

2019 Status Report

Task Force on Climate-related Financial Disclosures: Status Report

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Dear Chair Quarles,

It is my pleasure to present the second status report of the Task Force on Climate-related Financial Disclosures (TCFD). This report focuses on the continued progress of companies in disclosing information on climate-related risks and opportunities since the release of the final TCFD recommendations in June 2017.

Increasingly, we see evidence and acknowledgement that climate change presents financial risk to the global economy. According to the United Nations, delays in tackling this issue could cost companies nearly \$1.2 trillion over the next 15 years.

The relevance of climate-related risks to today's financial decisions and the need for greater transparency have only become clearer and more urgent over the past two years. Nearly 800 public- and private-sector organizations have announced their support for the TCFD and its work, including global financial firms responsible for assets in excess of \$118 trillion.

I applaud the recent acknowledgement from the Network for Greening the Financial System (NGFS), a group of 36 central banks and supervisors, that "climate-related risks are a source of financial risk [and it] falls squarely within the mandates of central banks and supervisors to ensure the financial system is resilient to these risks." As one of their six key recommendations to foster a resilient financial system, the NGFS highlighted the importance of disclosure and encouraged companies to disclose in line with the TCFD recommendations.

In this report, the Task Force finds that important progress is being made. Our review of over 1,000 companies showed that, for some recommended disclosures, the percentage of companies disclosing information increased up to nearly 15% over a two-year period. The results of our survey indicate that many companies are putting significant thought and effort into implementing the recommendations, and that many investors have seen this work pay off in the form of increases in the availability and quality of disclosure.

However, progress must be accelerated. Today's disclosures remain far from the scale the markets need to channel investment to sustainable and resilient solutions, opportunities, and business models. I believe in the power of transparency to spur action on climate change through market forces.

The Task Force remains committed to market transparency and stability. Over the next year we look forward to continuing to encourage and facilitate implementation of the TCFD recommendations, to making further progress on this critical work, and to providing you with a third status report next year. Thank you for your support of the Task Force.

Sincerely,



Michael 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 and other organizations to develop more effective climate-related financial disclosures through their existing reporting processes.¹ In its 2017 report, the Task Force emphasized the importance of transparency in pricing risk—including risk related to climate change—to support informed, efficient capital-allocation decisions.² The large-scale and complex nature of climate change makes it uniquely challenging, especially in the context of economic decision making. Furthermore, many companies incorrectly view the implications of climate change to be relevant only in the long term and, therefore, not necessarily relevant to decisions made today. Those views, however, have begun to change.³

A Call to Action

Based on a recent report issued by the Intergovernmental Panel on Climate Change, a global group of climate scientists convened by the United Nations, urgent and unprecedented changes are needed to meet the goals of the Paris Agreement.^{4,5} The report warns limiting the global average temperature to a maximum of 1.5°C “require[s] rapid and far-reaching transitions in energy, land, urban and infrastructure [systems] (including transport and buildings), and industrial systems.” In fact, according to a recent United Nations Environment Programme report on emissions, global greenhouse gas emissions have to peak by 2020 and decline rapidly thereafter to limit the increase in the global average temperature to no more than 1.5°C above pre-industrial levels.⁶ However, based on current policies and commitments, “global emissions are not even estimated to peak by 2030—let alone by 2020.” As a result, governments and private-sector entities are considering a range of options for reducing global emissions, which could result in disruptive changes across economic sectors and regions in the near term.

Limiting the global average temperature requires “rapid and far-reaching transitions in land, energy, industry, buildings, transport, and cities.”⁷

Figure E1 (p. iii) illustrates the level of impact and risk on people, economies, and ecosystems associated with global average temperature increases. Importantly, four of the five categories of risk have increased since 2014 “based on multiple lines of evidence.”⁸ Now more than ever it is critical for companies to consider the impact of climate change and associated mitigation and adaptation efforts on their strategies and operations and disclose related material information. Companies that invest in activities that may not be viable in the longer term may be less resilient to risks related to climate change; and their investors may experience lower financial returns.

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

² 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 For example, rising global average temperatures are increasing the frequency and severity of extreme weather events, with combined insured losses related to natural catastrophes of \$219 billion in 2017 and 2018, the highest ever for a two-year period (Swiss Re Institute, *Natural catastrophes and man-made disasters in 2018: “secondary” perils on the frontline*, April 10, 2019.).

⁴ Intergovernmental Panel on Climate Change, *Summary for Policymakers: Global Warming of 1.5°C.*, October 2018.

⁵ United Nations Framework Convention on Climate Change, “*The Paris Agreement*,” December 2015. Under the Paris Agreement, nearly 200 governments have agreed to strengthen the response to the threat of climate change by “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.”

⁶ United Nations Environment Programme, *The Emissions Gap Report 2018*, November 2018.

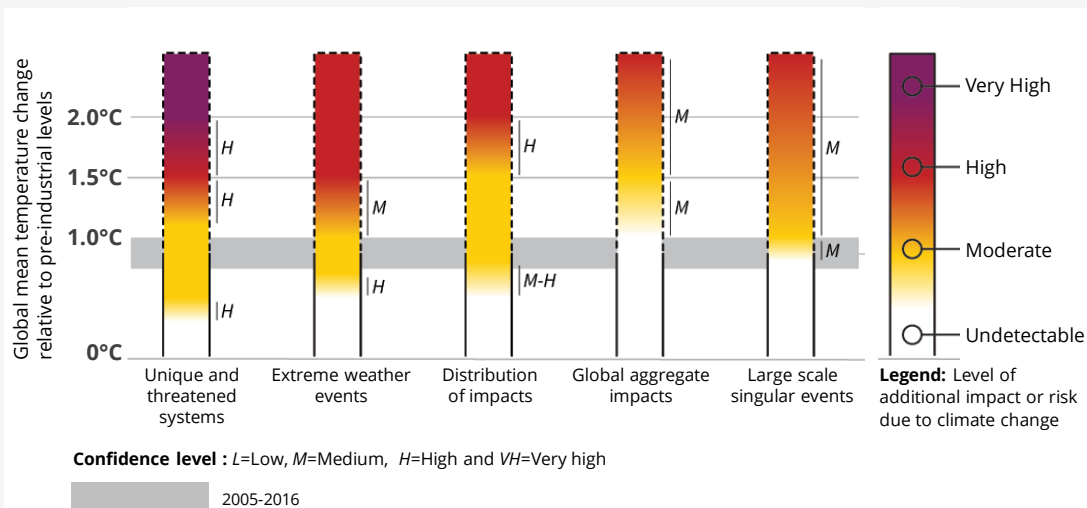
⁷ Intergovernmental Panel on Climate Change, “*Press Release: Summary for Policymakers: Global Warming of 1.5°C*,” October 8, 2018.

⁸ Ibid and Intergovernmental Panel on Climate Change, *Fifth Assessment Report*, Cambridge University Press, 2014.

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, investors need better information on how companies—across a wide range of sectors—have prepared or are preparing for a lower-carbon economy; and those companies that meet this need may have a competitive advantage over others.

Figure E1

Level of Impact and Risk Associated with Temperature Increases



See Intergovernmental Panel on Climate Change, [Summary for Policymakers: Global Warming of 1.5°C](#) for more information, including definitions of terms used.

In addition, there is a growing demand for decision-useful, climate-related financial information by investors. There are likely many factors driving investor demand, ranging from European regulations requiring certain investors to disclose climate-related information to weather-driven events resulting in significant financial impacts and leading investors to seek better information on their exposure to climate-related risks.⁹ As evidence of this demand, more than 340 investors with nearly \$34 trillion in assets under management have committed to engage the world's largest corporate greenhouse gas emitters to strengthen their climate-related disclosures by implementing the TCFD recommendations as part of Climate Action 100+.¹⁰

There is also growing interest in climate-related financial disclosures by financial regulators. In April, the Network for Greening the Financial System (NGFS)—comprised of 36 central banks and supervisors and six observers, representing five continents—issued six recommendations aimed at facilitating the role of the financial sector in achieving the objectives of the Paris Agreement. One of the recommendations is to achieve robust and internationally consistent climate and environment-related disclosure; and the NGFS "encourages all companies issuing public debt or equity as well as financial sector institutions to disclose in line with the TCFD recommendations."¹¹

⁹ For example, see France's [Article 173-VI of the Law on Energy Transition for Green Growth](#), [EU Directive on the activities and supervision of institutions for occupational retirement provision](#), and the United Kingdom's [Clarifying and strengthening trustees' investment duties](#).

¹⁰ See [Climate Action 100+](#).

¹¹ NGFS, [A call for action: Climate change as a source of financial risk](#), April 17, 2019.

Climate-Related Financial Disclosure Practices

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 as they relate to the Task Force’s recommendations, highlight key challenges associated with implementing the recommendations, and outline some of the efforts the Task Force will consider undertaking in coming months to help address some of the implementation challenges.

To better understand current climate-related financial disclosure practices and how they have evolved, the Task Force reviewed—using artificial intelligence technology—reports for over 1,000 large companies in multiple sectors and regions over a three-year period. In addition, the Task Force conducted a survey on companies’ efforts to implement the TCFD recommendations as well as users’ views on the usefulness of climate-related financial disclosures for decision-making. While the Task Force found some of the results of its disclosure review and survey encouraging, it is concerned that not enough companies are disclosing *decision-useful* climate-related financial information. This could be problematic for financial markets if market participants do not have sufficient information about the potential financial impact of climate-related issues on companies. [Table E1](#) summarizes the key themes and findings from the Task Force’s disclosure review and survey results.

Table E1

Key Themes and Findings

	Disclosure of climate-related financial information has increased since 2016, but is still insufficient for investors. Based on the TCFD survey, the artificial intelligence review, and input from external initiatives, the Task Force sees progress being made to improve the availability and quality of climate-related financial information. However, given the speed at which changes are needed to limit the rise in the global average temperature—across a wide range of sectors—more companies need to consider the potential impact of climate change and disclose material findings.
	More clarity is needed on the potential financial impact of climate-related issues on companies. The top area identified by users of climate-related financial disclosures as needing improvement is for companies to provide more clarity on the potential financial impact of climate-related issues on their businesses. Without such information, users may not have the information they need to make informed financial decisions.
	Of companies using scenarios, the majority do not disclose information on the resilience of their strategies. Three out of five companies responding to the TCFD survey that view climate-related risk as material and use scenario analysis to assess the resilience of their strategies do <i>not</i> disclose information on the resilience of their strategies. This is an important gap in disclosure for companies with material climate-related risks, but it is consistent with the Task Force’s understanding from discussions with various companies, industry associations, and other groups that companies are still early in the process of using climate-related scenarios internally, evolving their approaches, and learning how to integrate scenarios into corporate strategy formulation processes.
	Mainstreaming climate-related issues requires the involvement of multiple functions. While sustainability and corporate responsibility functions are the primary drivers of TCFD implementation efforts, risk management, finance, and executive management are increasingly involved as well. The Task Force believes involvement of multiple functions is critical to mainstreaming climate-related issues, especially the involvement of the risk management and finance functions.

In addition, [Figure E2](#) (p. vi) provides a summary of additional themes and findings from this report, and [Section A.2. Purpose of Report](#) provides an overview of the report’s major sections.

Overall, the Task Force found signs of progress in implementing the recommendations among companies traditionally engaged on climate-related issues. These companies demonstrate that disclosing climate-related information consistent with the TCFD recommendations is possible and is a journey of continuing improvement. Given the urgent and unprecedented changes needed to meet the goals of the Paris Agreement, the Task Force is concerned that not enough companies are disclosing information about their climate-related risks and opportunities.

The Task Force strongly encourages more companies to use its recommendations as a framework for reporting on climate-related risks and opportunities, 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.¹² To accelerate the disclosure of consistent, comparable, reliable, and clear climate-related financial information, the Task Force encourages investors and other users of such information to engage with companies on the specific types of information that are most useful for decision making.

The Task Force has often highlighted that implementation of its recommendations would be a journey, and it applauds those who have started down the path. The Task Force urges those companies to continually improve the quality and usefulness of their climate-related financial disclosures. For those companies that are “piloting” reporting internally, it is time to begin disclosing; and for those who have not started, now is the time.

Next Steps

The Task Force believes its climate-related financial disclosures review and survey results highlight the need for continued efforts to support implementation of the recommendations, especially in terms of companies using scenario analysis to assess the resilience of their strategies under a range of plausible future climate states. As such, over the next several months, the Task Force will continue to promote and monitor adoption of its recommendations and will prepare another status report for the Financial Stability Board in September 2020. In addition, the Task Force is considering additional work in the following areas:

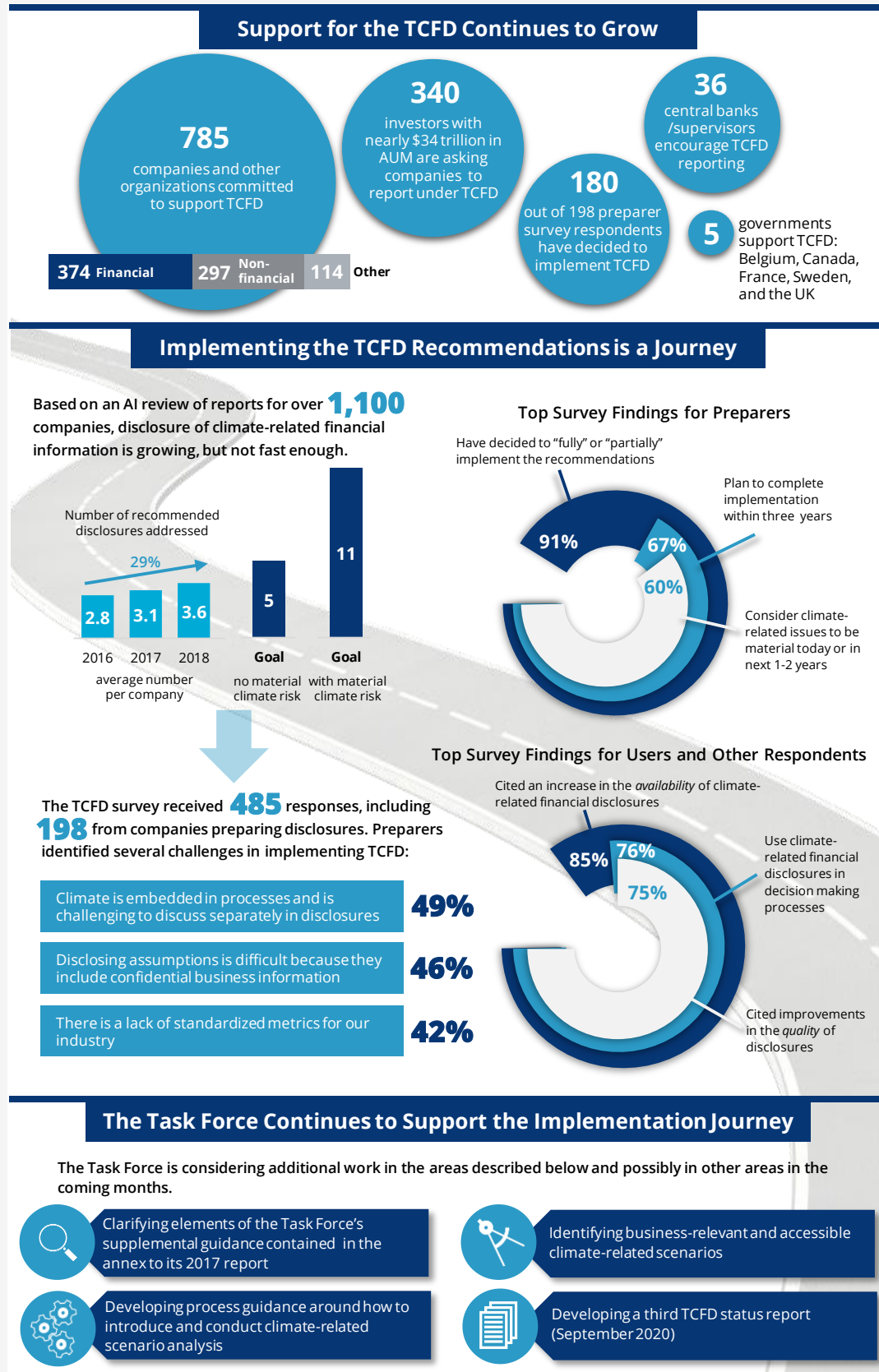
- Clarifying elements of the Task Force’s supplemental guidance contained in the annex to its 2017 report ([Implementing the Recommendations of the TCFD](#)),
- Developing process guidance around how to introduce and conduct climate-related scenario analysis, and
- Identifying business-relevant and accessible climate-related scenarios.

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 and contributing to a more orderly transition to a low-carbon economy.

¹² 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.

Figure E2

2019 TCFD Status Report: Additional Themes and Findings



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A Introduction

A Introduction

1. Background on the Task Force

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.¹³ 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. 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).¹⁴ 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 29-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.

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 industries 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.

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 11 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).

Figure 1

Key Features of Recommendations

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

¹³ “Communiqué from the G20 Finance Ministers and Central Bank Governors Meeting in Washington, D.C. April 16-17, 2015,” April 2015.

¹⁴ FSB, “FSB to establish Task Force on Climate-related Financial Disclosures,” December 4, 2015.

Figure 2

Recommendations and Supporting Recommended Disclosures

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

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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.¹⁵ 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.

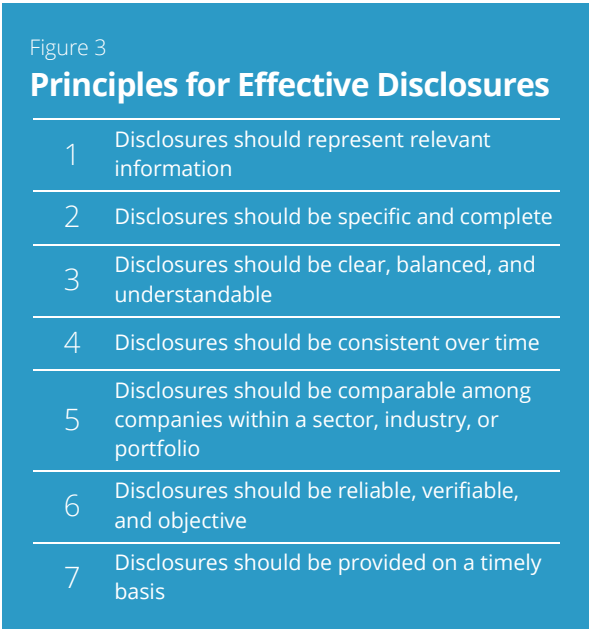
The Task Force recognizes reporting by asset managers and asset owners is intended to satisfy the needs of clients, beneficiaries, regulators, and oversight bodies and follows a format that is generally different from corporate financial reporting. For purposes of adopting the Task Force’s recommendations, 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.

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.

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.



¹⁵ 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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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.¹⁶ As part of its efforts to promote and monitor adoption of the recommendations, the Task Force prepared a [status report](#) for the FSB, published on September 26, 2018. In its [press release](#) announcing the 2018 status report, the FSB noted that it asked the Task Force to publish a further status report in June 2019 to allow for analysis of disclosures made in 2018 financial reports. This report—the Task Force’s 2019 status report—provides (1) an overview of disclosure practices that are aligned with the Task Force’s recommendations over a three-year period, (2) information on the adoption and use of the TCFD recommendations, and (3) other information to support preparers in implementing the recommendations.

The remainder of this report is organized as follows:

- **State of Climate-Related Financial Disclosures.** This section provides an overview of the current state of climate-related financial disclosures in terms of their alignment with the TCFD recommendations across different industries and highlights how such disclosures have changed over a three-year period. It also includes examples of disclosures that provide information aligned to one or more of the 11 recommended disclosures.
- **Adoption and Use of the TCFD Recommendations.** This section summarizes the results of a survey on companies’ efforts to implement the TCFD recommendations as well as users’ views on the usefulness of available climate-related financial disclosures for financial decision-making.
- **Disclosure of Strategy Resilience Using Scenario Analysis.** This section highlights the use of scenario analysis by companies for assessing the resilience of their strategies as well as trends and potential challenges facing companies in disclosing information about the resiliency of their strategies to a range of climate-related scenarios.
- **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.
- **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.

¹⁶ FSB, “FSB assesses implementation progress and effects of reforms,” February 28, 2017.

B State of Climate- Related Financial Disclosures

B State of Climate-Related Financial Disclosures

The TCFD received feedback that the baseline information on climate-related financial disclosures in its 2018 status report was helpful for companies implementing the TCFD recommendations. In addition, users, preparers, and others have expressed interest in understanding changes in climate-related financial disclosures over time, particularly as many companies have now had a full reporting cycle to implement the TCFD recommendations since their release in June 2017. Therefore, the Task Force undertook a second review of companies' reports for climate-related financial information using artificial intelligence (AI) technology.¹⁷ To better assess the current state and evolution of climate-related financial disclosures, the Task Force reviewed the reports of over 1,100 companies for three years: 2016, 2017, and 2018.

In addition, a small group of Task Force members selected examples of disclosure that provide information aligned to one or more of the 11 recommended disclosures. The Task Force tried to include examples from a geographically diverse set of companies and to cover all 11 recommended disclosures. The examples included are not intended to represent "best practice" nor demonstrate disclosures that fully meet the associated recommended disclosure.¹⁸ Instead, the examples are provided because they may help companies generate ideas for their own disclosures.

1. Scope and Approach

This section provides a brief summary of the scope and approach used to assess the alignment of 2016, 2017, and 2018 reporting with the Task Force's 11 recommended disclosures. More information on the Task Force's methodology is provided in [Appendix 2: Disclosure Selection and Review Methodology](#).

The Task Force reviewed financial filings, annual reports, integrated reports, and sustainability reports of over 1,100 companies from 142 countries in eight industries ([Figure 4](#)).¹⁹ Six of the eight industries align with groups highlighted in the Task Force's 2017 report: Banking, Insurance, Energy, Materials and Buildings, Transportation, and Agriculture, Food, and Forest Products. To incorporate additional companies that may be exposed to climate-related risks, two additional industries were added to the review—Technology and Media and Consumer Goods. The scope of the review was also broadened to include multiple years of reporting rather than the approach taken in the Task Force's 2018 status report in which only the most recently available disclosures were assessed.²⁰

The Task Force identified an initial review population of over 2,500 companies spread across the eight industries. Companies that did not have annual reports available for review in all three years were removed from the population to

Figure 4

AI Review Population Size

Industry	Number
Banking	104
Insurance	147
Energy	128
Materials and Buildings	213
Transportation	223
Agriculture, Food, and Forest Products	166
Technology and Media	63
Consumer Goods	82
Total	1,126

¹⁷ The Task Force gratefully acknowledges the work of PwC and the efforts led by Richard Berriman, Joaee Chew, Anna Nicholas, and Will Barnsley from PwC in developing, refining, and providing results from the AI technology review.

¹⁸ 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.

¹⁹ The Task Force used revenue to identify the largest public companies in non-financial industries and total assets for banks and insurance companies.

²⁰ The industries and companies reviewed in the 2019 status report are different than those reviewed in the 2018 status report, therefore, results for 2018 and 2019 are not directly comparable.

ensure a consistent population of companies and comparable reporting across all three years. Because the Task Force was asked to deliver the 2019 status report by early June 2019, not all 2018 annual reports were available at the time of review. This significantly reduced the number of companies from the initial population that could be included in the AI review. Companies were also removed from the initial population if they did not have annual reports available in English in all three years, which further reduced the number of companies included in the AI review. This approach resulted in a final review population of 1,126 companies.

Similar to the approach used to review climate-related financial disclosures for the 2018 status report, the Task Force again used AI technology to review companies' reports. The AI technology was used to review nearly 8,000 reports from the 1,126 companies and determine whether the reports included information that appeared to align with one or more of the Task Force's 11 recommended disclosures. Importantly, this approach was **not** designed to assess the quality of companies' climate-related financial disclosures, but rather to provide an indication of the alignment of existing disclosures with the Task Force's 11 recommended disclosures.²¹

Also consistent with the approach used in developing the 2018 status report, asset managers and asset owners were excluded from the AI review because, in many cases, the types of reports needed for analysis are not publicly available. However, because asset managers and asset owners play an important role in the investment chain, the Task Force reviewed the aggregate responses of 349 asset managers and 131 asset owners to the United Nations Principles of Responsible Investment (UN PRI) 2018 signatory assessment. The results of this review are described in [Section B.4. TCFD-Aligned Reporting by Asset Managers and Asset Owners](#).

2. Key Takeaways

This section summarizes the overall results and takeaways from the Task Force's AI review of companies' 2016, 2017, and 2018 reports for alignment with the Task Force's 11 recommended disclosures.

Many companies disclose some climate-related information, but more progress is needed.

Overall, the AI review results indicate that while climate-related financial disclosure has increased since 2016, only around 25% of companies disclosed information aligned with more than five of the 11 recommended disclosures and only 4% of companies disclosed information aligned with at least 10 of the recommended disclosures. As described in the [Executive Summary](#), given the speed at which changes are needed to limit the rise in the global average temperature—across a wide range of sectors—more companies need to consider the potential impact of climate change on their businesses, strategy, and financial planning and disclose material findings.

The percentage of companies disclosing climate-related information has increased, but overall is low. The AI review of available reports found that the percentage of companies disclosing information aligned with the TCFD recommendations increased between 2016 and 2018 for all of the 11 recommended disclosures. [Figure 5](#) (p. 8) shows the overall review results for each TCFD recommended disclosure.

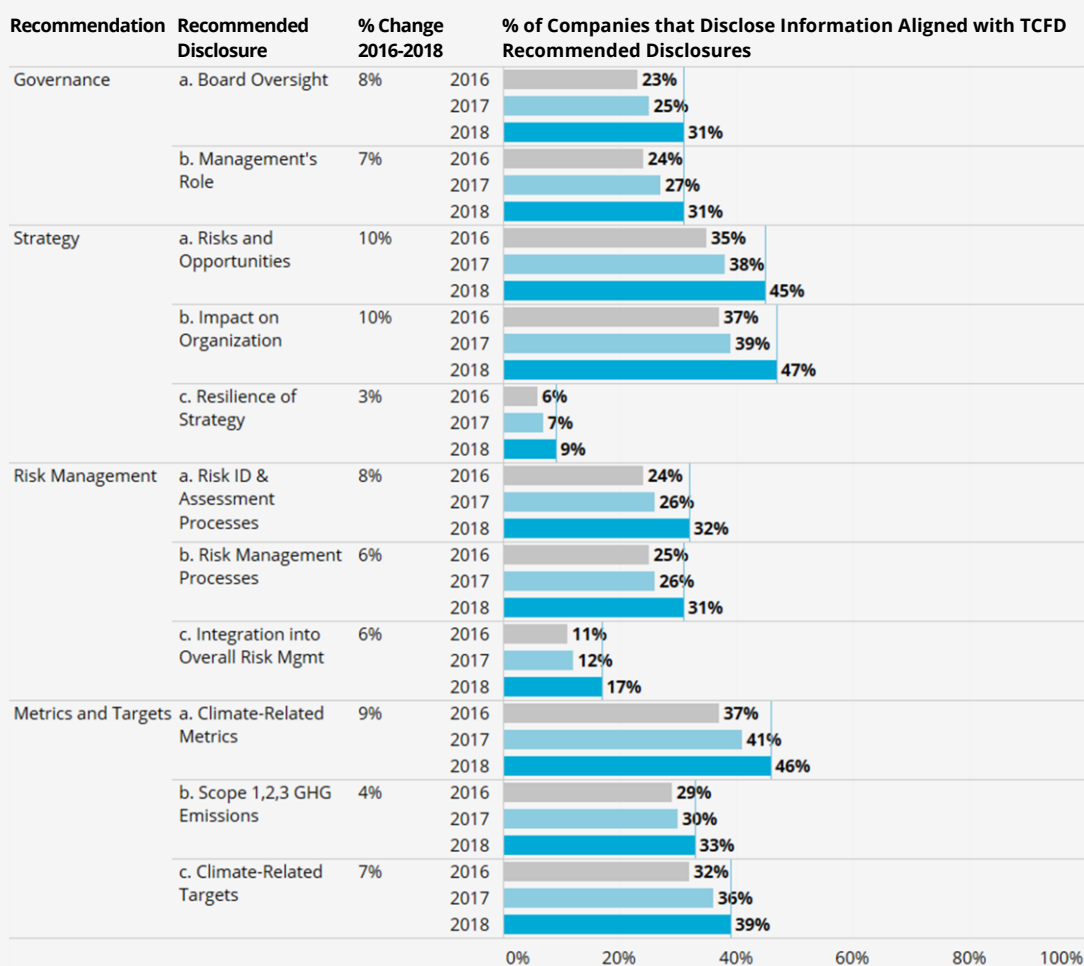
The greatest increase in the percentage of companies disclosing relevant information from 2016 to 2018—10%—was found for disclosure of climate-related risks and opportunities (*Strategy a*) and the impact of climate-related risks and opportunities on the company's businesses, strategy, and financial planning (*Strategy b*). However, the percentage of companies disclosing information on the resilience of their strategies, taking into consideration different climate-related scenarios, including a 2°C or lower scenario (*Strategy c*) increased only 3% over the same time period.

²¹ It is important to recognize the confidence of the AI technology in identifying disclosures that align with the Task Force's 11 recommended disclosures varies for each recommended disclosure, as described in [Appendix 2: Disclosure Selection and Review Methodology](#).

Importantly, the percentage of disclosure is not greater than 50% for any recommended disclosure, even those related to governance and risk management, which the Task Force recommends all companies disclose. In fact, the recommended disclosures related to governance and risk management have the lowest percentages of disclosure with the exception of *Strategy c*. As part of the 2018 TCFD survey, some preparers noted challenges disclosing information related to these recommendations because climate-related issues are integrated into company-wide governance and risk management processes, making separate disclosure unnecessary. See [Section C. Adoption and Use of the TCFD Recommendations](#) for more information.

Figure 5

TCFD-Aligned Disclosures by Year



Legend: | Percentage of companies that disclosed information aligned with TCFD recommended disclosures in 2018

The average number of recommended disclosures per company has increased. The AI review found the average number of the 11 recommended disclosures addressed by companies in their public reports grew each year between 2016 and 2018, from 2.8 in 2016, to 3.1 in 2017, and to 3.6 in 2018, as shown in [Figure 6](#). Similarly, in 2016, 70% of companies in the review population disclosed information aligned with at least one of the Task Force's recommendations, and that number grew to 78% in 2018.

Figure 6

Recommended Disclosures per Company

Year	Average Number Disclosed
2016	2.8
2017	3.1
2018	3.6

Disclosures are made in multiple reports. Companies disclosed information aligned with the TCFD recommendations in multiple types of reports (e.g., financial filings, annual reports, integrated reports, and sustainability reports), which is consistent with the Task Force’s findings in its 2018 status report. The AI review found that, on average, information aligned with the recommended disclosures was more likely to be disclosed in sustainability reports than in financial filings or annual reports. However, between 2016 and 2018, information aligned with the recommended disclosures included in financial filings or annual reports increased by almost 50% compared to an increase of about 30% in sustainability reports.

Disclosure increases with company size. The Task Force divided the AI review population into three categories to assess results by company size: those with less than \$4 billion in annual revenue, those with \$4 billion to \$10 billion in annual revenue, and those with more than \$10 billion in annual revenue. The results of the assessment by company size for 2016, 2017, and 2018 (Figure 7) are consistent with the Task Force’s 2018 disclosure review—that the percentage of companies disclosing information in alignment with the TCFD recommendations tends to increase with company size. For each recommended disclosure, the percentage of companies disclosing relevant information in 2018 grew as the category of company size increased.

