
- Designed to solicit decision-useful, forward-looking information on financial impacts
- Brings the “future” nature of issues into the present through scenario analysis
- Strong focus on risks and opportunities related to the transition to a lower-carbon economy

The Task Force structured its recommendations around four thematic areas that represent core elements of how companies operate: governance, strategy, risk management, and metrics and targets. The four overarching recommendations are supported by recommended disclosures that build out the framework with information that will help investors and others understand how reporting companies assess climate-related risks and opportunities ([Figure 2](#), p. 2). In addition, there is guidance to support all companies in developing climate-related financial disclosures consistent with the recommendations and recommended disclosures. For the financial sector and certain non-financial sectors, *supplemental* guidance was developed to highlight important sector-specific considerations and provide a fuller picture of potential climate-related financial impacts in those sectors. The Task Force's guidance and supplemental guidance is included in [Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures](#) (Annex).

⁷ “Communiqué from the G20 Finance Ministers and Central Bank Governors Meeting in Washington, D.C. April 16-17, 2015,” April 2015.

⁸ FSB, “FSB to establish Task Force on Climate-related Financial Disclosures,” December 4, 2015.

⁹ Ibid.

Figure 2

Recommendations and Supporting Recommended Disclosures

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

Disclosure in Mainstream Financial Filings

The Task Force recommends that preparers of climate-related financial disclosures provide such disclosures in their mainstream (i.e., public) annual financial filings.¹⁰ In most G20 jurisdictions, companies with public debt or equity have a legal obligation to disclose material information in their financial filings—including material climate-related information. The Task Force believes climate-related issues are or could be material for many companies, and its recommendations should be useful to companies in complying more effectively with existing disclosure obligations.

Importantly, companies should make financial disclosures in accordance with their national disclosure requirements. If certain elements of the recommendations are incompatible with national disclosure requirements for financial filings, the Task Force encourages companies to disclose those elements in other official company reports that are issued at least annually, widely distributed and available to investors and others, and subject to internal governance processes that are the same or substantially similar to those used for financial reporting.

The Task Force recognizes 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. For purposes of adopting the Task Force's recommendations, asset managers and asset owners should use their existing means of financial reporting to their clients and beneficiaries where relevant and where feasible.

The Task Force believes that climate-related financial disclosures should be subject to appropriate internal governance processes. Since these disclosures should be included in annual financial filings, the governance processes should be similar to those used for existing financial reporting and would likely involve review by the chief financial officer and audit committee, as appropriate. The Task Force recognizes that some companies may provide some or all of their climate-related financial disclosures in reports other than financial filings. This may occur because the companies are not required to issue public financial reports (e.g., some asset managers and asset owners). In such situations, companies should follow internal governance processes that are the same or substantially similar to those used for financial reporting.

Principles for Effective Disclosures

To underpin its recommendations and help guide current and future developments in climate-related financial reporting, the Task Force developed seven principles for effective disclosure (Figure 3), which are described more fully in the 2017 report. When used by companies in preparing their climate-related financial disclosures, these principles can help achieve high-quality and decision-useful disclosures that enable users to understand the impact of climate change on companies. The Task Force encourages companies to consider these principles as they develop climate-related financial disclosures.

Figure 3

Principles for Effective Disclosures

- 1 Disclosures should represent relevant information
- 2 Disclosures should be specific and complete
- 3 Disclosures should be clear, balanced, and understandable
- 4 Disclosures should be consistent over time
- 5 Disclosures should be comparable among companies within a sector, industry, or portfolio
- 6 Disclosures should be reliable, verifiable, and objective
- 7 Disclosures should be provided on a timely basis

¹⁰ Financial filings refer to the annual reporting packages in which organizations 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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The Task Force's disclosure principles are largely consistent with internationally accepted frameworks for financial reporting and are generally applicable to most providers of financial disclosures. The principles are designed to assist companies in making clear the linkages between climate-related issues and their governance, strategy, risk management, and metrics and targets.

2. Purpose of Report

In February 2017, the Financial Stability Board welcomed a proposal by the Task Force to continue its work until at least September 2018 to focus on promoting and monitoring adoption of the recommendations by companies.¹¹ As part of its efforts to promote and monitor adoption of the recommendations, the Task Force prepared this report to provide (1) an overview of current disclosure practices that are aligned with the Task Force's recommendations and (2) information to support preparers in implementing the recommendations.

The remainder of this report is organized as follows:

- **Review of Climate-Related Financial Disclosures.** This section provides companies that are implementing or considering implementing the recommendations with baseline information on the alignment of current climate-related financial disclosures with the recommendations.
- **User Perspectives on Decision-Useful Climate-Related Financial Disclosures.** This section describes the types of information individual investors and analysts (users) look for in climate-related financial disclosures and provides examples of disclosures that, consistent with the TCFD recommendations, those individual users view as providing decision-useful information.
- **Preparer Perspective: Oil and Gas Industry.** This section summarizes the findings of a small group of oil and gas companies, including the types of information they currently disclose that is consistent with the Task Force's recommendations as well as disclosure challenges they have identified.
- **Initiatives Supporting TCFD.** This section describes various initiatives aimed at supporting preparers and users of climate-related financial disclosures.
- **Appendices.** These sections provide supplemental information on the Task Force, the methodology for its review of disclosures, a glossary of terms, and references.

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¹¹ FSB, "FSB assesses implementation progress and effects of reforms," February 28, 2017.

B Review of Climate- Related Financial Disclosures

B Review of Climate-Related Financial Disclosures

Since the release of the Task Force's 2017 report, Task Force members and the TCFD Secretariat have heard from many companies that they would like additional information to help them in implementing the TCFD recommendations. To assist these companies, the Task Force reviewed climate-related financial disclosures from companies in eight specific groups highlighted in the 2017 report. The results of this review, summarized below, provide *baseline* information on the alignment of recent climate-related financial disclosures with the Task Force's recommendations.

Importantly, the Task Force has not attempted to assess the level of adoption of its recommendations for this report nor whether existing climate-related financial disclosures fully meet the recommendations. Companies implementing the recommendations in their 2017 reports had a limited amount of time between the release of the Task Force's 2017 report and the start of their internal processes to prepare their 2017 financial filings. As a result, the Task Force focused on providing companies with a general indication of how many companies, in eight specific groups, included information in recent reports that address the core element of each of the Task Force's 11 recommended disclosures. The Task Force believes the analysis in this section may help companies develop a roadmap for disclosing information consistent with the 11 recommended disclosures.

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1. Scope and Approach

This section provides a brief summary of the scope and approach used to develop baseline information on the alignment of recent disclosures with the Task Force's 11 recommended disclosures. More information on the Task Force's methodology is provided in [Appendix 2](#).

Scope of Review

The Task Force focused its review on climate-related financial disclosures developed by the largest companies in eight specific groups highlighted in the Task Force's 2017 report. The eight groups include the financial sector, divided into four industries, and four groups of non-financial industries potentially most affected by climate change and the transition to a lower-carbon economy—referred to as non-financial groups ([Figure 4](#)).

Figure 4

TCFD Financial Sector Industries and Non-Financial Groups

Financial Sector Industries

- Banks
- Insurance Companies
- Asset Managers
- Asset Owners

The financial sector was organized into four major industries largely based on activities performed. The activities are lending (banks), underwriting (insurance companies), asset management (asset managers), and investing (asset owners).

Non-Financial Groups

- Energy
- Transportation
- Materials and Buildings
- Agriculture, Food, and Forest Products

The non-financial groups identified by the Task Force account for the largest proportion of GHG emissions, energy usage, and water usage.

Review Approach

To develop *baseline* information on the alignment of recent climate-related financial disclosures with the Task Force's 11 recommended disclosures ([Figure 2](#), p. 2), the Task Force started by narrowing down each recommended disclosure to a single closed-ended or yes-no question (see [Figure 61](#) in [Appendix 2](#) for a list of the 11 questions). For example, recommended disclosure a) under the Governance recommendation (*Governance a*) asks companies to describe the board's oversight of climate-related risks and opportunities. The yes-no question for *Governance a*) asked

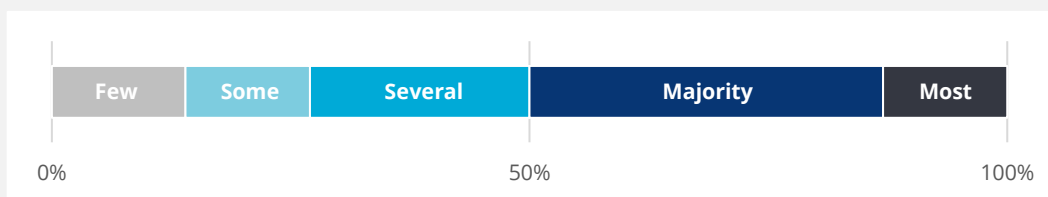
reviewers whether the company describes the board’s or a board committee’s oversight of climate-related risks or opportunities. If the reviewer determined the answer was “yes,” the Task Force considered the company to have disclosures aligned with *Governance a*). Importantly, this approach was **not** designed to assess the quality or comprehensiveness 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.

In reviewing companies’ disclosures, the Task Force focused primarily on information included in the largest companies’ financial filings and sustainability reports.¹² Most of the financial filings and sustainability reports reviewed were for fiscal year 2017. Reports for fiscal year 2016 were included if fiscal year 2017 reports were not available at the time of review. In addition, integrated reports, annual reports, and other relevant documents were included, as needed.

The Task Force used a two-pronged approach to review companies’ disclosures:

- **Artificial Intelligence Disclosure Review (AI Review).** The Task Force applied artificial intelligence (AI) technology to nearly 1,750 large companies’ publicly available reports to determine whether those reports included information that appeared to align with one or more of the 11 recommended disclosures. The companies were pulled from six of the eight groups listed in [Figure 4](#) (p. 6)—asset managers and asset owners were excluded.¹³
- **Disclosure Practices Review.** The Task Force formed a small group of members to review publicly available reports of 200 large companies—25 from each of the eight groups—to determine whether those reports included information aligned with one or more of the Task Force’s 11 recommended disclosures and gather additional insights on climate-related financial disclosure practices. It is important to highlight that the sample of 200 companies was intentionally biased toward companies more likely to disclose information on climate change.¹⁴ This was done so the Task Force could provide insight on the current disclosure practices of large companies. In addition, the reviews of companies in the four non-financial groups and the reviews for banks and insurance companies were used to train the underlying models used in the AI technology.

Figure 5
Review Scale



It is important to recognize the accuracy 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](#). The results from both the AI review and disclosure practices review are informative when considered on a relative basis (e.g., comparison of one recommended disclosure to another in terms of which is “higher or lower” versus exact numbers). Because the review results should be viewed on a relative basis, the Task Force developed a review scale,

¹² The Task Force used revenue to identify the largest companies in the four non-financial groups whereas total assets were used for banks and insurance companies, assets under management for asset managers, and assets owned for asset owners.

¹³ Asset owners and asset managers were excluded from the AI review because, in many cases, the types of reports needed are not publicly available. See [Appendix 2](#) for more information.

¹⁴ The Task Force needed a simple methodology to identify organizations “more likely” to disclose information on climate change. For the sake of simplicity, the Task Force reviewed disclosures from organizations that used the term “climate change” in their financial filings.

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shown in [Figure 5](#) (p. 7), to describe the relative number of companies (e.g., a few is less than some) that disclose information aligned with the recommended disclosures.

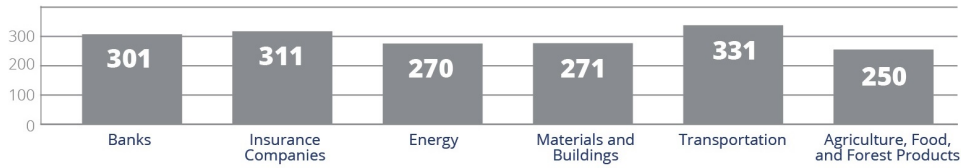
As noted previously, [Appendix 2](#) provides more information on the Task Force’s methodology, including how the review populations were determined. [Box 1](#) summarizes the populations for the AI review and disclosure practices review.

Box 1 Review Populations

Artificial Intelligence

The 1,734 companies selected for review represented 78 countries, including all G20 member countries.

AI Review Population: Number of Organizations by Group



\$15B average annual revenue of non-financial companies

\$170B average asset size of banks and insurers

- **2,894 relevant documents** were reviewed — an average of **1.7 per company**.
- The majority of the documents reviewed were financial filings (**58% of all documents**) and sustainability reports (**31% of all documents**).

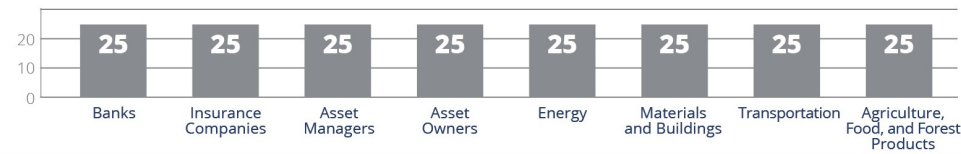
Distribution of Organizations



Disclosure Practices

The 200 organizations selected for review represented 29 countries, including 15 G20 member countries.

Disclosure Practices Review Population: Number of Organizations by Group



\$70B average annual revenue of non-financial companies

\$785B average asset size of banks and insurers

\$1.6T average AUM of asset managers

\$242B average assets owned by asset owners

Distribution of Organizations



- **412 relevant documents** were reviewed — an average of **2.2 per company**.
- The majority of the documents reviewed were financial filings (**44%**) and sustainability reports (**34%**).

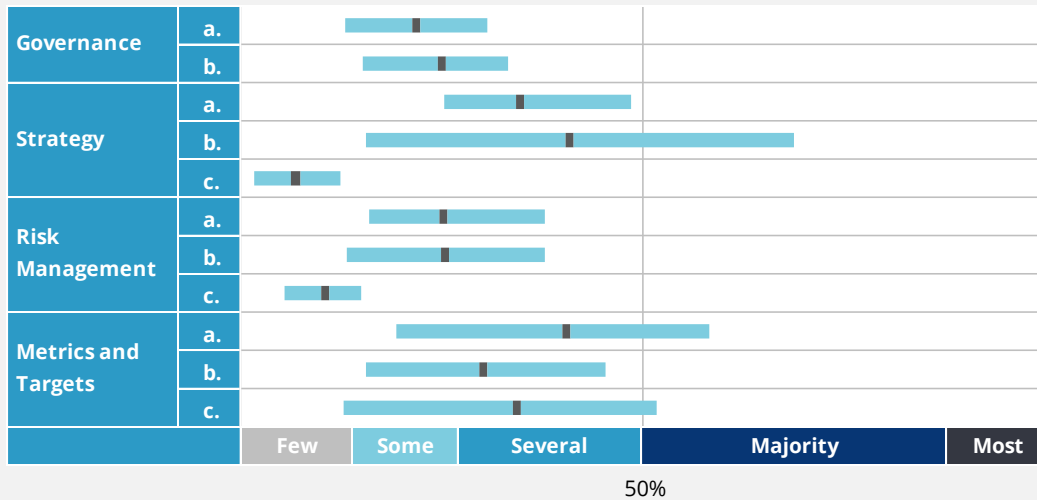
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2. Overall Observations

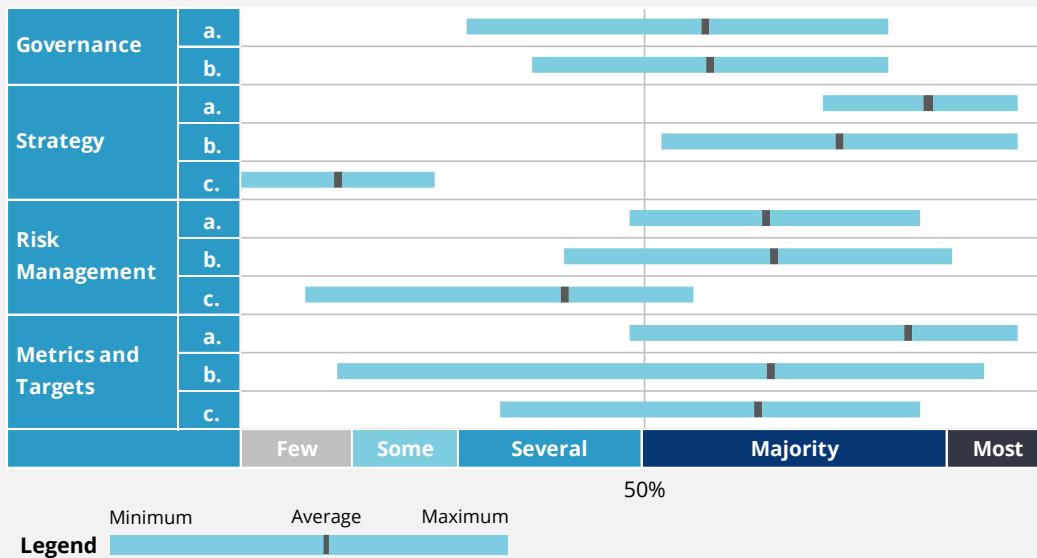
This section summarizes the results of the AI review and the disclosure practices review. [Figure 6](#) shows the results from the reviews for each of the recommended disclosures.¹⁵ Observations for each of the eight groups are described in [B.4. Observations by Group and Disclosure Examples](#).

Figure 6

Artificial Intelligence Review Results (1,734 Companies)



Disclosure Practices Review Results (200 Companies)



The results are displayed as a range of the percentage of companies from each group whose disclosures were identified as aligned with the recommended disclosure. The minimum for each recommended disclosure is set by the group in which the lowest percentage of alignment was found; similarly, the maximum is set by the group with the highest percentage of alignment. The average, shown in gray, is the average percentage of companies across the groups whose disclosures were identified as aligned with the recommended disclosure.

¹⁵ In some cases, the review results may seem counterintuitive. For example, one may expect the review results for *Strategy b*)—impact of climate-related risks or opportunities on companies' businesses, strategy, or financial planning—never to be higher than *Strategy a*)—companies' specific climate-related risks or opportunities. However, a company's disclosure may describe changes it has made to its strategy because of climate change in general, but not describe specific climate-related risks or opportunities to which the company is exposed.

As shown in [Figure 6](#) (p. 9), the review results for the disclosure practices review are higher than the results for the AI review. As mentioned previously, the sample of 200 companies used in the disclosure practices review was intentionally biased toward companies more likely to disclose information on climate change. Because an intentionally biased sample was chosen, one would expect the results to be higher than they would be for a larger, less biased sample. Below, the Task Force describes its observations on the AI and disclosure practices review results for each of its recommendations as well as insights from the disclosure practices review.

Observations by Recommendation

Governance Observations



Governance a)

Describe the board's oversight of climate-related risks and opportunities.

The AI review results were similar for both of these recommended disclosures, with some companies disclosing information on the board or management's role in governance of climate-related risks or opportunities. In the disclosure practices review, the majority of companies disclosed information aligned with these recommended disclosures. If a company described board or management responsibilities related to sustainability or ESG programs, but did not explicitly state that those programs included climate-related issues, the company's disclosure was **not** considered as aligned with the recommended disclosures.

Governance b)

Describe management's role in assessing and managing climate-related risks and opportunities.

Strategy Observations



Strategy a)

Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.

Some of the companies in the AI review disclosed their climate-related risks or opportunities. For five of the eight groups in the disclosure practices review, however, most of the companies disclosed information on their climate-related issues; and, in the other three groups (insurance companies, asset owners, and materials and buildings companies), the majority of the companies disclosed such information. Only some companies provided information on the short-, medium-, and long-term timeframes associated with their risks or opportunities.

Strategy b)

Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.

Under the AI review, several companies provided information that appeared to align with this recommended disclosure, including the majority of companies in the Energy group. The disclosure practices review found that a majority of the companies disclosed information aligned with *Strategy b*). Those disclosures primarily described targeted actions or initiatives companies have undertaken as part of their efforts to address climate-related issues, sometimes including the related costs or investment figures. The disclosures largely did not describe financial impacts to the company as a whole, which is of specific interest to investors.

Strategy c)

Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.

Both reviews identified only a few companies with disclosures that appeared to align with *Strategy c*). When looking at the eight groups in the disclosure practices review, a higher percentage of companies in the Energy, Materials and Buildings, and Insurance groups disclosed this information compared to the other five groups. Of the few companies in the disclosure practices review that described the resilience of their strategies, over half of them described using a 2°C or lower scenario.

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Risk Management Observations



Risk Management a)

Describe the organization's processes for identifying and assessing climate-related risks.

Some companies in the AI review and the majority of companies in the disclosure practices review disclosed information on their climate-related risk identification, assessment, and management processes. In many cases in the disclosure practices review, reviewers had to connect information located in different parts of a report to determine whether a company's disclosures were aligned with these recommended disclosures. For example, a company may describe its enterprise risk management processes broadly in one section and in another section mention climate-related risks are included in the enterprise risk management framework.

Risk Management b)

Describe the organization's processes for managing climate-related risks.

The AI review found only a few companies with disclosures that appeared to align with this recommended disclosure. For the disclosure practices review, several companies disclosed information allowing reviewers to determine that the companies' climate-related risk identification, assessment, and management processes were integrated into their overall risk management.

Risk Management c)

Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.

Metrics and Targets Observations



Metrics and Targets a)

Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.

Both reviews identified disclosures aligned with *Metrics and Targets a)* as the second most common type of disclosure. In addition, the AI review found the majority of companies in the Energy and Materials and Buildings groups disclosed information that appeared to be aligned with this recommended disclosure.

Metrics and Targets b)

Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.

The AI review found some companies' disclosures appeared to be aligned with *Metrics and Targets b)*, while the disclosure practices review found that the majority of companies' disclosures aligned with this recommended disclosure. Notably, the disclosure practices review found the greatest amount of variation among the eight groups for this recommended disclosure. In part, this is because only a few asset managers disclosed GHG emissions associated with their investments as requested in the TCFD guidance.

Metrics and Targets c)

Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.

Several companies in the AI review and the majority of companies in the disclosure practices review disclosed information on their climate-related targets. Most of the companies that disclosed their targets also disclosed performance against those targets.

Other Observations

The AI review provided insight, again on a relative basis, into whether there are differences in reporting aligned with the Task Force's recommended disclosures by company size or by the region in which the company is based.

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To assess disclosure by company size, the Task Force divided the review population into three groups by annual revenue: large companies (over \$10 billion), medium companies (\$4 billion to \$10 billion), and small companies (less than \$4 billion). For most of the 11 recommended disclosures, a higher percentage of large companies' disclosures appeared to align with the recommended disclosures than those of medium or small companies (Figure 7). Medium-sized companies appeared to have a slightly higher percentage of aligned disclosures than small companies.

Figure 7

AI Review: Company Size (Annual Revenue USD)

Size	Governance		Strategy			Risk Management			Metrics and Targets		
	a)	b)	a)	b)	c)	a)	b)	c)	a)	b)	c)
Large (>\$10b)	Several	Several	Majority	Majority	Few	Several	Several	Some	Majority	Majority	Majority
Medium (\$4b-\$10b)	Some	Some	Several	Several	Few	Some	Some	Few	Several	Several	Several
Small (<\$4b)	Few	Few	Some	Some	Few	Some	Few	Few	Some	Few	Some

Legend	Few	Some	Several	Majority	Most
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To assess whether there are regional differences in disclosure, the Task Force categorized the 78 countries in which the companies in the AI review population are based into five broad regions: Asia Pacific (40% of companies), Europe (25%), North America (24%), the Middle East and Africa (8%), and South America (3%). The AI review found that, on average, a higher percentage of companies in the Europe region disclosed information aligned with the recommended disclosures (Figure 8).

Figure 8

AI Review: Disclosure by Region

Region	Governance		Strategy			Risk Management			Metrics and Targets		
	a)	b)	a)	b)	c)	a)	b)	c)	a)	b)	c)
Asia Pacific	Few	Some	Some	Several	Few	Some	Some	Few	Several	Some	Several
Europe	Several	Several	Several	Majority	Few	Several	Several	Few	Majority	Several	Majority
Middle East and Africa	Few	Some	Few	Some	Few	Some	Few	Few	Some	Few	Few
North America	Some	Few	Several	Several	Few	Some	Some	Few	Several	Some	Several
South America	Some	Some	Several	Several	Few	Some	Several	Few	Several	Several	Several

Legend	Few	Some	Several	Majority	Most
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3. Key Takeaways

While the Task Force found the majority of the companies reviewed report some climate-related information today, further work is needed for disclosures to contain more decision-useful, climate-related information. The majority of companies reviewed disclosed information that is aligned with the core element of at least one of the recommended disclosures in their financial filings, annual reports, or sustainability reports. In addition, the Task Force found several instances of disclosures addressing the core element of each of the 11 recommended disclosures.

The review results demonstrate that it is both possible and practicable for companies to disclose certain *baseline* climate-related information today.

To reach a state where disclosures contain more complete, consistent, and comparable climate-related information that is useful to market participants, continued focus is needed on improving data analytics and modeling of climate-related issues. Improved practices and techniques should further improve the quality of climate-related financial disclosures and, ultimately, support more appropriate pricing of risks and allocation of capital in the global economy. Over the next nine months, the Task Force will continue to promote and monitor adoption of its recommendations and will prepare a second status report for the Financial Stability Board in mid-2019.

The Task Force believes the success of its recommendations depends on continued, widespread adoption by companies in the financial and non-financial sectors. To this end, the Task Force encourages more companies to use its recommendations as a framework for reporting on climate-related risks and opportunities during the next reporting cycle, especially companies with material climate-related risks. Companies in early stages of evaluating the impact of climate change on their businesses and strategies and those that have determined climate-related issues are not material are encouraged to disclose information on their governance and risk management practices.¹⁶

The key takeaways from the Task Force's reviews are summarized below.

Financial Implications are Often Not Disclosed

While many companies disclose climate-related information, they often do not disclose the financial implications of climate change on the company. As part of the disclosure practices review, the Task Force found companies more often disclosed information on the costs of individual projects, investments with climate-related implications, or measures of the company's impact on the environment. Users of disclosure have expressed the need for more quantitative information on the actual or potential climate-related financial impacts on a company. Many companies with material climate-related issues could improve their disclosures by describing the actual or potential financial implications of climate change.

Information on Strategy Resilience under Different Climate-Related Scenarios is Limited

The recommended disclosure with the lowest percentage of disclosure overall relates to one of the Task Force's key areas of focus—the description of the resilience of a company's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario. Qualitative or quantitative disclosure on how a company's strategies might address potential climate-related risks and opportunities is a key step to better understanding the potential implications of climate change on the company. The Task Force recognizes the use of scenarios in assessing climate-related issues and their potential financial implications is relatively recent and

¹⁶ The Task Force understands many investors want insight into the governance and risk management context in which companies' financial and operating results are achieved. The Task Force believes disclosures that follow its Governance and Risk Management recommendations directly address this need for context.

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practices will evolve over time, but believes such analysis is important for improving the disclosure of decision-useful, climate-related financial information.

Disclosures Vary Across Industries and Regions

The results of the disclosure practices review show that companies' climate-related financial disclosures vary by industry. There was often a large difference between the group with the highest percentage of disclosures aligned with a recommended disclosure and the group with the lowest percentage. For example, only a few companies in the Materials and Buildings group disclosed information on the integration of climate-related risk management processes into their overall risk management (*Risk Management c*). However, the majority of the banks disclosed information aligned with *Risk Management c*). In addition, Energy group companies had the highest percentage of disclosure for four of the 11 recommended disclosures in the disclosure practices review and five of 11 in the AI review—the most of any group. In terms of regional differences, a higher percentage of companies in Europe disclosed information aligned with the 11 recommended disclosures compared to companies in other regions. In addition, a higher percentage of companies in North America disclosed information on the board's oversight of climate-related issues than on management's role in assessing and managing such issues, but the reverse is true for companies in the Asia Pacific region. A higher percentage of companies in the Asia Pacific region disclosed information on management's role in assessing and managing climate-related issues than on the board's oversight of such issues.

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Disclosures are Often Made in Multiple Reports

The Task Force found that companies often provided information aligned with the TCFD recommendations in multiple reports (e.g., financial filings, annual reports, integrated reports, and/or sustainability reports). Companies in the disclosure practices review most often disclosed information related to the TCFD recommendations in sustainability reports—information related to around half of the recommended disclosures was found in sustainability reports and around a third in financial filings. For example, disclosure on climate-related metrics and targets was two to three times more likely to be found in a sustainability report than in a financial filing. When climate-related financial disclosures are spread across multiple reports or included in very lengthy reports, companies may wish to consider providing cross-references or mappings to assist users of disclosure in locating relevant information.

Context is Key

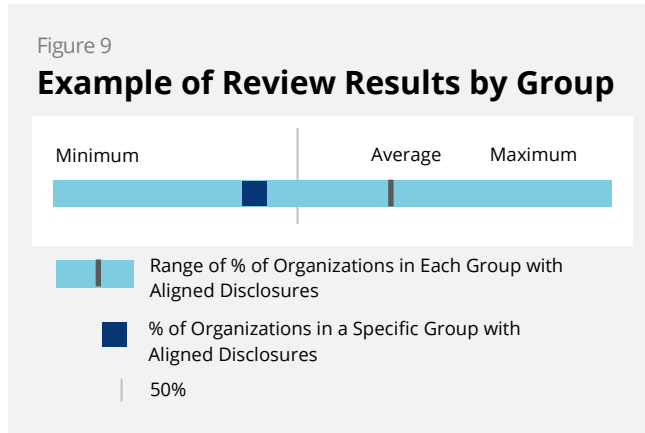
In the disclosure practices review, identification of disclosures aligned with the TCFD recommendations generally required judgment and context gathered through a review of multiple reports issued by a company or a complete review of a single report (rather than just specific sections). For example, a company might disclose in one part of its report that climate-related risks are integrated into its overall risk management, but describe the actual processes for identifying, assessing, and managing risks in another section without specifying that those processes address climate-related issues.

In addition, in some cases, it was difficult to understand the significance of climate-related projects described in companies' reports and their relevance to the companies' overall strategies. Reasons for climate-related projects could range from increasing the resilience of a company's strategy to reducing costs to demonstrating good corporate citizenship. If companies do not describe the reasons for their climate-related projects, it may be difficult for investors and others to determine the importance of such projects.

4. Observations by Group and Disclosure Examples

This section summarizes the results of the AI review, where available, and the disclosure practices review for each of the eight groups listed in [Figure 4](#) (p. 6). This section also describes the Task Force’s observations on current climate-related financial disclosure practices based on its review of a *biased* sample of 25 large companies from each group. Because the sample of 25 large companies from each group was intentionally biased toward companies more likely to disclose information on climate change, the associated review results are higher than the corresponding results from the AI review.

The review results are shown for each of the 11 recommended disclosures, which are denoted by the recommendation category (e.g., Governance) followed by the letter associated with the supporting recommended disclosures (see [Figure 2](#), p. 2 for the four recommendations and 11 supporting recommended disclosures). The results are displayed as a range of the percentage of companies from each group whose disclosures were identified as aligned with the recommended disclosure along with a dark blue box that represents the percentage of companies in a specific group whose disclosures were identified as aligned with the recommended disclosure ([Figure 9](#)).



In addition, as part of its review of disclosure practices of 25 large companies from each group, a small group of Task Force members selected examples of disclosure that provided information aligned to one or more of the 11 recommended disclosures. The Task Force members included examples from three different regions for each group whenever possible and tried to cover specific aspects of the 11 recommended disclosures. The examples included are **not** intended to represent “best practice” nor demonstrate disclosures that fully meet the associated recommended disclosure.¹⁷ Instead, the examples are provided because they may help companies generate ideas for their own disclosures.

Consistent with the descriptions of the review results in section [B.2. Overall Observations](#) the review results in this section are also described using the review scale shown in [Figure 6](#) (p. 9). Again, the review scale is intended to emphasize the importance of viewing the review results on a relative basis.

¹⁷ 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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AI Summary

Three hundred and one banks from 54 countries were included in the AI review. They ranged from over \$3 trillion to around \$13 billion in asset size. Five hundred and nineteen documents were reviewed, of which 68% were financial filings or annual reports and 32% were sustainability reports. The AI review found that the most common disclosure among banks was information on climate-related risk identification and assessment processes (Figure 10).

Disclosure Practices Summary

All 25 banks disclosed information aligned with at least one of the recommended disclosures; and the majority provided information aligned with ten of the 11 recommended disclosures. The banks disclosed information aligned with the recommended disclosures in their financial filings more than any other group. Other observations include the following (Figure 10):

Governance: The majority of the 25 banks provided information on the role of the board and management as it relates to climate-related issues, including describing specific board committees that oversee climate-related risks.

Strategy: Most of the banks disclosed their climate-related risks or opportunities, with the risks being focused more on transition risks than physical risks. Some of the banks noted climate change concerns might lead to regulation that could increase operating costs or negatively affect investments. A majority of the banks described the impact of climate-related issues on their businesses, but only a few disclosed information on how their strategies would be resilient under different climate-related scenarios. Some mentioned that they plan to begin disclosing information on climate-related scenario analysis in the coming years.

Risk Management: The majority of the 25 banks disclosed information about their processes for identifying, assessing, and managing climate-related risks and indicated that such processes are integrated with overall risk management processes. Some of the banks described how they determine the relative significance of climate-related risks in relation to other risks and the processes for assessing the potential size and scope of the identified climate-related risks.

Metrics and Targets: Most of the banks disclosed the metrics they use to assess or monitor climate-related issues; and the majority disclosed Scope 1 and Scope 2 GHG emissions and the targets they use to manage climate-related issues. Several banks focused on metrics and targets related to climate-related opportunities—green bonds and lending to specific social and environmental segments to stimulate a low-carbon economy.

Figure 10

Banks



¹⁸ The Task Force organized the financial sector into four industries based on activities performed: banks (lending), insurance companies (underwriting), asset managers (asset management), and asset owners (investing). This analysis focuses on banks' lending activities.

Examples of Disclosure Aligned with TCFD Recommendations

Strategy Recommendation

Strategy a) asks companies to describe the climate-related risks and opportunities they have identified, and the guidance asks for a description of the specific climate-related issues for each time horizon (short, medium, and long term) that could have a material financial impact on the company. [Figure 11](#) provides a bank's description of its indirect risks in the short, medium, and long term, potential impacts, and mitigating actions.

Figure 11

Excerpt from Non-Financial Statement

Indirect risks for the Intesa Sanpaolo Group

Potential risks	Timeframe*	Potential impact	Actions
Uncertainty surrounding environmental regulations	Short term	Negative impact on the possibility of implementing new products and services	Active collaboration with policy makers to highlight the need for stable and clear regulations and to be kept up-to-date on changes underway
Regulations and incentives on renewable energy	Short term	Negative impact on loans to customers that want to invest in renewable energy sources, due to an Italian scenario characterized by uncertainty and a sharp reduction in public incentives	Offering of advisory services to customers on new regulations and incentives for the energy efficiency sectors
Introduction of new rules related to waste reduction or emission reduction	Short term	Increased costs for corporate customers	Study of possible scenarios for Intesa Sanpaolo's customers and creation of financial solutions to prevent excessive costs
Extreme atmospheric events	Short/medium/long term	Financial implications related to the default risk of businesses seriously damaged by extreme atmospheric events	Suspension of repayments of loans and allocation of specific funding at special conditions in favour of damaged customers
Fluctuation of socio-economic conditions	Medium/long term	Reduction of customers' economic capacity and subsequent difficulty in repaying debts	Implementation of a Disaster events ceiling for the reconstruction of damaged properties and suspension of payments in the case of major natural events

* 0-3 years short term; 3-6 years medium term; over 6 years long term.

Europe: Intesa Sanpaolo Group, [2017 Consolidated Non-Financial Statement](#), p. 55

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Risk Management Recommendation

Risk Management b) asks companies to describe their processes for managing climate-related risks. [Figure 12](#) provides a bank's description of some of its risk management processes.¹⁹

Figure 12

Excerpt from Financial Filing

MANAGEMENT'S DISCUSSION AND ANALYSIS

The ESG group and ES group work in partnership with the lines of business and Corporate Support areas to manage environmental and social risk within our business. We work with external stakeholders to understand the consequences and impacts of our operations and financing decisions. As part of our enterprise risk management framework and credit risk management framework, we evaluate the environmental and social risk associated with credit and counterparty transactions and exposures. We have developed and implemented specific financing guidelines to address environmental and social risk for specific lines of business. To assess exposure to clients' environmental risks, we apply enhanced due diligence to transactions with clients operating in environmentally sensitive industry sectors, and we avoid doing business with borrowers that have poor environmental and social risk management track records.

We consider the impact our decisions have on our stakeholders. Our Board-approved Code of Conduct reflects our commitment to manage our business responsibly. We expect our suppliers to be aware of, understand and respect the principles of our Supplier Code of Conduct, which outlines our standards for integrity, fair dealing and sustainability. We issued our first statement under the United Kingdom Modern Slavery Act and we updated our Supplier Code of Conduct to reflect this legislation.

BMO has been a signatory to the Equator Principles since 2005 and applies its credit risk management framework to identify, assess and manage environmental and social risk in project finance transactions. We also apply the World Bank/International Finance Corporation environmental and social screening process to categorize and assess projects based on the magnitude of their potential impacts and risks. These principles have been integrated into our credit risk management framework. We are a long-time signatory to and participant in the Carbon Disclosure Project – a global initiative that assembles and publishes corporate disclosure on greenhouse gas emissions and climate change.

BMO is a signatory to the United Nations Principles for Responsible Investment, a framework designed to encourage sustainable investing through the integration of ESG issues into investment, decision-making and ownership practices. We are a partner in the Carbon Pricing Leadership Coalition, a voluntary partnership that supports the effective implementation of carbon pricing around the world.

To keep informed of emerging issues, we participate in global forums with our peers, maintain an open dialogue with our internal and external stakeholders, and continuously monitor and evaluate policy and legislative changes in the jurisdictions where we operate. We publicly report our environmental and social performance and targets in our annual Environmental, Social and Governance (ESG) Report and Public Accountability Statement (PAS), and on our Corporate Responsibility website. Selected environmental and social indicators in the ESG Report and PAS are assured by a third party.

North America: BMO Financial Group, [2017 BMO Financial Group Annual Report](#), p. 112

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¹⁹ Earlier in its report, the bank defines environmental and social risk as covering “a broad spectrum of issues, such as climate change.”

Risk Management Recommendation

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 13 provides a bank's description of its integration of climate-related risks and opportunities into its strategy and risk management processes.

Figure 13

Excerpt from Sustainability Report

On climate change

2017 marks almost a decade since we released our first climate change action plan and over this time we have continued to integrate the consideration of climate-related risks and opportunities into our strategy and risk management processes.

Building on extensive stakeholder consultation and climate change scenario analysis (see [2016 Sustainability Performance Report](#)), we released our third [Climate Change Position Statement and 2020 Action Plan](#) in May 2017. Outlining the next phase of actions we are taking over the short term to 2020, medium term to 2030, and long-term to 2050, it demonstrates our commitment to operate in a manner consistent with limiting global warming to less than 2°C above pre-industrial levels.

This process helped inform our approach to transitional risks including the policy, legal,

technology and financial impacts related to climate change, as well as the business implications of physical risks such as changes in climate patterns and extreme weather events. It has also underpinned our new ambitious financing targets for climate change solutions (see Positive societal impact) which are based on an economy-wide pathway to net zero emissions by 2050.

To address climate-related risks, we have enhanced our approach to lending to emissions-intensive sectors. We support customers that are in, or reliant on, these sectors and who assess the financial implications of climate change on their business, including how their strategies are likely to perform under various forward-looking scenarios and demonstrate a rigorous approach to governance, strategy setting, risk management and reporting.

Asia Pacific: Westpac Group, [2017 Westpac Group Sustainability Performance Report](#), p. 45

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Insurance Companies²⁰

AI Summary

Three hundred and eleven insurance companies from 54 countries were included in the AI review. They ranged from \$2.6 trillion to \$52 billion in asset size. Five hundred and nineteen documents were reviewed, of which 85% were financial filings or annual reports and 15% were sustainability reports. Overall, the 311 insurance companies disclosed information that appeared to align with the recommended disclosures less frequently than the other five groups included in the AI review (Figure 14). The AI review found that the most common disclosure within the sample was information on the companies' processes for identifying and assessing climate-related issues.

Disclosure Practices Summary

The 25 insurance companies disclosed information aligned with the recommended disclosures in their financial filings more than any other group except for banks. The most common disclosure among the insurance companies was on climate-related metrics. Other observations include the following (Figure 14):

Governance: The majority of the 25 insurance companies described board-level oversight of climate-related issues, and some described the frequency of relevant board-level meetings. The majority of the insurance companies described management's responsibility for climate-related issues at a high-level, but usually did not describe management's specific roles or responsibilities.

Strategy: The majority of the insurance companies disclosed information on their climate-related risks and opportunities. The majority also provided information on the impact of climate-related issues on their business, strategy, or financial planning. Some insurance companies reported on how their strategies would be resilient under different climate-related scenarios, with half of them mentioning the use of a 2°C climate-related scenario.

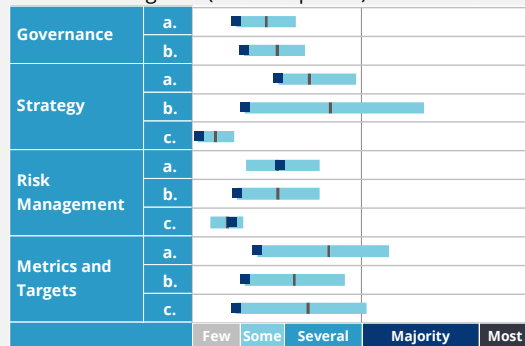
Risk Management: The majority of the 25 insurance companies provided information on their risk identification and assessment processes related to climate change; however, significantly fewer reported on their risk management processes. A majority of the companies indicated that their processes for identifying, assessing, and managing climate-related risks are integrated into their overall risk management processes.

Metrics and Targets: Most of the 25 insurance companies disclosed the metrics they use to assess or monitor climate-related issues, and the majority disclosed their Scope 1 and Scope 2 GHG emissions as well as the targets they use to manage climate-related issues.

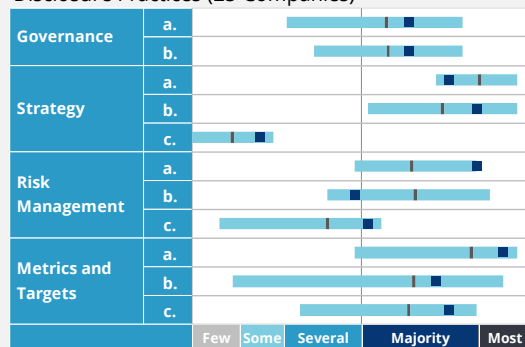
Figure 14

Insurance Companies

Artificial Intelligence (311 Companies)



Disclosure Practices (25 Companies)



Legend

■ Insurance Companies
| 50% Minimum Average Maximum

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²⁰ The Task Force organized the financial sector into four industries based on activities performed: banks (lending), insurance companies (underwriting), asset managers (asset management), and asset owners (investing). This analysis focuses on the underwriting side of insurance activities.

Examples of Disclosure Aligned with TCFD Recommendations

Governance Recommendation

Governance a) and b) ask companies to describe the board's oversight of climate-related risks and opportunities and management's role in assessing and managing climate-related risks and opportunities, respectively. Figure 15 provides an insurance company's description of its governance of climate-related issues, including the roles of the board and management.

Figure 15

Excerpt from Sustainability Report

ALLIANZ'S CLIMATE-RELATED FINANCIAL DISCLOSURE

The Allianz Group has had a Climate Change Strategy in place since 2005, which steers our business and is regularly updated. In our corporate reporting on climate change, we are applying the recommendations developed by the G20 Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD). The TCFD's four-pillar framework provides guidance on disclosure and business integration of risks and opportunities from a changing climate. As an active driver of best practice and tools, we strive to continuously enhance our reporting and business practices.

GOVERNANCE

Within the Allianz Group diverse committees steer sustainability topics, including climate change, within their scope of influence.

The Group ESG Board is the highest governing body for sustainability issues, such as climate change, and oversees the Allianz Group Climate Change Strategy. It consists of three members of the Allianz SE Board of Management (BoM), meets quarterly, and informs the BoM on relevant topics and activities at least twice a year. It also reviews and recommends policy proposals for consideration by the BoM and/or relevant Board committees.

The Group Finance and Risk Committee (GFRC), consisting of members of the BoM, oversees risk management and monitoring, including sustainability and climate risks, and serves as an escalation point based on analysis and deliberations within the Group ESG Board. Risks identified as emerging and/or significant are addressed either in the GFRC or the Group Underwriting Committee (GUC). The GUC consists of Members of the BoM, the Group Chief Risk Officer, Chief Underwriting Officers, and other executives of the Group. It monitors underwriting business, as well as its risk management and strategy and develops an underwriting policy.

The Allianz Group Corporate Responsibility department, and particularly the Group ESG Office, is responsible for steering the integration of ESG and climate aspects into core investment and insurance activities and acts as the Executive Office of the Group ESG Board.

All internal asset managers, the complete investment management function (Allianz Investment Management), and key insurance operating entities have well-established dedicated ESG functions and practice. Several units also have dedicated competence centers on promoting low-carbon technologies (Allianz Capital Partners, Allianz Global Investors, Allianz Global Corporate & Specialty, Allianz Climate Solutions, and others). ESG specialists and/or representatives from different local operating entities, global lines, and Group centers come together in the ESG Working Group to develop and discuss projects and proposals for ESG and climate integration in the business.

Specifically for climate change, we have a Climate Contact Group (CCG), consisting of experts from across the Group, exchanging and developing proposals on climate integration into business. The CCG's secretariat formally reports to the Group ESG Board, input from the CCG is used to inform top management and Group ESG Board.

Europe: Allianz Group, [Allianz Group Sustainability Report 2017](#), p. 86

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Strategy Recommendation

Strategy a) asks companies to describe the climate-related risks and opportunities they have identified. [Figure 16](#) provides an insurance company's description of one of its climate-related risks.

Figure 16

Excerpt from Integrated Report

(ii) Risk of large insurance claims due to natural disaster

Natural disasters such as typhoons and earthquakes can result in large losses, and with such natural disasters growing in frequency and scale worldwide due to the impact of such factors as climate change, there is a possibility that huge natural disasters exceeding forecast levels will occur. The Group utilizes reinsurance and builds appropriate catastrophe reserves, so it is able to properly respond to instances of large claim payments arising from such catastrophic events. Nonetheless, there is a risk of a negative impact on the Group's business results due to excessive payments caused by larger-than-expected natural disasters.

Asia Pacific: MS&AD Insurance Group, [MS&AD Integrated Report 2017](#), p. 64

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Strategy Recommendation

Strategy a) asks companies to describe the climate-related risks and opportunities they have identified. Figure 17 provides an insurance company's description of its physical risks.

Figure 17

Excerpt from Financial Filing

Climate-related risks

PHYSICAL RISKS

Physical risks posed by climate change could potentially affect three areas of our business:

- Reduction/disruption of our own operations
- Modelling and pricing of weather-related natural perils
- Impact on the economic viability of re/insurance for risks exposed to extreme weather events

Our own operations

According to our in-house catastrophe loss models, severe weather risks are potentially of importance for some of our operations, mainly in Florida and on the northeastern coast of the US. However, even assuming an extreme climate change scenario, we do not expect any of these locations to be exposed to risk levels that would question their economic viability. In 2012, Hurricane Sandy in New York showed that some of Swiss Re's offices are already exposed to severe weather risks today. In response, we have sharpened the Group's business continuity management to minimise property losses and business interruption. Thanks to these investments, we are able to swiftly transfer work tasks to unaffected areas if required and to keep potential financial impacts minimal.

Modelling and pricing of weather-related perils

Based on our proprietary loss modelling, we calculate the annual expected losses (AEL) of the major weather-related natural catastrophes; the four perils with the largest AEL at present are disclosed on page 148 (North Atlantic hurricane, US tornado, European windstorm, Japanese tropical cyclone). Our models show that with the current climate, the dominant factor is natural variability affecting both the frequency and severity of extreme weather events in all regions.

We expect this to remain the case both in the short and medium term (ie 2025 and 2030), in line with the latest scientific findings (see the IPCC Fifth Assessment Report, chapter 11).

In addition, we expect weather risk to remain assessable by scientific methods, meaning we can continue to update our loss models in the future to assure adequate costing of extreme weather events. Since most of the re/insurance contracts with our clients have a duration of one year, we can thus adequately price natural catastrophe risks by updating our models to reflect the current climate.