Figure 7

Disclosure by Company Size: 2018 Reporting

Recommendation	Recommended Disclosure	<\$4B Annual Revenue (620)	\$4-10B Annual Revenue (184)	>\$10B Annual Revenue (322)
Governance	a. Board Oversight	19%	27%	34%
	b. Management’s Role	18%	32%	43%
Strategy	a. Risks and Opportunities	31%	45%	56%
	b. Impact on Organization	30%	53%	65%
	c. Resilience of Strategy	3%	7%	14%
Risk Management	a. Risk ID & Assessment Processes	17%	33%	42%
	b. Risk Management Processes	17%	34%	44%
	c. Integration into Overall Risk Management	9%	14%	19%
Metrics and Targets	a. Climate-Related Metrics	28%	47%	63%
	b. Scope 1,2,3 GHG Emissions	19%	38%	51%
	c. Climate-Related Targets	22%	48%	55%

The numbers in parentheses represent the size of the review population

Legend:  Low to high percentage of disclosure

Disclosure varies across regions. Companies in the AI review population were categorized into five regions—Asia Pacific, Europe, Middle East and Africa, North America, and South America—based on the location of their headquarters to consider potential regional differences. As shown in Figure 8 (p. 10), companies in Europe had relatively high percentages of disclosure of information aligned with the TCFD recommendations. The Asia Pacific, North American, and South American regions had broadly similar percentages of disclosure across the recommended disclosures, and all had lower percentages of disclosure than Europe. In addition, consistent with the overall results, *Strategy c* had the lowest percentage of disclosure in each region.

Figure 8

Disclosure by Region: 2018 Reporting

Recommendation	Recommended Disclosure	Asia Pacific (484)	Europe (363)	Middle East and Africa (83)	North America (163)	South America (33)
Governance	a. Board Oversight	23%	36%	26%	20%	17%
	b. Management's Role	27%	44%	22%	21%	13%
Strategy	a. Risks and Opportunities	29%	59%	24%	51%	39%
	b. Impact on Organization	44%	61%	23%	40%	41%
	c. Resilience of Strategy	5%	13%	3%	7%	4%
Risk Management	a. Risk ID & Assessment Processes	23%	45%	17%	26%	18%
	b. Risk Management Processes	22%	41%	16%	33%	32%
	c. Integration into Overall Risk Management	10%	24%	7%	8%	8%
Metrics and Targets	a. Climate-Related Metrics	39%	62%	18%	38%	36%
	b. Scope 1,2,3 GHG Emissions	25%	48%	13%	37%	33%
	c. Climate-Related Targets	32%	58%	17%	33%	34%

The numbers in parentheses represent the size of the review population

Legend:  Low to high percentage of disclosure

Disclosure of resilience of strategy and scenario analysis remains low. As shown in [Figure 5](#) (p. 8), the AI review found the lowest percentage of disclosure aligned with *Strategy c*, the resilience of the company's strategy taking into consideration different climate-related scenarios, in all three years reviewed. While the percentage of companies disclosing increased between 2016 and 2018, only 9% of companies in 2018 disclosed information on strategy resilience. It is important to note that using the AI technology to review *Strategy c* was particularly challenging because there were few disclosures available to train the technology. As noted in the responses to the 2018 TCFD survey, companies have found this recommended disclosure to be one of the most challenging to implement.

3. Climate-Related Financial Disclosures for Select Industries 2016-2018

This section summarizes the results of the AI review of 2016, 2017, and 2018 disclosures and provides examples of disclosure for each of the industries shown in [Figure 9](#). In comparing 2018 results across industries, the Banking industry generally had the highest percentages across the recommended disclosures. However, other industries had higher percentages for specific recommended disclosures, for example, Energy and Materials and Buildings had higher percentages of disclosure for *Strategy b*) by about 10%. Of the two new industries added to the review population, Consumer Goods had levels of disclosure that were higher than Technology and Media and nearly comparable to Energy and Materials and Buildings.

Figure 9

Disclosure by Industry: 2018 Reporting

		Banking (104)	Insurance (147)	Energy (128)	Materials & Buildings (213)
Recommendation	Recommended Disclosure				
Governance	a. Board Oversight	48%	29%	38%	37%
	b. Management's Role	54%	35%	32%	35%
Strategy	a. Risks and Opportunities	51%	39%	57%	50%
	b. Impact on Organization	55%	26%	64%	65%
	c. Resilience of Strategy	20%	12%	13%	12%
Risk Management	a. Risk ID & Assessment Processes	52%	30%	38%	41%
	b. Risk Management Processes	46%	33%	42%	39%
	c. Integration into Overall Risk Management	32%	16%	21%	18%
Metrics and Targets	a. Climate-Related Metrics	51%	27%	49%	63%
	b. Scope 1,2,3 GHG Emissions	42%	22%	39%	41%
	c. Climate-Related Targets	50%	24%	45%	53%
		Transportation (223)	Ag., Food, & Forest (166)	Technology and Media (63)	Consumer Goods (82)
Recommendation	Recommended Disclosure				
Governance	a. Board Oversight	25%	22%	19%	29%
	b. Management's Role	18%	26%	17%	40%
Strategy	a. Risks and Opportunities	39%	40%	38%	50%
	b. Impact on Organization	34%	45%	25%	52%
	c. Resilience of Strategy	5%	4%	2%	6%
Risk Management	a. Risk ID & Assessment Processes	23%	24%	24%	22%
	b. Risk Management Processes	17%	26%	19%	23%
	c. Integration into Overall Risk Management	11%	9%	17%	21%
Metrics and Targets	a. Climate-Related Metrics	36%	45%	37%	55%
	b. Scope 1,2,3 GHG Emissions	29%	26%	29%	38%
	c. Climate-Related Targets	32%	30%	24%	51%

The numbers in parentheses represent the size of the review population

Legend:

Low to high percentage of disclosure

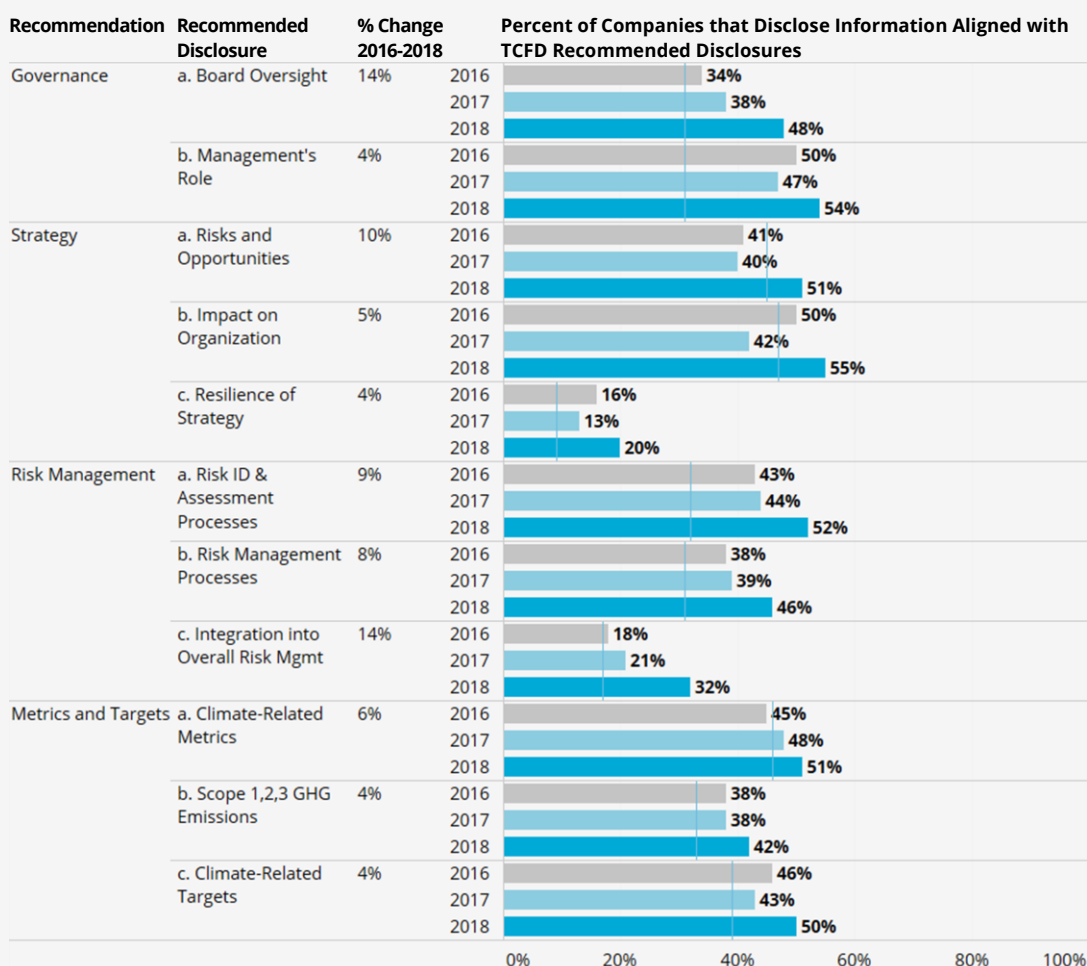
AI Review Summary

The AI technology reviewed disclosures from 104 banks in three sub-industries: regional banks; large, diversified banks; and investment and asset management firms. The 104 banks ranged in size from about \$4 trillion to \$8 billion in assets, with a median asset size of over \$200 billion in assets. The AI review results for banks are shown in Figure 10.

For nearly every recommended disclosure the percentage of banks disclosing relevant information was higher than the average across all companies reviewed. Banks' disclosure of information in alignment with the TCFD recommendations increased from 2016 to 2018 for all 11 recommended disclosures, although in 2017 there was a slight decrease in disclosure for three of the 11. There was a significant increase of 14% in disclosure of both *Governance a)* and *Risk Management c)* between 2016 and 2018, showing that banks are increasingly disclosing the board's oversight of climate-related issues and the integration of climate-related risks and opportunities into overall risk management processes. This trend is particularly notable as the results for *Risk Management c)* were some of the lowest in the overall results for all companies.

Figure 10

Banking Review Results by Year



Legend: | Percentage of total population that disclosed information aligned with TCFD recommended disclosures in 2018

Examples of Disclosure Aligned with TCFD Recommendations: Banking

Governance Recommendation

Governance a) asks companies to describe the board's oversight of climate-related risks and opportunities, and *Governance b)* asks companies to describe management's role in assessing and managing climate-related risks and opportunities. [Figure 11](#) provides a bank's description of the board's oversight and management's role in evaluating climate-related risks and opportunities.

Figure 11

Excerpt from Annual Report

Climate Change Risks

In February 2018, Scotiabank announced its support of the Financial Stability Board (FSB) Task Force on Climate-related Financial Disclosures (TCFD). This particular disclosure relates to the Bank's non-retail loan book. Additional disclosures relating to the non-retail loan book as well as other aspects of the Bank's operations will be included in the 2018 Corporate Social Responsibility Report.

Governance

Board Oversight

Climate Change risk and related disclosure is reviewed and discussed at several committees within the Board, including the Risk Committee and Audit and Conduct Review Committee, as well as by the full Board of Directors.

The Risk Committee, however, retains primary oversight responsibility for climate change related risks and opportunities with respect to the Bank's loan portfolio. As part of this responsibility, in 2018 the Risk Committee reviewed a Future of Energy report as part of its industry analyses and review of climate change risks. The Risk Committee advises the Board on key and emerging risks and related policies (e.g., Environmental Policy and Credit Risk Appetite) and reviews the Bank's management of key risks such as climate change. Reporting on such risks and opportunities is provided to the Risk Committee via the Emerging Risks section of the quarterly Enterprise Risk Management Report (when appropriate), as well as review and approval of industry reports and individual credit submissions. Any significant climate-related natural disasters affecting the Bank's loan book would also be discussed at Risk Committee.

The Corporate Governance Committee is also engaged, as it acts in an advisory capacity to the Board through a continuing assessment of the Bank's approach to corporate governance and makes policy recommendations. Amongst its responsibilities, this Committee reviews the Bank's corporate social responsibility strategy and reporting. This includes climate change, as one of the Bank's corporate social responsibility priorities.

Management's Role

The Bank's existing Environmental Policy and Credit Risk Policy are the two main policy tools for identifying and managing climate related risks associated with the Bank's non-retail lending portfolio. These risks are identified, assessed and managed through the Bank's credit risk and environmental risk due diligence and adjudication processes. In 2018, the Bank continued its work on enhancing its climate change due diligence as part of the overall environmental risk due diligence process.

Specific and emerging risks and issues are raised to the relevant levels of management and/or risk committees for discussion or resolution and when deemed appropriate are reported quarterly in the Emerging Risk section of the Enterprise Risk Management Report to the Risk Committee of the Board.

The day-to-day responsibility for managing and reporting on climate change risk rests within Global Risk Management and its dedicated Environmental and Social Risk (ESR) team. The ESR team has responsibility for the integration of climate change considerations into individual credit applications and industry reviews, through the development and implementation of climate-related risk policies, procedures, tools and the provision of training to banking officers and credit adjudicators. The team also assists with the review of transactions to ensure climate-related risks are appropriately identified, considered and mitigated.

North America: Scotiabank, [2018 Annual Report](#), pp. 87-88

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Risk Management Recommendation

Risk Management a) asks companies to describe their processes for identifying and assessing climate-related risks. Figure 12 provides a bank's description of its approach for identifying and assessing climate-related risks.

Figure 12

Excerpt from Annual Report



Credit

We include the climate change variable in the analysis of the Environmental and Social risk of companies and projects. When we analyze a project from a carbon-intensive sector, regardless of value and the product involved, the Environmental and Social Risk Management may request the inventory of GHG and includes its materiality as one of the requirements in the pre-approval process.

Additionally, in 2017 we started a project to identify and monitor emissions we finance in our corporate loan portfolio for the products as follows: Vehicles, Real Estate, Rural and Electricity. Each sector was analyzed according to its peculiarities and CO₂ emissions linked to its activities. The scope of each portfolio was defined among the assumptions:

- **Vehicles:** Vehicle used during the financing period.
- **Real estate:** Emissions generated during the works period.
- **Rural:** Agribusiness activity, location and change in land use.
- **Electricity:** Tool developed for previous concession analysis.

The tool used to identify emissions in each sector is customized to Itaú Unibanco based on the *Portfolio Carbon Initiative* guidelines.

Emissions financed in wholesale segment

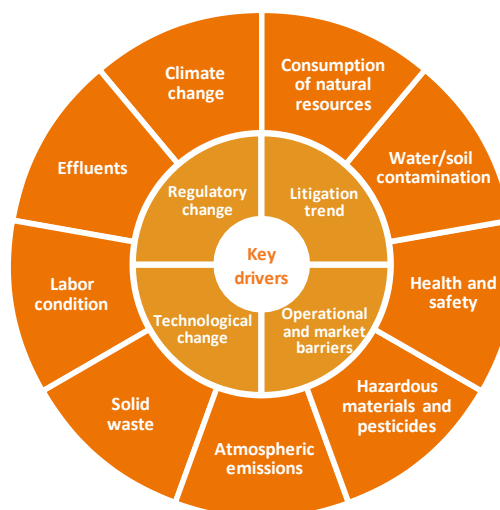
Portfolio	Share in loan portfolio (%)	CO ₂ E ton to each R\$10,000 financed ⁽¹⁾
Rural	1.0	16.50
Vehicles	0.4	5.80
Real estate	0.3	0.47

(1) Emissions were calculated by using an internal tool with assumptions specific for each portfolio.

Portfolios will be monitored from time to time and these data will be used in other internal studies and projects to identify any risk mitigation and opportunities.

In 2017 we also improved a proprietary E&S risk analysis methodology by using a sector approach applied to the corporate loan portfolio, so as to reassess the relation between E&S and credit risks. A mandala with E&S topics was generated for analysis of the portfolio, as shown below, and one of its assumptions was the climate change impact on sectors in the short and long terms.

Environmental and Social Risk Analysis



To assess the portfolio risk, credit risk factors were associated with the environmental and social topics.

Included:

- Common risks, arising from the production chain and processes of the sector;
- Risks associated with the portfolio reality; and
- Risks associated with political, economic, legal, and cultural issues.

Not Included:

- Management aspects, since the topics vary according to the company rather than to sector; and;
- Local idiosyncrasies, since they do not impact the sector as a whole.

This project aims to help our decision making and provide for the strategic integration of these data.

South America: Itaú Unibanco, [Consolidated Annual Report 2017](#), pp. A-405, A-406

Metrics and Targets Recommendation

Metrics and Targets a) asks companies to disclose the metrics used to assess climate-related risks and opportunities in line with their strategy and risk management process. [Figure 13](#) provides a bank's description of its climate-related metrics.

Figure 13

Excerpt from Climate Strategy Report

Climate-related metrics 2018

	For the year ended	
	31.12.2018	31.12.2017
Protecting our own assets		
Risks		
Identified significant climate-related financial risk on balance sheet ¹	None	None
Carbon-related assets (USD bn) ²	2.7	6.6
Proportion of total net credit exposure (%)	1.2	2.8
Protecting our clients' assets and mobilizing private and institutional capital		
Opportunities / products and services		
Climate-related sustainable investments (USD bn) ³	87.5	74
Proportion of UBS clients' total invested assets (%)	2.8	2.3
Total deal value in equity or debt capital market services related to climate change mitigation and adaptation (CCMA) (USD bn)	31.6	44.3
Total deal value of financial advisory services related to CCMA (USD bn)	24.9	5.5
Number of strategic transactions in support of Switzerland's Energy Strategy 2050	8	4
Number of climate-related shareholder resolutions voted upon	43	34
Proportion of supported climate-related shareholder resolutions (%) ⁴	88.0	82.0
Reducing our own climate change impact		
Greenhouse gas emissions		
GHG footprint (kilotons CO ₂ e) ⁵	132	148
Percentage change from baseline 2004 (Target: -75% by 2020) (%)	(63.4)	(59.0)
Weighted carbon intensity of the Climate Aware equities strategy (in tons CO ₂ e per million of USD revenue) ⁶	95.6	117.45
Compared to benchmark (FTSE Developed World Index) (%)	(55.7)	(44.0)

1 Methodologies for climate-related financial risk are emerging and may change over time. In 2018, a group of 16 banks, including UBS, and UNEP FI have partnered to refine methodologies for climate-related risks and opportunities. 2 Total net credit exposure across Personal & Corporate Banking and the Investment Bank, includes traded and banking products. Net of allowances, provisions, and hedges. As recommended by the TCFD, carbon-related assets are defined as assets tied to the energy and utilities sectors (Global Industry Classification Standard). Non-carbon-related assets, such as renewables, water utilities, and nuclear power excluded. For grid utilities, the national grid mix is applied. 2018 year-on-year drop attributed to planned reductions in Energy and Utilities lending exposure within the Investment Bank. 3 Invested assets of products such as sustainably managed properties and infrastructure, and renewable energy. 4 On all proposals that we supported, we voted against the recommendation provided by the issuer. 5 GHG footprint equals gross GHG emissions minus GHG reductions from renewable energy and GHG offsets (gross GHG emissions include: direct GHG emissions by UBS; indirect GHG emissions associated with the generation of imported / purchased electricity (grid average emission factor), heat or steam and other indirect GHG emissions associated with business travel, paper consumption and waste disposal). A breakdown of our GHG emissions (scope 1, 2, 3) is available in the UBS GRI Document 2018. 6 Year-on-year decrease of carbon intensity is mainly driven by higher carbon targets of the investment strategy. Carbon intensity is based on scope 1 and 2 CO₂ emissions of investee companies, which often rely on third-party estimates.

Europe: UBS, [Our Climate Strategy](#), p. 4

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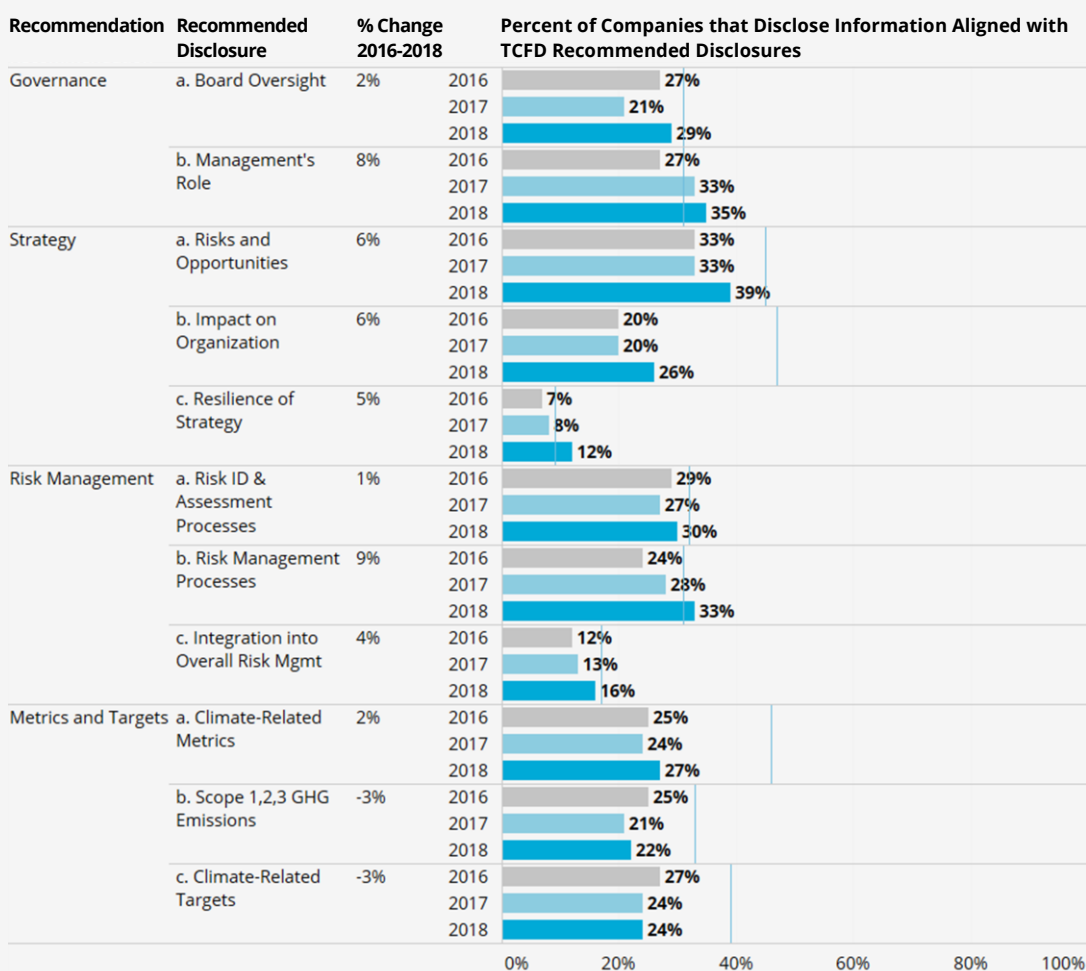
AI Review Summary

The AI reviewed disclosures from 147 insurance companies in four categories: multi-line insurance, property and casualty insurance, life and health insurance, and reinsurance. The insurance companies reviewed ranged in size from about \$2.7 trillion to \$200 million in assets, with a median asset size of around \$4 billion in assets. The AI review results for insurance companies are shown in Figure 14.

Overall, in 2018 reporting insurance companies most often disclosed information aligned with the TCFD recommended disclosure *Strategy a)*. Their disclosure of information in alignment with the TCFD recommendations increased from 2016 to 2018 for nine of the 11 recommended disclosures, however, the percentage of insurance companies disclosing relevant information in 2018 reporting was lower than the overall average for eight of the recommended disclosures. The insurance companies reviewed showed some of the smallest increases in the percentage of disclosure between 2016 and 2018, however they exceeded the overall average for disclosure of *Risk Management b)*.

Figure 14

Insurance Review Results by Year



Legend: | Percentage of total population that disclosed information aligned with TCFD recommended disclosures in 2018

Examples of Disclosure Aligned with TCFD Recommendations: Insurance

Strategy Recommendation

Strategy a) asks companies to describe their climate-related risks and opportunities, and *Strategy b)* asks companies to describe the impact of climate-related risks and opportunities on their businesses, strategy, and financial planning. [Figure 15](#) provides an insurance company's description of its physical climate-related risks and their impact on the company.

Figure 15

Excerpt from Financial Filing

Climate-related risks

Physical Risks

Physical risks posed by climate change could potentially affect four 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
- Impact on real assets exposed to weather-related natural perils

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) and loss-frequency distributions of the major weather-related natural catastrophes; the four perils with the largest AEL at present are disclosed on page 184 (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, and the IPCC Special Report 15).

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. The potential impact of climate change, including natural variability, is already being assessed and integrated into our risk view today, eg through regular updates of tropical cyclone frequencies. In addition, we conduct internal research and collaborate with academia to study the impact on extreme weather events in the near and medium term.

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. Finally, the overall size of the re/insurance market will depend on future economic growth rates.

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.

Impact on real assets exposed to weather-related perils

Real assets such as real estate are exposed to natural perils, eg hurricanes, tropical cyclones and floods. In addition to considering physical risk when acquiring new properties, we analyse these exposures across the portfolio based on Swiss Re's proprietary modelling capabilities used for our re/insurance underwriting. This analysis has been extended and refined recently, and results suggest a very low exposure to natural perils in general and to climate-related perils, in particular.

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, [2018 Financial Report](#), p. 177

Risk Management Recommendation

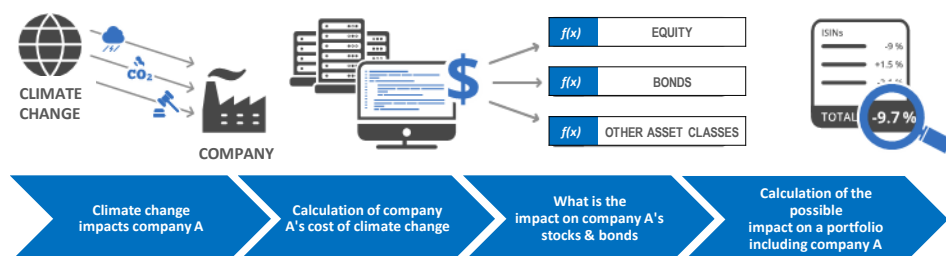
Risk Management a) asks companies to describe their processes for identifying and assessing climate-related risks. Figure 16 provides an insurance company's description of its approach for assessing climate-related risks.

Figure 16

Excerpt from Climate Report

AXA is reviewing an external methodological framework (developed by Carbon Delta) that models transition risks at company and sector level relating to "policy risks" (as defined in the TCFD recommendations) for curbing greenhouse gas (GHG) emissions, which correspond to the long-term goal of the 2015 Paris Agreement to limit climate change below a 2°C temperature increase. AXA is also assessing transition technology opportunities which would be generated via the development and sale of low carbon technology solutions to companies that need to comply with GHG reduction requirements. Only when balancing climate change policy risks on one hand with technology opportunities also generated by GHG reduction policies on the other hand could one obtain the comprehensive transition risk exposure for assets in a 2°C scenario.

[...]



A forward-looking "Climate VaR"

Taken together, the "policy risk" model combined with the "technology opportunities" model assess the downside costs of climate change policy as well as the additional green revenues that are attainable by the most innovative companies in their field. Forward-looking quantitative results are used, in the form of company specific costs and revenues, to calculate a "Climate Value-at-Risk" (Climate VaR) per security in AXA's portfolios.

This Climate VaR per security is calculated for equities and corporate bonds to understand the impact that future costs and/or revenues might have on the current pricing of these securities. A Dividend Discount Model (DDM) is also used to compute the impact that new, climate policy costs and revenues will have on future profits, which justify the current market value. The Climate VaR is the exact difference between the current market value of a security and the "new" present value after future climate change costs and/or revenues have been included into the DDM. The Climate VaR therefore represents the percentage of a company's market value that is poised to decrease or increase given the occurrence of climate change costs or revenues related to each scenario. This means that the Climate VaR can be negative or positive, depending on risks and upsides.



Europe: AXA, [Climate-Related Investment & Insurance Report 2018](#), p. 9

Note: some content, denoted by "[...]", was deleted in order to fit the page

Risk Management Recommendation

Risk Management a) asks companies to describe their processes for identifying and assessing climate-related risks. [Figure 17](#) provides an insurance company's description of elements of its risk identification processes as they relate to climate change.

Figure 17

Excerpt from Sustainability Report

Addressing Climate Change Risks

Climate change is a global issue, and its impacts are a topic of universal concern. In China, climate and climate-derived disasters account for 95% of losses from natural disasters. For the insurance industry, the risks brought by climate change include the uncontrollable loss caused by the frequent occurrence of extreme weather events [that] create a wide range of economic and social pressures and reduces insurability.

As the effects of climate change become more apparent, the probability of extreme weather events, natural disasters and other associated incidents will continue to increase. Heightened climate change-related risks will cause impacts on our product design and pricing, affecting our claim policies and our broader business strategy.

Global warming and more frequent extreme weather events have raised questions about the reliability of old product pricing models and hence the revenue impact. As a global leading multi-line insurance company, Ping An has always responded proactively to business risks and operational risks arising from climate change. To this end, we evaluate material risk on an annual basis.



- Ping An Life and Ping An Property & Casualty have initiated researches and developed a management system for climate change-related risks.
- We launched our Smart Environmental Protection solution to monitor and analyze environmental data. This supports the government as it addresses climate change and natural disaster risks.
- We developed DRS, a system for physical risk identification, analysis and management to assess the risk of nine types of natural disasters and manage the associated business risks.
- [Ping An] communicates and addresses concerns from stakeholders including government departments and investors about how we identify and respond to climate change-related insurance and investment risks.

[...]

Through risk identification and ex-ante warning, Ping An has developed an effective risk management system to alleviate the associated impacts of climate change-related risks.

Asia Pacific: Ping An Insurance (Group) Company of China, [2018 Sustainability Report](#), pp. 38-39

Note: some content, denoted by "[...]," was deleted in order to fit the page

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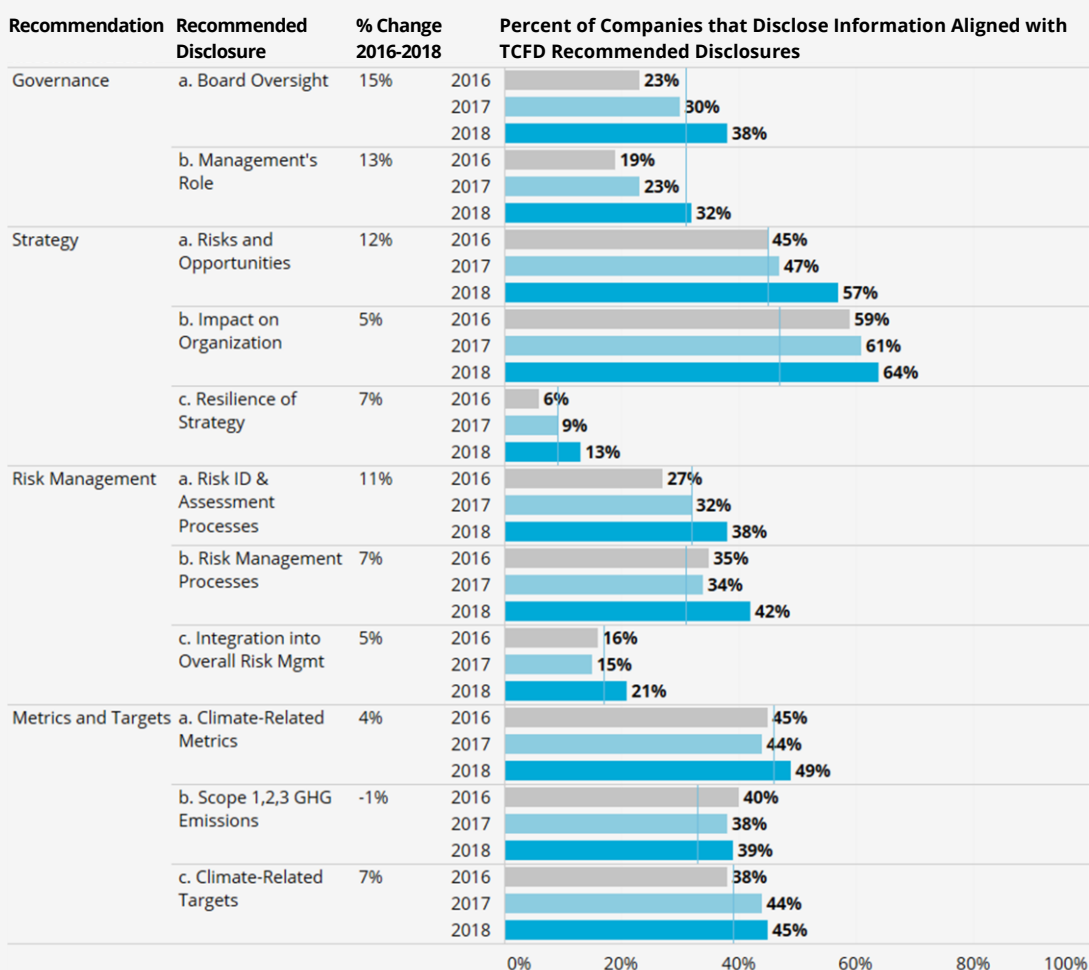
AI Review Summary

The AI reviewed disclosures from 128 energy companies in three categories: oil and gas, coal, and utilities. The energy companies ranged in size from about \$430 billion to \$10 million in annual revenue, with a median annual revenue of over \$5 billion. The AI review results for energy companies are shown in Figure 18.

In 2018 reporting, the 128 energy companies most often disclosed information aligned with the TCFD recommended disclosure *Strategy b)* on the impact of climate-related risks and opportunities on the company. While the percentage of energy companies reviewed that disclosed information on *Metrics and Targets b)*, Scope 1, Scope 2, and Scope 3 GHG emissions, fell slightly between 2016 and 2018, there was a significant 15% increase in reporting aligned with *Governance a)*, board oversight of climate-related risks and opportunities. Twenty percent (20%) of the energy companies disclosed information on timeframes associated with the climate-related risks and opportunities—a rate 5% higher than any other industry. Overall, in 2018 a larger percentage of the energy companies reviewed disclosed relevant information than the average across all industries for all 11 recommended disclosures.

Figure 18

Energy Review Results by Year



Legend: | Percentage of total population that disclosed information aligned with TCFD recommended disclosures in 2018

Examples of Disclosure Aligned with TCFD Recommendations: Energy

Governance Recommendation

Governance a) asks companies to describe the board's oversight of climate-related risks and opportunities. [Figure 19](#) provides a utility company's description of the schedule for its Sustainability Committee's meetings, including governance of "climate change and other sustainability risks."

Figure 19

Excerpt from Annual Report

Meetings and Attendance

The Committee meets as frequently as required but not less than twice a year and any Committee Member may call a meeting. Between 1 January 2018 and the date of this Report, the Committee met four times (including three times in 2018 and once in 2019). The following table provides an overview of how the Committee spent its time during the period.

	February	2018 August	December	2019 February
Sustainability Reporting / Indices performance	✓		✓	✓
Community investment activities	✓			✓
Climate change and other sustainability risks		✓	✓	✓
Health, Safety, Security, and Environment		✓	✓	

Asia Pacific: China Light and Power Company (CLP), [CLP Annual Report 2018](#), p. 151

Strategy Recommendation

Strategy a) asks companies to describe their climate-related risks and opportunities. [Figure 20](#) provides a utility company's disclosure of risks related to extreme climate events as well as potential impacts and measures to mitigate those risks.

Figure 20

Excerpt from Sustainability Report

EMERGING RISKS	DESCRIPTION	IMPACT	MITIGATION MEASURES
EXTREME CLIMATE EVENTS	Structural climate changes (in particular temperature and precipitation), with an impact on the frequency and severity of extreme climatic events (e.g. floods, droughts, storms, wildfires)	- Damage to physical assets and loss of revenue - Impact on quality of service provided (distribution network). (Possible) structural changes in hydro productivity (mean and volatility)	- Geographical and technological diversification - Active role in combating climate change (in particular the promotion of decarbonisation and energy efficiency) - Adoption of TCFD recommendations and mapping of main climatic risks to EDP according to the transition and physical risks categorization - Existence of dedicated areas and plans for Crisis Management and Business Continuity (corporate and main Business Units)

Europe: Energias de Portugal (EDP), [EDP Sustainability Report 2018](#), p. 50

Strategy Recommendation

Strategy b) asks companies to describe the impact of climate-related risks and opportunities on their businesses, strategy, and financial planning. [Figure 21](#) provides a utility company's disclosure of the impact of climate-related risks and opportunities.

Figure 21

Excerpt from Integrated Report

We are convinced that in order to give a comprehensive portrayal of the company, it is not only necessary to describe the economic, ecological and social context but also to illustrate and provide an analysis of interdependencies in this report. Linking together the various goal dimensions is an important element of integrated reporting. At the same time, this type of reporting encourages a holistic corporate management approach within EnBW. In order to illustrate these interdependencies, the key performance indicators for the goal and performance management system are used. The basic assumption for illustrating interdependencies is that a change in one key performance indicator can also lead, in many cases, to changes in one or more other key performance indicators. Reciprocal relationships thus exist between the key performance indicators – in the most extreme case, all of the key performance indicators can even influence each other. In this context, the investment guidelines have been adapted in the 2018 financial year: Non-financial aspects such as environmental and climate protection goals will be taken into account to a greater extent for investment projects (p. 88).

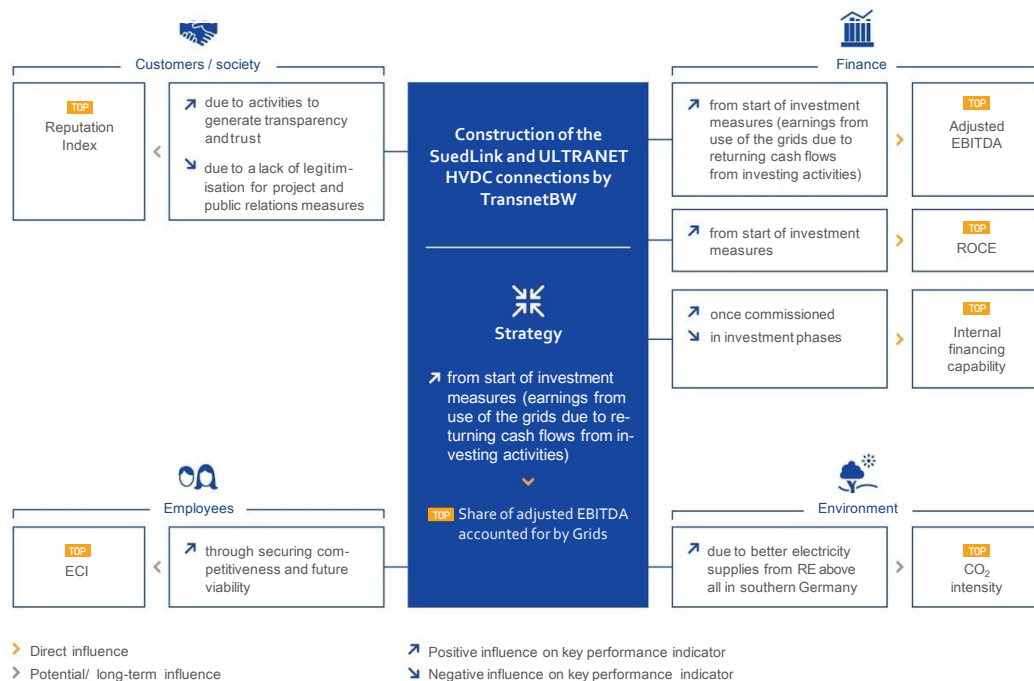
We have illustrated these interdependencies since 2015 using concrete examples that were important for the company in the past financial year or will be in the future and can thus also be found in other sections of the report. As part of an internal coordination process, various examples were examined by several specialist areas and selected based on the respective feedback.

In order to illustrate the interdependencies in 2018, we have selected two areas in which EnBW was already engaged in the past

financial year but which will become even more important in the future. The **expansion of the HVDC connections as part of the SuedLink and ULTRANET projects** will accompany us over the next few years. New, powerful transmission grids will form the backbone of the Energiewende, especially for transporting energy that has been sustainably generated in northern Germany to the main consumption areas in southern Germany (p. 62). We anticipate that there will be a direct or potential influence on many key performance indicators. **Digitalisation initiatives** are another example. EnBW is focussing on three main areas in its digital transformation: products and processes, technologies, and people and organisations (p. 39). Due to the diverse range of impending changes, we anticipate that there will be a direct or potential influence on many key performance indicators.

The key performance indicators that are directly influenced are positioned in the centre of the diagram and should essentially be directly measurable. The interdependencies between the financial and strategy key performance indicators are also essentially directly measurable and are represented in the example diagrams by orange arrows. The interdependencies with the other non-financial key performance indicators are difficult to measure and generally tend to be potential or long term in nature. They are represented by grey arrows. In the 2018 financial year, these interdependencies were not measured individually. They are presented based on internal discussions with the relevant specialist areas and those responsible for the performance indicators. The upward pointing arrows show a positive influence on the key performance indicator, while the downward pointing arrows show a negative influence.

Interdependencies between key performance indicators using the construction of HVDC connections as an example



Europe: Energie Baden-Württemberg (EnBW), [Integrated Annual Report 2018](#), pp. 53-54

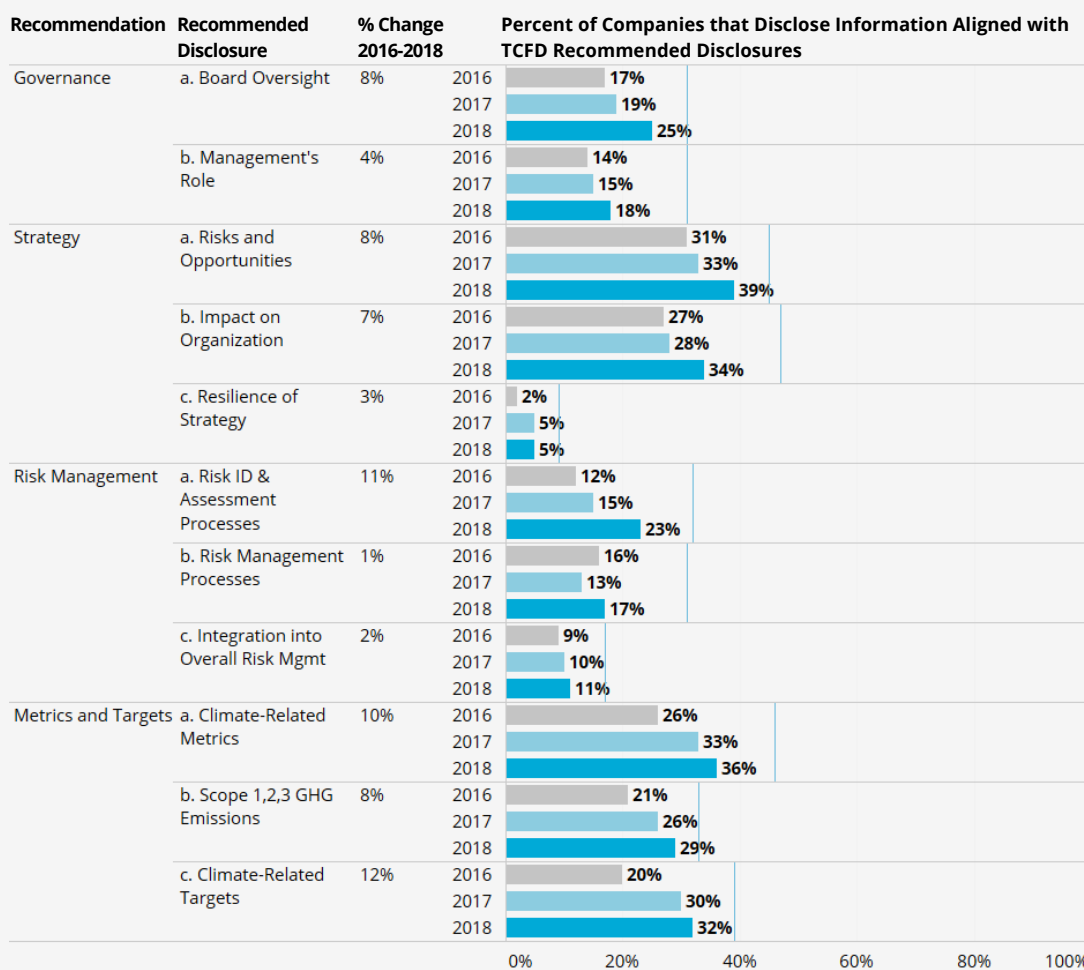
AI Review Summary

The AI reviewed disclosures from 223 transportation companies in six categories: air freight, rail transportation, passenger air transportation, trucking services, maritime transportation, and automobiles. The transportation companies ranged in size from about \$280 billion to \$17 million in annual revenue, with a median annual revenue of approximately \$1 billion. The AI review results for transportation companies are shown in Figure 22.

In 2018 reporting, the 223 transportation companies most often disclosed information aligned with the TCFD recommended disclosure *Strategy a)*, climate-related risks and opportunities, while the lowest percentage of disclosures related to *Strategy c)*, resilience of the organization's strategy to climate-related risks and opportunities. There was a notable 12% increase in disclosure of *Metrics and Targets c)*, climate-related targets, between 2016 and 2018. However, disclosure of *Risk Management b)* increased only 1% over the same time period, with a slight decrease in 2017. Overall a smaller percentage of transportation companies disclosed relevant information than the average across all industries for all 11 recommended disclosures.

Figure 22

Transportation Review Results by Year



Legend: | Percentage of total population that disclosed information aligned with TCFD recommended disclosures in 2018

Examples of Disclosure Aligned with TCFD Recommendations: Transportation

Governance Recommendation

Governance b) asks companies to describe management's role in assessing and managing climate-related risks and opportunities. [Figure 23](#) provides an airline's description of specific management roles responsible for processes to assess and manage climate-related risks and opportunities.

Figure 23

Excerpt from Environmental Social Governance Report

Governance

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

JetBlue integrates environmental, social, and governance (ESG) related risk assessment and opportunities into its larger enterprise risk management processes. To manage this process, JetBlue employs a dedicated Sustainability and ESG executive to oversee the sustainability efforts of our entire airline and to keep our management team and relevant board committees aware of climate-related risks and opportunities when developing strategy, performance, and budgets.

Specifically, climate change risk and opportunity assessment is led by JetBlue's Head of Sustainability. Actions are assessed at an officer level, with quarterly briefings to the Executive Vice President General Counsel. Risk assessment related to possible emissions regulations is ongoing.

Board committee involvement is determined based on the financial exposure and likelihood of a given environmental or social risk factor. The top environmental issues reviewed by the board are 1) the cost of carbon-offsetting compliance and strategy to mitigate cost; 2) market opportunities to use bio-jet fuel to hedge fuel cost; and 3) the integration of environmental and social risk factors into enterprise risk management. The Audit Committee of the board engages on relevant ESG issues, questions, and trends.

North America: JetBlue Airways Corporation, [2017 Environmental Social Governance Report](#), p. 29

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Strategy Recommendation

Strategy c) asks companies to describe the resilience of their strategies, taking into consideration different climate-related scenarios, including a 2°C or lower scenario. [Figure 24](#) provides an airline company's description of scenario analysis it has undertaken to assess its strategy resilience.

Figure 24

Excerpt from Annual Report and Accounts

Climate related scenario analysis

In line with our commitment to TCFD we have undertaken climate-related scenario analysis to review the resilience of our business strategies in the context of climate change. We regard this as an iterative process and will be continuing to consider further climate scenarios and develop more quantitative conclusions.

In 2018 we followed the TCFD six step process to consider two contrasting scenarios:

- 2°C scenario, consistent with meeting the Paris Agreement Goal (Representative Concentration Pathway 'RCP 2.6')
- 4°C scenario as an alternative high emission scenario (RCP 8.5)

We considered the implications of these two climate scenarios on our business in 2030, assuming we have the same business activities as we do today. 2030 was selected as a nearer term consideration en-route to 2050, which is the target year for our 50% net CO₂ reduction target.

The analysis included an initial qualitative assessment of potential IAG response in terms

of changes to business model, portfolio mix, investments in transition capabilities and technologies and the potential impact on strategic and financial plans.

Broadly, the 2 degrees scenario demonstrated that IAG would incur additional operating costs, mainly as a result of the increased cost of carbon or other policy interventions. The 4 degrees scenario also demonstrated that IAG would incur additional operating costs, but in this case, these would more likely arise from increased cost of operational disruption due to increased frequency of extreme weather events.

Initial outcomes of the exercise have resulted in IAG establishing new partnerships through our accelerator programme 'Hangar51', to deliver innovations in fuel efficiency and low carbon technologies. Other initiatives are also being developed. The process has also meant that we have identified and disclosed several new climate-related challenges this year.

In 2019 we will consider a 1.5 degree scenario and potential IAG pathways towards achieving net zero emissions by 2050.

Europe: International Airlines Group, [Annual Report and Accounts 2018](#), p. 54

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Strategy and Risk Management Recommendations

Strategy a) asks companies to describe the climate-related risks and opportunities they have identified over the short, medium, and long term; and *Risk Management b)* asks companies to describe their processes for managing climate-related risks. [Figure 25](#) provides a description of a rail freight company's climate-related risks and its approach to managing those.

Figure 25

Excerpt from Sustainability Report

Table 3 — Response to Climate-Related Risks

Risk	Description	Risk type	Potential impact to our business	Strategic planning, risk mitigation and opportunities	Metrics
Thermal Coal Demand	Demand for thermal coal is subject to energy policy and fuel-mix decisions driven by energy costs, energy security, and regulation of greenhouse gas (GHG) emissions (including carbon pricing).	Transition: Market, Policy & Legal, and Technology Risk level: High	Approximately a third of our network volumes and half of rail haulage volumes relate to continuing demand for thermal coal. Time horizon: Medium to Long-Term	- Continue to monitor and hold a view on demand for seaborne thermal coal (particularly in Asia) in addition to cost and quality of coal supply. - Continue to compare our scenario analysis with a range of projections (e.g. International Energy Agency). - Continue to undertake mine resilience analysis (based on coal quality, cost competitiveness and projected mine life) to inform investment decisions.	- Coal demand and supply projections and scenario analysis, (refer to our Future of Coal chapter). - Seaborne market demand/supply. - Average age of coal-fired electricity capacity. - Thermal coal generation projections. - Global coal quality specifications.
Access to Funding & Licences	Investor concern over climate-related risks may result in higher cost of capital for our business and our customers for funding coal mining, transport and coal-fired power projects.	Transition: Reputation Risk level: Moderate – High	Refinancing of existing borrowing facilities or development of new mines, greenfield rail infrastructure and coal-fired power may incur higher borrowing costs, delays in approvals or restrictions on licence conditions impacting growth opportunities. Time horizon: Short, Medium and Long-Term	- Continue to advocate the ability of Australia's metallurgical coal (and Australia's export infrastructure advantage) to underpin global metallurgical coal supply, used in steel production. - Continue to advocate the importance of Australian thermal coal supply, used for energy generation and contributing to a reduction in GHG emissions relative to lower quality alternatives. - Continue climate-related disclosures. - Access a broad range of capital markets and diversify funding sources/extend tenure where possible.	Disclosure ratings such as Australian Council of Superannuation disclosure reporting and CDP Climate Performance score.
Climate Change Resilience and Adaptation	Current and future disruption arising from increased severity and/or frequency of extreme weather events (higher temperatures, strong winds, flooding and associated erosion, bushfires and others)	Physical: Acute Risk level: Moderate – High	May result in loss of revenue due to extreme weather events affecting mining, transport and port activities across the supply chain. May result in higher costs associated with ensuring asset availability, or to address damage to assets. Time horizon: Short, Medium and Long-Term	- Continue to design infrastructure to recover quickly from flooding and extreme weather events, including the positioning of inventory such as ballast, flood rock, rail and formation material. - Reduce blanket heat-triggered speed restrictions through more localised real-time monitoring of track temperatures. - Improve engagement with customers on the estimated recovery timelines by providing an initial range that is narrowed as certainty increases. - An adaptive design approach to improved infrastructure resilience is likely to generate increased trust from key stakeholders, thereby retaining economic value and appropriate asset insurance. - Increasing demand for resilient infrastructure, particularly in areas vulnerable to severe weather events.	Current/projected temperatures through Aurizon Networks Remote Monitoring System, the Bureau of Meteorology, and CSIRO.
Carbon Emissions Management and Reporting	Carbon liability under the Safeguard Mechanism Rule and potential penalties for inappropriate carbon reporting under the National Greenhouse and Energy Reporting Act 2007. Increased opportunity under federal and state government energy/climate targets and policy instruments.	Transition: Policy & Legal Risk level: Moderate – Low	Facilities exceeding the emission baseline may require the need to purchase Australian carbon credit units (ACCUs) per tonne of CO ₂ e exceeded. Time horizon: Medium to Long-Term	- Assess future liability under the Emission Reduction Fund Safeguard Mechanism (current analysis indicates our baselines are not expected to be surpassed before 2020 with provision to amend baselines or defer requirement to acquire ACCUs). - Incorporate carbon prices into fleet purchase decisions when considering electric vs. diesel locomotives. [...] - Link our GHG emissions to our financial reporting. [...]	Locomotive emissions intensity (refer to our Environment chapter).

Asia Pacific: Aurizon, [2018 Sustainability Report](#), p. 21

Note: some content, denoted by "[...]," was deleted in order to fit the page

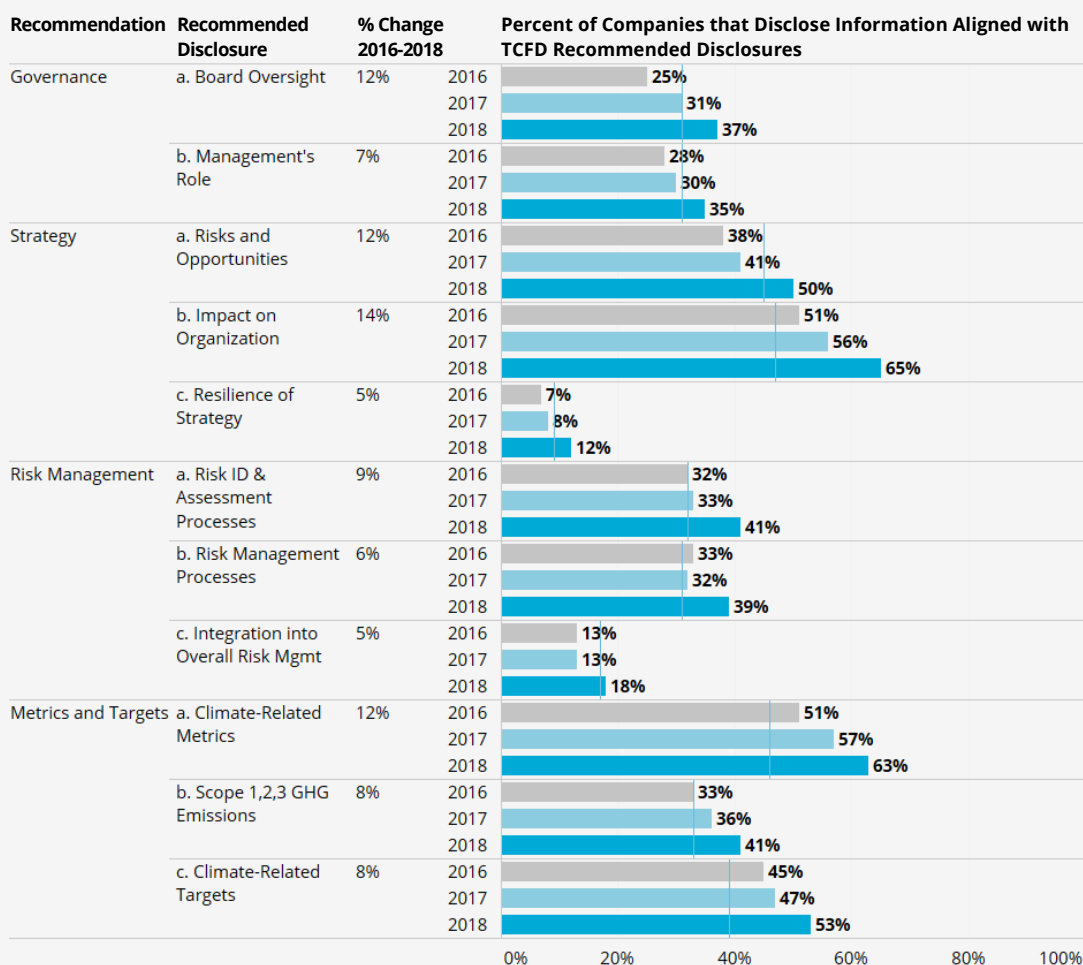
AI Review Summary

The AI reviewed disclosures from 213 materials and buildings companies in five categories: metals and mining, chemicals, construction materials, capital goods, and real estate management and development. The materials and buildings companies ranged in size from about \$100 billion to \$300 million in annual revenue, with a median annual revenue of over \$5 billion. The AI review results for materials and buildings companies are shown in [Figure 26](#).

On 2018 reporting, the 213 materials and buildings companies most often disclosed information aligned with the TCFD recommended disclosures *Strategy b)* and *Metrics and Targets a)*. Between 2016 and 2018, there were notable increases in the percentage of companies disclosing in alignment with nearly every recommended disclosure. Overall, a higher percentage of materials and buildings companies disclosed relevant information than the average across all industries for all 11 recommended disclosures.

Figure 26

Materials and Buildings Review Results by Year



Legend: | Percentage of total population that disclosed information aligned with TCFD recommended disclosures in 2018

Examples of Disclosure Aligned with TCFD Recommendations: Materials and Buildings

Governance Recommendation

Governance a) asks companies to describe their board's oversight of climate-related risks and opportunities. [Figure 27](#) provides a building products company's summary of its board oversight as well as a description of where the company discloses information aligned with the TCFD recommendations.

Figure 27

Excerpts from Annual Report

Roles & responsibilities

[...]

Through the Audit Committee and the Health, Safety and Sustainability Committee (HSSC), the Board of Directors oversees LafargeHolcim risk management, Internal Control and climate change related risks. The Audit Committee mandate includes the review of compliance and risk management processes and review of management's and internal audit reports on the effectiveness of internal control systems and on the performance of the annual risk assessment process.

The HSSC mandate is to support and advise the Board of Directors on the development and promotion of a healthy and safe environment for employees and contractors, as well as on sustainable development and social responsibility. More details of the Audit Committee and HSSC are disclosed in the Corporate Governance section on pages 94 and 96.

Task force on Climate-related Financial Disclosures (TCFD)

As a business leader, we must ensure transparency and action around climate-related risks and opportunities. LafargeHolcim therefore supports the voluntary recommendations of the Financial Stability Board (FSB) Task force on Climate-related Financial Disclosures.

The identification, assessment and effective management of climate-related risks and opportunities are fully embedded in our risk management process (as described on page 66), which is subject to continuous improvement. Governance of climate-related risks and opportunities, including management and Board roles & responsibilities, are described on page 98. Our sustainability ambition is on page 46 and further details, including our climate strategy, can be found in our sustainability report. Additional metrics & targets are detailed in our submissions to the Carbon Disclosure Project. Documents are available on www.cdp.net/en/responses.

Europe: LafargeHolcim, [2018 Annual Report](#), pp. 67-68

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Risk Management and Metrics and Targets Recommendations

Risk Management a) asks companies to describe their processes for identifying and assessing climate-related risks, and *Metrics and Targets* b) asks companies to disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions. Figure 28 provides a mining company's description of its risk assessment process and its disclosure of GHG emissions.

Figure 28

Excerpt from Integrated Annual Report

Gold Fields' climate change programme focuses on the assessment and mitigation of climate change-related risks, including the development and implementation of action plans and energy management programmes to reduce emissions (p70 – 73), while at the same time ensuring water security (p100 – 102). Gold Fields' objectives are to minimise the Company's contribution to climate change and to build resilience to impacts of climate-related risks on our operations and host communities. It is increasingly clear that the negative physical impacts of climate change are real and immediate, due to:

- The long-term risks posed by climate change to the Group's operations and surrounding communities
- Increasing efforts to regulate carbon emissions in most of our jurisdictions
- Taxes increasingly imposed by governments on non-renewable energy consumption

Climate change-related regulations, comprising carbon emission and renewable energy targets, continue to evolve across our regions, and we consistently assess and investigate how these changes will affect our operations. These are detailed in the regional reports on p98 – 99.

For details of our climate change management approach, policies and guidelines, go to www.goldfields.com/sustainability.php

Task Force on Climate-related Financial Disclosures (TCFD)

Business impact on the climate, and companies' ability to withstand climate change, are issues of increasing global importance, and vital to our stakeholders. In 2018, Gold Fields became the second Johannesburg Stock Exchange Limited (JSE)-listed company in South Africa (and the first mining company) to publicly back the United Nations (UN)-endorsed recommendations of the TCFD. The recommendations have been adopted by many national financial regulators.

By following the TCFD, we will be reporting our climate-related performance in a more targeted and practical way than before, linking it to financial risks and opportunities. In 2019, we will release our first TCFD report, which will replace our annual submission in terms of the CDP, formerly the Carbon Disclosure Project. The report details aspects of governance and climate-related risks, as well as our risk management framework, our strategic approach in adapting to and mitigating impacts of climate change, and presents trends in our key climate change-related metrics.

Gold Fields has been disclosing emissions, risks and opportunities for more than 10 years through the CDP. Key energy and carbon emissions data are assured externally. Gold Fields maintained its A- score for its 2018 CDP performance, ranking it among the leaders in the mining sector for both our disclosures and management practices.

Group performance and strategies

The 2018 Group risk register includes the impact of climate change among the top 20 Group risks. Furthermore, the Board's Safety, Health and Sustainable Development (SHSD) Committee reviews the performance of energy and climate change programmes on a quarterly basis. Every five years we review our vulnerability to climate change and develop Group-wide strategies and programmes in response to these. During 2017 our Ghanaian operations' piloted use of an ICMM climate-data viewer tool, which provides insight into physical changes in precipitation, temperature, wind and water stress levels. These outcomes were used in developing adaptation plans, such

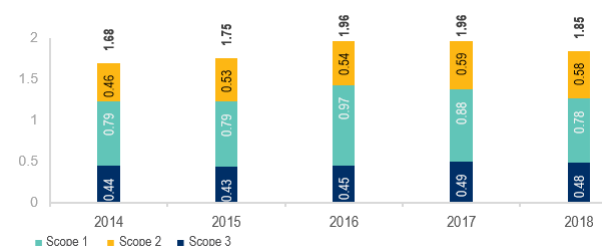
as reviewing design flood lines and inclusion of climate change impacts in our project standards. The ICMM tool is in the process of being rolled out to our other operations.