Regarding the long-term time horizon (2040), we expect a substantial need to adjust some of our weather risk models, based on current scientific knowledge. We are confident, however, that future research will give us sufficient guidance on the magnitude and direction of these adjustments.

Impact on the economic viability of re/insurance protection

An increase in the frequency and severity of extreme weather events can restrict the affordability of re/insurance in certain regions, especially in coastal areas, by requiring a rise in premiums. While climate projections are associated with a large range of uncertainty, especially when it comes to storms making landfall, increases in the frequency and severity of tropical storms are likely. Natural variability is expected to remain the dominant factor in the short and medium time horizon (2025 and 2030). In the longer term (2040), though, sea level rise will lead to non-linear increases in the storm surge risk for coastal areas. Additionally, warmer temperatures will lead to more extreme rainfall events that may increase flood risk.

If rises in re/insurance premiums necessitated by increasing extreme weather risks remain modest, ie re/insurance protection remains economically viable for our clients, the overall premium volume will actually grow. Larger increases, however, will reverse this effect eventually by pushing re/insurance prices for certain exposed risks beyond the limits of economic viability. This is particularly relevant for areas with inadequate construction planning and development. In addition, timing is also of crucial importance: if measures to exclude a particular risk are taken too early and without broader market support, we can offer our clients less insurance protection and may lose significant market share; if measures are taken too late, we may end up with increased loss potential.

In line with independent external studies, we have shown through a series of scenario assessments (Economics of Climate Adaptation studies, ECA) that in many regions, climate adaptation measures need to be taken to limit expected increases in natural catastrophe damages and thus to ensure the economic viability of re/insurance in the future. This is a key reason why Swiss Re actively engages with the United Nations, the public sector, clients, industry peers and employees to advocate cost-effective adaptation to climate change.

Conclusion: Although the physical risks arising from climate change will have significant economic consequences over time, especially from a wider societal perspective, they represent a limited and manageable risk for Swiss Re.

Europe: Swiss Re, 2017 Financial Report, p. 141

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Asset Managers

AI Summary

Asset managers were not included in the AI review. The AI population selection methodology is described in [Appendix 2](#).

Disclosure Practices Summary

As described in the 2017 report, preparers of climate-related financial disclosures should provide such disclosures in their annual financial filings. However, the Task Force recognized comparable reporting by asset managers to their clients would usually occur in other types of financial reporting and may not be publicly available. To provide some insight on climate-related financial disclosures by asset managers, the Task Force reviewed publicly available reports, recognizing such reports are a proxy and may differ from what is provided to clients on a confidential basis.

The majority of the documents reviewed for asset managers were financial filings and sustainability reports, consistent with the documentation reviewed for the non-financial groups, banks, and insurance companies.²¹ Two of the organizations issued specific reports on climate change and asset management, which were also reviewed. Of the 53 reports reviewed across the 25 asset managers, all but three were for fiscal year 2017 (issued in late 2017 or in 2018). The three reports that were for fiscal year 2016 were sustainability reports. The majority of asset managers mentioned support for the TCFD in their financial filings or sustainability reports. Other observations include the following ([Figure 18](#)):

Governance: Several of the asset managers provided information on the role of the board as it relates to climate-related issues, and the majority described the role of management. Less than half of the companies that described management's role also described the board's role.

Strategy: Most of the asset managers provided information about their climate-related risks or opportunities, but none explicitly discussed how the risks or opportunities related to the short, medium, or long term. The majority provided information about how their investment strategies consider climate-related risks, but none described how their strategies might change under different climate-related scenarios. One asset manager, however, described how it is exploring ways to measure the positioning of its portfolio versus a 2°C target.

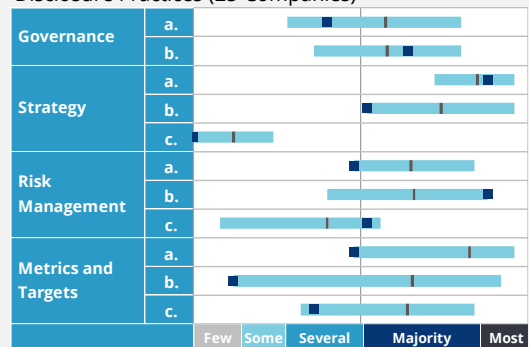
Risk Management: Several of the 25 asset managers provided information on how they identify or assess climate-related risks, and most described actions they take to manage climate-related risks. The majority provided information that indicated their management of climate-related risks is integrated into their overall risk management.

Metrics and Targets: Several asset managers described metrics and targets they use for climate-related issues. While the majority provided information on their own GHG emissions, only a few (as reflected in [Figure 18](#) for recommended disclosure b) provided information on the GHG emissions associated with their investments, which is the metric the Task Force recommends asset managers disclose.

Figure 18

Asset Managers

Disclosure Practices (25 Companies)



Legend

■ Asset Managers
| 50%
Minimum Average Maximum

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²¹ Most of the asset managers reviewed are part of diversified financial institutions. As a result, their financial filings and sustainability reports cover more than just their asset management activities. For purposes of this review, we focused on information related to the organization's asset management activities whenever possible.

Examples of Disclosure Aligned with TCFD Recommendations

Governance Recommendation

Governance b) asks companies to describe management’s role in assessing and managing climate-related risks and opportunities. [Figure 19](#) provides an asset manager’s description of the role of its management.

Figure 19

Excerpt from Financial Filing

1) GOVERNANCE OF ESG AND CLIMATE-RELATED RISKS AND OPPORTUNITIES

OVERALL APPROACH

AXA defines Responsible Investment (RI) as the integration of Environmental, Social and Governance (ESG) considerations into investment processes, including ownership practices. Our conviction is that ESG integration may impact long-term investment performance by offering an enhanced understanding of risk drivers. This conviction is derived from academic research and empirical market data. It is also a way to strive for alignment between our investments and our broader Corporate Responsibility (CR) commitments. AXA developed a comprehensive RI strategy covering the Group’s €600bn+ General Account assets and will extend it to its Unit-Linked investments. The process of ESG integration is coordinated centrally, with an active input from our asset managers that include ESG metrics in their investment analysis across asset classes and regions, as well as local investment teams.

ESG AND CLIMATE-RELATED GOVERNANCE

AXA created a Group-level Responsible Investment Committee (RIC), chaired by the Group Chief Investment Officer, and including representatives from AXA Asset Management entities, Corporate Responsibility (CR), Risk Management and Communications. The RIC reports to the Group Investment Committee, chaired by the Group Chief Financial Officer. In addition, the “ESG Footprint Committee” reviews risks posed by companies or sectors presenting a low ESG performance and/or serious and persistent controversies. AXA’s RI policy is supported by the RI Center of Expertise, a transversal working group from AXA’s local investment teams interacting with the CR network and the Group’s Asset Management entities. Finally, in 2016 the Group created a dedicated shareholder engagement-related function at Group level, to complement engagement initiatives already undertaken by AXA IM and AB, AXA’s in-house investment managers.

Europe: AXA Group, [Registration Document 2017](#), p. 381

Metrics and Targets Recommendation

Metrics and Targets b) asks companies to disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions. For asset managers, the Task Force asks them to disclose GHG emissions associated with their investments. [Figure 20](#) provides an asset manager’s disclosure of this metric.

Figure 20

Excerpt from Financial Filing

Business line indicators		Unit ^(*)	2017	2016	2015
Carbon footprint of the portfolios ***	Assets subject to a carbon footprint calculation ⁽¹⁵⁾	€ billion	463.84	-	-
	Carbon emissions in million euros of revenue	CO2 TEQ	226.5	-	-
	Carbon emissions in millions of euros invested	CO2 TEQ	180.5	-	-

* Scope: Amundi SEU (Amundi France)

*** Scope: Amundi (old configuration: Pioneer data not available)

(15) The outstanding amount on which the carbon footprint is calculated, i.e. €463.84 billion, corresponds to assets managed by Amundi (with the exception of assets of Pioneer, JV and Real assets), less non-rated and non-rateable securities, and for which we have data provided by TRUCOST.

Europe: Amundi, [Registration Document 2017](#), p. 114

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Risk Management Recommendation

Risk Management a) asks companies to describe their process for identifying and assessing climate-related risks, and the supplemental guidance for asset managers asks them to describe, where appropriate, engagement activity with investee companies. [Figure 21](#) provides an asset manager's description of its approach to engaging with investee companies.

Figure 21

Excerpt from Corporate Responsibility Report

However, we do believe that progress can be made. It is our belief, that by providing data in the following four areas, investors can gain a more holistic perspective of how a company manages climate-related risks, understand what steps the company is taking to mitigate such risks, and gain an overview of the governance structures in place to oversee these processes. We engage with companies in the following areas:

Governance: We expect companies, particularly in high-impact sectors such as the oil and gas sector, to address how the board or its committees oversee climate risks. As a best practice, companies will ensure that directors have some knowledge, expertise or training on material sustainability or climate risks facing the company.

Establishing GHG Goals: We view establishing company-specific GHG emissions targets as one of the most important steps in managing climate risk. Appropriate, long-term goals help companies manage emissions, demonstrate robust planning processes, and help contextualize capital allocation processes.

Carbon Pricing Assumptions: Establishing a price for carbon (carbon price) is a tool that companies have used to capture and monetize the costs and impacts of their activities as they relate to climate change, allowing them to express and incorporate the cost of operations, compliance, and future regulations into strategic decision-making.

Role of Scenario Planning: By incorporating results from scenario planning exercises into long-term strategy, companies can better position themselves to capitalize on opportunities and to mitigate risks. We have found that companies undertaking robust scenario-planning exercises often demonstrate their leadership in addressing climate risk by communicating to shareholders the impacts of their findings on their long-term capital expenditure plans.

We recognize that the work on improving disclosure of climate-related information has only just begun. As a long-term investor, State Street Global Advisors expects boards to consider climate risk as they would any other material risk to the sustainability of their business. However, the challenge of developing detailed guidance on emerging best practices remains.

North America: State Street, [2017 Corporate Responsibility Report](#), pp. 16-17

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Asset Owners

AI Summary

Asset owners were not included in the AI review. The AI population selection methodology is described in [Appendix 2](#).

Disclosure Practices Summary

As described in the 2017 report, preparers of climate-related financial disclosures should provide such disclosures in their annual financial filings. However, the Task Force recognized comparable reporting by asset owners to their beneficiaries would usually occur in other types of financial reporting and may not be publicly available. To provide some insight on climate-related financial disclosures by asset owners, the Task Force reviewed publicly available reports, recognizing such reports are a proxy and may differ from what is provided to beneficiaries.

Many of the asset owners reviewed are private organizations or government-run pension funds not subject to public company financial reporting requirements, making it challenging to find relevant reports for review. Observations based on the reports reviewed include the following ([Figure 22](#)):

Governance: Several asset owners provided information about the role of the board in overseeing climate-related issues, and several provided information on the role of management in assessing or managing climate-related issues. However, only some provided information on the roles of both the board and management.

Strategy: The majority of the 25 asset owners provided information about (1) their climate-related risks or opportunities and (2) how those risks or opportunities have affected their strategies. Some asset owners also described the timeframes associated with their climate-related issues (short, medium, or long term). While several asset owners mentioned, at a high level, the Paris Agreement or the potential for varying future scenarios related to climate change, only a few described the resilience of their strategies under different climate-related scenarios.

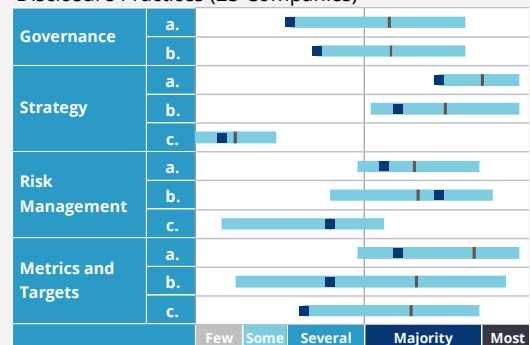
Risk Management: The majority of the asset owners provided information on how they identify or assess climate-related risks. In addition, the majority described actions they take to manage climate-related risks, primarily related to engagement with asset managers or companies held in their portfolios or through instituting requirements for asset managers to consider ESG/climate-related issues in their investment decisions. Several asset owners provided specific examples of past engagements to affect change within companies held in their portfolios, such as reducing GHG emissions, increasing energy efficiency, or encouraging adoption of the TCFD recommendations.

Metrics and Targets: The majority of the asset owners described metrics they use to assess or monitor climate-related risks, and a few provided several metrics with an explanation of their meaning. Several asset owners provided information on the GHG emissions associated with their investments, which is the metric the Task Force recommends asset owners disclose. Several asset owners also provided information on targets they use and their performance relative to those targets.

Figure 22

Asset Owners

Disclosure Practices (25 Companies)



Legend

■ Asset Owners
| 50%

Minimum Average Maximum

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Examples of Disclosure Aligned with TCFD Recommendations

Governance Recommendation

Governance a) and b) ask companies to describe the board's oversight of climate-related risks and opportunities and management's role in assessing and managing such issues, respectively.

Figure 23 provides a description of an asset owner's governance of climate-related issues, including the roles of the board and management.

Figure 23

Excerpt from Annual Report

Climate change governance and risk management

At Ontario Teachers', board members oversee management's implementation of responsible investing principles and approve investment policies and enterprise risk appetite. Management reports to the board at least annually on responsible investing initiatives and results, and this includes discussion of climate-related risks and opportunities.

The CEO, Chief Risk & Strategy Officer and Chief Investment Officer set responsible investing priorities, strategies and guidelines that help manage risk. Senior managing directors in the Investment Division regularly report to the Chief Investment Officer on material ESG exposures. The plan's investment professionals evaluate company-specific risks as well as broader ESG factors that could affect the long-term value of the investment portfolio.

Our 2017 Responsible Investing Report highlights some of our priorities. We began to adopt some of the recommendations of the Task Force on Climate-related Financial Disclosures. We developed climate change scenarios and have published our first carbon footprint. The report also provides more information on our engagements with companies, our voting record, and case studies illustrating how our portfolio companies are integrating ESG factors into their operations. View the full Responsible Investing Report at otpp.com/responsibleinvesting.

North America: Ontario Teachers' Pension Plan, [2017 Annual Report](#), p. 23

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Metrics and Targets Recommendation

Metrics and Targets b) asks companies to disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions. For asset owners, the Task Force asks them to disclose GHG emissions associated with their investments. Figure 24 provides an asset owner's disclosure of several metrics related to emissions associated with its listed equity portfolio.

Figure 24

Excerpt from Annual and Sustainability Report

	2017	2016
AP2's listed equity portfolio		
The equity portfolios' absolute emissions of greenhouse gases (Scope 1 and 2) (tCO ₂ e million)	2.6	2.7
Carbon dioxide intensity related to the share of the companies' market value (tCO ₂ e/SEK million)	18	20
Carbon dioxide intensity related to the share of the companies' revenue (tCO ₂ e/SEK million)	28	24
Carbon dioxide intensity, weighted average (tCO ₂ e/SEK million)	24	
The market value of the Fund's portfolio covered by CO ₂ e data (SEK billion, 31/12/2017)	142.4	135.4

Europe: AP2, [Annual and Sustainability Report 2017](#), p. 3

Risk Management Recommendation

Risk Management a) asks companies to describe their process for identifying and assessing climate-related risks, and the supplemental guidance for asset owners asks them to describe, where appropriate, engagement activity with investee companies. Figure 25 provides an asset owner's description of assessing climate-related risks and engaging with investee companies.

Figure 25

Excerpt from Climate Report

First State Super's Climate Change Adaptation Plan comprises three elements as follows:

1. Portfolio weather-proofing

This is seen as the first line of defence and involves a technical asset-by-asset review of the portfolio to assess asset-specific climate change risks and options to build resilience. These reviews go beyond basic carbon foot-printing to assessing exposures to plausible climatic events, supply chains, policy or technological change and public activism. The reviews are conducted by First State Super in collaboration with its asset managers and advisors over a two year cycle. It should be noted that many risks are interdependent and difficult to assess – such risks may not always present themselves in the way we anticipate.

2. Engagement

A key part of First State Super's ESG Policy is proactive engagement with senior executives and boards of the companies we hold, even where our percentage of share-holdings is small, e.g. listed shares. The second part of our Climate Change Adaptation Plan involved upgrading the 'E' piece in our engagement to ensure:

- suitable reporting of emissions and (more generally) climate change risk assessment and management;
- stress testing the impact of a carbon price on long-term business plans, including the development of each firm's own Adaptation Plan, including a review of energy efficiency and scope for embedded generation; and
- (in some cases) a return of capital over time rather than reinvestment in new exploration/development of fossil fuel reserves.

Divestments are possible under First State Super's engagement model, but are the last line of defence, considered only where: 1) assets have high levels of stranded asset risk; and 2) engagement fails or is unlikely to succeed. First State Super acknowledges that divestment may be ineffective in climate change mitigation as it simply transfers ownership of capital that has already been deployed and to which management will be largely indifferent. But there may still be a case for divestment to reduce excessive asset-specific risk. Moreover, when many pension funds divest en masse, this can increase the cost of capital for new projects, and may have real signalling effects that change corporate attitudes

3. Investing in Renewable Technology

The third plank in First State Super's Climate Change Adaptation Plan is the proactive assessment of investment in renewable energy generation, notably in wind and solar farms. Globally, renewables accounted for two-thirds of all new capacity in recent years. In Australia, investment in large-scale renewable generation came to a standstill in 2013 due to uncertainty around the government's Renewable Energy Target (RET) policy. The reset of the RET to 33,000GWh by 2020 however, is estimated to create the need for 5-6GW of new large scale capacity, estimated to require ~\$10 billion in capital over the next 3-4 years.

A key aspect of climate change mitigation in Australia is for this renewable capacity to displace a large part of our coal-fired generation capacity. In practice, the level of coal-fired capacity is likely to decline anyway as ageing coal-fired plants are decommissioned over the next 15-20 years. Around 1.5GW of coal-fired capacity was retired and another 500MW mothballed in recent years and other large coal plants such as Liddell (2GW) and Vale's Point are scheduled for decommissioning over the next decade.

As a back-of-the-envelope exercise, \$600 million (<1% of First State Super's total assets) in new renewables capacity over the next 3-4 years, would create 350-400MW of capacity – 6% of new capacity needed under the RET. Assuming this displaced an equivalent level of coal-fired capacity; this would reduce emissions by ~3MtCO₂e in emissions, or ~0.5% of Australia's current total emissions and reduce the Fund's net carbon footprint virtually to zero, i.e. 'carbon neutrality'.

Asia Pacific: First State Superannuation Fund, [Responding to Climate Change: A case study](#), pp. 14-15

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AI Summary

Two hundred and seventy energy companies from 49 countries were included in the AI review. They ranged from \$305 billion to \$1 billion in annual revenue. Five hundred and nine reports were reviewed, of which nearly 70% were financial filings or annual reports and 30% were sustainability reports. The 270 energy companies had the highest percentage of disclosures that appeared to align with five of the recommended disclosures (Figure 26). The most common disclosure within the sample was information on the impact of climate-related risks or opportunities on the company's businesses, strategy, or financial planning.

Disclosure Practices Summary

Similar to the AI review, the 25 energy companies had the highest percentage of disclosures aligned with four of the recommended disclosures (Figure 26). The majority of the energy companies provided information on climate-related issues in their sustainability or other reports rather than their financial filings. Other observations include the following:

Governance: The majority of the 25 companies disclosed information about the role of the board in overseeing climate-related issues, with several mentioning how the board integrates climate-related issues into strategy and business plans. The majority disclosed information about the role of management in assessing or managing climate-related issues, including the management committees that focus on climate-related issues as part of daily operations.

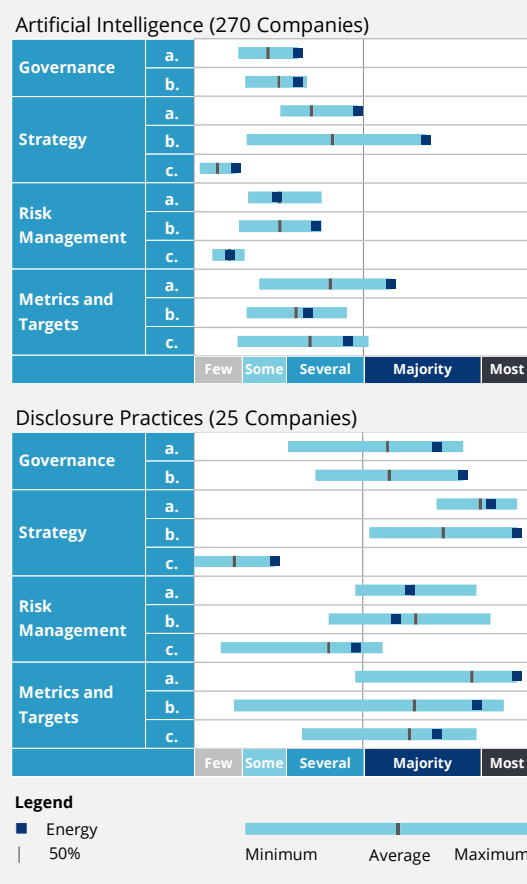
Strategy: Most of the 25 energy companies disclosed their climate-related risks or opportunities and their impact on business, strategy, or financial planning. The risks disclosed included those related to the regulation of carbon emissions, access to capital, and weather extremes, and the opportunities primarily described the companies' investments in renewable energy. Some of the energy companies reported on the resilience of their strategies under different climate-related scenarios; and all of those companies referenced 2°C climate-related scenarios.

Risk Management: The majority of the 25 companies disclosed information about the processes they use to identify, assess, and manage climate-related risks. Several provided information indicating their management of climate-related risks is integrated into overall risk management.

Metrics and Targets: Most of the energy companies disclosed metrics used to assess climate-related issues, and several indicated that performance metrics are incorporated into remuneration programs for key executives. The majority disclosed Scope 1 and Scope 2 GHG emissions, and several of those disclosed Scope 3 GHG emissions. The majority also disclosed their climate-related targets and performance against those targets, often using tables and charts along with explanatory text.

Figure 26

Energy Companies



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²² Industries in the Energy Group include oil and gas, coal, and electric utilities.

Examples of Disclosure Aligned with TCFD Recommendations

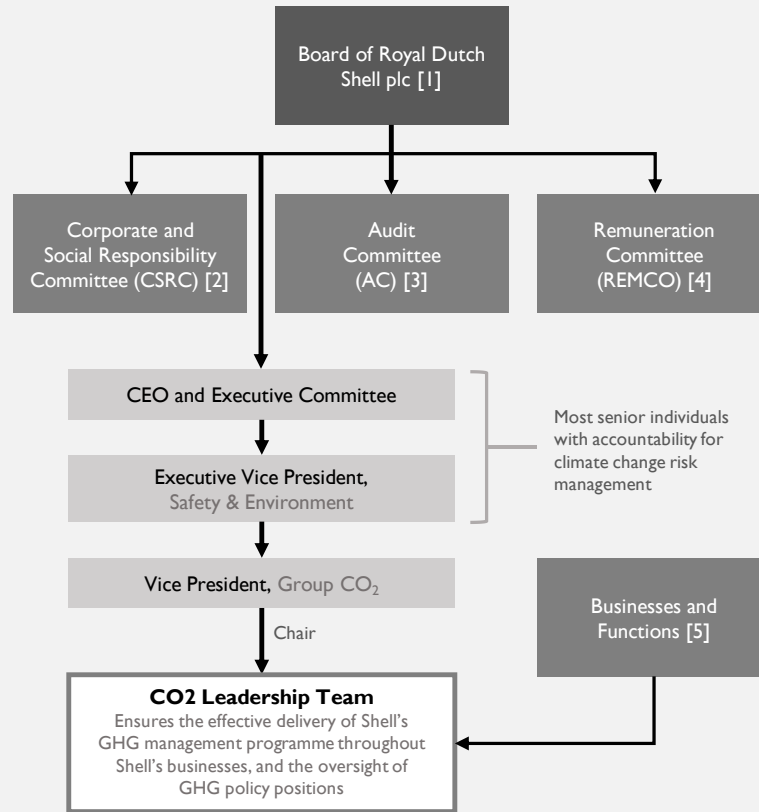
Governance Recommendation

Governance a) asks companies to describe the board's oversight of climate-related risks and opportunities. [Figure 27](#) provides an oil and gas company's description of the oversight responsibilities of the board and three board committees as they relate to climate change.