Our carbon emission performance mirrors the energy usage trends at our operations. These are detailed on p70 – 73. Gold Fields' disclosures cover all three carbon emission scopes, Scope 1 – 3, both in absolute figures and intensities. Total Scope 1 – 3 CO₂-e emissions during 2018 amounted to 1.85Mt, a significant drop from 1.96Mt in 2017, reflecting the decrease in total energy usage to 11.62TJ in 2018 from 12.18TJ in 2017. Emission intensity was unchanged from the 0.66t CO₂-e/oz in 2017, due to a decline in Group gold production. Our aspirational target is to reduce cumulative carbon emissions by 800kt CO₂-e between 2017 and 2020. Cumulative carbon emission reductions from 2017 – 2018 totalled 265kt CO₂-e.

Our commitment to low-carbon and renewable energy is a significant contributor to our efforts in reducing carbon emissions. All our operations, other than South Deep, are largely powered by LP gas, a low carbon energy source. In Q1 2019, Granny Smith and Agnew announced significant renewable energy projects to be operational later in 2019 or early 2020 (p72). South Deep, Tarkwa and Damang are also investigating developing renewable energy assets in the near future.

Given the water security impact of climate change to our operations, we also closely monitor our water usage and spending and invest in water security and efficiency initiatives.

Gold Fields Scope 1 – 3 CO₂ emissions
Million tonne CO₂-e



Middle East and Africa: Gold Fields, *Integrated Annual Report 2018*, p. 97

Metrics and Targets Recommendation

Metrics and Targets b) asks companies to disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG emissions. Figure 29 shows an electrical equipment manufacturing company's disclosure of its GHG emissions.

Figure 29

Excerpt from Environmental Performance Report

Fiscal 2018 Greenhouse Gas Emissions				The symbol "★" denotes Mitsubishi Electric Group greenhouse gas emissions for which third-party verification has been carried out by SGS Japan Inc.	
Scope	Category	Accounting/10,000 tons-CO ₂ (Scope 3 Emission Rates)		Accounting summary ^{*1}	
Scope1	Direct emissions associated with fuel use at our company	★	31	Direct emissions from fuel use and industrial processes at our company ^{*2}	
Scope2	Indirect emissions associated with use of externally-purchased electricity and heating			Indirect emissions associated with use of electricity and heat purchased by our company ^{*3}	
	Market based	★	98	Calculated using power emission coefficient based on contract	
	Location based	★	97	Calculated using average power-generation emission coefficient within the zone	
Scope3	Indirect emissions outside the scope of our company's operational activities				
	Category 1 Purchased goods and services		670 (15%)	Emissions associated with activities up to the manufacturing of materials, etc. relating to raw materials, parts, purchased products, and sales ^{*4}	
	Category 2 Capital goods		66 (1.5%)	Emissions generated by the construction and manufacturing of own capital goods	
	Category 3 Fuel- and energy-related activities not included in Scope 1 or Scope 2		8.5 (0.2%)	Emissions associated with procurement of fuel necessary for power generation, heat supply, etc. and power such as electricity supplied by other parties	
	Category 4 Upstream transportation and distribution		43 (1.0%)	Emissions associated with logistic processes up to the delivery to our company of materials, etc. relating to raw materials, parts, purchased products, and sales ^{*5}	
	Category 5 Waste generated in operations		0.04 (0.0%)	Emissions associated with transporting and processing waste produced by our company ^{*6}	
	Category 6 Business travel	★	4.0 (0.1%)	Emissions associated with employee business travel ^{*7}	
	Category 7 Employee commuting	★	2.9 (0.1%)	Emissions associated with employees commuting to and from their workplaces ^{*8}	
	Category 8 Upstream leased assets		-	Emissions associated with operation of leased assets hired by our company (Calculated by Mitsubishi Electric under Scope 1 and Scope 2)	
	Category 9 Downstream transportation and distribution		0.7 (0.0%)	Emissions associated with the transportation, storage, cargo handling and retailing of products	
	Category 10 Processing of said products		0.2 (0.0%)	Emissions associated with the processing of interim products by business operators	
	Category 11 Use of said products	★	3,736 (82%)	Emissions associated with the use of products by users (consumers/business operators)	
	Category 12 End-of-life treatment of said products		3.0 (0.1%)	Emissions associated with the transportation and processing of products for disposal by users (consumers/business operators)	
	Category 13 Downstream leased assets		0.01 (0.0%)	Emissions associated with operation of leased assets	
	Category 14 Franchises		-	Emissions at companies operating as franchises (Not applicable to Mitsubishi Electric)	
	Category 15 Investments		8.0 (0.2%)	Emissions associated with operation of investments	
Total			4,543		

^{*1} Excerpt from Basic Guidelines published by the Japanese Ministry of the Environment and Ministry of Economy, Trade and Industry

^{*2} CO₂, SF₆, PFC, and HFC emissions associated with the use of gas, heavy oil, etc., and with product manufacturing

^{*3} CO₂ emissions associated with the use of electricity, etc.

^{*4} Excludes some regions

^{*5} CO₂ emissions associated with product distribution/circulation (sales distribution) Subject to accounting: 55 companies (production sites)

^{*6} CO₂ emissions associated with transportation of waste (waste distribution) Subject to accounting: Mitsubishi Electric

^{*7} Results for Japan. Excludes CO₂ emissions associated with actual use of taxis and accommodation

^{*8} Assuming that all employees use passenger rail services

Asia Pacific: Mitsubishi Electric Group, [Environmental Performance Review 2018](#), p. 8

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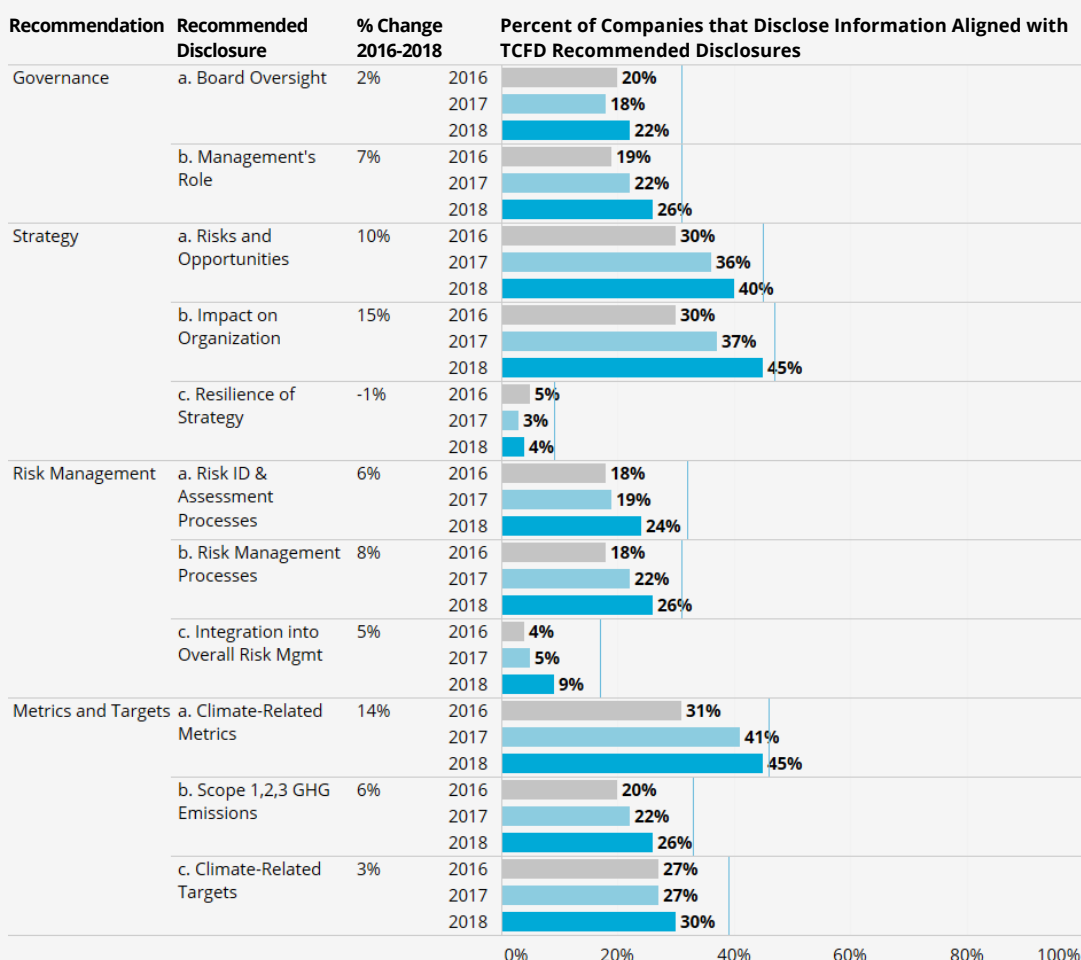
AI Review Summary

The AI reviewed disclosures from 166 agriculture, food, and forest products companies in four categories: beverages, packaged foods and meats, agriculture, and paper and forest products. The agriculture, food, and forest products companies ranged in size from about \$94 billion to \$70 million in annual revenue, with a median annual revenue of nearly \$900 million. The AI review results for agriculture, food, and forest products companies are shown in [Figure 30](#).

In 2018 reporting, the 166 agriculture, food, and forest products companies most often disclosed information aligned with the TCFD recommended disclosures *Strategy b)* and *Metrics and Targets a)*, while the lowest percentage of disclosures related to *Strategy c)*, consistent with the overall review results. There was a 15% increase in disclosure of *Strategy b)*, impact of climate-related risks and opportunities, between 2016 and 2018. However, disclosure of *Governance a)* increased only 2% over the same time period, with a slight decrease in 2017. Overall a smaller percentage of agriculture, food, and forest products companies disclosed relevant information than the average across all industries for all 11 recommended disclosures.

Figure 30

Agriculture, Food, and Forest Products Review Results by Year



Legend: | Percentage of total population that disclosed information aligned with TCFD recommended disclosures in 2018

Examples of Disclosure Aligned with TCFD Recommendations: Agriculture, Food, and Forest Products

Governance Recommendation

Governance a) asks companies to describe the board's oversight of climate-related risks and opportunities. [Figure 31](#) provides a food company's description of board oversight.

Figure 31

Excerpt from Sustainability Report

Environmental management

At board level, the risk and sustainability committee provides strategic guidance and leadership on climate change and environmental issues, and oversees implementation and revision of our environmental policy. Operational execution of the strategy and management of the environmental system rests with the group manufacturing excellence department.

Our environmental policy statement was approved three years ago. In it, we commit to identifying environmental and climate-change risks, taking action to address weaknesses, forging strong relationships with relevant stakeholders, developing and implementing a sustainability strategy, striving for continuous improvement, and reporting to the board through relevant committees. We also commit to set targets, and monitor, measure and report on our environmental scorecard against key performance indicators. The policy statement is available on the Tiger Brands intranet and website. Our manufacturing and distribution operations will conduct policy training for all relevant employees and suppliers.

Middle East and Africa: Tiger Brands Limited, [Sustainable Development Report 2018](#), p. 18

Risk Management Recommendation

Risk Management b) asks companies to describe their processes for managing climate-related risks. [Figure 32](#) provides a food company's description of how it manages climate-related risks.

Figure 32

Excerpt from Annual and Sustainability Report

Climate change GRI 103|201, 201-2



Climate change can significantly impact global supply and demand for agricultural commodities, affecting prices and, thereby, our stocks of raw materials, in addition to affecting energy safety and availability of water.



To become a benchmark for environmental efficiency initiatives and monitoring of climate risks that affect the acquisition of raw materials and our industrial processes. Expand the capability to anticipate and create a system to adapt to environmental and climate transformations.



We monitor the entire production chain attempting to anticipate impacts on operating costs and availability of grains. To this end, we manage opportunities combining market strategies and climate monitoring in the main grain producing countries in the world. We also prioritize risks and opportunities arising from climate change, evaluating the potential financial impact, considering those with greatest influence.

South America: BRF S.A., [Annual and Sustainability Report 2017](#), p. 31

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Metrics and Targets Recommendation

Metrics and Targets c) asks companies to describe the targets they use to manage climate-related risks and opportunities and performance against targets. [Figure 33](#) provides a food and agri-business company's climate-related targets.

Figure 33

Excerpt from Annual and Sustainability Report

Progress against 2016 – 2020 Natural Capital goals

Material Area: Climate Action

Goal	2018 achievements	Read more
<i>Increased energy efficiency</i>		
New target: By 2030, reduce greenhouse gas (GHG) emissions by 50% both in own operations and third party supply chains. Requires reduction of 3.85% per year	Science based targets developed 2% GHG intensity improvement for Tier 1 processing operations 9% increase in plantation and farming GHG emission intensity 5% increase in carbon sequestered in farming and plantation operations GHG footprint calculator developed for AtSource supply chains Our progress: on target	Almonds – page 55 Tomatoes and Spices – page 58 Coffee – page 61 Palm – page 67
<i>Avoided GHG emissions</i>		
By 2020, all Olam farms, plantations and Tier 1 facilities to have implemented their 2020 GHG reduction plans: 1. Operational efficiency 2. Avoid High Carbon Stocks for land development 3. Climate-Smart Agricultural practices.	Energy strategy developed to focus on 20 plants contributing 80% of Tier 1 processing emissions Climate-Smart operational plans in place at all plantations and farms Our progress: on target	Palm – page 67
<i>Increased share of renewable energy</i>		
By 2020, 25% of energy derived from renewable and biomass sources at Olam's Tier 1 facilities (from 2015 baseline – 15%).	11% of energy derived from biomass and renewables Decrease due to lower quantity of bagasse available from lower sugar cane production in 2017 and reduced consumption of rice husk due to brown rice production Cocoa shell boiler implementation plans in place for 2020 Power Purchase Agreement implemented for Australian Almonds Our progress: behind target	Almonds – page 55
<i>Reduced agricultural vulnerability to climate risks for farmers and Olam-managed plantations, concessions and farms</i>		
By 2020, implement the Olam 2020 Climate-Smart Agriculture (CSA) Programme.	Increased implementation of CSA practices e.g. 11% increase in CSA training and 70% increase in conservation training Climate resilience plan in development, to be completed in 2019. Our progress: behind target	Cocoa – page 63 SRP rice farmer video on methane ¹ Cotton – page 72

1. Rice farmer video on methane: <https://www.olamgroup.com/products/food-staples/rice/rice-sustainability.html>

Asia Pacific: Olam International, [Olam International Limited Annual Report 2018](#), p. 94

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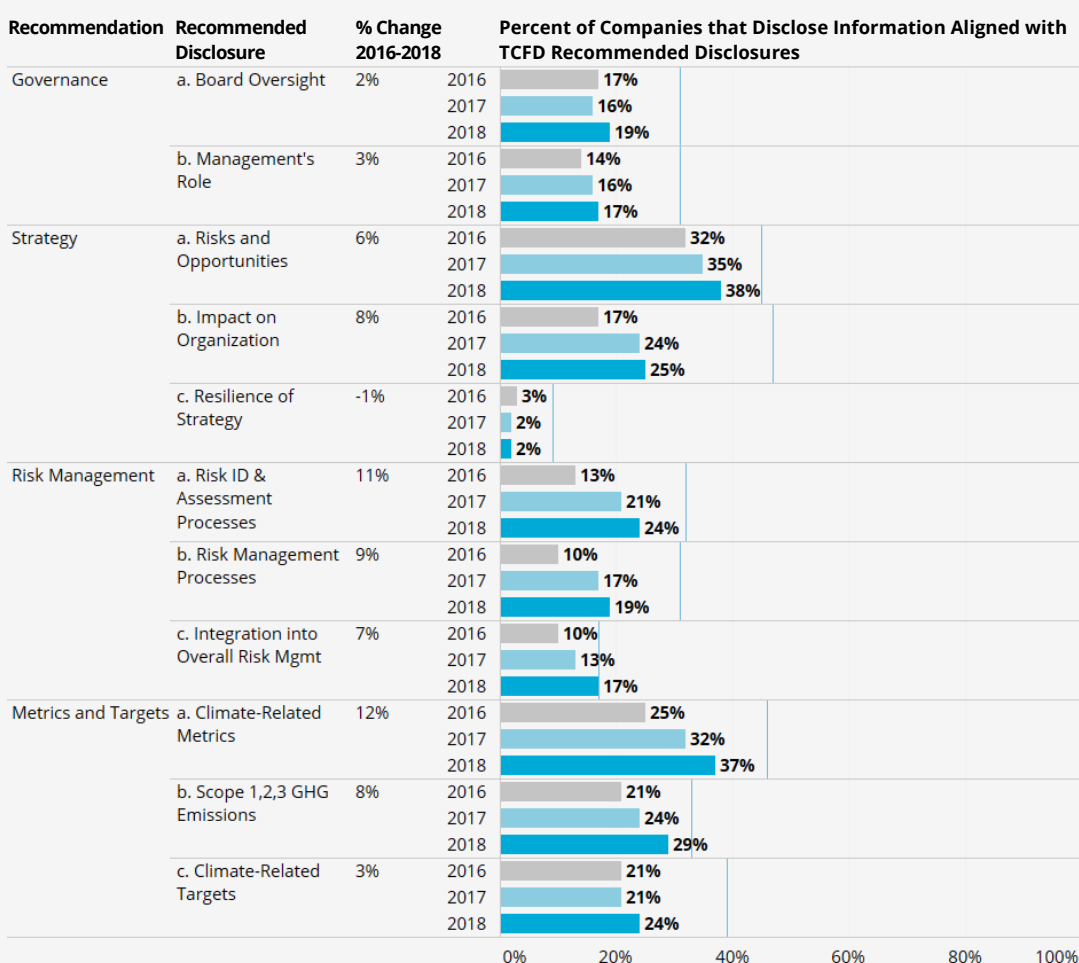
AI Review Summary

The AI reviewed disclosures from 63 technology and media companies in two categories: technology hardware and equipment, and interactive media and services. The technology and media companies ranged in size from about \$50 billion to \$12 million in annual revenue, with a median annual revenue of nearly \$3 billion. The AI review results for technology and media companies are shown in Figure 34.

Overall, in 2018 reporting, the 63 technology and media companies most often disclosed information aligned with the TCFD recommended disclosure *Strategy a)* while the lowest percentage of disclosures related to *Strategy c)*—slightly decreasing between 2016 and 2018. There was a notable 12% increase in disclosure of *Metrics and Targets a)*, climate-related metrics, between 2016 and 2018. However, disclosure of *Governance a)* increased only 2% over the same time period, with a slight decrease in 2017. Overall a smaller percentage of technology and media companies disclosed relevant information than the average across all industries for all 11 recommended disclosures.

Figure 34

Technology and Media Review Results by Year



Legend: | Percentage of total population that disclosed information aligned with TCFD recommended disclosures in 2018

Examples of Disclosure Aligned with TCFD Recommendations: Technology and Media

Strategy and Risk Management Recommendations

Strategy a) asks companies to describe the climate-related risks and opportunities they have identified, and *Risk Management b)* asks companies to describe their processes for managing climate-related risks. [Figure 35](#) provides a publishing company's description of its main risks and mitigation measures related to environmental matters, including climate change.

Figure 35

Excerpt from Annual Report

Risks connected with environmental matters

Climate change is a major issue for all industries, and no less so for publishing. In the publishing sector, greenhouse gas emissions are mainly connected with energy consumption, transportation (for distribution and logistics operations, for instance, or for business travel) and the production cycle for paper products. Growing concern on the part of stakeholders

and institutions over climate change could lead to reforms, in the future, to current legislative provisions governing emissions. Alongside the risks connected with climate-changing emissions are the risks connected with energy efficiency, which if low could adversely affect economic benefits, and the risks connected with potential interruptions in paper supply.

Main risks	Mitigation measures
Growing pressure from stakeholders and national and international institutions with regard to climate change.	Constant oversight of the issue through the continuous monitoring of overall greenhouse gas emissions produced by the various operations of the Group (such as product distribution and logistics and business travel) and the identification of useful actions to reduce them.
Loss of opportunities for economic benefits due to a reduced effectiveness of energy efficiency measures.	Constant oversight of the issue through the continuous monitoring of overall energy consumption, strong focus on the upgrading of IT equipment and the identification of energy efficiency measures in workplaces.
Interruptions in the production process due to the scarcity of paper as a raw material.	Progressive extension across the Group of the use of FSC and PEFC certified paper.

Europe: Gruppo Mondadori, [2018 Annual Report](#), p. 88

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Strategy Recommendation

Strategy a) asks companies to describe the organization's climate-related risks and opportunities. **Figure 36** provides a diversified technology company's description of its climate-related issues.

Figure 36

Excerpt from Integrated Report

Engaging with Climate-Related Risks and Opportunities

[...] As regards climate-related risks and opportunities, Hitachi is reviewing its risks in two categories, namely, (1) risks related to the transition to a low-carbon economy, and (2) risks related to the physical impact of climate change in accordance with the categories outlined in the new global TCFD recommendations. In terms of opportunities, we are positioning our contributions to the creation of a low-carbon society through enhanced energy-saving features of our products and services as a major opportunity, and are discussing how we can further expand it.

Risks in Transition to a Low-Carbon Economy Policy and Legal

Carbon taxes, energy consumption taxes, emissions trading systems, and other measures may be newly introduced or further strengthened, representing risks impacting directly on management costs in addition to those incurred in complying with environmental regulations and policies of countries and regions around the world.

To mitigate such risks, we have been reducing or minimizing cost burdens by enhancing production efficiency and introducing energy-saving measures. In fiscal 2017, our energy-saving investments totaled approximately 5.4 billion yen. Should our products fail to meet energy-efficiency standards and regulations, we will risk losing sales opportunities. In addition to strictly complying with existing standards and regulations, we will always endeavor to keep abreast of trends in laws and regulations and participate in the planning of new policies.

Technology

To reduce CO₂ emissions caused by the use of our products and services by our customers, which make a significant share of emissions in the value chain, we need new technology to achieve further energy-saving in our products and services.

Therefore, by applying Environmentally Conscious Design Assessments in the design and development stages of Hitachi products and service, we assess various environmental aspects at each stage of the product life cycle and strive to minimize environmental impact. In addition, by combining Hitachi's longstanding expertise in a wide range of social infrastructure technologies with OT (operational technology) and IT, we can provide optimal solutions that lead to the creation of new business opportunities.

Market and Reputation

A company's approach to climate change issues influences stakeholders' evaluations, and changes to market values, such as placing great importance on climate change countermeasures, affects customers' choice of products and services. This may pose a risk to business continuity. Hitachi upholds long-term environmental targets of reducing CO₂ emissions throughout its value chain by 50% in fiscal 2030 and 80% in fiscal 2050 compared to fiscal 2010 levels. Measures to attain these goals include investing in new facilities and equipment with higher energy efficiency and targeting greater efficiency in production through digitalization.

Risks Related to the Physical Impacts of Climate Change

Acute and Chronic

Climate-related physical risks include acute risks, such as increased severity of typhoons and floods, and chronic risks, including climate patterns that may cause the sea level to rise and chronic heat waves. Hitachi has a worldwide business presence and believes that disasters due to weather phenomena attributed to climate change, such as increasingly bigger typhoons and torrential rain, pose a risk to business continuity.

In order to minimize these risks, we take into consideration such factors as location and the possibility of damage from floods when setting up a new plant or deciding on the deployment of equipment. We also use the *Hitachi Group Guidelines for Developing Business Continuity Plans* that outline measures to be taken in terms of disaster to mitigate risks.

Climate-Related Opportunities

Resource Efficiency

Hitachi is promoting the efficient use of resources by reducing waste, recycling, and undertaking other measures. Also, for the efficient and sustainable use of natural resources, we are promoting efforts to minimize the amount of natural resources we use through improvements in production processes and resource-conserving designs.

Energy Source

Hitachi proactively uses renewable energy for our factories and offices. In our factories, we are able to efficiently use the electricity supplied from photovoltaic power generation facilities, despite fluctuations in the amount of power generated, by monitoring and controlling energy usage on production lines and by using storage batteries. Also, we are promoting the adoption of renewable energy credits and the expanded deployment of internal carbon pricing and the self-consumption solar power generation. In our offices, too, as well as visualizing energy usage and optimizing the amount of energy used in the building as a whole through Building and Energy Management Systems (BEMS).^{*} In our business operations, we create business opportunities, such as by actively providing renewable energy from wind power generation systems.

[...]

^{*} BEMS aims to optimize the internal environment of a building and its energy efficiency.

Asia-Pacific: Hitachi, Ltd., [Hitachi Integrated Report 2018](#), pp. 46-47

Note: some content, denoted by "[...]," was deleted in order to fit the page

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Risk Management Recommendation

Risk Management a) asks companies to describe their processes for identifying and assessing climate-related risks. Figure 37 provides a technology company's description of its process for identifying and assessing sustainability issues, which includes climate-related issues.

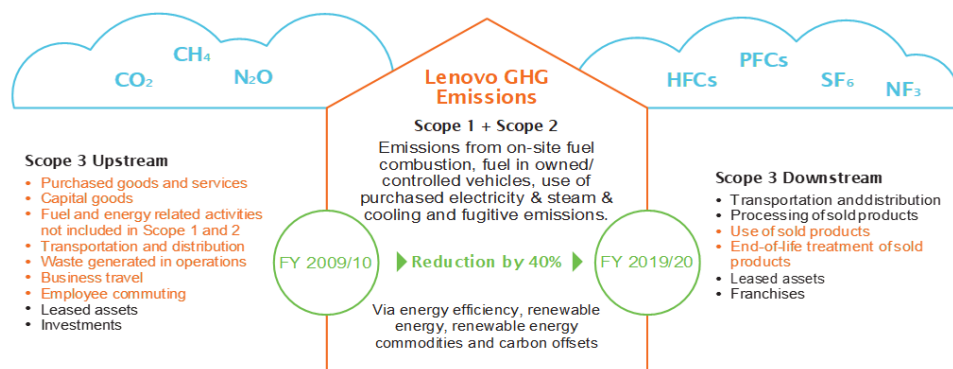
Figure 37

Excerpt from Sustainability Report

CLIMATE CHANGE RISK/OPPORTUNITIES MANAGEMENT

Climate change risks and opportunities are identified and evaluated as part of two processes within Lenovo's business management systems: our global annual risk registration process and our annual environmental significant aspect evaluation. These two processes are connected, meaning that if climate change risks are identified in the global risk registration, they are considered in the environmental aspects analysis — and vice versa.

1. Among other sustainability factors, Lenovo's formal risk management process includes: environmental risk categories such as environmental incidents, catastrophic weather conditions, supply chain disruptions and other elements. Each business unit is required to identify risks and assess their impacts on Lenovo's strategy execution, then develop mitigation plans for select identified risks. This process is managed by Lenovo's Enterprise Risk Management team.
2. We also evaluate climate change risks; the results of this evaluation are considered in the annual risk registration process described above. Energy consumption, the associated greenhouse gas emissions and climate change are identified as significant environmental aspects and impacts for Lenovo. As such, associated risks and opportunities are evaluated and prioritized annually based on Lenovo's significant aspect methodology in accordance with the requirements of our environmental management system. Per these requirements, climate change is evaluated relative to its actual and potential influence on the environment and the business. This process is managed by Lenovo's Global Environmental Affairs team.



Notes: Scope 3 categories in orange are tracked and evaluated and in some cases actions are being taken to drive emissions reductions
Scope 3 categories in black are not relevant to Lenovo

As a demonstration of Lenovo's long-term approach to risk management in this area, in May 2014, Lenovo's Board of Directors (BOD) and Executive Committee (LEC) acted to increase Lenovo's GHG emissions reduction commitment from 20 percent to 40 percent by FY 2019/20, relative to FY 2009/10 (see graphic above). We will meet this commitment through investment in on-site renewable generation, energy efficiency and renewable energy credits or offsets. We are preparing to identify and develop our third-generation targets after 2020. We are reviewing and evaluating Science Based Targets Initiative's methodology to determine the best approach for Lenovo that will align with the science based reduction pathways for limiting global temperature rise. Lenovo's commitment to addressing climate change extends to supporting global initiatives such as We Mean Business, a coalition of businesses and investors supporting a transition to a low carbon economy.

Asia-Pacific: Lenovo Group Ltd., [2017/18 Sustainability Report](#), pp. 75-76

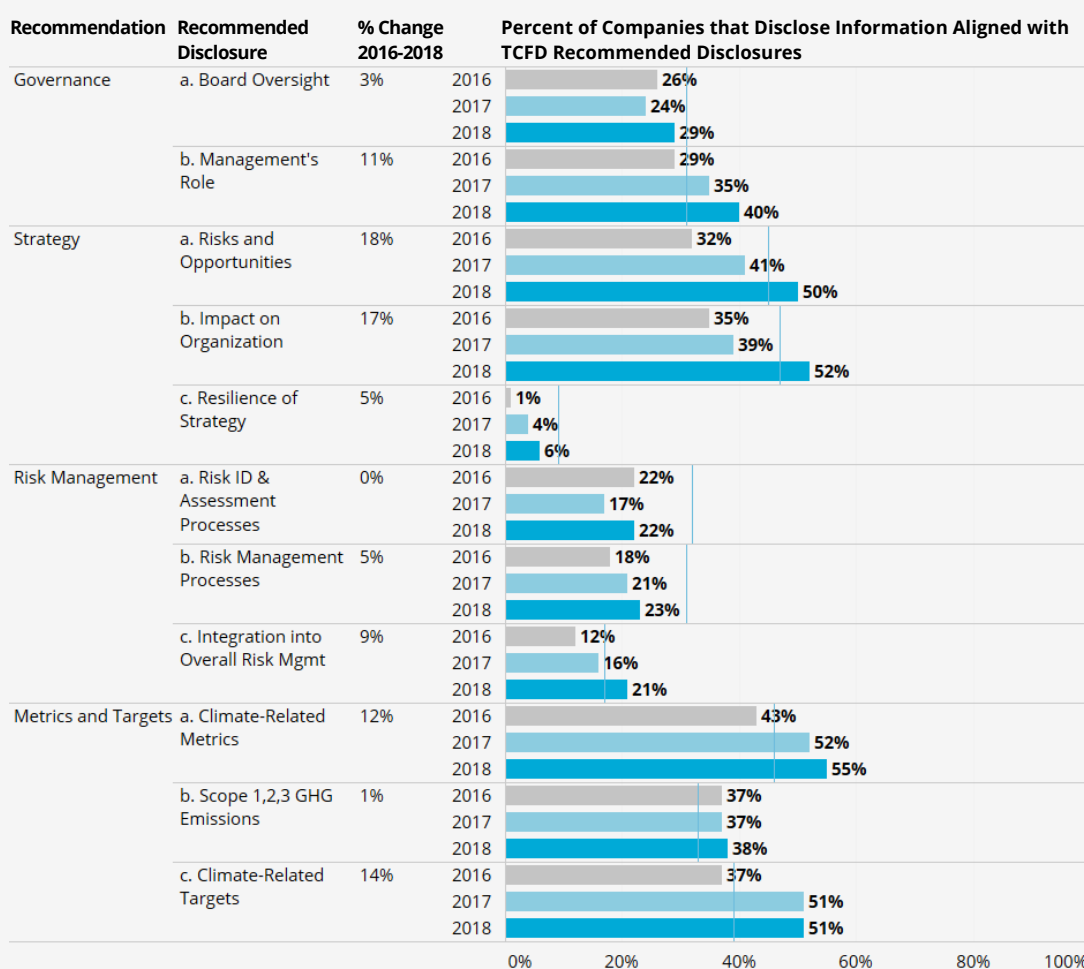
AI Review Summary

The AI reviewed disclosures from 82 consumer goods companies in two categories: consumer retailing and textiles and apparel. The consumer goods companies ranged in size from about \$120 billion to \$800 million in annual revenue, with a median annual revenue of over \$12 billion. The AI review results for consumer goods companies are shown in [Figure 38](#).

In 2018 reporting, over half of the 82 consumer goods companies disclosed information aligned with the TCFD recommended disclosure *Metrics and Targets a)*, climate-related metrics, while the lowest percentage of companies disclosed information in alignment with *Strategy c)*, resilience of the company's strategy. There was a notable 18% increase in disclosure of *Strategy a)*, climate-related risks and opportunities, between 2016 and 2018. However, there was no increase in the percentage of disclosure for information aligned with *Risk Management a)* over the same time period, although there was a slight decrease in 2017. When compared to the average across all industries, a higher percentage of consumer goods companies disclosed information aligned with eight of the 11 recommended disclosures.

Figure 38

Consumer Goods Review Results by Year



Legend: | Percentage of all companies that disclosed information aligned with TCFD recommended disclosures in 2018

Examples of Disclosure Aligned with TCFD Recommendations: Consumer Goods

Governance Recommendation

Governance a) asks companies to describe the board's oversight of climate-related risks and opportunities. [Figure 39](#) provides a retail company's description of its board-level governance of climate-related issues.

Figure 39

Excerpt from Sustainability Report

Climate change governance

Woolworths Group considers climate change to be a critical, board-level strategic issue. The Board Sustainability Committee oversees our Group-level response to climate change risks and opportunities. Climate change forms part of our sustainability strategy, progress on which is reported to the Board Sustainability Committee on a quarterly basis.

Management has primary responsibility for assessing and managing climate-related risks and opportunities as part of our enterprise risk management process. The Woolworths Facilities Management team is responsible for the energy efficiency and greenhouse gas emissions of our own operations, and manage our board-endorsed energy strategy targeting supply, demand and innovation opportunities to reduce our carbon emissions.

Asia Pacific: Woolworths Group, [2018 Sustainability Report](#), p. 34

Risk Management Recommendation

Risk Management b) asks companies to describe their processes for managing climate-related risks. [Figure 40](#) provides a consumer goods company's disclosure of its process.

Figure 40

Excerpt from Annual and Sustainability Report

THE MAIN FINANCIAL, SOCIAL AND ENVIRONMENTAL RISKS* IDENTIFIED AND MONITORED

CATEGORY	TYPES	DEFINITION	MITIGATION METHOD
SOCIAL AND ENVIRONMENTAL RISKS	Climate Change	Climate change could have a negative impact on the Company's businesses. Resources like water, electricity and animal feed (which is dependent on farming) are critical for production of raw materials (cattle, poultry, pork and lamb). Businesses could also be affected by new legislation and regulation in this area.	We monitor the environmental impacts from direct (industrial, logistics and shipping) operations and taking steps to minimize the impact of the Company's own and its suppliers' operations. Monitoring involves taking a global inventory of direct and indirect GHG emissions using the international GHG Protocol methodology. The results of the inventory are published annually on the CDP platform. JBS also monitors indicators representing the volume of water and electricity used by its operations in order to optimize production processes and gradually reduce consumption. To reduce the impact from JBS operations and create opportunities, the Company has an annual plan to invest in environmental improvements to optimize use of natural resources, water and waste energy recycling and address other issues.

*All potential risk factors the Company is aware of are detailed in sections 4 and 5 of the JBS S/A Reference Form, available at <http://jbs.infoinvest.com.br/ptb/4896/80775.pdf>

South America: JBS S.A., [2018 Annual and Sustainability Report](#), pp. 32-33

Metrics and Targets Recommendation

Metrics and Targets c) asks companies to describe the targets they use to manage climate-related risks and opportunities and performance against targets. [Figure 41](#) provides a home appliance manufacturing company’s assessment of progress against one of its targets, the reduction in CO₂ emissions.

Figure 41
Excerpt from Sustainability Report

Our targets

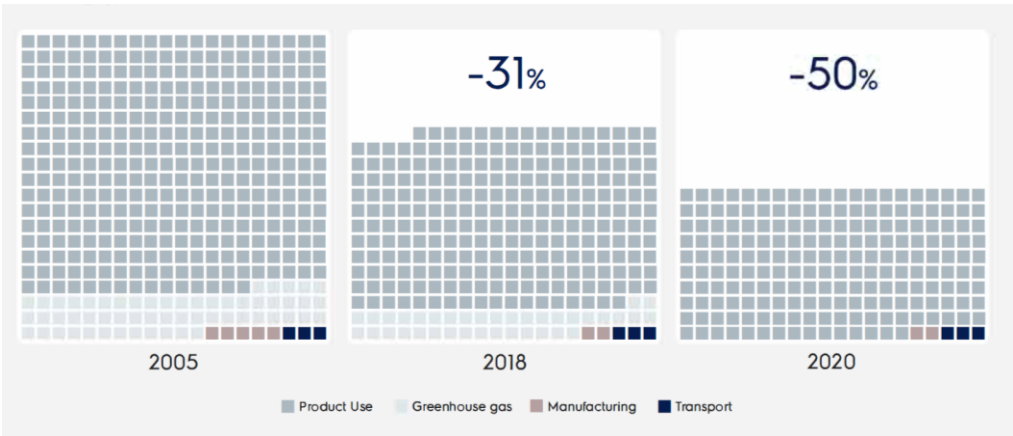
Our 50% climate target – halve the Group's climate impact, preventing the release of 25 million metric tons of carbon dioxide and its equivalents (CO₂e) over 15 years - between 2005 and 2020. The target focus on product efficiency in the main product categories. Sales volumes and emission factors are normalized to 2005.

[...]

Progress on our 50% target

By the end of 2018, we had cut our CO₂ emissions by 31% compared to 2005 - toward our 50% target by 2020.

Climate targets 2020 ¹⁾



1) Reduce CO₂ impact by 50% in 2020 focusing on product efficiency in the main product categories. Sales volumes and emission factors are normalized to 2005.

Europe: Electrolux AB, [2018 Sustainability Report](#), pp. 29-30
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4. TCFD-Aligned Reporting by Asset Managers and Asset Owners

As noted previously, asset managers and asset owners were excluded from the AI review because, in many cases, the types of reports needed for analysis are not publicly available. In its 2017 report, the Task Force 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 determined 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 reporting by asset managers and asset owners, the Task Force reviewed aggregated reporting results of signatories to the Principles for Responsible Investment (PRI). PRI signatories are required to report on their responsible investment activities on an annual basis (see [Figure 42](#) for more information on PRI).²² In late 2017, PRI integrated several climate-related indicators based on the TCFD recommendations into its 2018 reporting framework. The PRI made the climate-related indicators voluntary to report and voluntary to disclose and did not include those indicators in the PRI signatories' assessment scores.

The Task Force mapped PRI's climate-related and other indicators to its 11 recommended disclosures, and the aggregated results for both asset managers (referred to as investment managers by the PRI) and asset owners are shown in [Figure 43](#) (p. 42) and [Figure 44](#) (p. 42), respectively. It is important to note that a single PRI indicator was mapped to *Risk Management a*) and to *Risk Management b*), which is why those two recommended disclosures are combined.²³ The percentages included in these figures is based on aggregated 2018 reporting results of 1,449 PRI signatories—of which 1,111 are asset managers and 338 are asset owners. About one third (480) of 2018 reporting PRI signatories provided information on at least one of the PRI indicators that aligned with the TCFD recommended disclosures. Of these 480 signatories, 349 were asset managers and 131 were asset owners, with the majority in Europe.

As shown in [Figure 43](#) (p. 42), the highest levels of reporting for asset manager signatories was information on their risk management processes for identifying, assessing, and managing climate-related risks which relates to *Risk Management a*) and *Risk Management b*) under the Task Force's Risk Management recommendation. This was closely followed by reporting on the organization's consideration of climate change issues as possible investment risks and opportunities, which was mapped to *Strategy a*). The *Strategy c*) recommended disclosure had the lowest response rate, with 4% describing the resilience of their organization's strategy, considering different climate-related scenarios.

Figure 42

About PRI

The PRI works with its international network of signatories to put its six Principles for Responsible Investment into practice. Its goals are to understand the investment implications of environmental, social, and governance (ESG) issues and support signatories in integrating these issues into investment and ownership decisions.

The six Principles for Responsible Investment are a voluntary and aspirational set of principles that describe actions for incorporating ESG issues into investment practice.

Currently there are over 2,360, PRI signatories representing \$89 trillion in assets.

²² PRI, [Annual Report 2018](#), August 14, 2018, p. 92.

²³ PRI indicator SG 14.7 CC asks signatories to "[d]escribe [their] risk management processes for identifying, assessing, and managing climate-related risks" whereas the TCFD's *Risk Management a*) asks organizations to describe processes for identifying and assessing climate-related risks and *Risk Management b*) asks organizations to describe processes for managing climate-related risks.

Figure 43

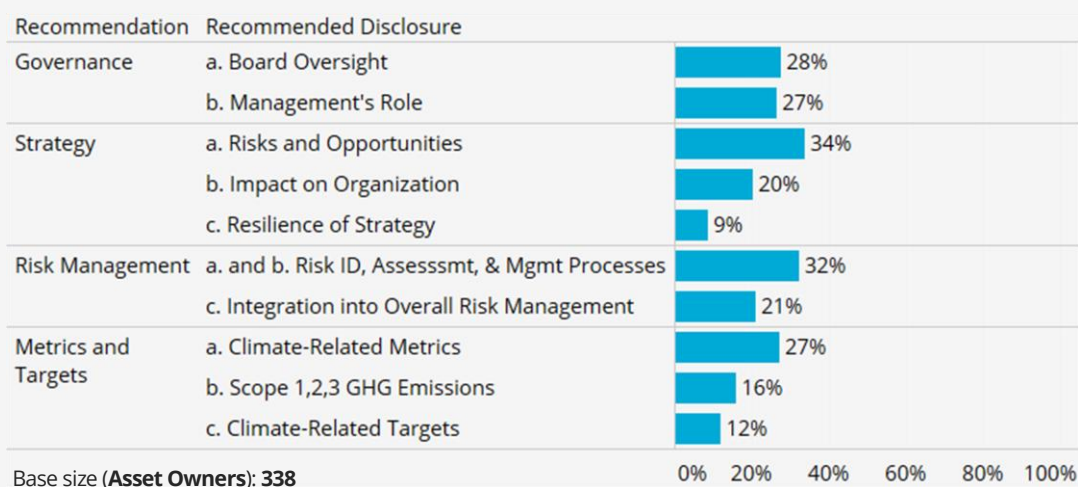
PRI Signatories with TCFD-Aligned Reporting: Asset Managers



For the asset owner signatories, the highest levels of reporting related to *Strategy a*) under the TCFD recommendations (see [Figure 44](#)). Similar to asset managers, the lowest response rate for asset owners was for the *Strategy c*) recommended disclosure at 9%. Overall, among the 2018 reporting PRI signatories, a larger percentage of asset owners than asset managers reported information aligned with the 11 TCFD recommended disclosures.

Figure 44

PRI Signatories with TCFD-Aligned Reporting: Asset Owners



Similar to [Section B.3. Climate-Related Financial Disclosures for Select Industries 2016-2018](#), this section includes examples of reporting by asset managers and asset owners to provide additional insight on current practices.

Examples of Disclosure Aligned with TCFD Recommendations: Asset Manager

Strategy Recommendation

Strategy b) asks companies to describe the impact of climate-related risks and opportunities on their businesses, strategy, and financial planning. For asset managers, the Task Force asks them to describe how climate-related issues are factored into relevant products or investment strategies. [Figure 45](#) provides an asset manager's description of this.

Figure 45

Excerpt from Transparency Report

SG 01.3b CC

Describe how climate-related risks and opportunities are factored into your investment strategies or products.



We factor climate-related risks and strategies into our investment strategies or products.

We have a formal comprehensive and integrated approach to manage our exposure to carbon risks and access opportunities from the transition to a low-carbon economy. Over the last three years, we have reviewed and refined our approach and continued to implement it across our investment and stewardship activities, taking account of the specific challenges faced by each investment strategy and different asset classes and learning from our experiences and industry best practice.

The carbon risk and opportunities management activities we are implementing cover our public equities and credit, private real estate and infrastructure assets, representing \$41bn AUM as of 31 Dec 2017, or 91.5% of our AUM.

Our approach has four elements:

Awareness: Portfolio managers are aware of the carbon risks in their portfolios, which investments are the largest contributors, and what are the associated risks and mitigation strategies.

Integration: Portfolio managers integrate carbon risk considerations alongside other value and risk considerations, exploiting green investment opportunities or divesting where carbon risk alongside other factors impacts value.

Engagement: We act as engaged stewards of the investments we manage or represent on behalf of our clients. Where we hold assets with significant carbon risk exposure, we will manage directly owned assets, and engage with public and private companies, to mitigate the carbon risk.

Advocacy: We engage with public policymakers and sector organisations, nationally and internationally, to encourage policy or best practice that facilitates the transition to a low-carbon economy.

Across private markets, infrastructure, real estate and private equity, our strategies have a governance structure and cover sectors that lend themselves more naturally to innovative opportunities arising from the low-carbon transition. We use our rights and leverage as owners or shareholders of those assets and companies in which we are invested to influence practice and strategy.

[...]

Going forward, we have initiated an internal working group looking at carbon risk and opportunity management, including 2-degree scenario planning. We aim to strengthen our internal understanding and further our analysis of carbon risks monitoring and reporting implications. Importantly, the internal discussions focus on how to implement 2-degree scenario planning and stress testing in ways that are meaningful for our investment processes across different asset classes. We will amend our carbon risk and opportunity approach and targets on the basis of our findings. We are confident that by expanding the work we already carry out in measuring carbon risk to include scenario analysis will help us, other investors and the assets themselves understand much better the scale of the carbon opportunity and more specifically on how to deliver on it.

Europe: Hermes Investment Management, [RI Transparency Report 2018](#), pp. 21-22

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Risk Management Recommendation

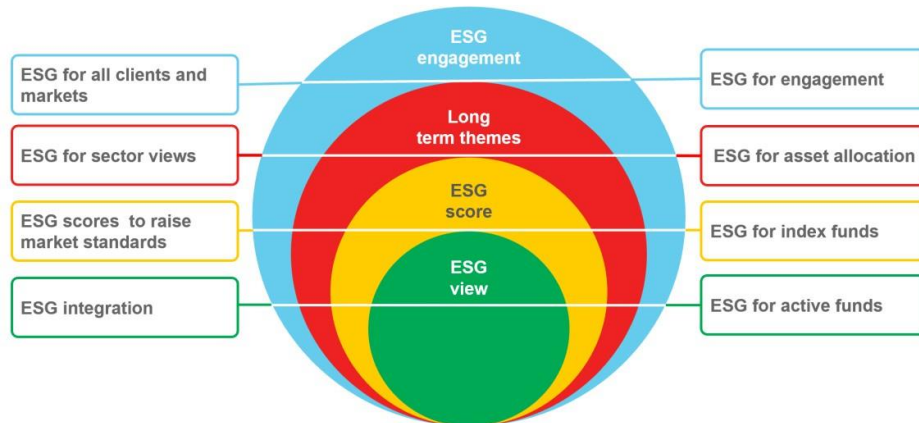
Risk Management a) asks companies to describe their processes for identifying and assessing climate-related risks. Figure 46 provides a description of an asset manager's risk identification and assessment process.

Figure 46

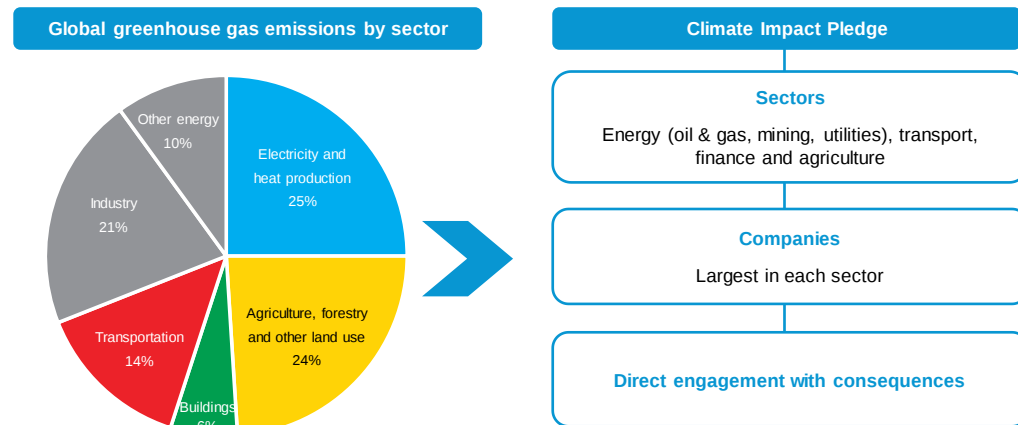
Excerpt from TCFD Report

PROCESSES FOR IDENTIFYING AND ASSESSING CLIMATE-RELATED RISKS

Climate-related risks can be identified at the level of a company, sector, country or the entire market. To systematically assess such risks, we utilise a multi-layered process, depicted below.



LGIM engages directly with companies and policymakers globally to ensure that the market transitions to a low-carbon economy in an orderly manner. The first step is identifying the industries which contribute the most to global greenhouse gas emissions and therefore require urgent action.



Source: IPCC, 2014

Beginning with the biggest contributors to global greenhouse gas emissions (left side of chart), we focused on sectors which need particular attention from the point of view of protecting overall market returns. These are energy (namely oil and gas, utilities and mining), transport (automobile manufacturers) and finance and food retail (two sectors which are not always discussed in a climate context). Agriculture is a significant source of emissions, but is often overlooked due to the low levels of direct exposure by investors. We put the onus on food retailers to address this issue from a supply chain perspective. Further detail on this engagement programme is explained in the next section.

Europe: Legal & General Investment Management, [Task Force on Climate-related Financial Disclosures Report 2018](#), pp. 22-23

Risk Management Recommendation

Risk Management b) asks companies to describe their processes for managing climate-related risks. [Figure 47](#) provides part of a diversified financial institution's disclosure of its risk management related to climate change, and [Box 1](#) describes how the asset management business has applied the institution's risk management approach to its activities.

Figure 47

Excerpt from Financial Filing

Risk management related to climate change

Since the November 2015 Paris Agreement, the BNP Paribas Group has taken a number of steps to integrate climate change risk management and to support energy transition in line with the 2°C trajectory.

The Group has strengthened its sectoral policy on coal so that it no longer finances the extraction of coal, whether via mining projects or via specialised coal mining companies without a diversification strategy, as well as coal-based power plant projects.

Europe: BNP Paribas, [2018 Registration Document and Annual Financial Report](#), p. 106

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Box 1

Using Scenarios to Align Investment Policy with Paris Agreement

In 2015, BNP Paribas committed to ensuring that its financing and investment activities in the energy sector would evolve in line with the objectives of the Paris Agreement to keep global warming significantly below the 2°C threshold. According to the International Energy Agency's (IEA) in its Sustainable Development Scenario (SDS), almost all of the emissions reductions from the energy sector required to achieve this—2.8Gt out of a total 3Gt—come from cutting back on the use of coal in power generation.^{1,2}

Using this scenario and the related emissions pathways as a guide, BNP Paribas Asset Management (BNPP AM) recently implemented an enhanced coal policy, addressing companies engaged in mining thermal coal and generating electricity from coal.^{3,4,5} Power generators whose carbon intensity is above the 2017 global average of 491 gCO₂/kWh will be excluded, with BNPP AM subsequently following the Paris-compliant trajectory for the sector as determined by the IEA SDS, which requires power generators' carbon intensity to fall to 327 gCO₂/kWh by 2025.

1. See IEA, *Power: Tracking Clean Energy Progress*, © 2019 OECD/IEA. Note that the Paris Agreement (Article 2a) commits its signatories to: "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change." The IEA's 2018 *World Energy Outlook* states (p.89): "The CO₂ emissions trajectory to 2040 in the Sustainable Development Scenario is lower than most published decarbonisation scenarios based on limiting the long-term global average temperature rise to 1.7-1.8°C above pre-industrial levels." Ideally, we would like to see the IEA publish and regularly update a 1.5°C scenario and to adopt a more precautionary stance with regard to negative emissions technologies in its modelling, but the SDS is without doubt the most widely referenced Paris-compliant scenario for the global energy industry, and as such the clearest reference point for governments, companies, and investors concerned with aligning energy emissions with the Paris Agreement.
2. According to the most recent iteration of the SDS set out in the IEA's 2018 *World Energy Outlook*, CO₂ emissions from energy need to fall by 3.1Gt by 2025 versus 2017 levels, and all of this 3.1Gt reduction comes from lower emissions from coal (emissions from natural gas are slightly higher in 2025 versus 2017 levels, and emissions from oil only slightly lower). Moreover, nearly all of this reduction in coal emissions - 2.83Gt of the total 3.1Gt required, or 93% - comes from the power sector.
3. The full policy is available here: <http://institutional.bnpparibas-am.com/divesting-coal-new-policy/>.
4. The new policy does not cover metallurgical coal as there are currently no viable alternatives to metallurgical coal in the steel-making process. By contrast, there are many cleaner alternatives to thermal coal for producing electricity.
5. This policy will come into effect in 2020 and apply to all of BNPP AM's actively managed open-ended funds, as well as becoming the default policy for segregated mandates.

Examples of Disclosure Aligned with TCFD Recommendations: Asset Owner

Governance Recommendation

Governance a) asks companies to describe the board's oversight of climate-related risks and opportunities, and *Governance b)* asks companies to describe management's role in assessing and managing climate-related risks and opportunities. [Figure 48](#) provides a pension plan's description of its board's oversight and management's role to evaluate climate-related risks and opportunities.

Figure 48

Excerpt from Report on Sustainable Investing

Implementation of the Task Force's recommendations

Governance

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

- a) Describe the board's oversight of climate-related risks and opportunities
- b) Describe management's role in assessing and managing climate-related risks and opportunities

The Board oversees CPPIB's efforts to understand and manage climate-related risks and opportunities. They receive updates about broad trends and specific investment-related developments via ongoing risk reporting and approve our overall risk appetite and risk policy, including the integration of ESG factors and climate change specifically.

Our CEO sets the tone and establishes the overall risk culture. The Head of Sustainable Investing provides the Board with updates on our sustainable investing activities (see page 9 for our Integrated Sustainable Investment Framework).

In July 2017, Neil Beaumont joined as CPPIB's Chief Financial and Risk Officer (CFRO). The CFRO has explicit accountability to oversee and enhance the risk management framework and to ensure it is appropriate given CPPIB's unique mandate and risk profile. The CFRO is working closely with the new ad hoc Risk Committee of the Board to advise management and the Board on the evolution of our risk management practices. He also sponsors CPPIB's climate change initiative, overseeing the Climate Change Steering Committee, which, along with the Climate Change Project Management Office, guides our climate-related efforts. (For more on the Climate Change Steering Committee and Climate Change Project Management Office (see page 14).

North America: CPP Investment Board (CPPIB), [2018 Report on Sustainable Investing](#), p. 59

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Strategy Recommendation

Strategy b) asks companies to describe the impact of climate-related risks and opportunities on their businesses, strategy, and financial planning. For asset owners, the Task Force asked them to describe how climate-related issues are factored into relevant products or investment strategies.

[Figure 49](#) provides a pension fund's disclosure of its consideration of climate-related issues.

Figure 49

Excerpt from Annual Financial Report

Strategy

With the transition to a low-carbon economy already underway and accelerating globally, and likely to affect virtually every investment in the Fund's broadly diversified portfolio, the Fund is developing strategies to address both the risks and opportunities presented by climate change. However, key drivers of climate risk assessment such as climate modeling, projections of energy demand, technological development, and regulations are in a state of flux. These factors will affect the magnitude and the timing of climate impacts on the Fund's assets. The Fund has set a strategic priority of evaluating the constantly shifting individual factors and the complex interaction among those factors to inform the Fund's investment, engagement and public policy advocacy strategies.

North America: New York State Common Retirement Fund, [2018 Comprehensive Annual Financial Report](#), p. 91

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 50](#) provides a pension fund's disclosure of such metrics.

Figure 50

Excerpt from Sustainability Report

Carbon footprint at portfolio level, Nordic equities, international equities and corporate bonds for 2018 (Enterprise Value)

	Carbon Footprint (tonnes CO ₂ e/DKKm)	Carbon Intensity (tonnes CO ₂ e/DKKm)	WACI (tonnes CO ₂ e/DKKm)
Nordic equities	20.79	39.68	29.07
Scope 1	19.43	37.07	25.94
Scope 2	1.37	2.61	3.13
International equities	20.08	27.35	36.49
Scope 1	16.95	23.09	30.89
Scope 2	3.13	4.26	5.60
Corporate bonds	10.39	14.01	22.39
Scope 1	7.20	9.71	16.44
Scope 2	3.19	4.30	5.95

Europe: ATP, [Responsibility 2018](#), p. 24

C Adoption and Use of the TCFD Recommendations

C Adoption and Use of the TCFD Recommendations

This section summarizes the results of a survey on companies' efforts to implement the TCFD recommendations as well as users' views on the usefulness of climate-related financial disclosures for decision-making.²⁴

The Task Force believes it is important to highlight the survey was primarily distributed to organizations and individuals that signed up for updates on the Task Force's website, which means that most survey respondents were familiar with the Task Force's work. In fact, 95% of respondents indicated they were either somewhat familiar or very familiar with the TCFD recommendations.

1. Scope and Approach

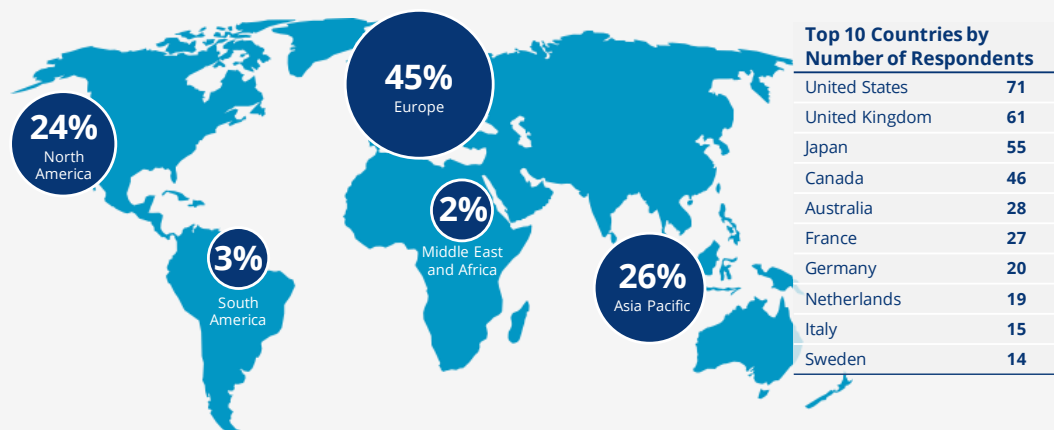
In November 2018, the Task Force issued a comprehensive survey to better understand the status of implementation of the TCFD's recommendations and associated challenges and to obtain views from users of climate-related financial disclosures and others on the usefulness, availability, and quality of such disclosures. The Task Force structured the survey to direct respondents to specific questions based on whether they are involved in preparing climate-related financial disclosures, use them for decision-making, or have other interests in these disclosures.

The Task Force distributed the survey to over 3,000 companies and other organizations, resulting in 485 responses.^{25,26} Half of the responses were from preparers and users of disclosures with the other half comprised of other interested parties, including non-governmental organizations (NGOs), consultants, industry associations, academia, the public sector, and stock exchanges.

Figure 51 shows the geographic distribution of the survey respondents, with 45% from organizations headquartered in Europe. The Task Force notes that the survey responses are significantly lower in Latin America, Africa, and Asia (excluding Japan), which may potentially indicate greater challenges in adoption of the TCFD recommendations in these regions.

Figure 51

Geographic Distribution of Respondents



²⁴ In its survey, the Task Force used the term "climate-related disclosures" as a synonym for "climate-related financial disclosures."

²⁵ The Task Force distributed the survey to individuals that signed up for updates on the Task Force's website. The Task Force also sent the survey to the following associations, requesting that they share the survey with their members: the Accounting for Sustainability Project, Beverage Industry Environmental Roundtable, Business for Social Responsibility, Ceres, China-UK TCFD Pilot Group, Farm Animal Investment Risk & Return, Institutional Investors Group on Climate Change, International Council on Mining and Metals, Institute of International Finance, United Nations Environment Programme Finance Initiative, World Business Council for Sustainable Development, and World Economic Forum.

²⁶ The Task Force uses the term "organizations" when referring to a broad range of entity types.

Box 2 summarizes key demographic information on the survey respondents, including the types of organizations that responded, the percent of survey respondents that were preparers, users, or other types of organizations, and the composition of preparers and users in terms of whether they represented financial or non-financial companies.

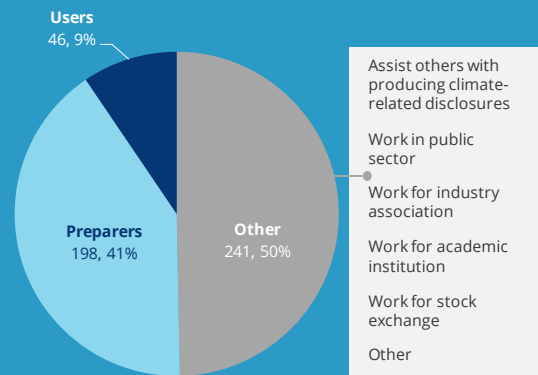
Box 2

TCFD Survey Respondent Demographics

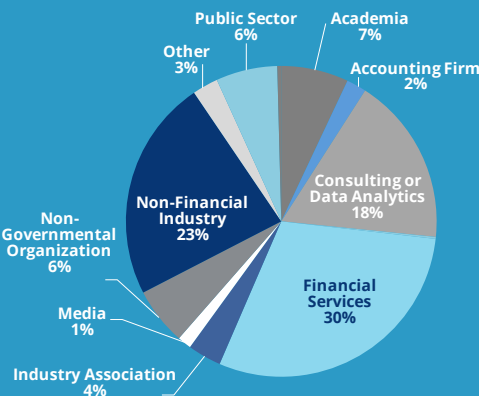
Types of Respondents

The Task Force received 485 survey responses. Respondents identified themselves based on the option that most closely matched their functional perspective or organizational type.

Respondents by Functional Type



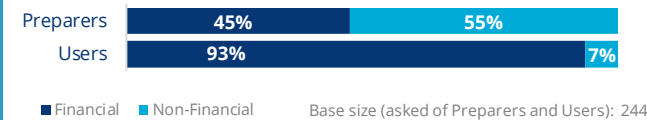
Respondents by Organization Type



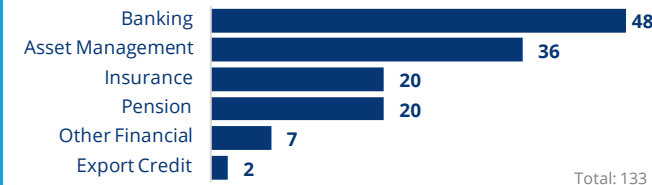
Composition of Preparers and Users

About half of the respondents identified themselves as preparers or users of climate-related disclosures. The Task Force asked these respondents to disclose their sector type, with 55% of preparers working for non-financial companies. The charts at the bottom provide additional granularity by industry type.