Figure 27

Excerpt from Financial Filing

Climate change management organogram



- [1] Oversight of climate change risk management.
- [2] Non-executive Directors appointed by the Board to review and advise on sustainability policies and practices including climate change.
- [3] Non-executive Directors appointed by the Board to oversee the effectiveness of the system of risk management and internal control.
- [4] Non-executive Directors appointed by the Board to set the remuneration policy in alignment with strategy.
- [5] Responsible for implementing Shell's GHG strategy. They are represented in the CO₂ Leadership Team.

Europe: Royal Dutch Shell, [Shell Annual Report and Form 20-F 2017](#), p. 63

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Strategy a) asks companies to describe the climate-related risks and opportunities they have identified. Figure 28 provides an oil and gas company's description of its climate-related risks.

Figure 28

Excerpt from Integrated Report

STRATEGY

Main risks and opportunities

The climate change risk is analysed taking into account five drivers for which the main results are shown below.

Market scenario. In a low carbon scenario, as in the IEA SDS2 (WEO 2017), the role of fossil fuels remains central to the energy mix. Natural gas that increases also the SDS scenario, represents an opportunity for strategic repositioning for oil & gas companies, due to its lower carbon intensity and the possibility of integration with renewable sources in electricity production. Although the IEA SDS scenario foresees the oil demand reaching a peak in around 2020 and going down to 75 Mb/d in 2040, the need for significant investments in the upstream sector to compensate for the drop in production from existing fields. There is residual uncertainty linked to the effect that regulatory developments and breakthrough technologies could have on the scenario, with a consequent impact on the company business model.

Regulatory developments. The adoption of policies (e.g. reduction of emissions, also from deforestation; carbon pricing; development of renewable sources; energy efficiency; diversification of electricity production; advanced biofuels; electric vehicles; etc.) designed to support energy transition to low carbon sources could have significant impacts on the business. The differentiated approach by Country could provide an advantage for the development of new business opportunities.

Technological developments. Technologies to capture and reduce GHG emissions as well as leaks of natural gas along the oil & gas value chain will be fundamental for affirming the dominant role of natural gas in the global energy mix. On the other hand, technological development in the field of renewable energy production and storage and in the efficiency of electric vehicles could have impacts on the demand for hydrocarbons and therefore on the business. The capacity to rapidly intercept and integrate technological break-throughs in the business will play a key role in business competitiveness.

Reputation. The increasing attention being given to climate change has a negative impact on the reputation of the entire oil & gas industry, seen as one of the main parties responsible for GHG emissions, with effects on the management of relations with the key stakeholders. The ability to develop and implement strategies to adapt the business model to a low-carbon scenario, as well as the capacity to communicate these in a transparent manner provides an opportunity to improve stakeholder perceptions.

Physical risks. The intensification of extreme/chronic weather and climate phenomena could result in an increase in costs (including insurance) for adaptation measures to protect assets and people. The IPCC (Intergovernmental Panel on Climate Change) scenarios predict that these physical effects will manifest themselves mainly over the medium to long-term. The exposure to risk is mitigated by the design requirements adopted (defined to resist extreme environmental conditions) and the insurance covers taken out.

Europe: Eni, 2017 Integrated Report, p. 95

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Strategy Recommendation

Strategy c) asks companies to describe the resilience of their strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario. [Figure 29](#) provides an oil and gas company's description of the sensitivity of its portfolio to changes in oil and gas prices under different scenarios.

Figure 29

Excerpt from Financial Filing

Portfolio sensitivity test: To assess energy transition-related risks, Statoil has analysed the sensitivity with changing the oil and gas prices and keeping other parameters constant, of its project portfolio (equity production and expected production from accessed exploration acreage) against the assumptions regarding commodity and carbon prices in the International Energy Agency's (IEA) energy scenarios, as laid out in their "World Economic Outlook 2017" report. The sensitivity analysis demonstrated a positive impact of around 20% on Statoil's net present value (NPV) when replacing Statoil's price assumptions as of 1 December 2017 with the price assumptions in the IEA's New Policies Scenario, a positive impact of 42% when using the price assumptions in the Current Policies Scenario, and a negative NPV impact of approximately 13% when using the price assumptions in the Sustainable Development Scenario. This sensitivity analysis is based on Statoil's and the IEA's energy scenario assumptions which may not be accurate and which are likely to develop over time as new information becomes available. Scenarios should not be mistaken for forecasts or predictions. Accordingly, there can be no assurance that the assessment, which is presented in more detail in Statoil ASA's 2017 Sustainability report, is a reliable indicator of the actual impact of climate change on Statoil's portfolio.

Europe: Statoil (now Equinor), [2017 Annual Report and Form 20-F](#), p. 69

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AI Summary

Three hundred and thirty one transportation companies from 47 countries were included in the AI review. They ranged from \$261 billion to \$862 million in annual revenue. Three hundred and ninety two documents were reviewed, of which 72% were financial filings or annual reports and 28% were sustainability reports. The AI review found the most common disclosures within the sample were on the targets used to manage climate-related issues (Figure 30).

Disclosure Practices Summary

Most of the 25 transportation companies disclosed information on their climate-related risks and opportunities and the metrics used to assess or monitor such risks and opportunities. The majority provided disclosures on climate-related issues in their sustainability reports rather than in financial filings. Other observations include the following (Figure 30):

Governance: The majority of the 25 transportation companies disclosed information on the board’s role in overseeing climate-related risks and opportunities, and several described management’s role in assessing and managing climate-related issues.

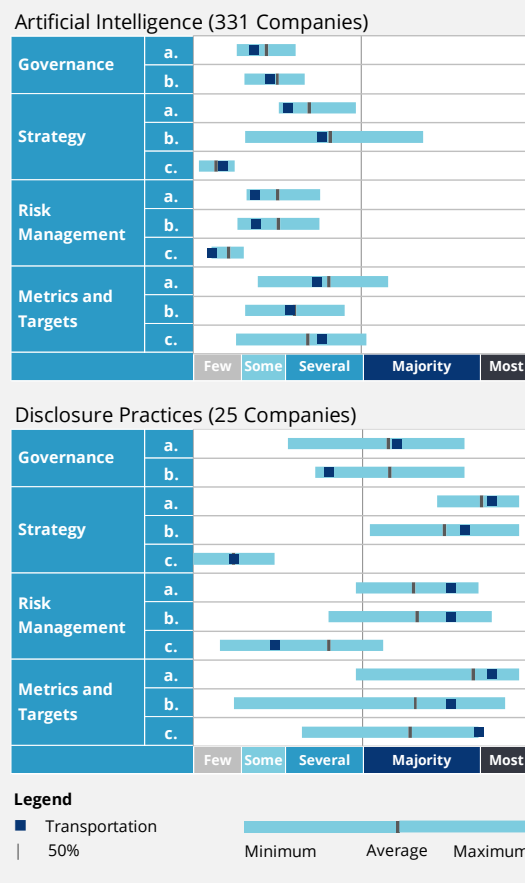
Strategy: Most of the 25 transportation companies disclosed information on climate-related risks or opportunities, with opportunities described more often than risks. The majority of companies disclosed the impact of climate-related issues on business, strategy, or financial planning, and a few described the resilience of their strategies, taking into consideration different climate-related scenarios.

Risk Management: The majority of the 25 transportation companies disclosed their processes for identifying, assessing, and managing climate-related risks, but only some described whether those processes were integrated with overall risk management.

Metrics and Targets: Most of the 25 transportation companies disclosed the metrics they use to assess or monitor climate-related issues, usually in alignment with the Global Reporting Initiative (GRI) standards. The majority disclosed Scope 1, Scope 2, and Scope 3 GHG emissions and described the targets they use to manage climate-related issues.

Figure 30

Transportation Companies



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²³ Industries in the transportation group include air freight, passenger air, maritime transportation, rail transportation, trucking services, and automobiles.

Examples of Disclosure Aligned with TCFD Recommendations

Strategy Recommendation

Strategy b) asks companies to describe the impact of climate-related risks and opportunities on the company's businesses, strategy, or financial planning. [Figure 31](#) provides a transportation company's description of some of the changes to its businesses to respond to climate change.

Figure 31

Excerpt from Sustainability Report

Responding to Climate Change

Classification	2016 Achievements	Mid-to Long-term Directions
GHG emission reduction at business sites	<ul style="list-style-type: none"> • Met the target allocated by the government under the Korean emissions trading scheme • Introduced the energy storage system (ESS), and began to develop a co-generation system • Continued efforts to save energy and improve process efficiency – changed lighting and heat source for material facilities, and adopted high efficiency equipment 	<ul style="list-style-type: none"> • Mid-to long-term direction for GHG emissions reduction at business sites <ul style="list-style-type: none"> – Supply equipment: Improve equipment efficiency, operation, and technology – Production equipment: Standardize operating hours and energy sources – Indirect equipment: Standardize management guidelines and optimize energy uses of buildings – New technology: Adopt self-power generation and renewable energy sources

Asia Pacific: Hyundai Motor Company, [2017 Sustainability Report](#), p. 63

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Risk Management Recommendation

Risk Management a) asks companies to describe their processes for identifying and assessing climate-related risks. Figure 32 provides a transportation company's description of its process for identifying and assessing sustainability issues, which includes climate-related issues.

Figure 32

Excerpt from Sustainability Report



Europe: A.P. Moller-Maersk Group, 2017 Sustainability Report, p. 21

Strategy Recommendation

Strategy a) asks companies to describe the climate-related risks and opportunities they have identified. Figure 33 provides a mapping of a transportation company's disclosure of climate-related risks and opportunities.

Figure 33

Excerpt from Sustainability Report

Task Force on Climate-related Financial Disclosures

The Financial Stability Board Task Force on Climate-related Financial Disclosure (TCFD) has developed a voluntary, consistent climate-related financial risk disclosure for use by companies in providing information to investors, lenders, insurers and other stakeholders. The TCFD framework rests on four main tenets.

Disclosure Focus Area and Recommended Disclosure	Source	Comment / Disclosure examples
STRATEGY		
Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy and financial planning. a) Describe the climate-related risks and opportunities the organization has identified over the short, medium and long term.	Sustainability Report, CDP and 10K	GM's 2017 Sustainability Report, 2017 CDP Climate Change survey response and its fiscal year 2017 10K include information on actual and potential impacts of climate-related risks and opportunities on GM.
	2017 Sustainability Report	CEO Letter to Stakeholders , Sustainability Strategy , Products , Personal Mobility , GRI Content Index
	2017 CDP Climate Change survey response, Question CC2.1a	Regulatory risks are among the most significant risks likely to impact GM. Due to the potentially catastrophic effects of climate change, governments around the world have or are likely to enact, policies and regulations that could impact our operations and products. Because it may take three to five years to design and develop a vehicle before it is launched in the market and then remain competitive and compliant for another four to seven years, GM must have a long-term approach to regulatory risks.
	2017 CDP Climate Change survey response, Question CC2.2a	In the short term (zero to five years), GM is responding to climate change by setting aggressive energy and GHG intensity reduction targets through 2020. The internal process used is to integrate energy reduction into our business plan. Annually, we develop energy and GHG reduction targets at global, regional and facility levels and include methods in our annual business planning process which GM calls its Business Plan Deployment (BPD). These methods include behavioral—cold shutdown, energy efficiency—LED lights, HVAC controls, and low carbon solutions—for example use landfill gas to generate electricity. Each month data is collected on energy use and carbon emissions performance that is compared at each site to the target, and, if the target is not met, countermeasures are developed to meet them. An example of how this process has influenced business strategy is the development of an ongoing dedicated fund for energy savings projects of \$20 million USD and use of energy performance contracting to fund energy- and carbon-reduction methods. In 2016, energy- and carbon-reduction projects resulted in 4.3 percent carbon reduction on an absolute basis.
	FY 2017 10K	Item 1A. Risk Factors

GENERAL MOTORS

2017 SUSTAINABILITY REPORT

North America: General Motors, [2017 Sustainability Report](#), p. 174 (format has been modified to fit page)

AI Summary

Two hundred and seventy one materials and buildings companies from 35 countries were included in the AI review. They ranged from \$205 billion to \$4 billion in annual revenue. Five hundred and eight documents were reviewed, of which 57% were financial filings or annual reports and 43% were sustainability reports. The AI review found the most common disclosure within the group to be the metrics used to assess climate-related issues in line with the companies' strategy and risk management (Figure 34).

Disclosure Practices Summary

The 25 materials and buildings companies disclosed information aligned with the recommended disclosures primarily in sustainability reports—at nearly twice the rate of such disclosures in financial filings. Other observations include the following (Figure 34):

Governance: The majority of the 25 materials and buildings companies disclosed the role of the board and the role of management with respect to climate-related issues. Some of the companies disclosed specific roles and responsibilities of management related to sustainability; however, not all explicitly stated that climate is included as part of their sustainability program.

Strategy: The majority of the materials and buildings companies disclosed climate-related risks and opportunities and their impact on business, strategy, or financial planning. Some companies defined the climate-related issues in relation to short-, medium-, or long-term timeframes. While only some of the companies disclosed the resilience of their strategies under different climate-related scenarios, the percentage of companies disclosing this information was higher than most other groups. In addition, the companies that disclosed this information often provided information on the climate-related scenarios used.

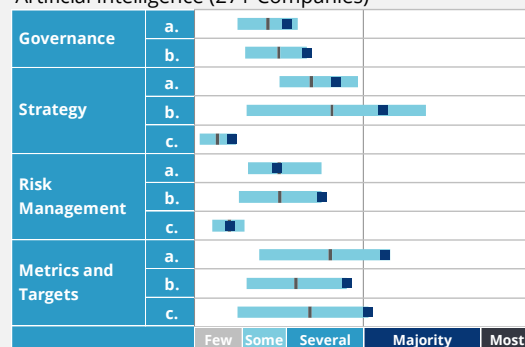
Risk Management: The majority of the 25 materials and buildings companies provided information on how they identify or assess climate-related risks, and several disclosed their processes for managing climate-related risks. However, only a few indicated climate-related risks were integrated into overall risk management.

Metrics and Targets: The majority of the 25 companies disclosed information aligned with all three recommended disclosures, including their Scope 1 and Scope 2 GHG emissions. In addition, the companies usually disclosed climate-related metrics in alignment with the Global Reporting Initiative (GRI) standards. The targets disclosed included ones related to GHG emissions and water usage and generally included comparative performance results for the past several years.

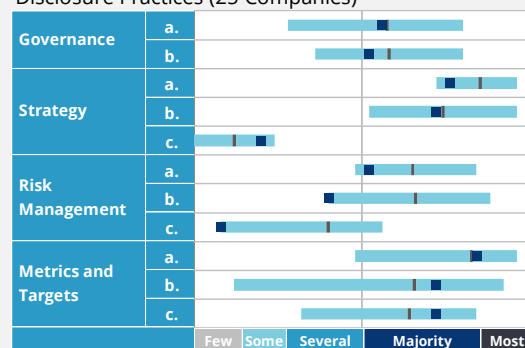
Figure 34

Materials and Buildings Companies

Artificial Intelligence (271 Companies)



Disclosure Practices (25 Companies)



Legend

■ Materials and Buildings
| 50% Minimum Average Maximum

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²⁴ Industries in the materials and buildings group include metals and mining, chemicals, construction materials, capital goods, and real estate management and development.

Examples of Disclosure Aligned with TCFD Recommendations

Risk Management Recommendation

Risk Management a) asks companies to describe their process for identifying and assessing climate-related risks. Figure 35 provides a mining company's description of its approach for assessing climate-related risks.

Figure 35

Excerpt from Sustainability Report

Risk Management Rio Tinto has used an internal price on carbon as an input for investment decisions since 1998. We use carbon price projections to assess the possible impact on costs and product prices. These price projections are calculated based on input from internal and external technical experts, and use existing short-term market data and alternative price forecasts.

In 2017, we undertook an assessment of our operations to the physical risks of climate change. This has provided us with a better understanding of exposure at each asset to potential changes in climate variables such as temperature, sea level rise, water risk and climatic extremes in the regions where our assets are located. The next stage of this study will look at operational characteristics and existing risk controls, to build up a Group view of the physical risks of climate change.

In the near term, we manage for physical risk impacts, such as extreme weather events, by monitoring our exposure using seasonal weather outlooks, and ensuring sites have a response plan for extreme weather events.

Europe: Rio Tinto Group, 2017 Sustainable Development Report, p. 34

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Metrics and Targets Recommendation

Metrics and Targets a) asks companies to disclose the metrics used by the company to assess climate-related risks and opportunities in line with its strategy and risk management process. Figure 36 provides a steel company's disclosure of its climate-related metrics.

Figure 36

Excerpt from Annual Report

Classification	Indicator	Unit	2015	2016	2017	
Environment	Air pollutant emissions	SOx	K tons/year	21.3	21.5	21.3
		NOx	K tons/year	32.3	33.5	30.9
		Dust	K tons/year	3.4	3.5	3.4
	Energy consumption ⁶⁾	TJ	355,877	355,649	353,463	
GHG emissions	SCOPE1+SCOPE2	K tons CO ₂ e	72,339	70,367	70,700	
	SCOPE1 (direct emissions)	K tons CO ₂ e	68,147	66,888	67,743	
	SCOPE2 (indirect emissions)	K tons CO ₂ e	4,192	3,479	2,956	
	CO ₂ emissions per ton of steel (direct)	t-CO ₂ /t-s	1.83	1.78	1.82	
	CO ₂ emissions per ton of steel (indirect)	t-CO ₂ /t-s	0.11	0.1	0.08	
Water	Water consumption	Million m ³ /year	155.1	154.5	160.8	
	Municipal water	Million m ³ /year	34.9	34.4	37.2	
	Surface water	Million m ³ /year	113.6	111.9	116.9	
	Underground water	Million m ³ /year	6.5	8.3	6.6	
	Wastewater discharge	Million m ³ /year	57.2	56.2	57.8	
Waste ⁷⁾	Waste generated	10K tons/year	1,172	1,110	1,059	
	Waste volume(recycled)	10K tons/year	1,144	1,051	1,020	
	Waste volume(disposed)	10K tons/year	27	59	39	
	Landfill(in-house/outsource)	10K tons/year	24	52	32	
	Incineration(in-house/ outsource)	10K tons/year	3	7	7	
	Chemical substance discharge	Tons/year	78	82*	81	
Investment in environmental facilities	Air quality	KRW in billion	92	70.9	100.9	
	Water quality	KRW in billion	34	52.1	50.6	
Environmental costs	Recycling and other	KRW in billion	43	26.8	44.9	
	Costs for environmental facility operation and recycling	KRW in billion	778	804	801	
	Depreciation costs	KRW in billion	174	174	189	
	Administrative costs	KRW in billion	51	52	51	
	Environmental R&D costs	KRW in billion	10	14	13	
	Energy recovery costs	KRW in billion	47	56	51	
	Total	KRW in billion	1,060	1,100	1,105	

3) Commercial initiative: Social contribution expenses for advertisements

6) Based on the figures on the statement submitted to the government. Electricity consumption was totaled up by converting into 3.6 TJ/GWh on the recommendation of the CDP.

7) Settled in accordance with domestic waste reporting standards.(2015, 2016)

* Corrected numerical errors in past years

Asia Pacific: POSCO, 2017 POSCO Report, p. 39

All Four Recommendations

Given the variety of reporting venues companies use, some investors have expressed that mapping the location of disclosures that address the Task Force's recommendations is helpful for finding climate-related information more quickly. Figure 37 provides a metals and mining company's mapping of information related to each of the recommended disclosures and the location in the report.

Figure 37

Excerpt from Annual Report

Climate-related disclosures

Responding to climate change is an integral part of our strategy and operations. Therefore information relating to climate change is contained throughout this Report. The table below shows how our disclosures in this Report align to the TCFD recommendations, and where the relevant information can be found. Further information can also be found in BHP's Sustainability Report 2017, *Climate Change: Portfolio Analysis (2015)* and *Climate Change: Portfolio Analysis – Views after Paris (2016)*.

TCFD recommendation	Disclosure	Location
Governance - Disclose the organization's governance around climate-related risks and opportunities.		
(a) Describe the Board's oversight of climate-related risks and opportunities.	Board skills and experience – climate change Sustainability Committee – role and focus	2.8 2.13.4
(b) Describe management's role in assessing and managing climate-related risks and opportunities.	Our climate change strategy Sustainability Committee – role and focus FY2017 STI performance outcomes	1.10.6 2.13.4 3.3.2
Strategy - Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.		
(a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	Sustainability risks Operational risks Climate change – overview	1.8.3 1.8.3 1.10.6
(b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	Sustainability risks Operational risks Portfolio evaluation	1.8.3 1.8.3 1.10.6
(c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	Portfolio evaluation	1.10.6
Risk Management - Disclose how the organization identifies, assesses, and manages climate-related risks.		
(a) Describe the organization's processes for identifying and assessing climate-related risks.	Managing performance and risk	1.5.2
(b) Describe the organization's processes for managing climate-related risks.	Managing performance and risk Sustainability risks	1.5.2 1.8.3
(c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	Managing performance and risk Sustainability risks Sustainability KPIs	1.5.2 1.8.3 1.6.1
Metrics and Targets - Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.		
(a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	Sustainability KPIs	1.6.1
(b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	Sustainability KPIs (GHGs) Mitigation – GHGs Low emissions technology	1.6.1 1.10.6 1.10.6
(c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	Sustainability KPIs (GHGs) FY2017 STI performance outcomes	1.6.1 3.3.2

Asia Pacific: BHP Billiton Limited, [2017 Annual Report](#), p. 51

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AI Summary

Two hundred and fifty agriculture, food, and forest product companies from 44 countries were included in the AI review. They ranged from \$91 billion to \$615 million in annual revenue. Four hundred and twenty five documents were reviewed, of which 66% were financial filings or annual reports and 34% were sustainability reports. The AI review found the most common disclosure within this sample was on the metrics used to assess climate-related issues in line with the company's strategy and risk management process (Figure 38).

Disclosure Practices Summary

Nearly all of the 25 agriculture, food, and forest products companies disclosed information on their climate-related risks or opportunities. The agriculture, food, and forest products companies primarily disclosed information aligned with the recommended disclosures in sustainability reports rather than in financial filings. Other observations include the following (Figure 38):

Governance: The majority of the 25 companies in the agriculture, food, and forest products group disclosed information on the role of the board in overseeing climate-related risks or opportunities; and several described management's role in assessing and managing climate-related issues.

Strategy: Nearly all of the 25 agriculture, food, and forest products companies disclosed information on their climate-related risks or opportunities, with many disclosing physical climate-related risks related to the availability of water and raw materials. The majority provided information on the impact of climate-related issues on business, strategy, or financial planning, but only a few companies disclosed information on the resilience of their strategies, taking into consideration different climate-related scenarios. None of those companies described the use of a 2°C or lower scenario in evaluating the resilience of their strategy.

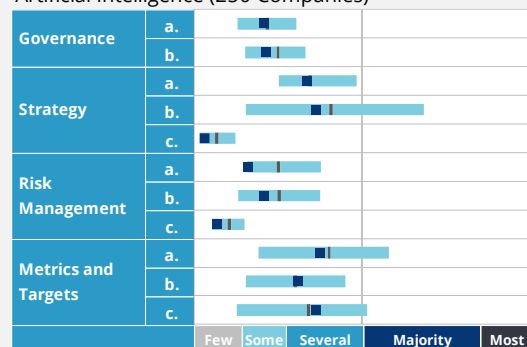
Risk Management: The majority of the 25 companies disclosed information on their processes for identifying, assessing, and managing climate-related risks. Several companies provided information that indicated those processes are integrated into their overall risk management.

Metrics and Targets: Most of the 25 companies disclosed metrics used to assess or monitor climate-related risks, which often related to water availability. Most of the companies also disclosed their Scope 1 and Scope 2 GHG emissions, but only a few disclosed their Scope 3 GHG emissions. The majority of the companies described climate-related targets for the coming years and current performance against those targets.

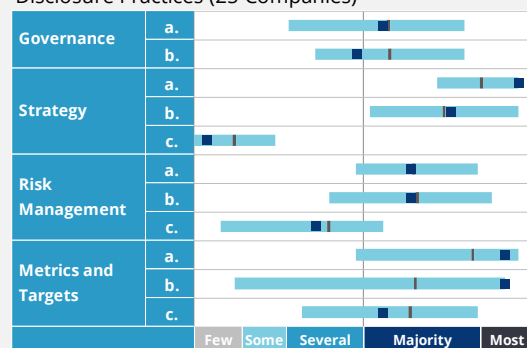
Figure 38

Agriculture, Food, and Forest Product Companies

Artificial Intelligence (250 Companies)



Disclosure Practices (25 Companies)



Legend

■ Agriculture, Food, and Forest Products
 Minimum Average Maximum
 | 50%

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²⁵ Industries in the Agriculture, Food, and Forest Products group include beverages, agriculture, packaged foods and meats, and paper and forest products.

Examples of Disclosure Aligned with TCFD Recommendations

Strategy Recommendation

Strategy a) asks companies to describe the climate-related risks and opportunities they have identified. [Figure 39](#) provides a food company's description of its climate-related risks and approach to monitoring and managing those risks.

Figure 39

Excerpt from Financial Filing

OVERVIEW OF ACTIVITIES, RISK FACTORS

2-7 RISK FACTORS

IDENTIFICATION OF RISK

RISK MONITORING AND MANAGEMENT

Natural and climate change risks

Natural risks

Danone's geographic expansion sometimes leads it to be present in regions exposed to natural risks, notably seismic. Natural disasters could therefore cause damage to persons, property or the environment, and directly affect Danone, its consumers or the regions where it is present, potentially having a negative impact on Danone's activities, financial situation and image.

Climate change risks

Danone's businesses are directly related to nature and agriculture and are naturally faced with climate change, which could have negative effects on the natural water cycles, soil, biodiversity and ecosystems. Climate change could therefore affect the activity of Danone, its suppliers and its customers, which could have negative impacts on its results and financial situation.

For its new site development projects, Danone conducts a risk exposure analysis for such risks in order to choose the site with the least possible exposure. If, however, the site chosen (or the existing site in the case of an expansion) is exposed to these risks, the building construction and equipment installation take into account recommendations from prevention/protection experts to limit the potential impacts of these natural risks. In addition, each year, Danone conducts a screening of its production sites' localization to identify its exposure to water cycles and climate change risks.

Danone is developing and implementing actions, procedures, tools and policies that seek to prevent and reduce these risks, notably its Climate Policy which aims in particular to reduce its greenhouse gas emissions, foster "carbon positive" solutions, offer healthy and sustainable products, reinforce the resiliency of its water and food cycles, and eliminate deforestation from its supply chain by 2020.

Europe: Danone, [2017 Registration Document](#), p. 28

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Risk Management Recommendation

Risk Management b) asks companies to describe their processes for managing climate-related risks, and the guidance asks companies to describe their processes for prioritizing climate-related risks, including how materiality determinations are made. [Figure 40](#) provides a beverage company's description of the factors considered in determining the materiality of issues.

Figure 40

Excerpt from Financial Filing

Business review (continued)

Our role in society

Sustainability & Responsibility review

Our vision is to create a positive role for alcohol in society, and an inclusive business that can play its part in a low-carbon and water-resilient economy. Our 2020 sustainability and responsibility targets are designed to help us on that journey, by addressing the issues most material to our stakeholders, and to us as a business. They are core to our growth, now and in the future.

Our sustainability and responsibility strategy is designed to support Diageo's overall growth and performance. It aims to make a positive contribution to society while building our business by growing our brands' relationships with consumers, strengthening our supply chain, supporting our productivity, and mitigating risk.

Key to our strategy is our assessment of our most material issues – those which are important to our stakeholders, the environment, and the future success of our business. These are reflected in our risk register and our growth plans too. That means looking at what will matter to the world, and our business, in 2020, 2030, and even 2050. As a result, we prioritise addressing climate change, water, non-communicable diseases, and empowering women – issues central to the UN's Global Goals for Sustainable Development.

Europe: Diageo, [2017 Form 20-F](#), p. 119

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Metrics and Targets Recommendation

Metrics and Targets c) asks companies to describe the targets used by the company to manage climate-related risks and opportunities and performance against targets. [Figure 41](#) provides a beverage company's disclosure of its climate-related targets.

Figure 41

Excerpt from Annual Report

Reducing Impacts

Energy is an important input to our business operations, which is why year after year, we incorporate new processes and tools to optimize its use, further diversify our energy portfolio and reduce our climate impact.

Total intensive emissions Scope 1 (stationary) + Scope 2

Tons of equivalent CO₂e / Total Revenues in P_s million

● S1 stationary¹ ● S1 non-stationary² ● S2³



- 1 Includes the stationary consumption of non-renewable sources.
- 2 Includes the fuel consumption of own units, Coca-Cola FEMSA consumption is estimated.
- 3 Includes fuel consumption of renewable and non-renewable sources.

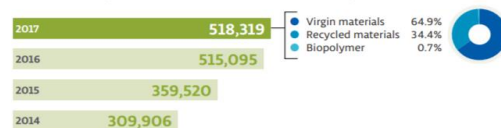
“ Our goal is to obtain 85% of our electric energy in Mexico from renewable sources by 2020. We met 26.4% of our energy needs in 2017 through renewable energy from four wind farms.

We are taking steps to minimize the waste generated by our operations, including proper management of industrial waste. All our bottling plants operate with a waste-reduction program, and our goal is to recycle 90 percent of the waste associated with each of them by 2020.

We comply with all regulations related to maintaining the proper infrastructure to collect hazardous waste and dispose of it through authorized service providers.

Used materials

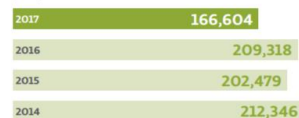
(Tons) In 2017, 34.4 percent of our total materials consumed were recycled.



This information excludes Solistica and Imbera's materials.

Waste management

(Tons)



North America: FEMSA, [Annual Report 2017](#), p. 27

C User Perspectives on Decision-Useful Climate-Related Financial Disclosures

C User Perspectives on Decision-Useful Climate-Related Financial Disclosures

The purpose of this section is to provide companies that are implementing or considering implementing the recommendations with examples of climate-related disclosures that an individual investor or analyst (user) views as having decision-useful information aligned with one of the Task Force’s recommendations. Each analysis was prepared by a user from a Task Force member’s company and represents the user’s individual views (rather than a consensus view of the users on the Task Force). The users—buy side analysts, credit analysts, and a portfolio manager—independently chose and assessed, based on their expertise, the companies and disclosures discussed in this section.

1. Buy Side Analyst’s Perspective on a Consumer Goods Company

Unilever is a consumer goods company headquartered in the UK and the Netherlands. It makes and sells around 400 brands in more than 190 countries. The document reviewed for this assessment was Unilever’s financial filing—[Annual Report and Accounts 2017](#)—and the areas of focus are disclosures related to governance and strategy.²⁶

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Introduction

Unilever’s [Annual Report and Accounts 2017](#) (report) is an integrated report, combining material financial and non-financial data, and expressly states Unilever’s intention to apply the recommendations of the TCFD in the report. It contains four sections: a Strategic Report, a Governance Report, the Financial Statements, and Additional information. One aspect of Unilever’s ongoing strategy is the Unilever Sustainable Living Plan (USLP), which it expressly links with positive commercial and financial outcomes throughout the report. USLP includes setting targets aligned to the United Nations Sustainable Development Goals (UN SDGs or SDGs) and reporting on performance against those targets. Included among those are certified Science Based Targets to reduce GHG emissions from its operations to align with a 2°C scenario.

Unilever’s report details the board’s governance of climate risks, and the ultimate responsibility of the board and executives for delivery, assessment, and management of climate-related risks and opportunities. One of four board committees is the Corporate Responsibility Committee, which has specific responsibility for delivering on climate change and USLP objectives. Unilever has enlisted a Big Four accounting firm to verify its accounting of GHG emissions and climate-related risk in line with the GHG protocol.

Executive remuneration is determined, in part, by performance on the targets set out in the USLP, including climate targets. Though the report explains how a portion of executive bonus pay is determined by performance on the Sustainability Progress Index, this disclosure could be clarified by explaining how Unilever converts the USLP into a quantitative index, which can be used as a multiplier.

As part of its strategic review, Unilever outlines the findings of scenario analyses for both 2°C and 4°C scenarios. Though these are laudable, they could be enhanced by further disclosing the methodology employed and linking the scenarios to long-term financial performance metrics.

Disclosure Example: Governance

Implementation of Unilever’s sustainability strategy is made possible by board and executive oversight and management. The report states that “[t]he Boards take overall accountability for the management of climate change risks and opportunities with support from the ULE [Unilever Leadership Executive] and the USLP Steering Team” (p. 32). Incentives are designed to promote

²⁶ Unilever. [Annual Report and Accounts 2017](#), February 2018.

sustainability and management of climate-related risk; long-term bonuses are linked, in part, to performance against the USLP targets, including GHG emissions reductions.

One of four board committees is the Corporate Responsibility Committee, which has responsibility for overseeing the implementation of the USLP, including GHG emissions reductions targets. This committee is also consulted by the Compensation Committee when assessing management's performance against sustainability targets. As shown on p. 64 of the report, performance on sustainability targets determines 25% of management- and executive-level, long-term performance bonuses (Management Co-Investment Plan or MCIP) (Figure 42).

Governance

Disclose the organization's governance around climate related risks and opportunities.

Figure 42

Excerpt from Financial Filing

ELEMENTS OF REMUNERATION	AT A GLANCE	ADDITIONAL INFORMATION																				
MCIP	<ul style="list-style-type: none"> Implemented in line with the 2018 Remuneration Policy. MCIP award to be made on [3] May 2018 (vesting 16 February 2022). Paul Polman elected to invest the value of 67% (£1,353,400) of his 2017 annual bonus into the MCIP. Graeme Pitkethly elected to invest the value of 67% (£659,531) of his 2017 annual bonus in MCIP investment shares. Matching shares are awarded based on performance up to a maximum of 3 x matching shares. Therefore the maximum value from the matching shares for the CEO would be £4,060,200 and for the CFO would be £1,978,594. 	<p>Performance conditions are assessed over a four-year period. The performance conditions and target ranges for 2018 awards under the MCIP will be as follows:</p> <div style="border: 1px solid black; padding: 5px;"> <p>MCIP 2018 AWARDS</p> <table border="1"> <thead> <tr> <th></th> <th>Weighting</th> <th>Min</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>Underlying Sales Growth (CAGR, current rates)</td> <td>25%</td> <td>1.5%</td> <td>5.5%</td> </tr> <tr> <td>Underlying EPS Growth (CAGR, current rates)</td> <td>25%</td> <td>6.0%</td> <td>11.0%</td> </tr> <tr> <td>Return on Invested Capital (exit year %)</td> <td>25%</td> <td>17.0%</td> <td>21.0%</td> </tr> <tr> <td>Sustainability Progress Index (Committee assessment of USLP progress)</td> <td>25%</td> <td colspan="2">Evaluated basis</td> </tr> </tbody> </table> <p>0 x matching 3 x matching</p> </div> <p>Performance at threshold results in no matching shares being awarded, target performance results in an award of 1.5 x matching shares, up to a maximum award of 3 x matching shares, with straight-line vesting between threshold and maximum. Participants are required to hold all their own investment shares and remain employed by Unilever for the duration of the relevant performance period.</p> <p>It is the Committee's intention that management should be assessed against the progress they make on the USLP as a whole, rather than selected components of it. Accordingly, each year the Committee will determine a numerical rating for the previous year's MCIP Sustainability Progress Index in the range of zero to 200%, with 100% representing on-target performance; annual ratings will then be tallied as an average index for each four-year MCIP performance period. At the end of the MCIP performance period, the Committee will disclose a full narrative setting out the performance achieved and the corresponding outcome that the Committee determines for the Sustainability Progress Index.</p>		Weighting	Min	Max	Underlying Sales Growth (CAGR, current rates)	25%	1.5%	5.5%	Underlying EPS Growth (CAGR, current rates)	25%	6.0%	11.0%	Return on Invested Capital (exit year %)	25%	17.0%	21.0%	Sustainability Progress Index (Committee assessment of USLP progress)	25%	Evaluated basis	
	Weighting	Min	Max																			
Underlying Sales Growth (CAGR, current rates)	25%	1.5%	5.5%																			
Underlying EPS Growth (CAGR, current rates)	25%	6.0%	11.0%																			
Return on Invested Capital (exit year %)	25%	17.0%	21.0%																			
Sustainability Progress Index (Committee assessment of USLP progress)	25%	Evaluated basis																				

Unilever, [Annual Report and Accounts 2017](#), p. 64

Disclosure Assessment: Governance

Unilever's report lays out the boards' responsibility to deliver against climate targets. The fact that one of only four board committees is the Corporate Responsibility Committee with ultimate responsibility for the governance of the company's sustainability targets shows that this is an organizational priority and identifies the parties accountable for climate-related risks and opportunities. In the report (p. 44), the board's effectiveness is assessed, noting "...the Committee has agreed to further enhance its effectiveness by reviewing how the USLP has been embedded into Unilever and how it should evolve."

In terms of management oversight of climate-related risks and opportunities, Unilever has aligned incentives to sustainability to performance. The company's practice of tying management

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compensation to sustainability performance ensures that stewardship of sustainability does not stop at board level, but is required for success throughout the company. Compensation is a powerful tool to embed board-level strategy throughout the company. This practice gives investors assurance the plan will be taken seriously and targets are more likely to be met.

Though the report provides the calculus for management pay and shows that the Sustainability Progress Index accounts for 25% of the MCIP (long-term incentive bonus), it does not provide a great deal of detail on how the index is calculated.

It would be particularly useful to know what the Index rating was and exactly how the figures were calculated. This would perform the dual purpose of clarifying progress against strategic goals (something noted in the next section) and providing transparency on how sustainability is incorporated into management pay.

Disclosure Example: Strategy

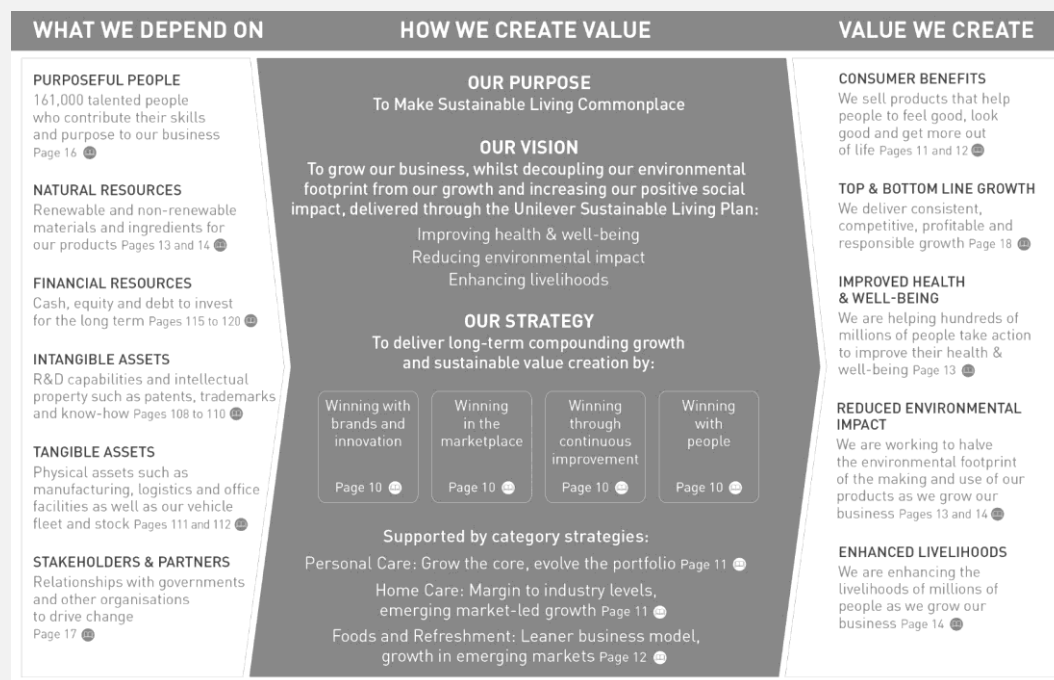
Unilever’s report clearly links its business strategy and sustainability strategy, including its performance against climate and SDG targets. It highlights the fact that consumers are increasingly interested in more sustainable products and that its Sustainable Living brands are enjoying growth at a rate 50% higher than their other products. The value-creation model, shown in Figure 43, incorporates sustainability, demonstrating the company’s integrated approach.

Strategy

Disclose the actual and potential impacts of climate-related risks and opportunities on the organization’s businesses, strategy, and financial planning where such information is material.

Figure 43

Excerpt from Financial Filing



Unilever, [Annual Report and Accounts 2017](#), p. 9

The report highlights on p. 32 that Unilever’s efforts to track and reduce GHG emissions have been part of its strategy since 1995; and the company noted that efforts have already benefited their profitability, resulting in a €490 million reduction in energy costs since 2008.

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The report also presents internal targets associated with the USLP (pp. 6-7). These include an ambition to become carbon positive by 2030—a plan which entails using only renewable energy in its manufacturing operations and providing renewable energy to the communities in which it operates (p. 32). The GHG emissions reduction targets have been filed and reviewed by the Science Based Targets Initiative, which has deemed them as aligned to a 2°C scenario, meaning that—if they follow through on their commitments—their emissions will not exceed their proportionate share of the 2°C carbon budget. Using verifiable and externally audited targets to guide their strategy provides investors comfort that Unilever is managing its exposure to climate-related risks and aligning the business strategy to avail of climate-related opportunities that may arise.

Finally, Unilever has implemented the TCFD’s recommendation to perform scenario analysis. The company considered the impact of both 2°C and 4°C scenarios, based on the International Energy Agency (IEA) scenarios. The report provides the summary findings of that exercise on p. 32 (see specifically the bolded text in [Figure 44](#)).

Figure 44

Excerpt from Financial Filing

UNDERSTANDING IMPACT

Climate change has been identified as a principal risk to Unilever (see page 28). To further understand the impact that climate change could have on Unilever’s business we performed a high-level assessment of the impact of 2°C and 4°C global warming scenarios. The 2°C and 4°C scenarios are constructed on the basis that average global temperatures will have increased by 2°C and 4°C in the year 2100. Between today and 2100 there will be gradual changes towards these endpoints and we have looked at the impact on our business in 2030 assuming we have the same business activities as we do today. We also made the following simplifying assumptions:

- In the 2°C scenario, we assumed that in the period to 2030 society acts rapidly to limit greenhouse gas emissions and puts in place measures to restrain deforestation and discourage emissions (for example implementing carbon pricing at \$75-\$100 per tonne, taken from the International Energy Agency’s 450 scenario). We have assumed that there will be no significant impact to our business from the physical ramifications of climate change by 2030 – ie from greater scarcity of water or increased impact of severe weather events. The scenario assesses the impact on our business from regulatory changes.
- In the 4°C scenario, we assumed climate policy is less ambitious and emissions remain high so the physical manifestations of climate change are increasingly apparent by 2030. Given this we have not included impacts from regulatory restrictions but focus on those resulting from the physical impacts.

We identified the material impacts on Unilever’s business arising from each of these scenarios based on existing internal and external data. The impacts were assessed without considering any actions that Unilever might take to mitigate or adapt to the adverse impacts or to introduce new products which might offer new sources of revenue as consumers adjust to the new circumstances.

The main impacts of the 2°C scenario were as follows:

- Carbon pricing is introduced in key countries and hence there are increases in both manufacturing costs and the costs of raw materials such as dairy ingredients and the metals used in packaging
- Zero net deforestation requirements are introduced and a shift to sustainable agriculture puts pressure on agricultural production, raising the price of certain raw materials

The main impacts of the 4°C scenario were as follows:

- Chronic and acute water stress reduces agricultural productivity in some regions, raising prices of raw materials
- Increased frequency of extreme weather (storms and floods) causes increased incidence of disruption to our manufacturing and distribution networks
- Temperature increase and extreme weather events reduce economic activity, GDP growth and hence sales levels fall

Our analysis shows that, without action, both scenarios present financial risks to Unilever by 2030, predominantly due to increased costs. However, while there are financial risks which would need to be managed, we would not have to materially change our business model.

The most significant impacts of both scenarios are on our supply chain where costs of raw materials and packaging rise, due to carbon pricing and rapid shift to sustainable agriculture in a 2°C scenario and due to chronic water stress and extreme weather in a 4°C scenario. The impacts on sales and our own manufacturing operations are relatively small.

The results of this analysis confirm the importance of doing further work to ensure that we understand the critical dependencies of climate change on our business and to ensure we have action plans in place to help mitigate these risks and thus prepare the business for the future environment in which we will operate. We plan to conduct further analysis on the impact of climate change on our agricultural supply chain and the impact of changing weather patterns (including both persistent effects such as droughts and the temporary effects of storms) on critical markets and manufacturing.

Unilever, [Annual Report and Accounts 2017](#), p. 32 (emphasis added)

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Disclosure Assessment: Strategy

Unilever's report, through its integration of targets, risks, and use of third-party verified carbon and environmental data, shows investors the company's commitment and strategic approach to identifying and managing climate-related risks and opportunities.

By setting Science Based Targets that ensure compliance with the 2°C carbon budget, they signal to investors that the company's exposure to regulatory and market risk in a 2°C scenario is likely to be low. Clearly outlining annual performance against quantitative GHG and sustainability targets alongside financial metrics invites investors to evaluate the likelihood of achieving (or exceeding) climate action goals. In their scorecard of USLP targets, however, in some instances they fail to provide the information that would help investors understand their progress toward their climate goals.

For example, one target is, "[b]y 2020 CO₂ emissions from energy from our factories will be at or below 2008 levels despite significantly higher volumes" (p. 7). This metric does not, however, indicate whether they are close to achieving this goal, since the metric is presented as "CO₂ by tonne of production," a relative measure, which does not actually tell investors if they will achieve their absolute target to reduce overall emissions from below 2008 levels by 2020.

Unilever's report integrates their sustainability strategy with their business strategy and highlights the financial benefits of initiatives such as their waste and emissions reductions and the improved sales of their sustainable living brands as consumers begin to be more conscious of their individual environmental impact. By also including targets on the end use (Scope 3) impacts of their products, they give investors a fuller picture of the company's strategic management of climate impacts.

The scenario analysis gives investors the ability to understand the company's exposure to climate-related risk and demonstrates Unilever's acknowledgement and preparation for potential impacts of a 2°C or 4°C scenario. They discuss the actions they intend to take to manage the risks and opportunities identified in the scenario analysis. For example, they announce a program of work called the Sustainable Agriculture Code (SAC) which they will launch in 2018 in an effort to improve sustainability throughout their supply chains, thus mitigating their supply chain risk in a 2°C or 4°C scenario. They also reiterate their target of being "carbon positive" by 2030, stating:

"Our 2030 carbon positive target commits us to eliminating fossil fuels from our manufacturing operations by using only energy from renewable sources and supporting the generation of more renewable energy than we consume, making the surplus available to the communities in which we operate" (p. 32).

In future iterations of the report, investors would benefit from more detail on the methodology employed in this scenario analysis. Though Unilever identifies some of the impacts it is likely to face in each scenario, they miss an opportunity to describe how they would fare in a scenario where, for example, a carbon tax of \$100t/kgCO₂e were implemented. For example, given they are on track to achieve significant emissions reductions and aim to be "carbon positive" by 2030, they might discuss the possibility of a climate-related opportunity they may enjoy in the form of improved market position if their competitors were penalized for emissions-intensity in a 2°C scenario. Improved disclosure and depth in the scenario analysis would help investors to gain a deeper understanding of climate-related risks and opportunities.

Conclusion

Overall, Unilever's report provides detailed disclosures addressing climate-related risks and opportunities and linking them clearly and specifically to current and future financial performance, providing decision-useful information for investors. By using specific, time-limited, independently verified targets, they give confidence to investors that the disclosures are reliable. Clearer presentation of progress against targets would help investors to evaluate the company's

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climate-related performance. Board-level oversight and alignment of incentives to performance against sustainability targets assures investors that these targets are genuinely integrated into the business. The use of scenario analysis gives investors insight into the company's climate-related risks and opportunities. In the future, more detail on the methods and models used and further disclosure of the financial impacts would be useful.