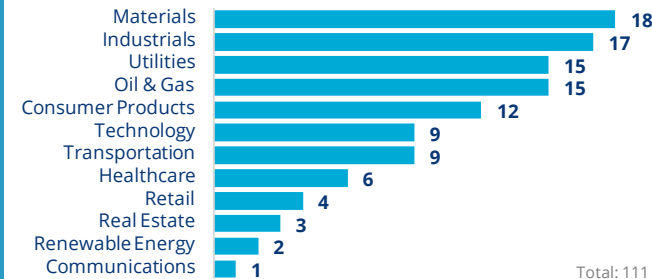
Percentage of Respondents by Sector



Financial Industries



Non-Financial Industries



\$770B

average asset size of banks and insurers

\$118B

average AUM of asset managers

\$114B

average assets owned by asset owners

\$30B

average annual revenue of non-financial companies

These averages are based on a subset of the 244 respondents that identified as preparers or users. Specifically, the averages are based on the 70% of respondents that provided their organization names and for which public information was available.

2. Overview of Results

Overall, the Task Force was pleased with the number of responses it received to the survey, especially the number of respondents that identified as preparers. The Task Force would like to have received a larger number of respondents that identified as users and recognizes that further outreach to users may be needed. Across respondent types, the Task Force received comments that helped clarify specific issues and enhance the Task Force’s analysis. The Task Force observed positive aspects of the survey results as well as several continuing challenges associated with implementing the TCFD recommendations and using climate-related financial disclosures.

Positive Aspects

The Task Force identified several areas where the vast majority of respondents provided a positive or favorable response, including the following:

- **TCFD Implementation.** Ninety-one percent (91%) of respondents that identified as preparers have decided to “fully” or “partially” implement the TCFD recommendations, with 67% stating their organizations plan to complete implementation within three years.
- **Use of Climate-Related Financial Disclosures.** Seventy-six percent (76%) of respondents that identified as users have incorporated climate-related financial disclosures in their financial decision making processes.
- **Availability and Quality of Climate-Related Financial Disclosures.** Eighty-five percent (85%) of respondents that identified as users or an organization that assists preparers with climate-related financial disclosures saw an increase in the *availability* of climate-related financial disclosures since the release of the TCFD recommendations in June 2017, with 75% of such respondents citing improvements in the *quality* of disclosures.

The Task Force recognizes the survey results showed significantly higher rates of climate-related financial disclosures in alignment with the TCFD recommendations than the findings of our wider AI review of disclosures outlined in the previous section. This supports our view that progress—while positive—is slower across a broader population. As such, the Task Force will continue to focus on increasing the rate of awareness and implementation of the TCFD recommendations.

Continuing Challenges

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

- **Scenario Analysis.** Almost half of the respondents that identified as preparers found disclosing scenario analysis assumptions difficult due to their inclusion of confidential business information. [Section D. Disclosure of Strategy Resilience Using Scenario Analysis](#) provides more information on the survey results related to scenario analysis and disclosure of strategy resilience.
- **Standardization of Metrics.** Respondents that identified as preparers stated that increased standardization of metrics and targets would ease implementation challenges, while respondents that identified as users noted increased standardization would improve comparability across companies’ climate-related financial disclosures.
- **Financial Impact.** The top area of disclosure identified by users as needing improvement was for companies to provide more clarity on the financial impact of climate-related issues on the companies.

In other areas, preparers’ views on implementation issues differed from users’ vision for improving climate-related financial disclosures, as shown in [Figure 52](#) (p. 52). Some of these differences echo the feedback the Task Force received during its public consultation process in 2017, including preparers’ concerns with disclosing confidential information and difficulties in identifying relevant metrics, especially ones that demonstrate financial impact. As discussed in its

2017 report, in developing its recommendations and guidance, the Task Force recognized the tension between preparers and users and sought to balance the burden of disclosure on preparers with the need for consistent and decision-useful information for users.

Figure 52

Differences in Perspectives between Preparers and Users

Governance	Strategy	Risk Management	Metrics and Targets
Preparer View Climate is embedded in our processes so it is challenging to discuss separately in our governance disclosures User View The most useful element of disclosures on governance is information on how companies integrate climate-related risks into the governance framework and the associated roles and responsibilities	Preparer View Disclosing scenario analysis assumptions is difficult due to their inclusion of confidential business information User View Information on the scenarios and assumptions used, as well as financial impact of climate-related issues on the organization would improve the usefulness of disclosures	Preparer View Climate is integrated into our normal risk management processes and therefore does not require separate disclosure User View The most useful element of disclosures on risk management is information on how companies measure and manage climate-related risks	Preparer View GHG emissions or carbon footprint metrics are not reflective of our climate-related risks or opportunities User View Information on GHG emissions is a useful element of climate-related financial disclosures

3. Preparer Perspectives

The Task Force received 198 survey responses from individuals that identified themselves as preparers, defined as someone who contributes to producing climate-related financial disclosures for his or her organization. The survey presented a series of questions to these respondents designed to elicit information on their organizations’ efforts to implement the recommendations, including levels of implementation and public disclosure, location of disclosures, factors and functions driving implementation, and implementation issues. The Task Force asked these questions of preparers to better understand where preparers are on the path to adoption and obstacles to the development of decision-useful climate-related financial disclosures.

TCFD Implementation and Public Disclosure

The vast majority of preparers—91%—responded their organizations have decided to “fully” or “partially” implement the TCFD recommendations (Figure 53, p. 53). Of these respondents, 7% said they have completed implementation of the TCFD recommendations, 9% said they expect to complete implementation within one year, 58% said in two to three years, and 21% said in more than three years.²⁷

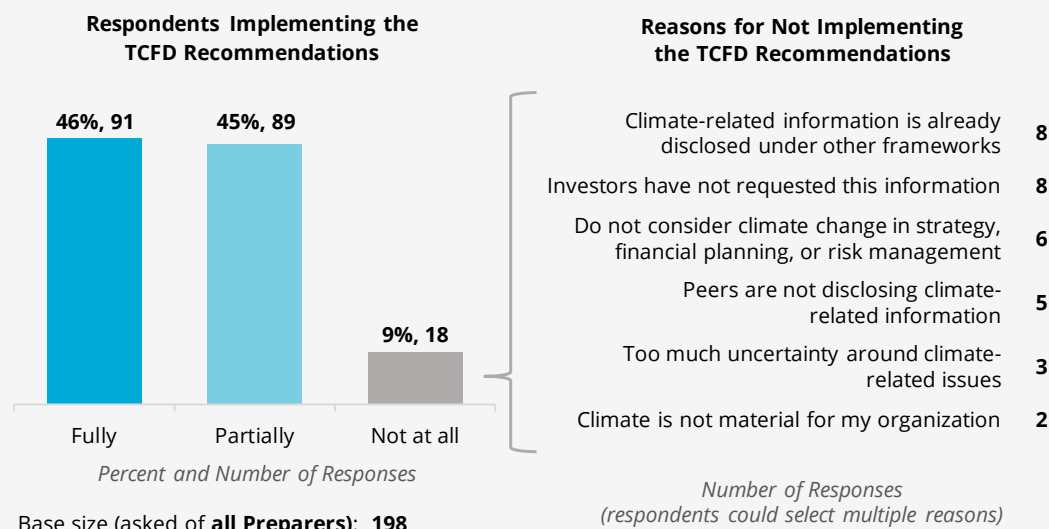
The majority of respondents—67%—believe they will complete implementation of the TCFD recommendations within three years.

²⁷ The remaining 5% of respondents selected “other,” with many noting they were unsure how long implementation would take.

The top two reasons respondents cited for their organizations deciding *not* to implement the TCFD recommendations were that their organizations already disclose climate-related information under other frameworks and investors have not requested this information.

Figure 53

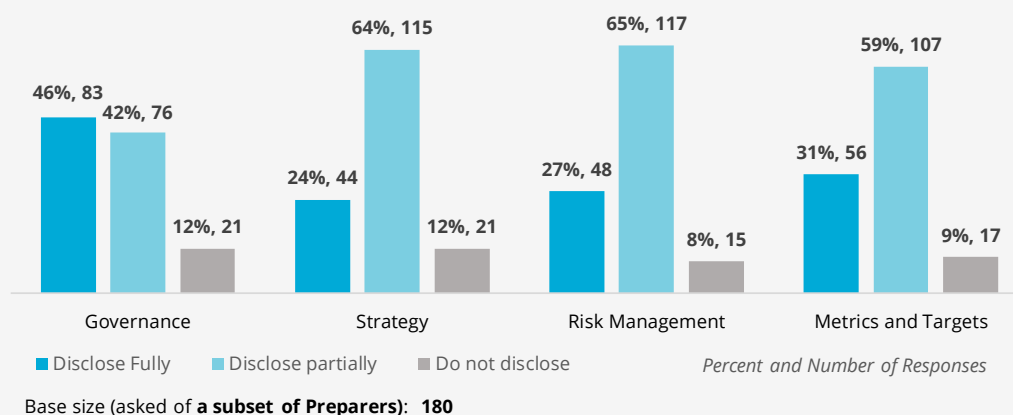
Implementation of the TCFD Recommendations



A key area of interest for the Task Force in conducting the survey was to better understand where companies are with respect to implementing each of the TCFD recommendations—whether they disclose information that “fully” or “partially” aligns with each recommendation or do not disclose information for the recommendation. Figure 54 shows the levels of implementation for the respondents that identified as preparers and indicated their organizations have decided to “fully” or “partially” implement the TCFD recommendations. For each recommendation, a majority of respondents said they disclose at least some climate-related information; however, only for the Governance recommendation did a plurality of respondents indicate that the information disclosed “fully” aligns with the recommendation (46% or 83 of 180). For the three other recommendations, the majority responded that the information they disclose “partially” aligns with the recommendations. As organizations complete their implementation efforts, the Task Force would expect the number that disclose “fully” to increase.

Figure 54

Disclosure by TCFD Recommendation

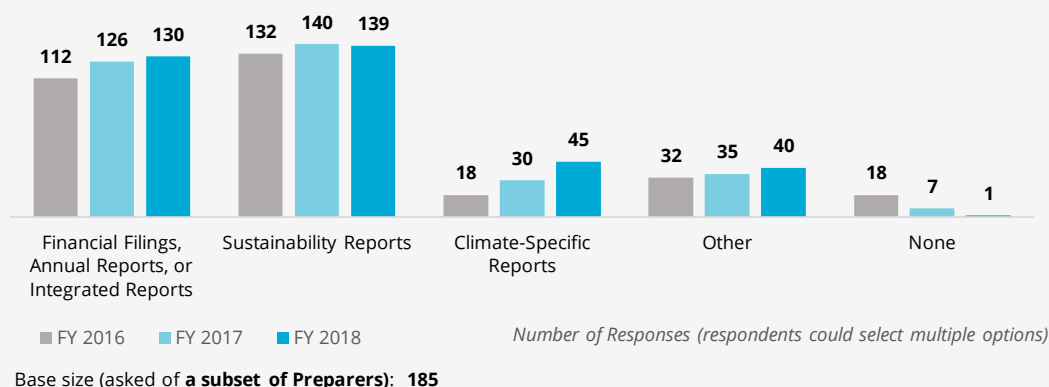


Location of Disclosures

As described in its 2017 report, the Task Force recommended that preparers of climate-related financial disclosures provide such disclosures in their annual financial filings. However, the Task Force also recognized that reporting practices would evolve over time, with more climate-related information moving into financial filings. To better understand whether more companies are including climate-related information in their financial filings, the Task Force asked survey respondents that identified as preparers where they disclosed this information for fiscal years 2016, 2017, and 2018. Sustainability reports continue to be the dominant location of climate-related financial disclosures; however, preparers increasingly include such information in their financial filings, annual reports, and integrated reports, as shown in [Figure 55](#).²⁸

Figure 55

Location of Disclosures for Fiscal Years 2016, 2017, and 2018

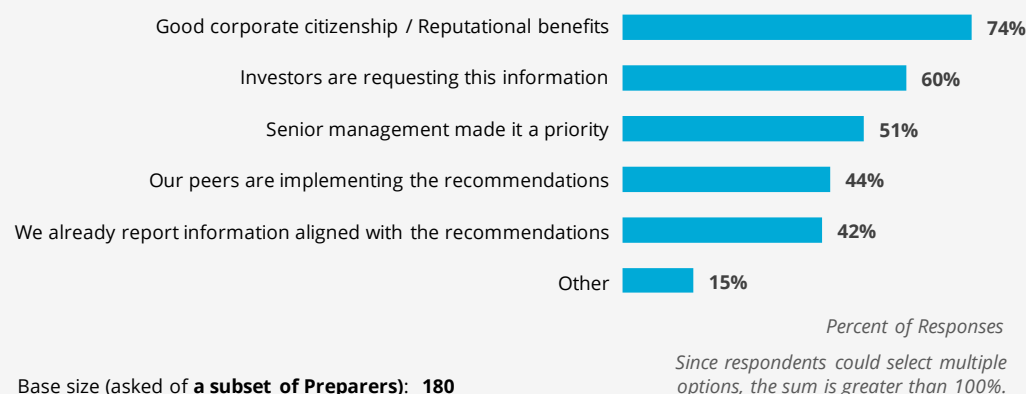


Factors and Functions Driving Implementation

The Task Force asked respondents that identified as preparers why they were implementing the TCFD recommendations, and the top two reasons cited were reputational benefits and investor pressure, as shown in [Figure 56](#).

Figure 56

Reasons for Implementing the Recommendations



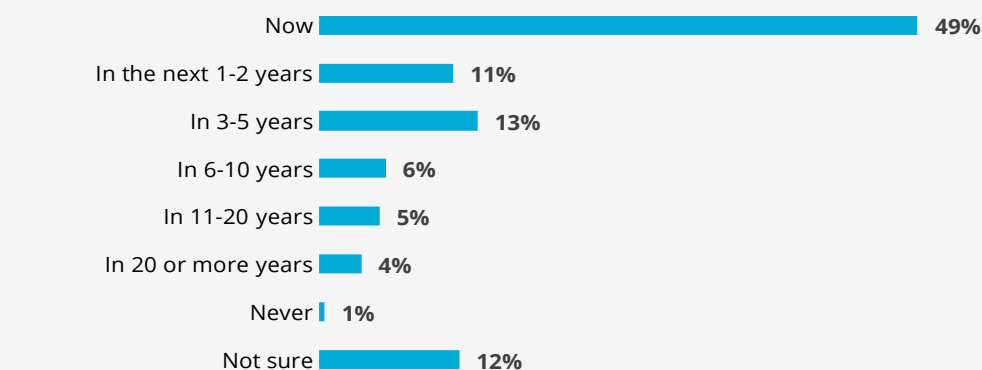
²⁸ Please see the [Glossary](#) for definitions of financial filings, annual or integrated reports, and sustainability reports. Climate-specific reports refer to reports that describe companies' implementation of the TCFD recommendations or their use of climate-related scenario analysis; and "other" refers to any other report or venue that a respondent identified as containing climate-related information, such as CDP reports and companies' public websites.

Recognizing materiality could be a factor in organizations deciding to implement the recommendations, the Task Force also asked respondents about the timeframe in which their organizations considered climate-related risks to be material. [Figure 57](#) shows that almost half of the respondents that identified as preparers said climate-related risks are material today, and almost a quarter said climate-related risks will be material in the next 1-2 years or 3-5 years.

60% of respondents said their organizations consider climate-related issues to be a material risk today or in the next 1-2 years.

Figure 57

Timeframe When Climate-Related Risks Will be Material



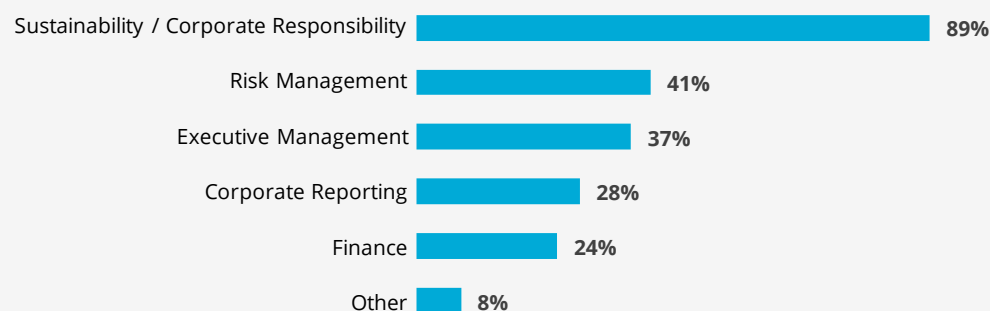
Base size (asked of **Preparers**): 198

Percent of Responses

In terms of functions driving implementation of the recommendations, 89% of respondents identified their sustainability or corporate responsibility area as one of the functions driving implementation, as shown in [Figure 58](#). While the sustainability or corporate responsibility areas may be a natural conduit for implementation efforts, particularly at larger, more complex companies, the Task Force encourages increased involvement of executive management, risk management, strategy, corporate reporting, and finance to provide companies with a more holistic view and assessment of relevant climate-related risks and opportunities.²⁹

Figure 58

Internal Functions Involved in Implementation



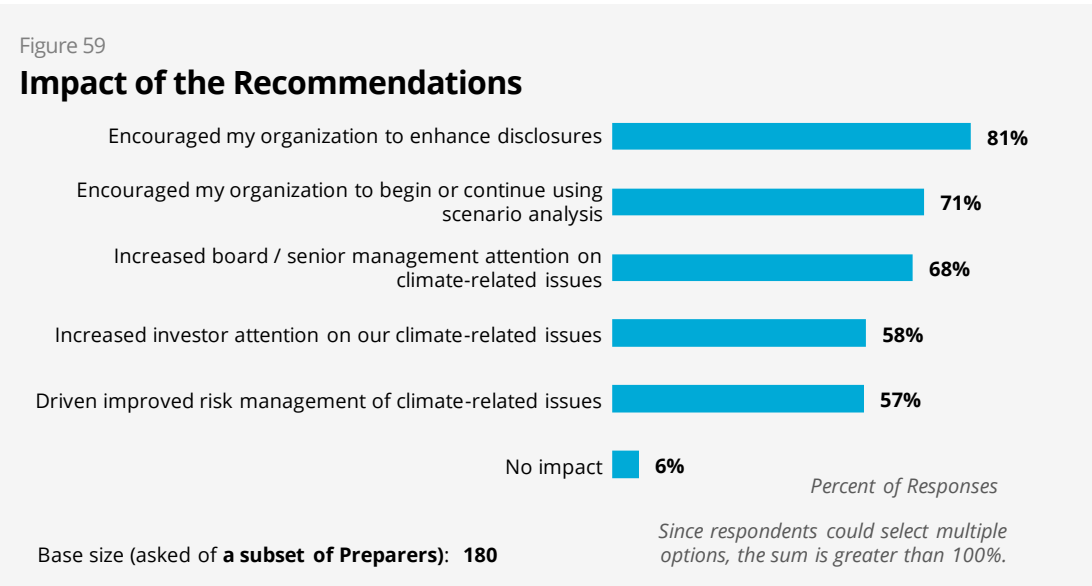
Base size (asked of a **subset of Preparers**): 180

Percent of Responses

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

²⁹ This is consistent with the Task Force's view that climate-related financial information should be included in annual financial filings and subject to review by the chief financial officer and audit committee, as appropriate.

Figure 59 shows preparers’ responses on how the recommendations have affected their organizations, with the most common responses being the recommendations have encouraged enhancement of climate-related practices and disclosures and increased internal and external attention on climate-related issues.



Implementation Issues

The Task Force asked respondents that identified as preparers to rate the ease or difficulty of implementing each TCFD recommendation and to identify specific implementation issues. In response, preparers reported significant implementation issues across the recommendations, with the majority of respondents rating each recommendation other than Governance as “somewhat difficult” or “very difficult” to implement (see Figure 60). Respondents that identified as preparers appear to be having the most difficulty implementing the recommendation on Strategy, with 26% describing it as “very difficult.” In particular, respondents highlighted issues related to scenario analysis and assessing the resilience of their strategies, which are discussed further in Section D. Disclosure of Strategy Resilience Using Scenario Analysis. To a lesser extent, respondents also identified the recommendations for Risk Management and Metrics and Targets as “very difficult” to implement—16% and 19%, respectively.

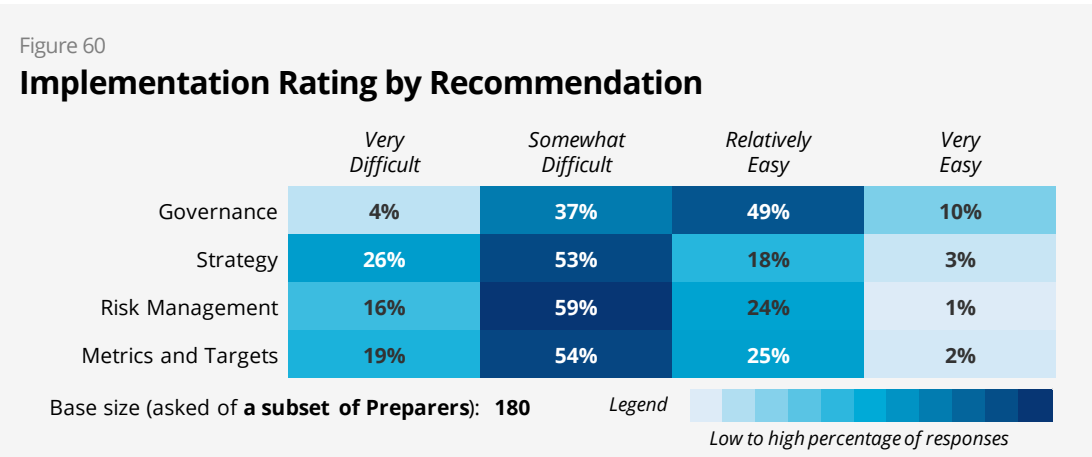


Figure 61 (p. 57) describes the reported implementation issues by recommendation. Of note, the top cited issue for both the Governance and Risk Management recommendations was that for preparers with climate-related issues integrated into existing governance and risk management frameworks, making a separate or explicit climate-related financial disclosure is challenging. The

Task Force did not intend for companies with comprehensive governance and risk management processes that address climate-related issues to duplicate existing disclosures. If a company's disclosures clearly describe its governance and risk management processes and it is clear those processes cover climate-related issues, then no further disclosure may be needed. The top cited issue on the Strategy recommendation was concerns about disclosing confidential business information; and the Task Force wishes to highlight that it did not intend for preparers to disclose confidential business information.

Figure 61

Key Implementation Issues Identified

Governance	Strategy	Risk Management	Metrics and Targets
- Climate is embedded in our processes so it is challenging to discuss separately in our governance disclosures (49%, 89) None (35%, 63) - Our board and/or management does not consider climate-related issues (11%, 19)	- Disclosing assumptions is difficult because they include confidential business information (46%, 83) - Unsure how to assess resilience (23%, 42) None (16%, 29) - Climate-related risks are not material so it is challenging to include them in financial filings (11%, 19)	- Climate is integrated into our risk management processes and, therefore, does not require separate disclosure (36%, 65) None (22%, 40) - We do not have processes for identifying, assessing, or managing climate-related risks (17%, 31)	- There is a lack of standardized metrics for our industry (42%, 75) - We are just beginning to use climate-related metrics and targets and are not ready to disclose them (27%, 48) None (23%, 41) - Emissions-related metrics are not reflective of our climate-related risks (13%, 24)

Base size (asked of a **subset of Preparers**): 180

Percent and Number of Responses

Since respondents could select multiple options, the sum may be greater than 100%.

4. User Perspectives

The Task Force received 46 survey responses from individuals that identified themselves as users, defined as someone responsible for making financial decisions, such as investing, lending, or insurance underwriting decisions, based on companies' disclosures. The survey presented a series of questions to these respondents related to their organizations' use of climate-related financial disclosures in financial decision making, including levels of use, decision-useful elements of disclosures, and desired improvements to disclosures. Given the relatively small sample size of respondents that identified as users, the Task Force cautions that the results may not be representative of the broader population of users of climate-related financial disclosures.

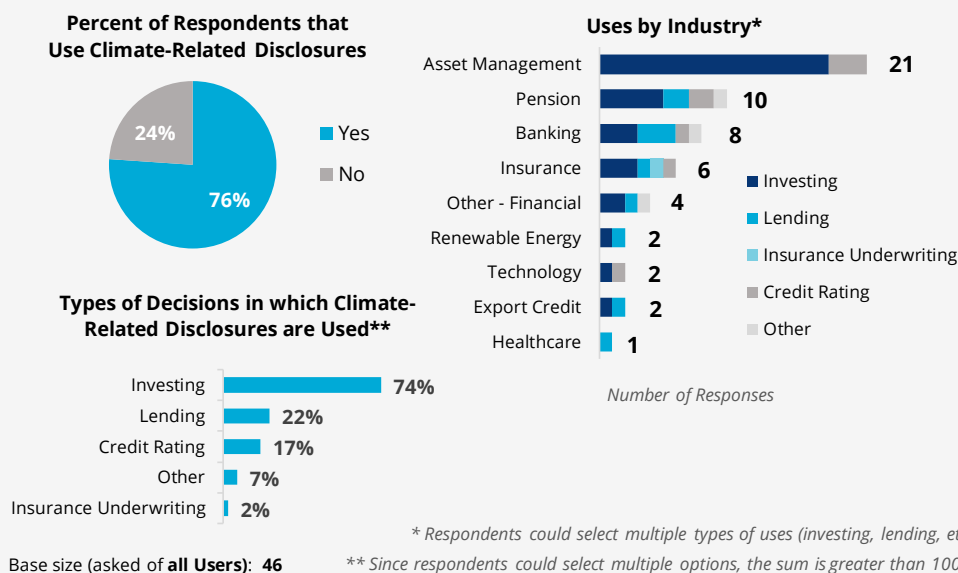
Use of Disclosures

The Task Force asked survey respondents that identified as users about their use of climate-related financial disclosures in financial decision making. Seventy-six percent (76% or 35 of 46) stated their organizations use climate-related financial disclosures for such decision making, with investing and lending decisions being the primary uses, as shown in the charts at the top of [Figure 62](#) (p. 58). The chart at the bottom of [Figure 62](#) (p. 58) shows the types of financial decisions for which respondents from different industries use climate-related financial disclosures. For example, respondents from the asset management industry primarily use climate-related financial disclosures for investment decisions whereas respondents from the banking and

insurance industries appear to use such information for a broader range of financial decisions—investing, lending, insurance underwriting, credit rating, and other financial decisions.

Figure 62

Use of Climate-Related Disclosures in Financial Decision Making



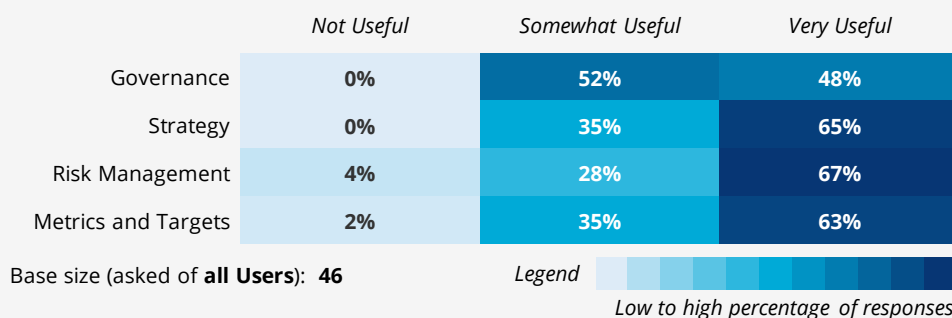
For the 24% of users (11 of 46) who said their organizations do *not* use climate-related financial disclosures in financial decision making, the most commonly cited reasons for not using such information were (1) difficulty quantifying climate-related risks based on current disclosures and (2) difficulty locating climate-related information.

Usefulness of Disclosures

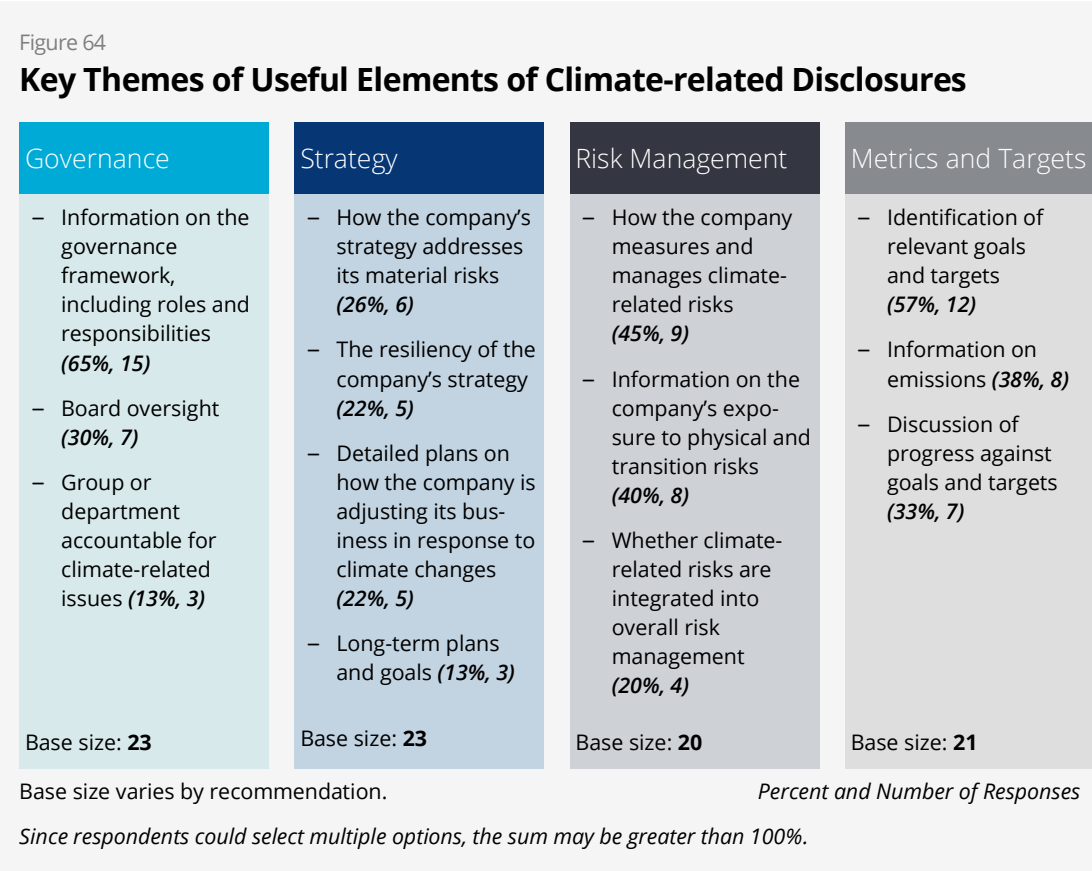
The Task Force asked respondents that identified as users to rate the usefulness of information disclosed in alignment with each TCFD recommendation for financial decision-making as “not useful,” “somewhat useful,” or “very useful.” In response, the majority of users rated the information aligned with the recommendations as “very useful” with the exception of the Governance recommendation, where respondents were split between “somewhat useful” and “very useful,” as shown in Figure 63.

Figure 63

Disclosure Usefulness Rating by Recommendation



To better understand the specific types of information that are useful for financial decision-making, the Task Force asked respondents that rated the disclosures as “somewhat useful” or “very useful” to describe the information, for each recommendation, they have found most useful. As shown in [Figure 64](#), respondents identified information on how companies (1) incorporate climate into their governance framework; (2) measure and manage climate-related risks; and (3) address such risks in their strategies as particularly useful elements of disclosure.