2. Credit Analyst's Perspective on a Steel Company

SSAB is a Stockholm, Sweden-based steelmaker with primary operations in Finland, Sweden, and the United States. The document reviewed for this assessment was the [SSAB 2017 Annual Report](#) and the areas of focus are disclosures related to strategy and metrics and targets.²⁷

Introduction

SSAB's [2017 Annual Report](#) includes disclosures in accordance with the Global Reporting Initiative (GRI) disclosure framework and contains four components: a business review, corporate governance report, GRI report, and the financial report. Although SSAB does not disclose any analysis of scenarios regarding the transition to a low-carbon economy, as recommended by the TCFD, it does report on seven of the United Nations Sustainable Development Goals (UN SDGs) that it believes are closely linked to its business and where it believes it can have impact, including goal 13 (Climate Action). Within the GRI report, SSAB provides an index of the various GRI disclosures included in its report (pp. 144-145 for Environmental Standards). Many of these disclosures also provide information aligned with the TCFD recommendations, particularly those related to metrics and targets.

SSAB'S GRI environmental standards disclosures include:

- Materials (Disclosures 301-1; 301-2)
- Energy (Disclosures 302-1; 302-3; 302-4)
- Water (Disclosure 303-1)
- Emissions (Disclosures 305-1; 305-2; 305-3; 305-4; 305-5; 305-7)
- Effluents and waste (Disclosure 306-2)

The company also provides a materiality assessment, with the topics for reporting defined in compliance with the requirements of the GRI Standards. Overall, the materiality assessment is opportunity focused. There is little discussion of climate-related risks, only a recognition that "steel production is energy and resource intensive and has a significant impact on the environment. In both Sweden and Finland, SSAB's blast furnaces are among the largest sources of CO₂ emissions."

Disclosure Example: Strategy

In its disclosures, SSAB clearly outlines a strategic decision stemming from identified climate-related risks: that it aims to be a fossil fuel-free steelmaker by 2045. As part of this strategy, the company discloses that it has entered into a joint venture called HYBRIT with two other Swedish firms. HYBRIT seeks to replace coking coal with hydrogen. SSAB provides a descriptive case study on p. 59 of its Business Review that summarizes the HYBRIT project ([Figure 45](#), p. 51).

Strategy

Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.

²⁷ SSAB. [SSAB 2017 Annual Report](#), March 2018.

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Figure 45
Excerpt from Annual Report

CASE
HYBRIT – TOWARD FOSSIL-FREE STEEL

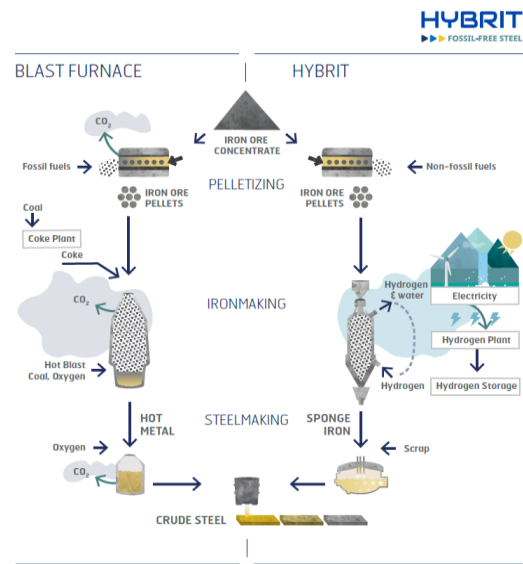
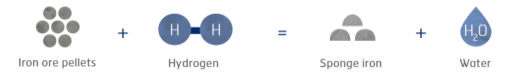
In 2016, SSAB, LKAB and Vattenfall joined forces to create HYBRIT – a joint venture project that endeavors to revolutionize steel-making. HYBRIT aims to replace coking coal, traditionally needed for ore-based steel making, with hydrogen. The result will be unique: the world's first fossil-free steel-making technology, with virtually no carbon footprint.

In spring 2018, a pilot plant for fossil-free steel production will be planned and designed in Luleå and the Norrbotten iron ore fields, 250 km north west of Luleå. The goal is to have a solution for fossil-free steel by 2035. If successful, HYBRIT means that together we can reduce Sweden's CO₂ emissions by 10% and Finland's by 7%.

The steel industry is one of the highest CO₂-emitting industries, accounting for 7% of CO₂ emissions globally. A growing global population and an expanding urbanization are expected to trigger a rise in global steel demand by 2050.

The carbon footprint in the steel industry is thus a challenge both for Europe and the world.

This is why, in 2016, SSAB, LKAB (Europe's largest iron ore producer) and Vattenfall (one of Europe's largest electricity producers) joined forces to create HYBRIT, a joint-venture project that endeavors to revolutionize steel-making. HYBRIT aims to replace coking coal, traditionally needed for ore-based steel making, with hydrogen. The result will be unique: The world's first fossil-free steel-making technology, with virtually no carbon footprint.



SSAB, *SSAB Annual Report 2017*, p. 59

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On page 60 of its annual report, SSAB offers a discussion of financial impacts related to the project—costs for the planning and design of the pilot plant—as well as a timeline for the project. SSAB also estimates its future production costs as being “20%-30% more expensive” by going fossil fuel free, based on today's electricity costs but also notes that it expects electricity prices for renewable sources to continue to drop and that it will ultimately be able to compete in the market with traditional steel (Figure 46).

Figure 46
Excerpt from Annual Report

Planning and designing the pilot plant is estimated to cost SEK 20 million and it was recently confirmed that the Swedish Energy Agency will finance half of this, while the other half will be covered by SSAB, LKAB and Vattenfall. The Swedish Energy Agency has earlier contributed SEK 60 million to the pre-feasibility study and a four-year-long research project.

The pilot phase is planned to last until 2024, after which it will move to the demonstration phase in 2025–2035. The conclusion is that fossil-free steel, given today's price of electricity, coal and CO₂ emissions, would be 20–30% more expensive. With falling prices in electricity from fossil-free sources and increasing costs for CO₂ emissions through the European Union Emissions Trading System (ETS), the pre-feasibility study considers that fossil-free steel will, in future, be able to compete in the market with traditional steel.

Already before a solution for fossil-free steel making is in place, SSAB aims to cut its joint carbon dioxide emissions in Sweden by 25% by as early as 2025, through conversion of the blast furnace in Oxelösund, Sweden. Between 2030–2040, the aim is convert also the blast furnaces in Luleå, Sweden and Raahé, Finland to eliminate most of the remaining CO₂ emissions and to attain the target of being fossil-free by 2045.

To be able to carry out this project, however, significant national contributions are still required from the state, research institutions and universities. There has to be good access to fossil-free electricity, improved infrastructure and rapid expansion of high voltage networks, research initiatives, faster permit processes and the government's active support for the pilot and demonstration facilities and long term support at the EU level.

SSAB, *SSAB Annual Report 2017*, p. 60

Also in the discussion on p. 60, there is a narrative on achieving a 25% reduction in CO₂ emissions in Sweden by 2025 through conversion of a blast furnace in Oxelosund to an electric arc furnace (EAF). SSAB also identifies two other furnaces it aims to convert to EAFs (one each in Sweden and Finland) between 2030 and 2040. A timeline on the company's sustainability section of its website, depicts how these projects will phase in, the expected drop in emission associated with each event, and the anticipated use of electricity through the period. SSAB provides an overview of the risks associated with its plans:

"To be able to carry out this project, however, significant national contributions are still required from the state, research institutions and universities. There has to be good access to fossil-free electricity, improved infrastructure and rapid expansion of high voltage networks, research initiatives, faster permit processes and the government's active support for the pilot and demonstration facilities and long term support at the EU level."

Disclosure Assessment: Strategy

In terms of understanding SSAB's carbon exposure and strategy for addressing its emissions, these disclosures are "decision useful" in that they set objectives for emissions remediation and identify near-term costs related to the identified opportunities. They also provide insight into SSAB's strategy and describe the actions taken to manage climate-related risks.

Acknowledging the potential for higher operating costs gives context to future risk. While recognizing the EAF conversions and HYBRIT in particular are long term projects, estimates of longer term costs for both would be of added use, as would identifying the challenges associated with each. Greater granularity in the risk overview for these long-term projects would also be beneficial.

Many of the climate-driven initiatives SSAB is pursuing would also benefit profitability (lower energy usage, greater waste recycling, increased sales of high-strength steel to truck and construction equipment manufacturers), as discussed in the Business Review. A clear connection between the company's emissions strategy and overall operating strategy is articulated and investors are able to understand the overall value proposition of the actions and opportunities the company has identified. The use of goals (short-, medium-, and long-term) with quantifiable targets attached provides good insight into the company's strategic direction.

Investors would benefit from scenario analysis to assess risks it may face associated with a transition to a lower-carbon economy, as well as discussion of any physical climate-related risks SSAB faces and their potential financial impacts.

Disclosure Example: Metrics and Targets

In support of its sustainability strategy, SSAB provides well-defined, measurable short-term targets for GHG emissions, energy usage, and waste recycling. These targets are closely tied with the company's planning and performance monitoring reporting.

SSAB discloses that the targets have been updated with increased levels and a new target year of 2020 (previously 2019); all previous targets were achieved faster than anticipated from when they were originally set in 2015. The original targets are not disclosed. The current targets, discussed in the GRI Report, are:

- A lasting emissions reduction of 300,000 tonnes in CO₂ emissions (p. 125)
- A lasting reduction of 400 GWh in purchased energy (electricity and fuels) (p. 120) (Figure 47, p. 53)
- A lasting improvement of 50,000 tones in residual (p. 115)

Metrics and Targets

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

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The target completion date for each is by the end of 2020 and the targets are set against a 2014 baseline.

Within its energy disclosure, SSAB also discloses its energy consumption over the past five years by fuel type (p. 119). The company also discloses it has purchased “guarantees of origin” regarding renewable electricity for the share of electricity it buys in the Nordic countries, of which a minimum of 30% is from hydropower and a minimum of 20% is wind power. SSAB currently relies on electricity for 51% of its power needs, which will increase as it transitions to EAFs.

Figure 47

Excerpt from Financial Filing

302-3 Energy intensity

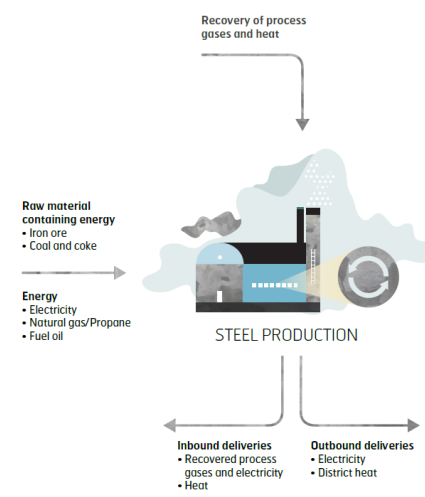
SSAB's energy intensity in 2017 was 1,148 (1,122) kWh/tonne crude steel when including the total energy consumption (electricity and purchased fuels) from the iron and steel production sites and rolling mills.

302-4 Reduction of energy consumption

SSAB has set an energy savings target to reduce the use of purchased energy by 400 GWh by the end of 2020. This energy savings is equal to approximately 3.5% of SSAB's total amount of purchased energy in 2014. By the end of 2017, SSAB achieved approximately 304 GWh (1,094 TJ) or 76% of this target.

The most important energy-saving measures were the following:

- Applied principle of continuous improvement in developing energy efficiency at production sites
- Optimized media systems for compressed air and hydraulics, as well as furnace control systems at several SSAB sites
- Natural gas, supplied as LNG, replaced oil in Borlänge to fuel one of the reheating furnaces in the hot strip mill. The switch from oil to natural gas was completed in December 2014 and the main savings occurred in 2015
- Consolidated color-coated product production from four lines to three in 2015, increasing the energy efficiency of the Nordic production system as a whole
- Transferred metal-coated product production from Borlänge to Hämeenlinna in 2016, increasing the energy efficiency of the Nordic production system
- Expanded implementation of oxygen lancing in a reheating furnace in Borlänge in 2016
- Upgraded the system of optimizing, heating and processing steel slabs in Iowa, US. Improvements were initiated in 2016 and further energy saving potential will be investigated
- A new power plant with higher efficiency in Raabe in 2017. The increased efficiency of the power plant is achieved by increased technical efficiency, lower flaring of process gases and the change of steam turbine blower machine



SSAB, [SSAB Annual Report 2017](#), p. 120

Within the GRI discussion of each metric there is description of the progress made to date, a detailed accounting of the most important factors contributing to progress on meeting targets, and the yearly results over previous five years. In addition to robust discussion of the targets and progress toward meeting them, the targets themselves are viewed to be strong: CDP considers SSAB's emissions reduction target among the strongest of the steel companies it assessed.

Due to the inherent difficulty industrial issuers such as steelmakers face in cutting their considerable Scope 1 GHG emissions in the near term, SSAB encourages consideration of life-cycle emissions. Consistent with this approach, the company seeks to identify emissions savings achieved by end use of its products; SSAB has set a target for customer CO₂ savings of 10 million tonnes annually by 2025, which equals SSAB's Scope 1 emissions. Pages 49 and 50 of the Business Review provide a detailed description and a case study of how the company calculates these savings. The sustainability section on the company's website provides a more detailed discussion and calculations for twelve additional applications where emissions savings can be achieved by end users.

Pages 122-124 of the GRI Report provide disclosure and discussion of SSAB's Scope 1, Scope 2, and Scope 3 emissions (Figure 48, p. 54). Of note in the discussion:

- Scope 1 emissions are calculated in accordance with the procedures in the GHG Protocol, together with additional guidelines from the EU and/or national authorities.
- Scope 2 methodology uses a grid average. This results in an overestimate because SSAB does not take into account renewable energy it procures through its “guarantee of origin” – minimum of 30% hydropower; 20% wind power.

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- Scope 3 GHG emissions are calculated using the GHG Protocol and a table is provided listing Scope 3 GHG emissions by source. SSAB was assisted in calculating scope 3 by Gaia Consulting. More information can be found in the report “[SSAB Scope 3 Calculation Report 2017](#)” on the company’s website.
- SSAB also discloses GHG emissions intensity (p. 124) over the past five years, by activity.

Disclosure Assessment: Metrics and Targets

Disclosure around these metrics provides decision-useful insight into how SSAB intends to achieve its strategy for addressing climate-related risks. It also allows for monitoring of the company’s operational performance against these targets—a key indicator of the company’s levels of dedication and success in pursuing its strategy around mitigating climate-related risks. Presentation of the methodology used to calculate Scope 3 GHG emissions savings achieved by end users provides a meaningful basis for future evaluation of progress toward fully offsetting Scope 1 GHG emissions by 2025. In addition, presentation of the GHG emissions calculation methodologies for all types of emissions allows for greater comparability across different companies’ disclosures. Financial disclosure around expenditures made to achieve progress to date and expected future spending would enhance the usefulness of these disclosures.

Figure 48

Excerpt from Annual Report

305-1, 305-2: GREENHOUSE GAS EMISSIONS ¹⁾					
Thousand tonnes	2017	2016	2015	2014	2013
305-1: Direct greenhouse gas (GHG) emissions (Scope 1)²⁾					
Iron ore-based steel production in Nordics	9,117	9,323	8,850	8,910	8,643
Scrap-based steel production in US	690	644	581	651	651
Other reported sites	21	22	18	17	17
Total	9,828	9,989	9,448	9,578	9,311
305-2: Indirect emissions from the generation of purchased electricity, heating and steam (Scope 2)					
Iron ore-based steel production in Nordics	167	182	182	193	194
Scrap-based steel production in US	1,032	934	934	1,009	1,234
Other reported sites	17	17	17	18	18
Total	1,216	1,166	1,133	1,220	1,447

¹⁾ Only CO₂ is included in the calculation.

²⁾ Generation of electricity from process gases is included in the direct emissions (Scope 1).

SSAB, [SSAB Annual Report 2017](#), p. 123

Conclusion

Overall, SSAB’s disclosures provide a helpful level of specificity in the information provided around its strategy and climate-related metrics and targets, and several decision-useful forward-looking insights. Disclosure of such information can help give users of disclosure confidence that the company has concrete objectives and a plan for meeting them. Incorporation of scenario analysis and additional disclosure around the costs of SSAB’s climate-related risk mitigation activities would further help in understanding the potential for future impacts and outcomes of these efforts.

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3. Buy Side Analyst's Perspective on a Banking Institution

ANZ (Australia and New Zealand Banking Group) is the third largest bank in Australia and the largest bank in New Zealand. It operates in Asia, the Pacific, Europe, North America, and the Middle East and serves retail, commercial, and institutional clients. Its presence in the Pacific, in particular, implies that ANZ is exposed to areas vulnerable to rising sea levels. The documents reviewed for this assessment include ANZ's [Climate-related Financial Disclosures](#) and [Climate Change Statement](#).^{28,29}

Introduction

ANZ is an early supporter of the TCFD recommendations and one of the members of the United Nations Environment Programme Finance Initiative (UNEP FI) [pilot project on implementing the TCFD Recommendations](#) for banks. All 16 banks participating in this pilot have committed to publishing an initial TCFD disclosure by mid-2019.

Disclosure Example: Strategy

ANZ's [Climate-related Financial Disclosures](#) report covers each of the four major categories of the TCFD recommendations. The strategy section discusses the potential implications of two scenarios for ANZ's customers most exposed to transition risk, i.e., ANZ's lending book. In addition, the Climate Change Statement describes ANZ's policy on financing fossil fuel industries.

Strategy

Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.

Disclosure Assessment: Strategy

The initial focus has been on customers in the thermal coal supply chain. The analysis provides insight into the extent to which ANZ's customers—and, hence, ANZ as a lender—are exposed to various climate-related scenarios, how these customers are preparing for the energy transition, and how ANZ can support customers to transition to a low-carbon economy ([Figure 49](#)).

Figure 49

Excerpt from Climate-related Financial Disclosures Report

What is scenario analysis?

A scenario is not necessarily what the company thinks will happen, but what might happen.

Scenario analysis can be used to test whether business strategies are sufficiently robust and flexible to withstand potential implications – in this case from climate change.

What did we do to test ANZ's customers?

We chose two scenarios, and a group of customers, and took all the information we knew about those customers and their strategy for managing climate change transition risks.

Once we understood how each customer had planned for climate change, we assigned a level of customer awareness and a level of resilience to climate change risks.

We also assessed their disclosure of climate-related risks.

ANZ, [2017 Climate-Related Financial Disclosures](#), p. 2

ANZ discusses its policy towards financing fossil fuel industries, addressing implicitly investors' potential concern for stranded assets ([Figure 50](#), p. 56). Although ANZ has an ambition to

²⁸ ANZ. [Climate-related Financial Disclosures](#), 2018.

²⁹ ANZ. [Climate Change Statement](#), 2017.

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contribute to the energy transition, the bank also understands that fossil fuels will continue to play a significant role in the energy mix for the coming decades. The focus is, therefore, on supporting alternatives to fossil fuels, such as energy efficiency measures and renewable energies, and on the most carbon efficient fossil fuel plants.

Figure 50

Excerpt from Climate Change Statement

FINANCING FOSSIL FUEL INDUSTRIES

We understand some of our stakeholders view our financing of fossil fuel industries as a material risk and in direct conflict with our stated position on the need to reduce greenhouse gas emissions. Today, around 40% of the world’s electricity comes from coal-fired power stations and coal remains the cheapest source of fuel. We therefore consider that decarbonisation of the economy must be managed responsibly and over time.

To facilitate a gradual and orderly transition, ANZ makes the following commitments:

We will fund and facilitate at least \$10 billion by 2020 to support our customers to transition to a low carbon economy, including increased energy efficiency in industry, low emissions transport, green buildings, reforestation, renewable energy and battery storage, emerging technologies (such as carbon capture and storage) and climate change adaptation measures

We will consider financing new coal fired power plants if they use advanced technologies and higher quality thermal coal to significantly reduce emissions to at least 0.8 tCO₂/ MWh.² We will not finance any new build of conventional³ coal fired power plants

We will implement strengthened due diligence processes which govern our lending to coal mining, transportation and power generation

² For example, ultra-supercritical plants using advanced, commercially proven low emissions technologies to reduce emissions by up to ~50% compared to some existing subcritical plants.

³ “Conventional” plants are those not utilising advanced, commercially proven technologies (such as supercritical or ultra-supercritical boilers, gasification or circulating fluidised boilers) to significantly reduce CO₂ emissions.

ANZ, [2017 Climate Change Statement](#), p. 1

Investors would benefit from a wider coverage of customers (beyond coal supply chain) and risks, in particular physical risks. For instance, is ANZ still willing to provide mortgages for residential and commercial real estate in flood-prone areas? How would a business-as-usual scenario (likely leading to more than 3°C degrees of global warming) affect risk-return tradeoffs?

Disclosure Example: Metrics and Targets

ANZ’s [Climate-related Financial Disclosures](#) report covers the evolution of the carbon intensity of financed energy generation. In a separate subsection, ANZ discusses metrics for other lending activities (qualitatively) and the footprint of its own physical assets (office buildings and data centers, quantitatively).

Metrics and Targets

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

Disclosure Assessment: Metrics and Targets

[Figure 51](#) (p. 57) provides some evidence for recent improvements in energy efficiency and may be used to assess ANZ’s exposure to higher carbon prices. Investors would benefit from a more comprehensive discussion of financed emissions. In particular, how are they measured (which scopes are included)? Which sectors and asset classes are included? Would it be possible to add forward-looking information?

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Figure 51

Excerpt from Climate-related Financial Disclosures Report

3.3 WE REDUCED THE INTENSITY OF OUR FINANCED EMISSIONS

During 2017, we continued to reduce the emissions intensity of our direct exposure to electricity generation in our project finance portfolio.

Average emissions intensity of ANZ financed energy generation

Tonnes of Carbon Dioxide per Megawatt hour

	Australia	Outside Australia
2017	0.58	0.24
2016	0.62	0.16
2015	0.64	0.20
2014	0.77	0.25
Movement 2014–2017	-25%	-4%

The average emissions intensity of generation we finance continues to be below the grid average in Australia and internationally.

The reduction in Australia is due to new renewable generation projects we finance. The finance of new windfarms in Australia increased the amount of electricity generated from renewable sources from 30% in 2016 to 35% in 2017.

ANZ, [2017 Climate-Related Financial Disclosures](#), p. 5

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4. Buy Side Equity and Credit Analysts' Perspective on an Electric Utility Company

Duke Energy is a diversified energy company with mostly regulated utility operations headquartered in Charlotte, North Carolina. Its largest business consists of its electric utilities and infrastructure segment, which serves approximately 7.5 million retail electric customers in six U.S. states. The company's gas utilities and infrastructure businesses provide natural gas to over 1.5 million customers located in five states. Duke Energy has also formed a joint venture to build and own the proposed Atlantic Coast Pipeline and has a \$225 million investment in the Sabal Trail Pipeline into Florida. The smaller commercial renewables business segment builds, develops, and operates wind and solar generation projects throughout the continental U.S. The document reviewed for this assessment was Duke Energy's [2017 Climate Report to Shareholders](#).³⁰

Disclosure Example: Strategy

In its disclosures, Duke Energy provides a clear strategy focused on transforming the customer experience, modernizing the power grid, generating cleaner energy, expanding the natural gas infrastructure, and engaging employees and stakeholders.

Duke Energy is committed to a lower-carbon future and has incorporated carbon dioxide (CO₂) emissions into its long-term planning. The company has retired older, less efficient coal- and oil-fired power plants, built highly efficient natural gas generation, expanded its

Strategy

Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.

³⁰ Duke Energy, [2017 Climate Report to Shareholders](#), March 2018.

portfolio of wind and solar resources, increased energy efficiency offerings, and invested in zero-CO₂ emissions hydropower and nuclear plants.

Duke Energy has reduced CO₂ emissions by 31% since 2005. In 2017, Duke Energy established a goal to reduce CO₂ emissions 40% from 2005 levels by 2030. Beyond 2030, the company's long-term strategy will continue to drive carbon out of the system.

Duke Energy's [2017 Climate Report to Shareholders](#) explains its business strategy (pp. 3-8) and steps it is taking to address the risks described in [Figure 52](#).

Figure 52

Excerpt from Climate Report

The purpose of this report is to provide information on Duke Energy's strategy and the steps we are taking to mitigate risks from climate change including:

- Physical Risk – How we are addressing issues such as managing water resources and hardening the system against extreme weather;
- Policy Risk – How we are navigating policy uncertainty and planning for possible constraints on CO₂ emissions; and
- Economic Risk – How we are strategically planning investments that will reduce the risk of stranded assets and position the company well into the future.