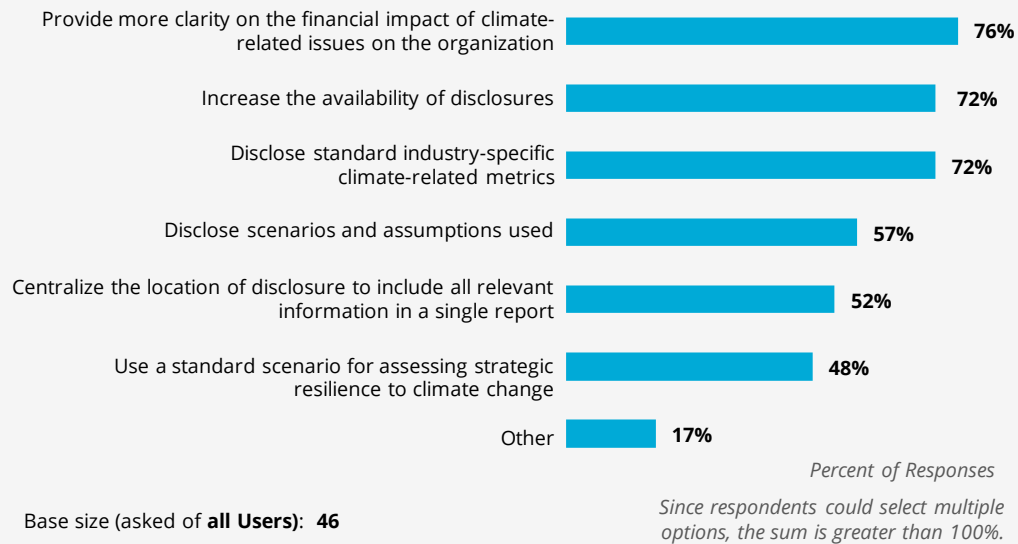
Desired Improvements to Disclosures

The Task Force asked respondents that identified as users how the usefulness of climate-related financial disclosures could be improved. Users responded by suggesting a broad range of enhancements to climate-related financial disclosures, with more clarity on the financial impact of climate-related issues being the most common request (76% of users), as shown in [Figure 65](#) (p. 60). Seventy-two percent (72%) of users asked for a general increase in the availability of disclosure, as well as disclosure of standard industry-specific climate-related metrics. Fifty-seven percent (57%) of users requested disclosure of scenarios and assumptions used.

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Figure 65

Desired Improvements to Disclosures



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5. Conclusion

The survey results suggest that organizations are making progress in implementing the TCFD recommendations and using climate-related information for decision-making, but that much work remains. From the perspective of the 198 respondents that identified as preparers of climate-related financial disclosures, the majority represented that they:

- Are in the process of implementing the TCFD recommendations, with reputational benefits and investor pressure being the top two factors driving implementation;
- Report on climate-related information in both their annual reports and sustainability reports—with a small percentage reporting only in sustainability reports;
- Recognize climate-related risks are or soon will be material to their organization; and
- Plan to complete implementation of the TCFD recommendations in the next two to three years.

Nonetheless, these preparers—55% of whom are from non-financial companies—highlighted key challenges in implementing the recommendations, including lack of standardized industry metrics and concerns about revealing confidential business information.

From the perspective of the respondents that identified as users of climate-related financial disclosures, over three-quarters indicated that they include such information in their financial decision-making processes. However, these respondents also requested improvements to climate-related financial disclosures—notably, asking for more clarity on the financial impact of climate-related issues.

Across the respondent population, including preparers, users, and other parties interested in climate-related financial disclosures (e.g., NGOs, consultants, public sector, academia), respondents cited improvements to the availability and quality of climate-related financial disclosures and voiced their support for the Task Force.

D Disclosure of Strategy Resilience Using Scenario Analysis

D Disclosure of Strategy Resilience Using Scenario Analysis

1. Background

One of the Task Force's key recommended disclosures—referred to as *Strategy c*)—focuses on the resilience of a company's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario (see Figure 66). The Task Force believes a company's disclosure of how its strategy addresses potential climate-related risks and opportunities is a key step to better understanding the potential implications of climate change on the company. In its 2017 report, the Task Force recognized the use of scenarios in assessing climate-related issues and their potential financial implications is relatively recent and practices will evolve over time. In its 2018 status report, the Task Force highlighted that very few companies disclosed information on the resilience of their strategies (or strategy resilience) under different climate-related scenarios. Given the importance of disclosing strategy resilience, the Task Force has taken a closer look at challenges identified by preparers and examples of current reporting that relate to *Strategy c*).

The central tenet of *Strategy c*) is that climate-related risks, like other risks, can have potential strategic implications for a company. Given the uncertainties of climate change, the Task Force believes companies should describe to stakeholders how well their strategies, including financial and operating plans, might perform over a range of plausible future climate states.³⁰ Companies' assessments of their strategies should take account of a range of different plausible future climate states, including a transition to a lower-carbon economy consistent with a 2°C or lower scenario and, where relevant to the company, scenarios consistent with increased physical climate-related risks.

To help companies implement *Strategy c*), the TCFD provided guidance in its 2017 report and technical supplement on the use of scenarios.³¹ To emphasize the importance of this recommended disclosure and provide additional insight on the use of scenario analysis, this section of the report highlights progress in the use of scenario analysis by companies for assessing the resilience of their strategies as well as trends and potential challenges facing companies in disclosing information about their strategy resilience under a range of climate-related scenarios.

Figure 66

Strategy Recommendation

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.

Recommended Disclosures

- Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.
- Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.
- Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.

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³⁰ In its 2017 report, the Task Force noted that for the Strategy and Metrics and Targets recommendations "organizations should provide such information in annual financial filings when the information is deemed material."

³¹ The Task Force's technical supplement, *The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities*, provides more information on scenario inputs, analytical assumptions and choices, and assessment and presentation of potential impacts.

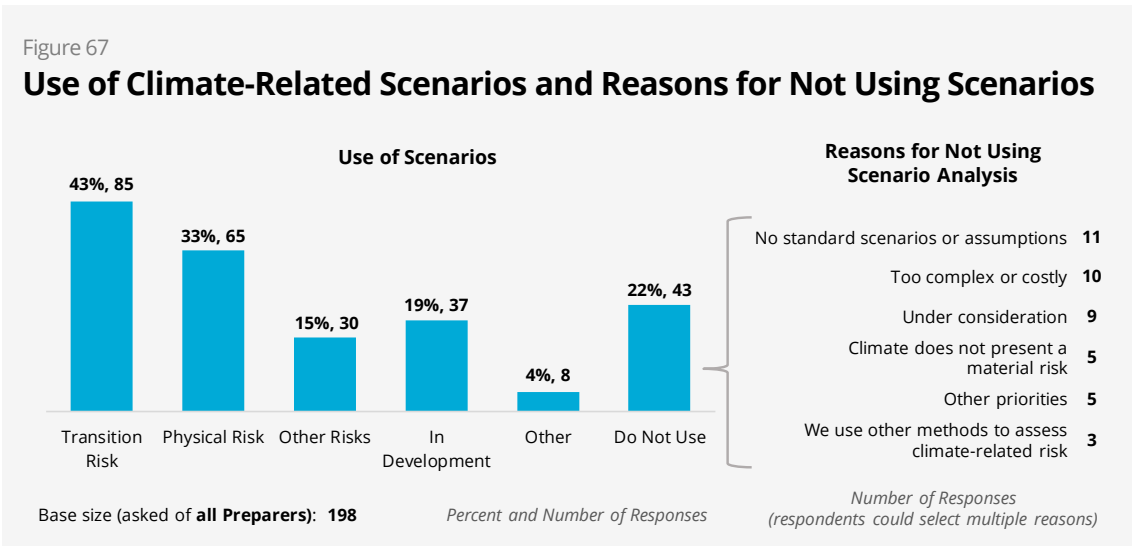
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2. Results from the TCFD Survey

A key takeaway from the 2018 status report was that information related to *Strategy c)* had the lowest levels of disclosure across the 11 recommended disclosures. As a result, in developing the 2018 TCFD survey, the Task Force included specific questions about a company's *use of scenarios* in assessing the resilience of its strategy to climate-related issues and its *disclosure of information* on the resilience of its strategy under different climate-related scenarios.

As noted in [Section C. Adoption and Use of the TCFD Recommendations](#), 198 survey respondents identified themselves as preparers of disclosures, with 45% from the financial sector and 55% from non-financial industries. These respondents were asked to rate the level of effort, from very easy to very difficult, needed to implement each of the TCFD recommendations. The majority of those respondents found the Strategy recommendation somewhat difficult or very difficult to implement, and the most often cited reason was concern around disclosing confidential business information as part of scenario assumptions.

The TCFD survey also asked respondents that identified as preparers about their companies' use of scenarios to assess the resilience of their strategies. Of the 198 preparer respondents, 110 (56%) said their companies use scenarios for that purpose, 37 (19%) said scenario analysis is in development or early stages of implementation, and 43 (22%) said their companies were not using scenarios at this time ([Figure 67](#), chart on left).³² The list on the right in [Figure 67](#) shows the reasons given for not using scenarios and the number of respondents that cited that reason.



To understand further how companies use climate-related scenarios, the Task Force asked survey respondents about the types of risks—transition, physical, or other risks—they use climate-related scenarios to assess. As shown in the chart on the left in [Figure 67](#), most of the respondents using scenario analysis said they use it for transition or physical risk, while 15% of respondents said they use scenario analysis to assess other risks.

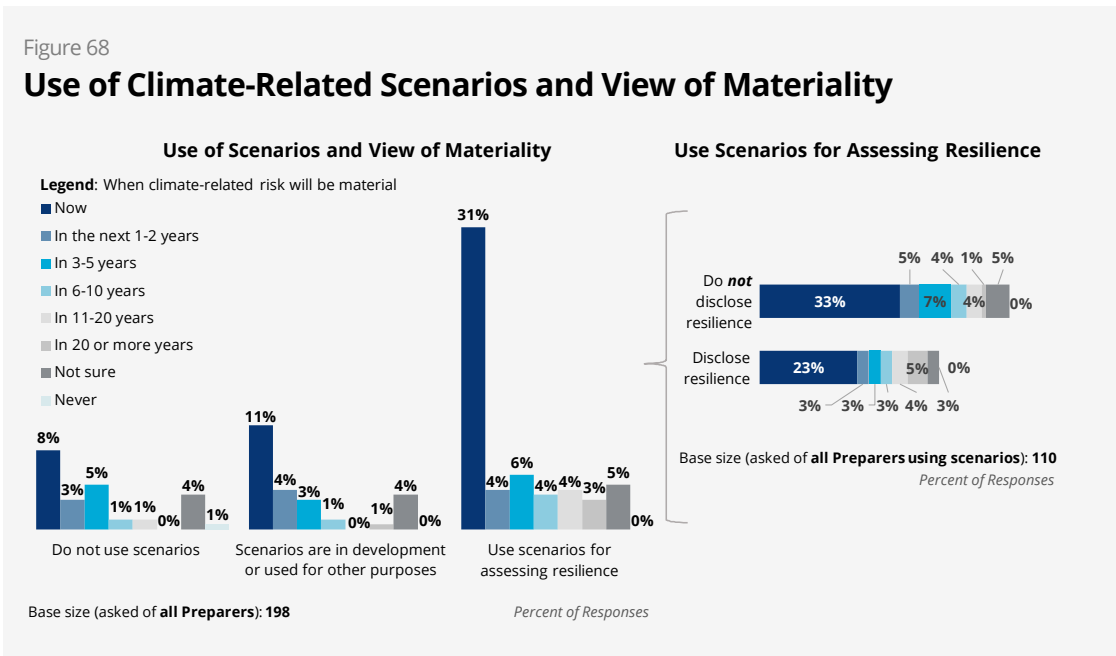
Of the respondents indicating they *use* scenario analysis (110 of 198), 43% were from the financial sector and 57% were from non-financial industries. About half of the financial sector respondents were banks; and two-thirds of the non-financial respondents were in the oil and gas, materials, industrials, or utilities industries.

Importantly, only 46 out of 110 preparers using scenario analysis (43%) said they publicly disclose information on the resilience of their strategies under different climate-related scenarios. This

³² The 110 preparers (56%) that use scenarios could select multiple types of risk (transition, physical, other) for which they use climate-related scenarios, resulting in the sum of the number and percent for the left three bars in [Figure 67](#) exceeding 110 and 56%, respectively.

may be an important gap in disclosure for companies with *material* climate-related risks, but it is consistent with the Task Force’s understanding from discussions with various companies, industry associations, and other groups that companies are still early in the process of using climate-related scenarios internally, evolving their approaches, and learning how to integrate scenarios into corporate strategy formulation processes.³³

To better understand the use of scenario analysis and disclosure of strategy resilience, the Task Force reviewed the survey responses from preparers in the context of when they thought climate-related risks would be material to their companies. As shown in Figure 68 (chart on the left), 31% of preparer respondents are using scenarios for assessing strategy resilience and believe climate-related risks are material for them today. Of the respondents using scenario analysis that believe climate-related risks are material now, more of them are **not** disclosing strategy resilience than are disclosing (Figure 68, chart on the right).



The Task Force recognizes that companies’ use of scenarios in assessing climate-related issues and their potential financial implications will take time to implement and will evolve, but believes scenario analysis is critical for improving the disclosure of decision-useful, climate-related information on a company’s strategy. Investors and other stakeholders continue to emphasize the importance of information on how a company’s strategy might fare under different climate-related scenarios. Based on the survey results, 95% of the 46 respondents that identified as users of climate-related financial disclosures found information about a company’s strategy useful for their financial decision-making; and 61% said climate-related financial disclosures have affected a financial decision.

3. Challenges Related to the Use of Climate-Related Scenario Analysis

Through its ongoing discussions with companies and other organizations and analysis of responses to the TCFD survey, the Task Force recognizes companies continue to find certain

³³ For another perspective on companies’ use of scenario analysis, see Institute for Climate Economics, *Climate Brief No61: Very few companies make good use of scenarios to anticipate their climate-constrained future*, February 2019.

aspects of scenario analysis challenging. In particular, the Task Force has identified the following as key challenges in implementing the Strategy recommendation:

- Lack of appropriately granular, business-relevant data and tools supporting scenario analysis;
- Difficulty determining scenarios, particularly business-oriented scenarios, and connecting climate-related scenarios to business requirements;
- Difficulties quantifying climate-related risks and opportunities on business operations and finances; and
- Challenges around how to characterize resiliency.

Industry associations and others working on climate-related scenario analysis have echoed many of these challenges. Addressing these challenges will require further work by the Task Force, companies, industry associations, and others, in the four key areas described below.

Data, Tools, and Resources

While preparers continue to raise the need for business-relevant data and support tools, significant progress has been, and continues to be, made in this area. Many tools, data, models, and guidance exist to assist companies in applying scenarios and similar approaches to the assessment of their climate-related risks and opportunities.

The Climate Disclosure Standards Board (CDSB), with input from the TCFD Secretariat, created a [TCFD Knowledge Hub](#) to house a variety of resources—such as guidance, research, tools, standards, frameworks, and webinars—that facilitate implementation of the TCFD recommendations. The TCFD Knowledge Hub's [Scenario Analysis](#) summary page provides extracts and highlights from the TCFD's technical supplement that may be a helpful starting point for understanding scenario analysis and its usefulness, as well as other resources and tools intended to help companies broaden and deepen their understanding and practical application of scenarios. These resources range from academic papers about specific sectors to introductory briefings and practical guidance.

In addition to these resources, other parties, such as industry associations, NGOs, and consulting firms, are developing guidance and tools for assisting companies in using climate-related scenarios, assessing climate-related risks, and developing climate-resilient strategies. This includes several industry associations and non-governmental organizations that have brought companies together to work through sector-specific approaches to climate change issues. For example, the World Business Council for Sustainable Development (WBCSD) has convened or announced "[preparer forums](#)" for various sectors and industries: oil and gas; electric utilities; chemicals; construction; automobiles; and food, agriculture, and forest products.³⁴ The United Nations Environment Programme Finance Initiative (UNEP FI) worked with sixteen large global banks to pilot the TCFD recommendations and develop a scenario-based approach for assessing the potential impact of climate change on the banks' lending portfolios.³⁵ See [Section F.4. Initiatives Related to Scenario Analysis](#) for more information on industry and other initiatives aimed at supporting implementation of the TCFD recommendations.

Business-Relevant Scenarios

Many existing climate-related scenarios currently in the public domain, including those developed by the International Energy Agency (IEA) and Intergovernmental Panel on Climate Change (IPCC) are intended primarily for research and policy purposes on a global scale. As such, some companies using these scenarios to assess potential financial impacts on their businesses may find it challenging to incorporate the global-scale output of these models into their scenario

³⁴ See WBCSD's [Task Force on Climate-related Financial Disclosure \(TCFD\) Preparer Forums](#) for more information.

³⁵ See UNEP FI, *Extending Our Horizons: Assessing credit risk and opportunity in a changing climate (Part 1: Transition-related risks & opportunities)*, April 2018, and UNEP FI, *Navigating a New Climate: Assessing credit risk and opportunity in a changing climate (Part 2: Physical risks & opportunities)*, July 2018.

analysis. This makes it difficult for companies to leverage such scenarios in their own assessments of strategy resilience.

Further work is required on the development of business-oriented scenarios. This will likely require a better understanding of climate impacts at scales below the global level, identification of the key climate-related drivers affecting business performance, and the key climate-related uncertainties faced by an industry. Furthermore, several survey respondents (both preparers and users) indicated that the use of “standard” scenarios would be beneficial. Such an approach may reduce concerns about releasing confidential business information, reduce scenario analysis costs, and improve transparency and comparability of disclosures. However, the use of standard scenarios may introduce other challenges and mean less flexibility for companies in tailoring assumptions and key drivers to their specific businesses.

Business and Financial Impacts of Climate-Related Risks and Opportunities

Another key challenge for companies relates to determining the financial implications of different climate-related scenarios. In addition, the most often cited improvement by users that responded to the TCFD survey was the need for more clarity on the financial impact of climate-related issues on companies. A recent report, based on CDP data from over 1,600 companies, highlighted “that a large number of companies do not report financial impacts and that many that do are probably underestimating them.”³⁶ Furthermore, the report noted that “companies clearly need further guidance on estimating the costs of physical climate change impacts, particularly in using scenario analysis to derive cost ranges for risks [...]”³⁷

The Task Force recognizes the financial impacts of climate-related issues on companies are not always clear or direct and, for many companies, identifying the issues and assessing potential impacts may be challenging. In the annex to its 2017 report, the Task Force described some considerations for assessing the financial impacts of climate-related risks and opportunities.³⁸ Specifically, the Task Force highlighted four major categories of financial impact that companies should consider—revenues, expenditures, assets and liabilities, and capital and financing—and provided examples of specific elements under each category. Some of the elements for consideration include potential business interruptions, supply chain disruptions, and distribution channel disruptions due to physical impacts of climate change and changes in asset values resulting from transition risk. The Task Force recognizes the specific elements may vary from industry to industry. For example, the WBCSD’s work with the oil and gas industry on implementing the TCFD recommendations highlighted changes in portfolio mix, investment in new technologies, capital and cost base flexibility, reserve life, capital allocations plans, and research and development spending as relevant elements for consideration.³⁹

Strategy Resilience

Finally, the Task Force understands—from the TCFD survey results and discussions with companies—that some preparers are unsure of the types of information to disclose to demonstrate the resilience of their strategies. While there is no single definition of strategy resilience, the Task Force encourages companies to describe the characteristics of their strategies that allow them to adapt to climate-related changes materially affecting their business while maintaining operations and profitability and safeguarding people, assets, and overall reputation. Information disclosed about the climate resiliency of a strategy should allow investors to understand how the company is positioning itself given identified, material climate-related risks and opportunities. In this context, investors are likely to need information on the range of

³⁶ CDP is a not-for-profit organization that administers a global disclosure system for reporting by companies, cities, states, and regions on their environmental impacts. See Goldstein, A., Turner, W., Gladstone, J., Hole, D. (2018), *The private sector’s climate change risk and adaptation blind spots*. Nature Climate Change, published online December 10, 2018.

³⁷ Ibid.

³⁸ Task Force on Climate-Related Financial Disclosures, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, June 29, 2017.

³⁹ WBCSD, *Climate-related Financial Disclosure by Oil and Gas Companies: Implementing the TCFD Recommendations*, July 19, 2018.

scenarios considered by a company; implications of each scenario for the business; strategic options considered; and the reasoning around the strategy adopted. Another factor that may warrant disclosure is the company’s ability—and flexibility—to adjust its strategy in response to emerging climate conditions, including alternative ways to use resources and the robustness and redundancy of business processes.

The Task Force recognizes that some preparers, including nearly half of those that responded to the TCFD survey, remain concerned about the disclosure of confidential business information when discussing strategy and strategy resilience. Further work by industry groups, in conjunction with users, to better articulate information needs and define reasonable disclosure content is needed.

4. Selected Companies’ Use of Scenario Analysis

Despite these challenges, companies in different sectors are using climate-related scenarios to assess strategy resilience and disclose information on the resiliency of their strategies. To illustrate the use of scenarios, the practices of several selected companies (Figure 69) are described below.⁴⁰ While these companies take different approaches to assessing their strategy resilience, they all use scenario analysis and provide disclosures with characteristics broadly aligned with the TCFD recommendations or related guidance. We highlight four such characteristics:

- Uses multiple climate-related scenarios to assess resilience of strategy
- Describes assumptions and parameters specific to the company
- Identifies potential impacts of climate-related risks or opportunities
- Discloses potential strategy resilience under different climate-related scenarios

Figure 69

Selected Companies

BHP is an Australia-based, multinational mining, metals, and petroleum company

BlueScope Steel Limited is an Australia-based steel manufacturer

Citi is a U.S.-based multinational investment bank and financial services company

Oil Search is a Papua New Guinea-based oil and gas exploration and development company

OPTrust is a Canadian legal trust that manages one of Canada’s largest pension funds

Rio Tinto is a British-Australian metals and mining company

Unilever is a British-Dutch global consumer goods company

In this section, the Task Force distills information from the selected companies’ publicly available disclosures into tables to allow comparison of specific characteristics across certain companies.

The information included does not necessarily depict “best practices” nor represent disclosure that fully meets each of these characteristics.

In addition, to maintain readability of the tables, each table includes information from four of the seven companies rather than all seven. The information provided below illustrates aspects of how companies—across different industries and exposed to different types of climate-related risks (transition and physical)—are using climate-related scenarios to evaluate the resilience of their strategies.

⁴⁰ Selected companies were identified based on responses to the TCFD survey as well as through interviews with NGOs, academics, and consulting firms. The mention of specific companies does not imply 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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Importantly, while the selected companies are using more advanced approaches of scenario analysis (i.e., using complex models and sophisticated analytical techniques), the Task Force emphasizes that scenario analysis can take different forms along a “qualitative-quantitative” spectrum. At one end, scenario analysis can be solely qualitative, relying on descriptive, written narratives to challenge strategic thinking and explore relationships and trends. At the other end, scenario analysis might rely on numerical data, models, or sophisticated analytical techniques. In between are varying degrees of a qualitative narrative supplemented with numerical content.

As noted in the Task Force’s technical supplement, companies just beginning to use scenario analysis may choose to start with qualitative scenario narratives or storylines to help management explore the potential range of climate change implications for the company. As a company gains experience with qualitative scenario analysis, the scenarios and associated analysis of development paths can use quantitative information to illustrate potential pathways and outcomes. For companies with significant experience conducting scenario analysis, greater rigor and sophistication in the use of data sets and quantitative models and analysis may be warranted. Quantitative approaches may be achieved by using existing external scenarios and models (e.g., those provided by third-party providers) or by companies developing their own, in-house modeling capabilities. The choice of approach will depend on a company’s needs, resources, and capabilities. Companies that are likely to be significantly impacted by climate-related transition or physical risks should consider some level of quantitative scenario analysis.

Uses Multiple Climate-Related Scenarios to Assess Resilience of Strategy

Throughout its 2017 report, the Task Force emphasized the importance of (1) using a set of scenarios that covers a reasonable variety of plausible future climate states and (2) including in the scenario set a 2°C or lower scenario. The selected companies employ a range of climate-related scenarios from a variety of sources, including scenarios that are publicly available (e.g., from IEA), internally produced, and vendor-developed.⁴¹ Each company uses a 2°C or lower scenario as one of several climate-related scenarios to evaluate the potential implications of climate-related risk and specifies the time horizon of the climate-related scenarios (e.g., 2030, 2050, etc.) as summarized in [Table 1](#) (p. 69).^{42,43,44}

⁴¹ Oil Search, *Climate Change Resilience Report 2017*, March 22, 2018, p. 20. OPTrust, *Portfolio Climate Risk Assessment*, January 24, 2017, p. 5.

⁴² BlueScope, *2017-2018 Sustainability Report*, October 29, 2018, p. 53. Citi, *Finance for a Climate-Resilient Future: Citi’s TCFD Report*, November 13, 2018, pp. 7 and 21. Oil Search, *Climate Change Resilience Report 2017*, March 22, 2018, pp. 20 and 24-25. Rio Tinto, *Our Approach to Climate Change*, February 27, 2019, p. 19.

⁴³ See the Task Force’s [technical supplement](#) (pp. 3-4) for a discussion of scenario characteristics.

⁴⁴ The time horizon specified for a scenario is not necessarily equivalent to a company’s planning timeframe. Scenarios describe a plausible climate pathway from the present to the stated time horizon (e.g. 2030, 2050, etc.), based on the scenario’s assumptions. Given this pathway, a company must assess the implications of the scenario pathway for the company within a stated planning timeframe (e.g., 5-10 years). The TCFD’s 2017 report suggests that companies define planning timeframes for climate-related risks and opportunities taking into consideration the life of their assets, their climate-related risk profile, and the geographies in which they operate.

Table 1

Description of Climate-Related Scenarios Used

Time Horizon	Temp. Outcome	Description of Scenarios
BlueScope		
2050	2°C or less	Global Cooperation: Describes a scenario with carbon pricing. Advances in green technology and growth in urbanization lead to drop in steel intensity, but overall demand increases.
	3°C	Patchy Progress: Regional adoption of climate-related policies leads to 3°C increase. Rapid urbanization drives demand for steel as does increased demand for weather-resilient products.
	4°C	Runaway Climate Change: Little or no action to tackle climate change. Heavy climate impact (including 0.5-meter sea rise, large-scale displacement) occurs. Supply chains and operations are impacted, and demand increases for durable and weather-resilient products.
Citi		
2030 and 2040	1.5°C, 2°C, and 4°C	Transition Risk Scenarios: Consider 1.5°C and 2°C scenarios relative to a business-as-usual 4°C scenario for U.S. utilities portfolio and North American exploration and production portfolio.
	2°C and 4°C	2°C Physical Risk Scenario: Corresponds to IPCC RCP 2.6 for U.S. utilities portfolio. 4°C Physical Risk Scenario: Corresponded to IPCC RCP 8.5 using data from scientific studies of climate and potential climate impacts (e.g., availability of water on power production in the future) for U.S. utilities portfolio.
Oil Search		
2040	~1.5°C	Greenpeace Advance Energy [R]evolution Scenario: Sets a target for complete decarbonization by 2050. The scenario assumes a near-zero emissions world in 2050, based on 100% renewable energy supply.
	2°C	IEA 450 Scenario: Depicts a 50% chance of limiting warming to 2°C by 2100 through technology (e.g., renewables and carbon capture and storage or CCS), policy initiatives, and the phasing out of fuel subsidies.
	~2.7°C ⁴⁵	IEA New Policies Scenario: Depicts strong gas demand growth with peak oil and gas not occurring until 2040, with gas as a higher percent of fuel mix.
Rio Tinto		
0-20 years and 20-50 years horizons	1.7-1.8 °C	IEA Sustainable Development Scenario: Assumes relatively high carbon prices (up to US\$140/tCO ₂ e by 2040 in developed countries) as well as wide-spread deployment of low-carbon technologies such as CCS.
	2.5-3.5°C	Coordinated Action: Describes a central case view of policy pathways to 2050, taking account of climate change objectives and the feasibility of policies being adopted.

Describes Assumptions and Parameters Specific to the Company

In the annex to its 2017 report, the Task Force recommended that non-financial companies with more than one billion U.S. dollar equivalent in annual revenue should consider conducting more robust scenario analysis and disclosing the critical assumptions and input parameters for the scenarios they use. As shown in [Table 2](#) (p. 70), each of the selected companies disclosed their company-specific assumptions (economic growth, governmental policy, energy mix, etc.)—a critical element of making scenarios useful for strategic planning.⁴⁶

⁴⁵ See IEA “[Energy and climate change](#)” for more information on IEA’s climate scenarios’ temperature target and carbon pathway assumptions.

⁴⁶ BHP, *Climate Change: Portfolio Analysis*, September 29, 2015, p. 9. BlueScope, *2017-2018 Sustainability Report*, October 29, 2018, p. 53. Citi, *Finance for a Climate-Resilient Future: Citi’s TCFD Report*, November 13, 2018, pp. 7 and 12. OPTrust, *Portfolio Climate Risk Assessment*, January 24, 2017, p. 12.

Table 2

Company-Specific Assumptions

Topic	Brief Description of Assumption
BHP⁴⁷	
Economic growth	"Robust global economic growth sustains strong impetus to develop and implement cleaner, more energy efficient solutions that support growth."
Technology	"Technology plays a pivotal role with breakthroughs in new, next generation clean energy technologies. Higher-cost options are often deployed to meet lower emissions targets."
Policy/regulatory	"Unified societal action to address climate change leads to high cooperation and commitment to limit emissions."
BlueScope	
Carbon pricing	Outcomes associated with "uniform carbon pricing [i]n most OECD countries," "little or no global action to tackle climate change" where "no additional carbon prices are implemented and some countries wind back existing mechanisms," and "no additional carbon pricing is introduced outside those countries that already have a mechanism in place or that have been include within global climate commitments."
Fuel mix	Outcomes associated with "global GHG emissions peak[ing] in 2025" where fossil fuel component of energy supply falls from 80 per cent in 2016 to 60 per cent by 2040 and continues to decline," "energy from fossil fuels remains at 80 per cent of overall energy mix," and "energy mix differs greatly from country to country."
Trade restrictions	Outcomes associated with "cooperation lead[ing] to minimal protectionism and the development of new industries, technologies and carbon markets," "countries go it alone, some introduce trade restrictions and tariffs to protect local industries," and "tariffs and trade restrictions are introduced in some countries based on divergence of approaches to climate change."
Citi	
Socio-economics	"Population peaks at 9.5 billion in 2070. GDP continues to grow, with average global income increasing by a factor of 6 by 2100. Developing countries achieve significant economic growth, reaching current OECD average income levels in the second half of the century."
Energy	"Use of fossil fuels continues throughout the century, although at declining rates, with the exception of coal, which rapidly declines to under 2% of the total energy mix by 2030. Oil demand remains steady through 2030 due to growing demand for liquid fuels in the transport sector [...] Reverse emissions technologies and carbon sequestration through land use are critical in mitigating the cost of carbon and reducing emissions." "Use of renewable energy increases, accelerating rapidly after 2030[...]"
Policy	"A global carbon price implemented after 2020 is the sole policy instrument for transition risk in the energy end-use sectors. The given carbon price is assumed to be the same across all regions, though regions have differing economic responses to prices."
OPTrust	
Technology	"The rate of progress and investment in the development of technology to support the low carbon economy."
Resource availability	"The impact of chronic weather patterns (e.g. long-term changes in temperature or precipitation)."
Physical damages	"The physical impact of acute weather (i.e. extreme or catastrophic events)."
Policy	"Collectively refers to all international, national, and sub-national regulation (including legislation and targets) intended to reduce risk of further man-made climate change."