As part of our Policy Risk analysis, we evaluated a “two-degree policy” where CO₂ emissions are sharply reduced in order to limit global temperature increase to no more than 2 degrees Celsius above pre-industrial levels. This analysis provides high-level insights on one possible pathway consistent with a carbon-constrained future, including potential long-term impacts on the company's generation mix associated with a “two-degree policy” scenario. It is important to note that our current plan to achieve a 40 percent reduction by 2030 is consistent with a pathway to achieve a science-based two-degree target.

Duke Energy, [2017 Climate Report to Shareholders](#), p. 1

Disclosure Assessment: Strategy

The information in Duke Energy's [2017 Climate Report to Shareholders](#) is useful for investment decisions because it clearly describes the climate-related risks associated with the company's existing power generation portfolios as well as strategies over the short, medium, and long term to reduce CO₂ emissions. In addition, Duke Energy describes alternate ways it plans to reduce CO₂ emissions above and beyond changes to its power generation mix, including reducing the growth in demand for electricity through energy efficiency and smart grid modernization.

5. Portfolio Manager's Perspective on a Mining Company

Teck Resources Ltd. (Teck) is an integrated natural resource group with activities in mining, smelting, and refining. The company mines zinc, copper, molybdenum, gold, and metallurgical coal in the United States, Canada, Peru, and Chile. Teck also produces refined metals, specialized metal products, and other products.

Teck produces zinc, metallurgical coal, and copper. Its Red Dog mine in Alaska holds some of the world's largest zinc reserves. The company's coal business operates through subsidiary Fording Canadian Coal Trust, which mines copper in Canada, Chile, and Peru. Teck's energy segment consists of stakes in three oil sands projects in Canada that are in the development stage. In 2012, Teck acquired Canada's SilverBirch Energy, which holds a 50% stake in the Frontier oil sands

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mining project, for \$425 million. The documents reviewed for this assessment, which focuses on metrics and targets, include Teck’s [2017 Sustainability Report](#) and [2017 Sustainability Performance Data](#).^{31,32}

Disclosure Example: Metrics and Targets

Teck’s [2017 Sustainability Report](#) includes considerable data and references a downloadable spreadsheet of sustainability performance data—[2017 Sustainability Performance Data](#)—that is a good prototype for its industry. The data in the spreadsheet covers topics such as economic performance, workforce demographics, relationships with communities, waste and product impacts, and energy and emissions.

Metrics and Targets

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

This assessment draws on supplemental guidance for the Materials and Buildings group in the Task Force’s [Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures](#) (Annex) and, in particular, the examples of metrics identified as possibly relevant to metals and mining companies. These metrics are included in [Figure 53](#).

Figure 53

Excerpt from TCFD Annex: Example Metrics for Metals and Mining

Financial Category	Climate-Related Category	Example Metric	Unit of Measure
Revenues	Risk Adaptation & Mitigation	Revenues/savings from investments in low-carbon alternatives (e.g., R&D, equipment, products or services)	Local currency
Expenditures	Risk Adaptation & Mitigation	Expenditures (OpEx) for low-carbon alternatives (e.g., R&D, technology, products, or services)	Local currency
Expenditures	Energy/Fuel	Total energy consumed, broken down by source (e.g., purchased electricity and renewable sources)	GJ
Expenditures	Energy/Fuel	Total fuel consumed—percentage from coal, natural gas, oil, and renewable sources	GJ
Expenditures	Energy/Fuel	Total energy intensity—by tons of product, amount of sales, number of products depending on informational value	GJ
Expenditures	Water	Percent of fresh water withdrawn in regions with high or extremely high baseline water stress	Percentage

Task Force on Climate-related Financial Disclosures, [Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures](#), pp. 60-61

Disclosure Assessment: Metrics and Targets

In its [2017 Sustainability Performance Data](#) spreadsheet, Teck provides energy consumption by type, Scope 1 and Scope 2 GHG emissions by fuel type over the past four years, and coal, copper, zinc and lead production intensity that helps analysts compare Teck to other industry participants on a like-for-like basis ([Figure 54](#), p. 60). This information largely addresses the energy and fuel consumption and adaptation metrics included in [Figure 53](#). In addition, by collecting additional data (separately disclosed by the company) on production, it is straightforward to calculate energy expenditures relative to volume, revenues, or other metrics with good accuracy.

The only missing item in terms of disclosure might be the proportion of energy from renewable sources, though this may not be possible without footprinting the grids to which the company is

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³¹ Teck Resources. [2017 Sustainability Report](#), April 2018.

³² Teck Resources. [2017 Sustainability Performance Data](#), April 2018.

connected. In addition, this data might not be meaningful if Teck cannot source energy from multiple sources.

Figure 54

Energy Consumption by Type⁽¹⁾

	2017	2016	2015	2014
Diesel	16,287	15,141	15,861	17,256
Gasoline	275	264	266	221
Coal	3,720	3,420	3,123	2,792
Natural Gas	7,851	7,744	7,206	7,251
Coke & Petroleum Coke	424	455	635	1,379
Other	869	862	1,606	2,126
Electricity	14,473	14,651	14,463	14,037
Total	43,899	42,538	43,159	45,062

(1) Other includes propane, waste oil, and other process fuels.

Scope 1 and Scope 2 GHG Emissions by Fuel Type^{(1),(2)}

	2017	2016	2015	2014
Diesel	1,179	1,095	1,147	1,248
Gasoline	19	18	18	15
Coal	359	324	298	272
Natural Gas	395	389	362	365
Coke and Petroleum Coke	47	50	64	135
Other	97	97	147	180
Fugitive Emissions	586	578	525	579
Electricity	328	379	373	343
Total	3,010	2,931	2,934	3,135

(1) Scope 1 (Direct) GHG emissions are those that occur from energy sources that are owned or controlled by the company.

(2) Scope 2 (indirect) GHG emissions are those that occur from the generation of purchased electricity consumed by the company, and physically occur at the facility where electricity is generated.

Steelmaking Coal Production Intensity

Type	2017	2016	2015	2014
Energy Intensity (energy used per tonne of product)	0.73	0.65	0.69	0.7
Carbon Intensity (carbon emitted per tonne of product)	0.067	0.06	0.062	0.065

Copper Production Intensity

Type	2017	2016	2015	2014
Energy Intensity (energy used per tonne of product)	50.46	43.72	41.2	46.65
Carbon Intensity (carbon emitted per tonne of product)	2.86	2.65	2.54	2.86

Zinc and Lead Production Intensity

Type	2017	2016	2015	2014
Energy Intensity (energy used per tonne of product)	12.81	12.05	12.52	12.06
Carbon Intensity (carbon emitted per tonne of product)	0.56	0.53	0.55	0.54

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In terms of adaptation, the company discloses the effect of energy reduction and emission projects (Figure 55). This data enables the analyst to place the company on the IEA "glide path" for adaptation to a 2°C world using IEA emission and carbon budgets for each industry.

Figure 55

Energy Reduction Projects⁽¹⁾

	2017	2016	2015	2014
Cumulative reductions in energy from projects implemented since 2011(TJ)	2,132	1,550	1,200	1,050

(1) Calculations made using 2011 as the baseline year.

GHG Emission Reduction Projects

	2017	2016	2015	2014
Cumulative reductions in GHG emissions since 2011 (kt)	281	217	200	170

Teck, [2017 Sustainability Performance Data](#)

The other major area of impact and disclosure is around water stewardship. Similar to its energy-related disclosures, Teck has extensive disclosure around water used, reused, and recycled (Figure 56 and Figure 57, p. 62). Water intensity (relative to tonnage) is disclosed and company-

Figure 56

Water Used, Reused, and Recycled (million m³)

	2017	2016	2015	2014
Total water inputs	365.4	346.5	333.2	391.6
Total water outputs	376.3	353.4	340.2	388.7
Total water use ⁽¹⁾	291.9	285.3	285.9	326.7
New water use	117.3	117.9	115.5	128.4
Water reused/recycled ⁽¹⁾	174.6	167.3	170.4	198.4
Reused/recycled as % of total new water use ⁽¹⁾⁽²⁾	149%	142%	148%	155%

(1) The figures for 2014-2016 have been restated due to improved methodology for reporting total water reuse at our Red Dog Operations.

(2) The percentage calculation is based on the total volume of water reused/recycled divided by the total volume of new water used.

New Water Use Intensity at Coal Operations⁽¹⁾

	2017	2016	2015	2014
New water use (million m ³)	11.3	15.5	14.9	15.4
Raw coal processed (tonnes)	40,706,000	38,871,000	35,302,000	40,424,000
New water use intensity (million m³/tonne)	0.28	0.4	0.42	0.38

(1) Includes Cardinal River, Coal Mountain, Elkview, Fording River, Greenhills and Line Creek operations.

New Water Use Intensity at Milling and Flotation Operations⁽¹⁾

	2017	2016	2015	2014
New water use (million m ³)	33.1	28.0	27.2	29.5
Ore processed (tonnes)	74,356,000	72,262,000	69,186,000	72,565,000
New water use intensity (million m³/tonne)	0.45	0.39	0.39	0.41

(1) Includes Red Dog, Pend Oreille, Highland Valley Copper and Carmen de Andacollo operations.

Teck, [2017 Sustainability Performance Data](#)

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wide water balance is calculated. This level of disclosure is unusually rich and clearly permits the analyst to make like-for-like comparisons.

Figure 57

Total Water Use and New Water Use (million m³)

	2017	2016	2015	2014
New water use (all operations)	117.3	117.9	115.5	128.4
Total water use (all operations)	291.9	285.3	285.8	326.7
New water use (mining operations only - excludes Trail Operations)	46.2	45.2	43.7	46.8
Total water use (mining operations only - excludes Trail Operations)	220.8	212.5	214.1	231.6

Company-Wide Water Balance (million m³)⁽¹⁾⁽²⁾⁽³⁾

	2017	2016	2015	2014
Water Inputs				
Surface Water	329.8	312.6	298.8	355.9
Groundwater	35.6	33.8	34.4	35.7
Third-Party Water	0.003	0.003	0.003	0.003
Total Water Inputs	365.4	346.5	333.1	391.6
Water Outputs				
New Water Used	117.3	117.9	115.5	128.4
Reused and Recycled Water	174.6	167.3	170.4	198.4
Water Inputs Discharged Without Use	248.1	228.5	217.7	263.3
Water Outputs				
Surface Water	277.7	247	236.7	287.6
Other	60.7	61.9	58.6	55.8
Groundwater	35.1	41.5	42.4	43.5
Third-Party Water	2.7	3	2.4	1.8
Seawater	0.1	0.1	0.1	0.1
Total Water Outputs	376.3	353.4	340.2	388.7
Total Difference Between Water Inputs and Water Outputs	(10.70)	(7.0)	(7.1)	3.0

(1) Surface water includes water from precipitation and runoff that is not diverted around the operation, and water inputs from surface waterbodies that may or may not be within the boundaries of our operations. While we do not actively collect rainwater for use in our operations, the quantities of rainwater and runoff inputs to our operations constitute the majority of our surface water inputs, except at Trail Operations.

(2) Third-party water is water supplied by an entity external to the operation, such as from a municipality. We do not use wastewater from other organizations.

(3) Other includes water that has evaporated and/or is not recoverable (e.g., contained in ore concentrate or tailings).

Teck, [2017 Sustainability Performance Data](#)

Conclusion

Taken together with the sustainability report commentary, Teck discloses a high level of data with granular detail that makes it possible for an analyst to make a detailed assessment of the company with respect to climate-related risk and ESG risk and to specifically make comparisons to other industry participants.

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Similar to the approach the Task Force used during the development of its 2017 report, the Task Force again sought to understand the perspectives of both users of climate-related financial disclosures and preparers of such disclosures. Section C. [User Perspectives on Decision-Useful Climate-Related Financial Disclosures](#) provides individual users' views on existing disclosures containing decision-useful information, while this section summarizes the views of a group of oil and gas company preparers.

This group of preparers—the TCFD Oil and Gas Preparer Forum (Forum)—was established in October 2017, by the World Business Council for Sustainable Development (WBCSD) with input from the TCFD Secretariat. The Forum includes representatives from four large European oil and gas companies (Eni, Equinor, Shell, and Total), and its work is coordinated by WBCSD.³³ The Forum recently released a report—[Climate-Related Financial Disclosure by Oil and Gas Companies: Implementing the TCFD Recommendations](#) (Forum's report)—with its findings, which are summarized below.³⁴ Excerpts from the Forum's report are included to highlight how the four member companies are implementing the TCFD recommendations today and how reporting may continue to develop in the future, including through wider engagement with other companies in the energy sector and with users of climate-related financial disclosures.

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1. Implementation Path

The Forum's report highlights that the progression of disclosure content and the quality of information depends on (1) input from and interaction between the preparers and users of disclosures to balance users' information needs and the interests of reporting companies, including commercial sensitivities and (2) the continuing development of enabling conditions to support effective disclosure including data collection processes, agreed definitions, and assurance approaches.

The Forum's report also highlights that disclosures related to the Task Force's recommendations related to strategy and metrics and targets depend on a range of interpretations including "management analysis," strategic discussion, and some forward-looking assessments and, therefore, involve a greater degree of judgement than the recommendations related to governance and risk management. As a result, the Forum notes the implementation pathway for disclosures related to strategy and metrics and targets is likely to proceed through more steps and at a different pace than disclosures on governance and risk management.

2. Current Disclosure Practices Aligned with TCFD Recommendations

One of the key areas of focus of the Forum's report is an "illustrated guide" to reporting in alignment with each of the TCFD's recommendations: Governance, Strategy, Risk Management, and Metrics and Targets. The illustrated guide includes more than 30 examples of current disclosures from Forum member companies that Forum members view as responsive to the recommendations as well as aspects of the supplemental guidance. [Figure 58](#) (p. 65) describes the types of information or topics covered in the disclosure examples in the Forum's report, organized by each recommendation (category) and recommended disclosure (a, b, and c). Also described below is the Forum's perspective on each of the TCFD recommendations.

³³ Membership in the Forum was deliberately restricted to a small number of oil and gas companies because of the limited time the Forum had to complete its work and contribute to the Task Force's 2018 status report. Forum members include companies whose senior management made public statements of support for the TCFD's work and welcomed the initiative to further enhance transparency regarding climate-related financial risk.

³⁴ WBCSD, "Climate-Related Financial Disclosure by Oil and Gas Companies: Implementing the TCFD Recommendations," July 2018.

Figure 58

Topics Addressed in Disclosure Examples

Category	Supporting Recommended Disclosure		
	a)	b)	c)
Governance	<ul style="list-style-type: none"> - Outline the process for Board oversight of climate change - Identify roles and responsibilities for climate change - Define the frequency with which climate change is discussed by the Board - Show whether and how oversight and management of climate change risks and opportunities are taken into account in business and strategic decisions, risk management, budgeting, performance and capital expenditure, acquisition and divestment - Describe how management monitors climate-related issues 		N/A
Strategy	<ul style="list-style-type: none"> - Identify and describe material climate-related risks - Identify and describe climate-related opportunities - Describe the time horizons over which climate-related risk and opportunities might affect the organization - Describe the process used to determine which climate-related risks and opportunities could have a material financial impact on the organization 	<ul style="list-style-type: none"> - Sensitivity to carbon pricing and sensitivity to oil price - Committed and uncommitted capital expenditure - Descriptions of portfolio optimization - Management of the cost base, production forecasts, internal rate of return, and breakeven and cost of supply - Key quantitative assumptions/ parameters: population, GDP, final consumption, primary energy, CO₂ emissions and emissions captured - Factors and options that support strategic and business resilience - The optimization and development of the business, its portfolio, new capabilities or technologies - Capital allocation and expenditure plans in place to support strategies 	
Risk Management	<ul style="list-style-type: none"> - Identify that climate change risk is integrated into the organization's overall risk management - Identify and describe the process for climate change risk management - Outline risk identification processes applied at the asset level - Outline use of impact metrics and prioritization matrices 		
Metrics and Targets	<ul style="list-style-type: none"> - Identify emission reductions, flaring, methane emissions and carbon captured - Identify Scope 3 GHG emissions including the use of sold products - Demonstrate how operational metrics are used to manage climate-related risk and opportunities through target setting - Connect climate to strategy and financial planning 		

Governance

Where climate change issues are already integrated into robust governance processes, disclosures made in the ordinary course of reporting might already provide much of the information recommended by the TCFD about the processes and policies used for climate change governance. Disclosure is useful when it complements that information with explanatory material about why companies have made particular governance choices, how the policies are executed, who is involved, and what decisions result from the policies.

Strategy

The TCFD recommends that companies identify climate-related risks and opportunities over the short, medium, and long term and quantify their impact on the business, including analyses of the resilience of their strategy. Forum members have identified transition risks as typically being more material than physical risks, with transition risks described in the risk section of their financial filings. Forum members disclose the safeguards in place to minimize the possibility of physical risks becoming material risks. As physical risks are currently considered less material for Forum members, their disclosure in this area can be more limited.

Achieving consistent and comparable scenario analyses will be challenging given the range of views on the pace and implications of the transition to a low-carbon economy. Against a background of uncertainty, the purpose of scenario analyses is therefore to inform strategy and assess resilience rather than as a forecasting tool. Forum members use cautionary language to explain this uncertainty.

All Forum member companies use energy transition scenarios to inform choices and strategic decisions. The companies disclose the inputs to and outputs of their scenario analyses including strategic responses to the low-carbon transition, such as changes in portfolio mix or investment in new technologies. Evidence of resilience to climate change risks can also be found in conventional measures such as capital and cost base flexibility, reserve life, capital allocation plans, or research and development (R&D) spending although these may not necessarily be labeled as specifically related to climate change.

Risk management

As with governance, where climate change is already integrated into a company's overall risk processes, Forum members question whether disclosures that specifically address risk management related to climate change add value. However, disclosure is useful where it includes information about how the risk management processes are applied to climate issues, such as stress-testing new projects and identifying the relative significance of climate change in relation to other risks.

Metrics and targets

Forum members' disclosures already include many of the climate-related metrics and targets suggested in the TCFD's [Annex](#). However, the Forum report indicates the need for a progression from operational to more financial measures. As disclosures develop in this area, the Forum's report anticipates greater linkage and coherence between operational metrics such as GHG emissions, energy usage, strategic targets, management of risks and opportunities, and financial metrics.

3. Challenges and Further Work

The Forum's conclusions are described on pages 41-42 of its report and are summarized below. The Forum believes the foundations of effective climate-related financial disclosure practice are already in place and that the progression and enhancement of climate-related financial disclosure for the oil and gas industry is dependent on the continued development of content and complementary information.

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Standardization of Measures

Climate-related metrics are currently not standardized. To support comparability among oil and gas companies, standardized methodologies and a common level of disclosure could be developed. Developments in disclosure practices are dependent not only on oil and gas companies but also on continuing engagement with users. This will help to establish principles for the disclosure of critical assumptions and may lead to the development of a simple standardized resilience test for the industry.

Communicating Resilience

Analyzing and disclosing business resilience to different climate-related scenarios is considered one of the more challenging areas of the TCFD's recommendations. As many variables are needed to illustrate resilience over the longer term, the complexity, uncertainty, and lack of consistency between companies on scenario analyses can limit their value to users. Further work is required to determine whether and to what extent longer-term resilience assessments can be developed in order to make them comparable and meaningful to users.

Coherence and Linking

At this stage in climate-related financial disclosure, information, strategies, results, and ambitions relating to climate change are often widely dispersed and disconnected (e.g., mainstream reports, sustainability reports, submissions to surveys of rating agencies, investor presentations).

Better linking and coherence in climate-related disclosures could be achieved by the following:

- Signposting and navigation tools could help to show where and how complementary information is reported.
- Connecting a company's performance, targets, and ambitions with the level of decarbonization required to achieve national goals or to keep global temperature increase below 2°C.
- Presenting assumptions, results, strategies, and actions relating to climate change.

The Forum's report acknowledges the limited and informal nature of engagement it was able to undertake with users of climate-related financial disclosures and highlights the need for ongoing interaction between users and preparers of information along the implementation path.

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E Initiatives

Supporting TCFD

E Initiatives Supporting TCFD

The Task Force recognizes that support from market participants is critical to its success as an industry-led initiative. Since the release of the Task Force's 2017 report, several groups have been working to help preparers of disclosure report information aligned with the recommendations, highlight user demand for climate-related financial disclosures, and build support for the Task Force, significantly extending the reach of the recommendations. This section describes some of the major initiatives supporting the TCFD.

1. Group-Focused Implementation Initiatives

Since the release of the recommendations, an increasing number of organizations have begun to work together on implementation efforts. For example, the World Business Council on Sustainable Development (WBCSD) formed an oil and gas industry working group to identify examples of effective disclosure practices and consider how disclosures may evolve over time. The group's report was published in July 2018 and is summarized in Section D. [Preparer Perspective: Oil and Gas Industry](#). WBCSD plans to form two additional working groups for the utilities and chemicals industries. Members of the International Council for Mining and Metals (ICMM) also formed a working group to address TCFD implementation. The ICMM working group has met throughout 2018 to advance members' understanding of the TCFD recommendations, learn from industry leaders, and improve reporting. They are focused on ways to address disclosure challenges in their industry, investor engagement, and sharing key lessons with other members of the ICMM.

Ceres has worked with its investor members to engage with companies in the oil and gas, electric power, and transportation industries to address [carbon asset risks](#) and encourage reporting in line with the TCFD recommendations. Ceres has also published [guidance](#) to help companies in the electric power industry with 2°C scenario analysis.

In the financial sector, the United Nations Environment Programme Finance Initiative (UNEP FI) formed a [TCFD pilot project](#) in July 2017 to develop guidance on scenario analysis. In the pilot, 16 banks from around the world worked on modeling and stress testing with climate change experts to develop a scenario-based approach for assessing the potential impact of climate change on their lending portfolios. The group published [two publicly available reports](#) focused on scenario analysis for banks: one on climate-related transition risks and opportunities and one on climate-related physical risks and opportunities. UNEP FI launched a similar pilot project with a [group of 20 investors](#) in March 2018 and a [pilot for insurance companies](#) in July 2018.

The Institute of International Finance (IIF) has provided additional support for financial sector organizations by integrating the TCFD recommendations into multiple aspects of its annual agenda and bringing together organizations across banking, asset management, and insurance industries to work toward greater alignment of disclosures with the TCFD recommendations.³⁵ In addition, the 29 global insurance companies that constitute ClimateWise have [agreed to align "The ClimateWise Principles"](#) with the Task Force's recommendations.

The City of London Green Finance Initiative, China Green Finance Committee, and Principles for Responsible Investment (PRI) together established a [working group of financial institutions](#) from China and the United Kingdom to pilot TCFD reporting and help inform the direction of China's environmental disclosure guidelines. In September 2018, the pilot group released an [action plan](#) outlining additional work related to the TCFD and improving climate-related disclosure.

The European Bank for Reconstruction and Development (EBRD) and the Global Centre of Excellence on Climate Adaptation worked with financial and non-financial companies and others to develop [guidance on physical climate risks and opportunities](#), published in May 2018. The

³⁵ Institute of International Finance, "IIF Launches Forum on Implementation of TCFD Recommendations." December 7, 2017.

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guidance includes recommendations that are intended to support early efforts to adopt the TCFD recommendations. In addition, in September 2018, the EBRD released a [web tool](#) with step-by-step examples of how the recommendations may be put into practice by businesses across a range of sectors.

Other organizations assisting with adoption of the TCFD recommendations include the Climate Disclosure Standards Board (CDSB), which secured a [commitment from 19 companies](#) to implement the recommendations over three years, and Accounting for Sustainability (A4S), which released a statement from over 60 corporate CFOs, CEOs of accounting bodies, and chairs of pension funds [committing to support and work towards adoption](#). Business for Social Responsibility has [incorporated TCFD](#) into its climate work streams and is helping members in Japan and the United States adopt the recommendations.

The World Economic Forum (WEF) formed an [Alliance of CEO Climate Leaders](#) focused on implementation of the recommendations and building support for effective carbon markets. In addition, the Institutional Investors Group on Climate Change (IIGCC) formed an [Investor Practices Programme](#) to focus on climate-related governance, strategic tools and metrics, and practical support and guidance. In India, the Confederation of Indian Industry (CII) has been working with its members across India to build awareness of and support for the TCFD and to help its members implement the recommendations.

2. Investor Initiatives

Investors are also working to increase the availability of disclosures made in alignment with the TCFD recommendations. One of the first of these initiatives to support the TCFD was a [combined group of 390 investors](#)—coordinated by the Asia Investor Group on Climate Change (AIGCC), CDP, Ceres, Investor Group on Climate Change (IGCC), IIGCC, and signatories of the PRI—that called on G20 leaders and their nations to support the TCFD recommendations.

In addition, 289 investors with \$30 trillion in assets under management committed to engage the world's largest corporate greenhouse gas emitters to strengthen climate-related disclosures by implementing the TCFD recommendations as part of the [Climate Action 100+](#).³⁶ PRI published a [guide](#) to support asset owners implementing the TCFD recommendations. The guide focuses on the actions asset owners can take to improve processes around governance, strategy, risk management, and metrics and targets. Other investor groups have focused on specific industries. For example, the Farm Animal Investment Risk and Return (FAIRR) initiative is [working with investors and corporations](#) in the food industry with a specific focus on using climate-related scenario analysis.

3. Alignment of Reporting Guidelines

In developing its recommendations, the Task Force drew from the work of existing voluntary and mandatory climate-related reporting frameworks, including those developed by CDP, CDSB, the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), PRI, and the International Integrated Reporting Council (IIRC). As part of the work of the Corporate Reporting Dialogue (CRD), several of these organizations have adjusted their frameworks based on the TCFD recommendations to increase alignment of disclosure standards; and CDSB, CDP, and PRI note where their disclosure standards and questions relate to the recommendations. In addition, PRI and CDP included TCFD-aligned items in their 2018 reporting frameworks; and [Box 2](#) (p. 71) provides response rates on TCFD-aligned items in those frameworks.³⁷ In a September 2017 report, "[Converging on Climate Risk: CDSB, the SASB, and the TCFD](#)," SASB and CDSB issued

³⁶ [Climate Action 100+](#) is led by Asia Investor Group on Climate Change; Ceres; Investor Group on Climate Change; Institutional Investors Group on Climate Change; and Principles for Responsible Investment.

³⁷ CDP response rates are as of August 22, 2018. The deadline for 2018 CDP questionnaires was August 29, 2018.

a statement of agreement to further this harmonization. The report illustrates how the standards and reporting frameworks align with the recommendations.

The Sustainable Stock Exchanges initiative updated its [Model Guidance on Reporting ESG Information](#), encouraging companies to support TCFD implementation, and the World Federation of Exchanges is taking the TCFD recommendations into account in revising its [Environmental, Social & Governance \(ESG\) Guidance & Metrics](#).

Box 2

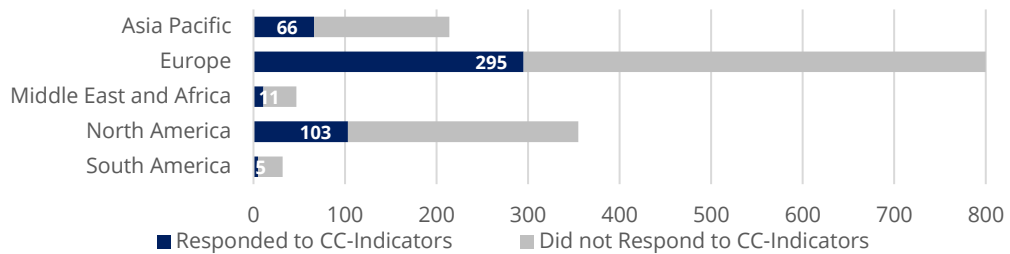
TCFD Recommendations in PRI and CDP Frameworks

Principles for Responsible Investment

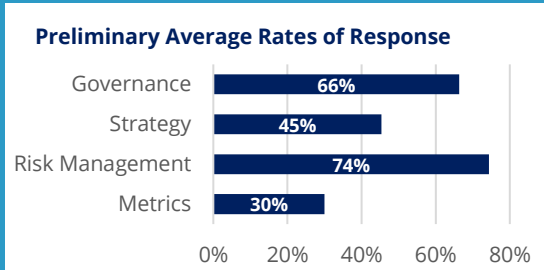
In late 2017, PRI integrated 14 climate-related indicators based on the TCFD recommendations into its 2018 reporting framework. Those indicators were marked with “CC” (climate change).

About one third of PRI 2018 respondents provided information on at least one of the 14 CC indicators. Of these respondents, 132 are asset owners and 348 are asset managers, with the majority in Europe.

Number of Responses to PRI CC Indicators by Region



On average, PRI respondents that provided information on CC indicators most frequently addressed CC indicators related to the TCFD recommendation on risk management, followed by governance.



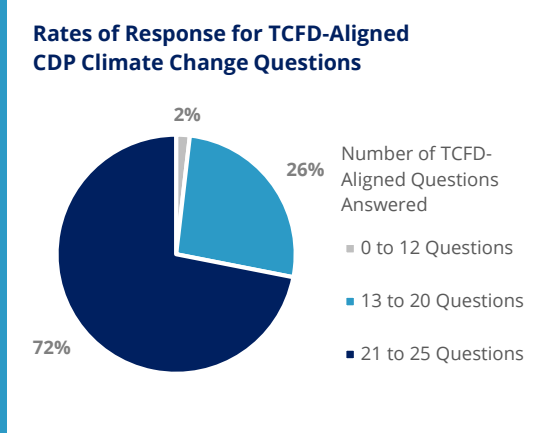
Twenty eight percent of PRI respondents that provided information on CC indicators opted to share their information publicly.

CDP Climate Change Questionnaire

The 2018 CDP climate change questionnaire was updated to include 25 new questions aligned with the TCFD recommendations.

As of August 22, 2018, over 70% of the companies that had submitted their CDP questionnaires answered 21 or more of the 25 questions. These results are preliminary as all responses were due by August 29, 2018.

Of note, 1,612 out of 1,734 companies (93%) that submitted their CDP questionnaires answered questions on how the organization’s process for identifying, assessing, and managing climate-related issues are integrated into the overall risk management process. This information (*Risk Management c*) was one of the lowest areas of disclosure in the AI and disclosure practices reviews.



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4. Government Support

While the TCFD remains a voluntary initiative, support from governments can help develop a holistic approach to improving climate-related financial disclosures. To date, governments in Belgium, France, Sweden, and the United Kingdom (U.K.) have expressed support for the TCFD. In addition, financial regulators around the world, including in Australia, Belgium, France, Hong Kong, Japan, the Netherlands, Singapore, South Africa, Sweden, and the U.K. support the TCFD. The U.K. [Green Finance Taskforce](#) recommends that “relevant financial regulators should integrate the TCFD recommendations throughout the existing U.K. corporate governance and reporting frameworks.”³⁸

In August 2018, the European Commission published its [Action Plan: Financing Sustainable Growth](#), in which it commits to revise the guidelines of the Non-Financial Reporting Directive by the second quarter of 2019 to include guidance on disclosing information in line with the TCFD recommendations. The European Commission created the [Technical Expert Group on Sustainable Finance](#) to implement elements of the Action Plan, including revising the guidelines.

In the Netherlands, the Sustainable Finance Platform—chaired by the central bank—has a [working group on climate risks](#) that is developing tools for measuring and managing climate-related risks and assessing gaps in approaches to the TCFD recommendations.

In Canada, the Minister of Environment and Climate Change and the Minister of Finance launched an [Expert Panel on Sustainable Finance](#), which will provide recommendations for the federal government to build on the work of the TCFD in the fall of 2018. Additionally, a [G7 investor initiative](#) led by Caisse de dépôt et placement du Québec and Ontario Teachers’ Pension Plan, in collaboration with the Government of Canada and 11 global partner institutions, includes a pledge to accelerate implementation of the TCFD recommendations.

In Japan, [public support](#) from the Financial Services Agency (FSA) and Ministry of the Environment (MOE) has helped encourage adoption of the recommendations. MOE is [implementing initiatives](#) in response to the TCFD recommendations, such as plans to revise its Environmental Reporting Guidelines and disseminate the experiences of companies that support the TCFD, particularly related to scenario analysis. Additionally, the Ministry of Economy, Trade and Industry (METI) has [organized a project with corporations and investors](#) to explore methodologies for climate mitigation, sustainable growth, and building best practices for TCFD-aligned disclosure.

5. Tools and Resources

Recognizing the importance of providing preparers and users of disclosures with resources related to the TCFD recommendations, CDSB created the [TCFD Knowledge Hub](#): a dedicated online aggregator for publicly available resources, events, and case studies on climate-related disclosure in alignment with the TCFD recommendations ([Figure 59](#)).

The TCFD Knowledge Hub houses guidance on the TCFD recommendations, climate-related tools, and other resources for stakeholders to use for years to come. CDSB and the TCFD Secretariat are currently working with resource and data providers to provide more public access to climate-related tools. In addition, there are plans to include further examples of decision-useful climate-related disclosure as more become available.

Figure 59

TCFD Knowledge Hub

To access resources, events and cases studies visit www.tcfdhub.org. Over 400 resources can be searched by TCFD recommendation, region, industry, and resource type. Resources can also be submitted for consideration for inclusion on the TCFD Knowledge Hub.

³⁸ Green Finance Taskforce, *A report to Government by the Green Finance Taskforce: Accelerating Green Finance*, March 2018, p. 8.

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Appendix 1: Task Force Members

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Michael Bloomberg

Chair
Founder
Bloomberg LP and Bloomberg Philanthropies

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Vice Chair
Executive Director
Banco Bradesco

Christian Thimann

Vice Chair
CEO and Chairman of the Management Board
Athora Germany

Graeme Pitkethly

Vice Chair
Chief Financial Officer
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Yeo Lian Sim

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Special Adviser, Diversity
Singapore Exchange

Members

Jane Ambachtsheer

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Managing Director and Global Head of Sustainable
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UBS Asset Management

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Chief Risk Officer, Moody's Corporation
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Liliana Franco

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Neil Hawkins

Corporate Vice President and Chief Sustainability
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Martin Skancke

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Management, Group Risk Management
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Eni

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Global Head of Green Banking
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Special Adviser

Russell Picot

Chair, Audit and Risk Committee, LifeSight
Board Chair, HSBC Bank (UK) Pension Scheme
Trustee
Former Group Chief Accounting Officer, HSBC

Secretariat

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Didem Nisanci

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Promontory Financial Group, an IBM Company

Stacy Coleman

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Joe Perry

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Appendix 2: Disclosure Selection and Review Methodology

As summarized in [Section B. Review of Climate-Related Financial Disclosures](#) of this report, the Task Force developed a two-pronged review approach (AI review and disclosure practices review) to provide *baseline* information on the alignment of recent climate-related financial disclosures with the TCFD recommendations.³⁹ This appendix describes the Task Force’s methodology for selecting and reviewing disclosures under the two approaches.

1. Companies Included in the Reviews

The Task Force focused its review on climate-related financial disclosures developed by the largest companies in eight specific groups highlighted in the Task Force’s 2017 report. The eight groups are Banks, Insurance Companies, Asset Managers, Asset Owners, Energy, Materials and Buildings, Transportation, and Agriculture, Food, and Forest Products. The Task Force selected companies included in these reviews using the following methodology.

- Identified universe of public companies—companies with public debt or equity—in the relevant groups and industries (more than 26,000) as well as several hundred asset managers and asset owners.⁴⁰
- Ranked companies by size. The Task Force used annual revenue to identify the largest companies in the four non-financial groups whereas total assets were used for banks and insurance companies, assets under management for asset managers, and assets owned for asset owners.
- Selected the 400 largest companies in each group or industry, except asset managers and asset owners where the top 50 in each industry were identified (2,500 in total).
- Adjusted population based on available documents and review objectives as follows (see [Figure 60](#) for the size of the final AI review population. For the disclosure practices review, 200 companies were reviewed—25 in each group):
 - Removed companies that did not have financial filings available in English.
 - For the disclosure practices review, identified the largest 25 companies that included the term “climate change” in their most recent financial filings.^{41,42}
 - For the AI review, removed companies whose reports could not be sufficiently processed (see [Digitized Relevant Reports](#) for more information) and removed asset managers and asset owners.

Figure 60

Size of AI Review Population

Industry or Group	Number
Banks	301
Insurance Companies	311
Asset Managers	N/A
Asset Owners	N/A
Energy	270
Materials and Buildings	271
Transportation	331
Agriculture, Food, and Forest Products	250
Total	1,734

Asset owners and asset managers were excluded from the AI review because, in many cases, the types of reports needed are not publicly available. In its 2017 report, the Task Force

³⁹ The Task Force gratefully acknowledges the work of Richard Berriman and Joaee Chew from PwC in developing the AI technology, running the AI review, and supplying supporting information for this report.

⁴⁰ The Task Force used the Bloomberg terminal to identify over 26,000 public companies in the six groups and Willis Towers Watson’s “[The World’s 500 Largest Asset Managers](#)” and “[The World’s 300 Largest Pension Funds](#)” to identify several asset managers and asset owners.

⁴¹ Because the disclosure practices review focused on companies more likely to disclose climate-related information, the Task Force needed a simple methodology for identifying such companies. Therefore, companies that used the term “climate change” in their financial filings were selected for review. The Task Force recognizes this approach may not have captured all examples of climate-related financial disclosure.

⁴² For asset managers and asset owners, the Task Force reviewed a broader set of reports for the term “climate change” (annual reports, sustainability reports, financial filings, or other public reports).

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recommended that companies provide climate-related financial disclosures in their public annual financial filings (or other publicly available corporate reporting). However, the Task Force recognized comparable reporting by asset managers and asset owners to their clients and beneficiaries, respectively, would usually occur in other types of financial reporting and may not be publicly available. As a result, the Task Force decided to exclude asset managers and asset owners from the AI review given the lack of a consistent set of public reports in the two industries.

To provide some insight on climate-related financial disclosures by asset managers and asset owners to their clients and beneficiaries, respectively, the Task Force included them in the disclosure practices review. The Task Force recognizes that, in many cases, the publicly available reports reviewed for the two industries are simply a proxy and may differ from what is provided to clients and beneficiaries on a confidential basis.

2. Documents Reviewed

The Task Force focused primarily on companies' fiscal year 2017 financial filings, most of which were released after the publication of the 2017 report, and fiscal year 2017 annual and sustainability reports. Reports for fiscal year 2016 were included if fiscal year 2017 reports were not available at the time of review. In addition, integrated reports, documents incorporated by reference in financial filings, and other relevant documents were also reviewed. The Task Force only selected documents available in English.

- **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.
- **Sustainability Reports** (including Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG) reports): Reports that describe companies' impact on society, often addressing environmental, social, and governance issues.
- **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).
- **Documents Incorporated by Reference and Other Relevant Documents:** Documents formally incorporated into financial filings that contain required information, such as proxy statements in the U.S., other documents mentioned in a company's financial filings or annual reports (e.g., climate-specific or scenario analysis reports), and publicly available reports issued on an annual or periodic basis by asset managers or asset owners.

3. Review Methodology

To develop *baseline* information on the alignment of climate-related financial disclosures with the Task Force's 11 recommended disclosures (Figure 2, p. 2), the Task Force narrowed down each recommended disclosure to a single yes-no question (Figure 61, p. 78). For example, recommended disclosure a) under the Governance recommendation (*Governance a*) asks companies to describe the board's oversight of climate-related risks and opportunities. The yes-no question for *Governance a*, Question 1, asked reviewers whether the company describes the board's or a board committee's oversight of climate-related risks or opportunities. If the reviewer determined the answer was "yes," the Task Force considered the company to have disclosure(s) aligned with *Governance a*). Importantly, this approach was **not** designed to assess the quality or comprehensiveness of companies' climate-related financial disclosures, but rather to provide an indication of the alignment of existing disclosures with the 11 recommended disclosures.

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Figure 61

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

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Disclosure Practices Review

The Task Force formed a small group to review publicly available reports of 200 large companies—25 from each of the eight groups—to determine whether those reports included information aligned with one or more of the Task Force's 11 recommended disclosures and gather additional information on climate-related financial disclosure practices. The sample of 200 companies was intentionally biased toward companies more likely to disclose information on climate change. This was done so the Task Force could (1) provide insight on current climate-related financial disclosure practices of large companies and (2) identify a robust set of disclosure examples aligned with the recommended disclosures to train the models used in the AI review.⁴³

Artificial Intelligence Review

The Task Force used AI technology to perform an automated review of several hundred companies' public reports. The AI technology was based on a set of statistical language models that were designed to answer the 11 yes-no questions tied to the recommended disclosures for companies in the four non-financial groups and for banks and insurance companies. The development of the AI review approach consisted of four steps, as described below.

⁴³ Because the AI review did not include asset managers and asset owners, disclosure examples for 150 companies (six groups with 25 companies each) were used to train the AI models.

Digitized Relevant Reports

To use the AI technology to review companies' reports, the reports first had to be "digitized" by running a program to extract text from each report. In some cases, the digitization program was not able to extract all relevant text. Companies with one or more reports that could not be digitized were removed from the review population. Ultimately, nearly 3,000 reports associated with 1,734 companies were processed, yielding over 7.9 million passages of text for review.

Trained AI Models to Identify Climate-Related Financial Disclosures

The statistical language models underlying the AI technology were trained using "labeled data," which was developed from the passages of text or excerpts identified as aligning with the 11 yes-no review questions during the disclosure practices review. After the initial training, the models were calibrated to account for potential biases between the labeled data from the 150 large companies and the larger AI review population of 1,734.

Validated the AI Results

The AI technology allocated each excerpt with a likelihood that it aligned with the recommended disclosures. Those excerpts were then categorized as either positive or negative results depending on whether the likelihood of alignment was over or under a specific confidence level for a given recommended disclosure. In addition, human reviewers performed a validation exercise on a sample of 480 excerpts that were randomly drawn from excerpts that were identified as either positive results or negative results that were borderline cases. The validation results, shown in Figure 62, were then used to adjust the confidence level necessary to judge an excerpt as aligning with a recommended disclosure and to refine further the AI models.

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Figure 62

AI Validation Results

Recommended Disclosure	Validation results (a)	Expected results (b)
Governance a	60%	77%
Governance b	53%	74%
Strategy a	87%	69%
Strategy b	55%	79%
Strategy c	10%	50%
Risk Management a	37%	70%
Risk Management b	57%	65%
Risk Management c	53%	68%
Metrics and Targets a	73%	80%
Metrics and Targets b	83%	76%
Metrics and Targets c	87%	82%

(a) The validation results are the true positive rates for the sample of excerpts identified as aligning with each of the recommended disclosures (i.e., the proportion of excerpts that the human reviewers agreed with AI sample).

(b) Each passage of text is attributed with a likelihood of being a positive result through the AI review. The higher the likelihood, the more confident that an excerpt aligns with a recommended disclosure. The expected results are the average of the likelihoods across the sample of excerpts and hence the proportion that would be expected to be returned as true positives.

Overall, the validation results were consistent with the expected results. However, the outputs from the models were typically "over confident" that an excerpt aligned with a recommended disclosure. In addition, the model for recommended disclosure *Strategy c* performed very poorly. For this disclosure, very few excerpts were identified through the disclosure practices review and available to train the AI model. Results for this disclosure are, therefore, unreliable.

Applied AI Models to Review Population

Finally, the revised AI models were applied to all excerpts from the reports of the 1,734 companies, and the results were aggregated for analysis by the 11 recommended disclosures, the six groups, the reports in which relevant excerpts were found, and by the regions in which the companies were located.

Appendix 3: Glossary and Abbreviations

Glossary

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.”⁴⁴

CLIMATE-RELATED OPPORTUNITY refers to the potential positive impacts related to climate change on a company or organization. Efforts to mitigate and adapt to climate change can produce opportunities for companies, such as through resource efficiency and cost savings, the adoption and utilization of low-emission energy sources, the development of new products and services, and building resilience along the supply chain. Climate-related opportunities will vary depending on the region, market, and industry in which an organization operates.

CLIMATE-RELATED RISK refers to the potential negative impacts of climate change on a company or organization. Physical risks emanating from climate change can be event-driven (acute) such as increased severity of extreme weather events (e.g., cyclones, droughts, floods, and fires). They can also relate to longer-term shifts (chronic) in precipitation and temperature and increased variability in weather patterns (e.g., sea level rise). Climate-related risks can also be associated with the transition to a lower-carbon global economy, the most common of which relate to policy and legal actions, technology changes, market responses, and reputational considerations.

DECARBONIZATION refers to a decrease in the “average carbon intensity of primary energy over time.”⁴⁵

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.⁴⁶

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 1-5 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 3-5 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.”⁴⁷ “Governance involves a set of relationships between an organization’s management, its board, its shareholders, and other stakeholders.

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⁴⁴ OECD, *G20/OECD Principles of Corporate Governance*, OECD Publishing, Paris, 2015.

⁴⁵ IPCC, “3.4.1.1 Decarbonization trends,” *Climate Change 2007: Working Group III: Mitigation of Climate Change*, 2007.

⁴⁶ Based on Climate Disclosure Standards Board, “*CDSB Framework for Reporting Environmental Information, Natural Capital and Associated Business Impacts*,” April 2018.

⁴⁷ A. Cadbury, *Report of the Committee on the Financial Aspects of Corporate Governance*, London, 1992.

Governance provides the structure and processes through which the objectives of the organization are set, progress against performance is monitored, and results are evaluated.”⁴⁸

GREENHOUSE GAS (GHG) EMISSIONS SCOPE LEVELS⁴⁹

- **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.⁵⁰

MANAGEMENT refers to those positions a company or organization views as executive or senior management positions and that are generally separate from the board.

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 develop an understanding of how the physical and transition risks of climate change may impact its businesses, strategies, and financial performance over time.

SCIENCE BASED TARGETS are targets adopted by companies to reduce greenhouse gas emissions that are in line with the level of decarbonization required to keep global temperature increase below 2°C compared to pre-industrial temperatures.⁵¹

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, taking into account 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.

VALUE AT RISK measures the loss a portfolio may experience within a given time horizon and at a particular probability.

VALUE CHAIN refers to the upstream and downstream life cycle of a product, process, or service, including material sourcing, production, consumption, and disposal/recycling. Upstream activities

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⁴⁸ OECD, *G20/OECD Principles of Corporate Governance*, OECD Publishing, Paris, 2015.

⁴⁹ World Resources Institute and World Business Council for Sustainable Development, *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)*, March 2004.

⁵⁰ IPCC, *Climate Change 2014 Mitigation of Climate Change*, Cambridge University Press, 2014.

⁵¹ Science-Based Targets Initiative, “What is a science-based target.”

include operations that relate to the initial stages of producing a good or service (e.g., material sourcing, material processing, supplier activities). Downstream activities include operations that relate to processing the materials into a finished product and delivering it to the end user (e.g., transportation, distribution, and consumption).

Abbreviations

2°C —2° Celsius	ICMM —International Council on Mining and Metals
3°C —3° Celsius	IEA —International Energy Agency
4°C —4° Celsius	IGCC —Investor Group on Climate Change
AI —Artificial Intelligence	IIF —Institute for International Finance
AIGCC —Asia Investor Group on Climate Change	IIGCC —Institutional Investors Group for Climate Change
ANZ —Australia New Zealand Bank	IIRC —International Integrated Reporting Council
CDSB —Climate Disclosure Standards Board	IPCC —Intergovernmental Panel on Climate Change
CEO —Chief Executive Officer	kg —Kilogram
CFO —Chief Financial Officer	METI —Ministry of Economy, Trade, and Industry (Japan)
CO₂ —Carbon Dioxide	MOE —Ministry of the Environment (Japan)
CO_{2e} —Carbon Dioxide Equivalent	OECD —Organization for Economic Co-operation and Development
CRD —Corporate Reporting Dialogue	PRI —Principles for Responsible Investment
CSR —Corporate Social Responsibility	R&D —Research and Development
EBRD —European Bank for Reconstruction and Development	SASB —Sustainability Accounting Standards Board
ESG —Environmental, Social, and Governance	TCFD —Task Force on Climate-related Financial Disclosures
FAIRR —Farm Animal Investment Risk and Return	UN SDGs —United Nations Sustainable Development Goals
FSA —Financial Services Agency (Japan)	UNEP FI —United Nations Environment Programme Financial Initiative
G20 —Group of 20	WBCSD —World Business Council for Sustainable Development
GHG —Greenhouse Gas	WEF —World Economic Forum
GRI —Global Reporting Initiative	

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