Identifies Potential Impacts of Climate-Related Risks or Opportunities

An important use of scenario analysis is to help determine potential impacts of climate-related risks and opportunities on a company's business, including operational and financial impacts. In the annex to its 2017 report, the Task Force emphasized that non-financial companies with more than one billion U.S. dollar equivalent in annual revenue should consider providing information on potential qualitative or quantitative financial implications of the climate-related scenarios, if

⁴⁷ For BHP, assumptions relate to its "Global Accord" (2°C) scenario. For BlueScope, assumptions relate to each of its climate-related scenarios. For Citi, assumptions relate to its transition scenario. For OPTrust, assumptions relate to its four climate change investment risk factors.

any. In addition, the Task Force identified four major categories through which climate-related issues may affect a company's financial position (major categories of financial impact):

- Revenues
- Expenditures
- Assets and Liabilities
- Capital and Financing

Table 3 lists the major categories of financial impact the selected companies described in their reports, as determined by the Task Force, along with a few excerpts that describe the companies' impact analysis process.⁴⁸

Table 3

Major Categories of Financial Impact and Impact Analysis Process

Categories	Description of Impact Analysis Process
BHP	
Revenues Expenditures Assets	BHP evaluated the impact of its 2°C-aligned scenario on key investment drivers. This included analysis of potential impact on long-term demand for its commodities and earnings before interest, tax, depreciation, and amortization (EBITDA). It identified the critical uncertainties that could impact demand for its commodities in both an orderly and a more rapid transition to a 2°C world and the relative impact of each of these uncertainties. It also assessed the potential impact of these transitions on demand for commodities, finding that, for example, there is likely to be upside for copper, high quality iron ore, and metallurgical coal whereas there is potential downside for energy coal and crude oil.
Citi	
Assets	For transition risk, Citi adapted scenario outputs from climate models into financial terms by translating outputs into four key risk factors—direct emissions costs, indirect emissions costs, revenues, and capital expenditures—that drive changes to the financial performance of oil and gas and utilities sector companies under review. This approach allowed Citi to evaluate the scenario-implied probability of default and expected loss to the portfolio under different transition scenarios. For physical risk, Citi evaluated both the impact on revenue from incremental (chronic) climate change factors (e.g., precipitation and temperature) as well as extreme weather events to calculate the potential period of inoperability if an event occurred at an asset's location by asset type (e.g., fossil fuel generation, nuclear generation, or hydropower generation).
Oil Search	
Revenues Expenditures Assets	Oil Search evaluated specific projects' viability based on its three scenarios to understand its key assets' medium- and long-term profitability. With respect to transition risk, Oil Search evaluated its Liquid Natural Gas Expansion Project (Elk-Antelope, P'nyang, and foundation field gas). Oil Search identified that the project has a positive impact "with an extend[ed] economic lift of the project by approximately two years" following the IEA New Policies Scenario assumptions. In contrast, the project would see significant value erosion, but would remain net present value-positive in the Greenpeace Advance Energy Revolution (1.5°C) scenario. The company also addresses specific facilities' physical risk due to climate-related events to determine if its facilities can withstand extreme weather events.
Unilever	
Revenues Expenditures	Unilever noted that the most significant impacts of both 2°C and 4°C scenarios are on its supply chain (impacting cost, where costs of raw materials and packaging rise). Under the 4°C scenario, there is also increased incidence of disruption to manufacturing and distribution due to extreme weather. On balance, though, Unilever noted "impacts on sales and our own manufacturing operations are relatively small."

⁴⁸ BHP, *Climate Change: Portfolio Analysis*, September 29, 2015, pp. 12-15. Citi, *Finance for a Climate-Resilient Future: Citi's TCFD Report*, November 13, 2018, pp. 10-12 and 18-19. Oil Search, *Climate Change Resilience Report 2017*, March 22, 2018, pp. 18 and 27. Unilever, *Unilever Annual Report and Accounts 2018*, March 6, 2019, p. 34.

The Task Force recognizes many companies have struggled with determining the potential impact of climate-related risks on their strategies and operations. As a result, in addition to the summary provided in [Table 3](#) (p. 71), excerpts from two of the selected companies’ reports are included to provide further insight on how some companies describe the potential impact of climate-related issues. In [Figure 70](#), Rio Tinto describes potential impacts on commodities under a 2°C scenario in the short to medium term and in the long term.

Figure 70
Excerpt from Climate Change Report

Commodity impacts of a 2°C scenario			
Commodity	Outlook	Short to medium term	Long term
Pilbara iron ore		Pilbara iron ore becomes less attractive due to the effects of increased use of scrap, however, the business continues to be highly profitable. Demand for lump and pellet is robust. There is scope to significantly decarbonize our iron ore mining operations in order to maintain cost-competitiveness (see Reducing our footprint).	There is large uncertainty around how the steel production sector will decarbonise in the long run, which could materially affect the value of Rio Tinto’s iron ore business. In addition to an escalation of the severity of the medium-term impacts, there is a need to plan for greater frequency and intensity of cyclones on the Pilbara coast.
Copper (and battery materials such as lithium)		Increased demand for copper as well as other battery materials due to greater focus on electrification. Supply investment expected to lag demand due to long mine development lead times, resulting in extended periods of high prices.	Structural increase in demand due to faster electric vehicle take-up and investment in power and the grid, requiring significant new supply, partially offset by an increase in scrap collection rates.
Aluminum (including bauxite mining and alumina refining)		Emission-reduction policies likely to increase aluminium prices, benefiting low-cost, low-carbon producers but putting greater pressure on coal-based smelters as well as the refineries supporting them.	Structurally steeper global aluminium cost curve and potential for decarbonising aluminium smelting direct emissions using inert anode technology.

Rio Tinto, [Our Approach to Climate Change 2018](#), p. 22

In [Figure 71](#), Oil Search describes its evaluation of specific facilities’ exposure to climate-related physical risk events to determine whether its facilities can withstand extreme weather events.

Figure 71
Excerpt from Climate Change Resilience Report

Physical Climate Risk Assessment

To minimise the physical risk of climate change to Oil Search’s assets, we consider climate risks when developing projects and in our planning procedures. Any potential impacts from climate variability on new facilities and infrastructure are identified and assessed as part of the engineering risk process, with the outcomes incorporated into engineering design decisions.

For example, in 2017 we assessed potential climate impacts on the Oil Search-operated Kumul Marine Terminal in PNG to test its climate change resilience. To determine if wave conditions at the Kumul Marine Terminal would be impacted, the study used projections for elements of PNG’s future climate: annual mean temperatures, extreme high temperatures, average annual rainfall, extreme rain events, sea level rise and wind storm events.

To test the resilience of the assets under worst-case situations, the study examined high-emission scenarios, including the Intergovernmental Panel on Climate Change (IPCC) RCP 8.5 path-way. This has a projected global temperature increase of 3.7°C.

Oil Search, [Climate Change Resilience Report 2017](#), p. 18

Discloses Potential Strategy Resilience under Different Climate-Related Scenarios

The Task Force’s *Strategy c)* recommended disclosure calls for companies to describe the resilience of their strategies, taking into consideration different climate-related scenarios. Such disclosures are critical in assisting investors and other stakeholders in better understanding the following three factors:

- The degree of robustness of the company’s strategy and financial plans under different plausible future climate states of the world;
- How the company may be positioning itself to take advantage of opportunities, and its plans to mitigate or adapt to climate-related risks; and
- How the company is thinking strategically about longer-term climate-related risks and opportunities.⁴⁹

Characteristics of sound disclosures include (1) an evaluation of how the company’s strategy might perform under each climate-related scenario, (2) identification of key uncertainties potentially affecting strategic performance and relevant signposts to monitor such uncertainties, and (3) identification of options for increasing the company’s resiliency through adjustments to strategic and financial plans. Disclosures should promote a constructive dialogue between investors and the company on the resilience of the company’s strategy under different climate-related scenarios.

To varying degrees, the selected companies discussed the resilience of their strategies under the climate-related scenarios used. [Table 4](#) depicts how the selected companies described strategy resilience based on potential financial impacts under the various climate-related scenarios.⁵⁰

Table 4

Disclosure of Strategy Resilience

Disclosures References to Strategy Resilience
BHP “Our analysis shows that the portfolio is resilient due to long-term demand, high-quality resources, low production costs and rapid payback periods of growth projects. In a 2°C world, we believe there is a likelihood of upside for uranium, high-quality metallurgical coal and iron ore.”
Oil Search “As highlighted in the 2018 Climate Change Resilience Report, Oil Search’s current and growth assets are highly robust and would continue to generate positive returns to shareholders under a range of decarbonisation scenarios, including a 2°C pathway.”
Rio Tinto “We continue to take steps to manage risks and increase the resilience of our business to climate change, as well as position ourselves for new opportunities [...]. Our analysis indicates that Rio Tinto’s business is relatively robust, including against a 2°C scenario consistent with the goals of the Paris Agreement.”
Unilever “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.”

Companies’ disclosure of the resilience of their strategies is a critical element of the TCFD recommendations, and it is an area where the Task Force believes providing further details and depth to a company’s discussion around strategy resilience would strengthen disclosures.

⁴⁹ TCFD, *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*, June 29, 2017, p. 29.

⁵⁰ BHP, *Climate Change: Portfolio Analysis*, September 29, 2015, p. 2. Oil Search, *Annual Report 2018*, March 28, 2019, p. 15. Rio Tinto, *Our Approach to Climate Change*, February 27, 2019, p. 36. Unilever, *Unilever Annual Report and Accounts 2018*, March 6, 2019, p. 34.

Companies with material climate-related risks should consider including additional information on alternative strategies they considered and how the chosen strategy influences the flexibility, robustness, and redundancy of critical business processes.

5. Conclusion

To improve the usefulness of disclosures, the Task Force has recommended companies use scenario analysis as a tool to enhance their strategy formulation processes under conditions of uncertainty. In the case of climate change, scenarios allow a company to explore and develop an understanding of how the physical and transition risks of climate change may affect its operations, strategies, and financial performance over time. The Task Force believes understanding how a company thinks its strategy might perform under various climate-related scenarios is a key component of disclosure to—and dialogue with—investors and other stakeholders. It allows investors and other stakeholders to understand better the potential implications of climate change on the company and serves as a basis for a dialogue around a company's strategic options.

Although several TCFD survey respondents reported using scenario analysis for assessing strategy resilience, its full integration into corporate planning and disclosure processes appears to be at early stages for many companies. In particular, the fact that relatively few companies disclose information related to potential financial impact and strategy resilience across a range of climate-related scenarios is an area clearly in need of further work. In part, this may be because many companies are still learning how to use climate-related scenarios and incorporate scenario analysis into their strategic planning and risk management processes. Companies also face other challenges in adopting scenario analysis, including the need for further tools, business-relevant data, industry- and sector-specific methodologies, business-relevant climate-related scenarios, and methods to quantify financial impacts.

Work to address some of these challenges is underway. Industry groups and others are working to improve various aspects of climate-related scenario analysis and climate-related risk assessment. While these efforts may help to improve the depth and content of disclosures around strategy resilience under different climate-related scenarios, the Task Force believes further work is necessary.

To promote greater adoption of climate-related scenario analysis by companies, the Task Force is considering additional work in the following two areas:

- Additional process guidance around how to introduce and conduct climate-related scenario analysis and
- Business-relevant and accessible scenarios.

Many existing scenarios, such as those developed by the IEA and IPCC, are largely intended for policy and research purposes; they do not lend themselves easily to business-specific applications in different sectors. More business-relevant scenarios may spur additional adoption of scenario analysis by lowering implementation costs, improving understanding, and furthering comparability.

Understanding how a company positions itself strategically to address a range of plausible future climate states is a critical area requiring further attention and emphasis in the disclosures of companies most affected by climate change. In considering further work in these two areas, the Task Force's intent is to address practically some of the key challenges raised by companies using climate-related scenario analysis, remove barriers to implementing climate-related scenario analysis, and help provide guidance to broaden and deepen companies' disclosures around their climate-related strategy resilience.

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

E 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 financial disclosures that an individual investor, portfolio manager, or analyst (user) views as having decision-useful information aligned with one or more of the Task Force's recommendations. Each analysis was prepared by a user from a Task Force member's company or related organization and represents the user's individual views (rather than a consensus view of the users on the Task Force). The users independently chose and assessed, based on their expertise, the companies and disclosures discussed in this section.

A key theme from the user assessments included in this section is that specifics matter. Users often highlighted that they chose these examples because they include detailed information in key areas they review when making financial decisions, such as who is responsible for managing climate-related risks and opportunities at the company and how the company's strategy has changed because of climate-related risks or opportunities. Users also noted—consistent with the results of the TCFD survey—that more information on the potential financial impact of climate change on companies is needed.

1. Buy Side Analyst's Perspective on a Materials Company

Royal DSM (DSM) is a multinational company in life sciences (nutrition and health) and specialty materials. The company delivers solutions for human nutrition, animal nutrition, personal care and aroma, medical devices, green products and applications, and new mobility and connectivity. DSM and its associated companies delivered annual net sales of about €8.9 billion with approximately 21,000 employees in 2018. The company is based and listed in the Netherlands.

Introduction

DSM's [Integrated Annual Report 2018](#) offers detailed insights into the company's strategic progress, business development, financial results and corporate governance, as well as into its environmental and social performance.⁵¹ The sustainability reporting in DSM's Integrated Annual Report 2018 has been prepared in accordance with the GRI Standards.

Disclosure Example: Governance

DSM's governance framework around all sustainability issues (which includes climate change) involves the Supervisory Board, the Management Board, as well as the External Sustainability Advisory Board. On the corporate level, DSM's sustainability efforts are driven by the Sustainability Leadership Team, which is chaired by the Vice President Sustainability and consists of a group of senior executives representing various divisions within the company.

DSM considers sustainability as one of its core values, and this is reflected in how the company ties sustainability with financials—including remuneration.

The remuneration of DSM's Managing Board is based on both short- and long-term goals, stretching beyond purely financial targets. Fifty percent (50%) of board members' total compensation is a base salary. Variable income (bonuses) makes up the remaining 50% of salary. Variable income is comprised equally of Short-Term and Long-Term Incentives ([Figure 72](#), p. 77).

Governance

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

⁵¹ Royal DSM, [Integrated Annual Report 2018](#), March 2019.

Short-Term Incentives include the proportion of products qualifying as Brighter Living Solutions, Employee Engagement, and Safety Performance.

Long-Term Incentives include progress in reducing DSM's greenhouse gas emissions and improving DSM's energy efficiency.

Figure 72

Excerpt from Integrated Annual Report

STI linked to sustainability and individual targets

The part of the STI that is linked to shared sustainability as well as to individual targets, represents 25% of base salary for on target performance. Further refinement/adaptations of performance measures in the area of sustainability and their relative weight may take place following proper evaluation. The following shared measures linked to sustainability are applicable for the STI:

- Brighter Living Solutions (BLS): percentage of running business that meets ECO+ and People+ criteria (products that offer a better environmental or social benefit compared to mainstream reference solutions)
- Employee Engagement Index: related to the High-Performance Norm in industry
- Safety Performance: defined as Frequency Index for Recordable Injuries

Long-Term Incentives (LTI)

The Managing Board members are eligible to receive performance-related shares. Under the Performance Share Plan, shares will conditionally be granted to Managing Board members. Vesting of these shares is conditional on the achievement of certain predetermined performance targets at the end of a three-year period. The following four performance measures are, equally weighted, applicable for the calculation of the vesting of LTI Performance Shares:

- Relative Total Shareholder Return (TSR) performance versus a peer group
- Return on Capital Employed (ROCE) growth
- Energy Efficiency Improvement (EEI)
- Greenhouse Gas Emissions (GHGE) Efficiency Improvement

Royal DSM, [Integrated Annual Report 2018](#), p. 133

Disclosure Assessment: Governance

The fact that DSM's Supervisory Board has appointed its own Sustainability Committee to oversee progress against targets and report on the embedding of sustainability across the organization demonstrates that the company takes its climate-related risks, opportunities and commitments seriously.

This conclusion is further strengthened by the fact that DSM senior management's remuneration is directly linked to sustainability targets, including reductions in the emissions of the greenhouse gases.

Disclosure Example: Strategy

DSM is explicit about the role of sustainability in its business strategy ([Figure 73](#), p. 78). During its 2018 Capital Markets Day, the company presented its new business strategy which couples sustainability impact with financial performance.⁵²

Climate-related risks are an important part of DSM's strategy and form a core of the company's focus. Apart from improving its own carbon footprint through production efficiency and increased usage of renewable energy, DSM also enables its customers to improve their carbon efficiency.

The company develops and sells various so-called "Brighter Living Solutions"—a term defined by DSM to denote a product or service that the company deems "measurably better than the mainstream solution on the market in terms of their environmental (i.e. CO₂ emissions, resource

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.

⁵² See "DSM strategy update" for more information.

extraction, waste etc.) and/or social impact (i.e. criteria such as working conditions and health).⁵³ Brighter Living Solutions currently account for 62% of DSM's product portfolio and a vast majority of its R&D effort.

Finally, DSM is also active in advocating for climate action. Some examples of DSM's advocacy work include cooperation with CDP, the Carbon Pricing Leadership Coalition, and the World Economic Forum CEO Climate Leaders.⁵⁴

Figure 73

Excerpts from Integrated Annual Report

Sustainability and business

At DSM, sustainability is not only our core value and a key responsibility; it is also increasingly an important business driver that is fully engrained in our strategy, business and operations. Our approach for bringing about positive change is to *improve, enable and advocate*.

Improve is all about the impact of our own operations. In 2018, we continued our sustainable approach to our own operations. We apply an internal carbon price of € 50 per ton of CO₂ to help guide our investments and operational decisions and are making good progress in reducing our own greenhouse gas (GHG) emissions. Our GHG efficiency improved from 26% in 2017 to 33% in 2018 versus our 2008 baseline, strongly outperforming our aspirations. Also, in absolute terms our emissions fell by more than 8% in 2018. Last year 41% of our purchased electricity came from renewable resources, compared with 21% the year before, which puts us on track to achieve 75% in 2030. In addition to this our energy efficiency improved by 1.4% year-on-year, compared with a 1% average annual target.

Not only do we work hard to improve our own operations; we also enable our customers to do the same with our innovative solutions. We ensure that the solutions we offer are better for people and/or the planet than existing offerings. In 2018, 62% of our sales came from products that have a better environmental (ECO+) and/or social (People+) impact than mainstream solutions. We call these our Brighter Living Solutions. Our innovative solutions are applied within three

domains: Nutrition & Health, Climate & Energy and Resources & Circularity. They include our Project Clean Cow, Veramaris®, fermentative Stevia, Niaga®, light-weight materials and green energy projects in solar and bio-based, which enable our customers and the entire value chain to be more sustainable. We took further steps to tackle malnutrition. More than a decade ago, we entered into our partnership with the UN World Food Programme (WFP). We extended this for another three years in 2018, and today reach over 39 million people worldwide annually with essential nutrients. We have now decided to also address nutrient deficiency among at-risk populations by means of local initiatives, for example, through our Africa Improved Foods (AIF) project we started in Rwanda, where together with partners we are working hard to address the issue of malnutrition and stunting by using local sourcing and production.

[...]

We contribute through...

... our Advanced Solar and biofuel solutions which contribute to the uptake and efficiency of renewable energy sources.

... our high-performance materials which improve energy efficiency in and lower emissions from the automotive, maritime and food sectors.

... our animal feed solutions (such as Project Clean Cow), which promote resource efficiency and reduce greenhouse gas emissions.

... advocating for a shift to a low-carbon economy, including implementing a meaningful price on carbon.

Royal DSM, [Integrated Annual Report 2018](#), pp. 8, 10

Disclosure Assessment: Strategy

DSM is very clear about the role that climate change plays in its business strategy. DSM has managed to turn climate-related risks into climate-related opportunities by focusing its strategy on providing products and solutions that enable clients to limit their own carbon footprints. As carbon prices are widely expected to increase in the coming years, those products and solutions should become a strong revenue generator for DSM. Furthermore, strong focus on the reduction of its own GHG emissions could help the company to curb costs in scenarios where governments focus more on climate action and begin to impose additional carbon taxes.

Finally, although full disclosure on analysis of climate-related scenarios is still missing, the company has announced that it has joined the WBCSD preparer forum for the chemical sector. As explained in its Integrated Annual Report 2018 (p. 155), scenario analysis will be one of the main items the forum members will jointly work on.

⁵³ See DSM's "[Enabling the low-carbon economy](#)" for more information.

⁵⁴ See DSM's "[Advocating climate action](#)" for more information.

Disclosure Example: Metrics and Targets

DSM actively manages and discloses its GHG emissions, reduction targets, and energy efficiency metrics stewardship (Figure 74). In 2018, as part of company's strategic update, a new target was announced of 30% absolute reduction of the company's direct GHG emissions (Scope 1) and emissions from its purchased energy (Scope 2), by 2030.

In addition, DSM has committed to reduce indirect value chain emissions (Scope 3) by 28% per ton of product produced by 2030. DSM's targets have been validated to be aligned with the Paris Agreement by the Science Based Targets initiative.⁵⁵

Metrics and Targets

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

Figure 74
Excerpt from Integrated Annual Report

	Aspiration	2018	2017
<i>Greenhouse gas (GHG)</i>			
GHG emissions scope 1 + 2 market-based (million tons)		1.2 ¹	1.5
GHG emissions scope 1 + 2 location-based (million tons)		1.4 ¹	1.6
GHG emissions scope 3 (million tons)		11.3	13.1 ²
GHG efficiency improvement versus 2015	25% in 2025	16.6%	8.1%
GHG efficiency improvement versus 2008	40–45% in 2025	33%	26%
<i>Energy</i>			
Primary energy use (PJ)		20.8	23.6
Energy efficiency improvement versus 2015	> 10% in 2025	5.1%	3.8% ³
Purchased electricity from renewable sources	50% in 2025	41%	21%

¹ Including a one-time effect of large plant shutdowns in 2018, estimated at roughly 150 kt. These effects will not take place in 2019.

² Adjusted using updated emission factors and assumptions.

³ The 2017 figure has been adjusted positively because of improved data quality.

Scope 1 + 2 GHG emissions

We actively manage our absolute GHG emissions reduction, GHG efficiency and energy efficiency.

Our scope 1 + 2 market-based GHG emissions decreased from 1.50 in 2017 to 1.23 million tons of CO₂eq in 2018. Our GHG efficiency improved from 26% in 2017 to 33% in 2018 versus our 2008 baseline³. In addition to improvement actions, a large part of the result is due to planned maintenance shutdowns (contributing approximately 150 kt CO₂eq). The effect of the shutdowns is temporary, impacting the year in which the shutdown was executed. The increased use of renewable energy (contributing approximately 80 kt CO₂eq) resulted in a significant permanent improvement of our GHG emissions. The energy efficiency improvement measures also contributed to the improved GHG performance. Projects included a switch at DSM Nutritional Products' site in Kingstree (South Carolina, USA) from a solvent-based to a water-based technology, requiring less energy and, consequently generating a smaller environmental footprint.

Taking all these different factors into account, we can split the development of the absolute GHG emissions into an underlying structural improvement (such as contributions from renewable electricity, and energy efficiency gains) and some one-time effects from major plant shutdowns (such as maintenance). The structural improvement gains will vary year-on-year depending on the potential renewable electricity initiatives and the magnitude of the improvement projects executed within the company. We estimate the effect of the underlying structural improvements in absolute GHG emissions to be roughly 8% in 2018 versus 2016. The absolute GHG emission reduction (the sum of the structural and one-time effects) amounts to approximately 18% in 2018 versus 2016.

Royal DSM, *Integrated Annual Report 2018*, pp. 53-54

Disclosure Assessment: Metrics and Targets

DSM's GHG metrics and targets disclosures are clear and well-communicated. We appreciate DSM's attempts and progress at measuring Scope 3 emissions and target setting in line with Science-Based Targets. Few other competitors are able to measure Scope 3, let alone set targets.

⁵⁵ See "DSM sets science-based reduction targets for emissions."

Conclusion

DSM is an industry leader with a strategy focused on providing climate (and other) solutions. Its climate-related disclosures reflect its position. The company is transparent about the level of its own emissions as well as its actions to reduce them. What makes DSM stand out among many of its peers is the link that the company makes between climate-related risks with its own ability to grow revenue from products and services that enable the transition to a low-carbon economy.

Still, additional disclosure around scenario analysis—including the potential financial impact of various scenarios (transition as well as physical)—would be welcome.

2. Buy Side Analyst's Perspective on an Electric Utility Company

Ørsted is a Danish renewable energy company.⁵⁶ It is a global leader in developing, constructing, and operating offshore wind farms. The company also engages in onshore wind farms, bioenergy plants and innovative waste-to-energy solutions and provides smart energy products to its customers. Ørsted is headquartered in Denmark and employs over 6,000 people. The documents reviewed for this assessment include Ørsted's [Annual Report 2018](#), [ESG Performance Report 2018](#), and [Sustainability Report 2018](#).⁵⁷ The areas of focus are disclosures related to the TCFD recommendations on Strategy and Metrics and Targets.

Introduction

Ørsted's [Annual Report 2018](#) (annual report) is an integrated report, combining disclosures of material financial and non-financial data. It contains four main components: a business review, governance report, financial statements, and additional information containing the consolidated ESG statements. Ørsted endorsed the TCFD framework in 2018 and began implementing the recommendations for the first time in the annual report. The company also reports how it contributes to the United Nations Sustainable Development Goals (UN SDGs) through deploying renewable energy at scale and decarbonization of its heat and power generation. It conducts a materiality assessment each year that turns the most relevant and material societal challenges into 20 sustainability programs, each with well-defined targets and management accountability. Additionally, the company has a detailed [ESG Performance Report 2018](#) (ESG report) and [Sustainability Report 2018](#) that contain additional relevant ESG metrics and performance.

Disclosure Example: Strategy

In its annual report, Ørsted outlines a vision of “a world that runs entirely on green energy” and states that climate change is fundamental to the company's business strategy and all its investments. As such, the company integrates climate-related risks and opportunities in reviewing and guiding its strategy, in setting performance objectives, and in overseeing major investments, acquisitions and divestments. More specifically, the company seeks to exploit climate-related opportunities through the development and construction of renewable heat and power generation capacity such as offshore wind, solar, and bioenergy. At the same time, it seeks to reduce both the transition and physical climate-related risks identified over the short, medium and long term. For example, policies towards increased renewable energy capacity and generation and the future competitiveness of green technologies are among some of the transition risks identified. The company looks to address these by 1) engaging with regulators to strive for regulatory frameworks that support ambitious renewable capacity build-out and 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.

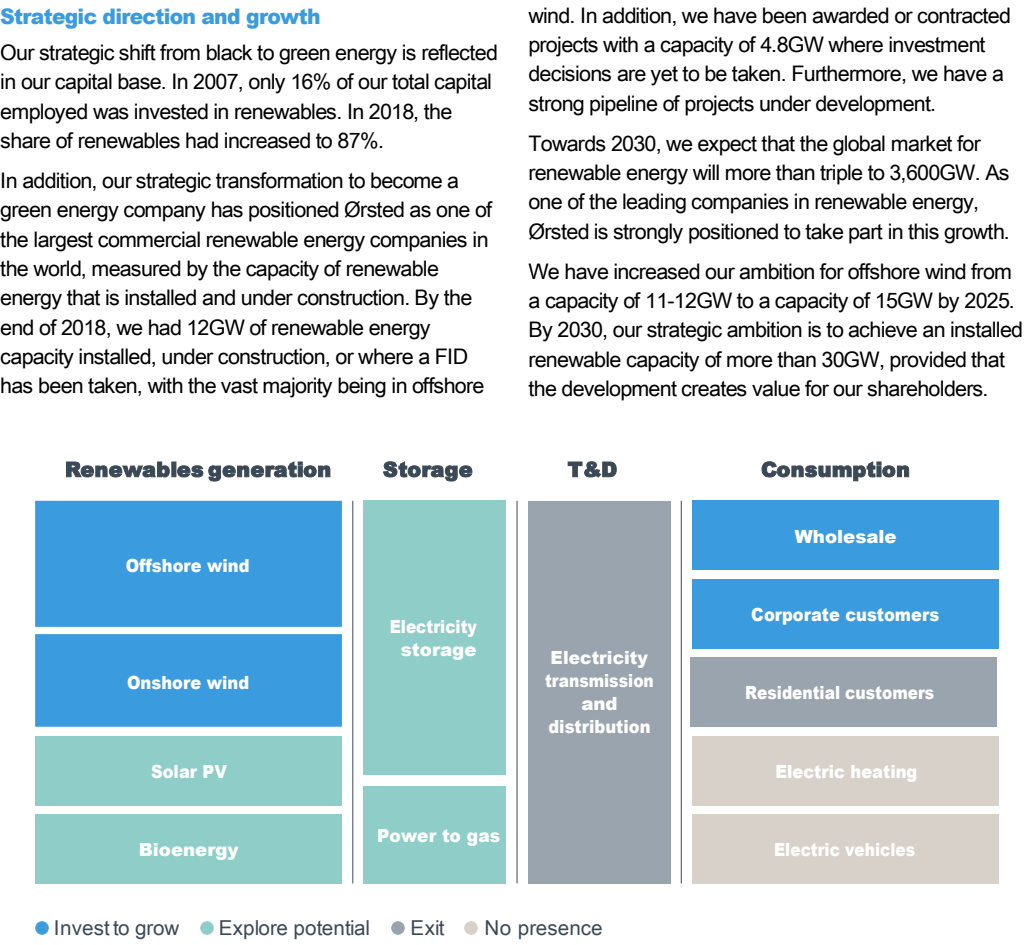
⁵⁶ Ørsted was formerly known as DONG (Danish Oil and Natural Gas) Energy. Following the major strategic transformation from black to green energy and the divestment of its upstream oil and gas business in 2017, the company changed its name to Ørsted.

⁵⁷ Ørsted, [Annual Report 2018](#), January 31, 2019; Ørsted, [ESG Performance Report 2018](#), January 31, 2019; and Ørsted, [Sustainability Report 2018](#), January 31, 2019.

continuously working to improve the future competitiveness of green technologies. In order to mitigate physical risks, the company states that it takes extreme weather conditions and other relevant factors into account when designing and constructing its assets. Climate-related risks and opportunities are also an integral part of the business decisions for investing in new assets or divesting. For example, the company decided to exit Danish power distribution, residential customer, and city light businesses in June 2018 to focus on renewable energy assets (Figure 75). With respect to capital allocation, Ørsted will also be investing the majority of its 2019-2025 capital expenditure (capex) in renewable energy areas (e.g., 75-85% in offshore wind, 15-20% in onshore wind, 0-5% in bioenergy and customer solutions).

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Figure 75
Excerpt from Annual Report



Ørsted, [Annual Report 2018](#), pp. 18, 22

Disclosure Assessment: Strategy

Ørsted’s reports clearly illustrate the company’s strategic transformation path from black to green energy and lay out its future blueprint for further commitment using clearly-defined emissions metrics and targets and renewables build-out plans. This allows investors to make better-informed assessments on how the company is integrating climate-related risks and opportunities in setting its strategic direction and how it compares to sector peers. The reports contain extended discussions on climate change, with reference to third-party science-based analyses (i.e., Paris Agreement, IPCC reports) to highlight the urgency for action and the resulting increase

in potential opportunities in renewable energy. However, investors would benefit from Ørsted more clearly linking climate-related risks and opportunities to financial impacts on the company. For example, although the company suggests that a rapid build-out of renewable capacity such as offshore wind can potentially lower operating costs through scale, the extent of cost savings is unclear. That said, we understand that the company may not want to disclose such sensitive information as it closely ties to the competitive contract bidding process. What could further help investors is disclosure of the country-specific energy policies used to map out the renewables opportunities so that investors can assess the opportunity set in relation to the 2°C target. We agree with the Task Force recommendations that including scenario analysis would help investors better understand the potential financial impacts on Ørsted's revenues, costs, and earnings.

Disclosure Example: Metrics and Targets

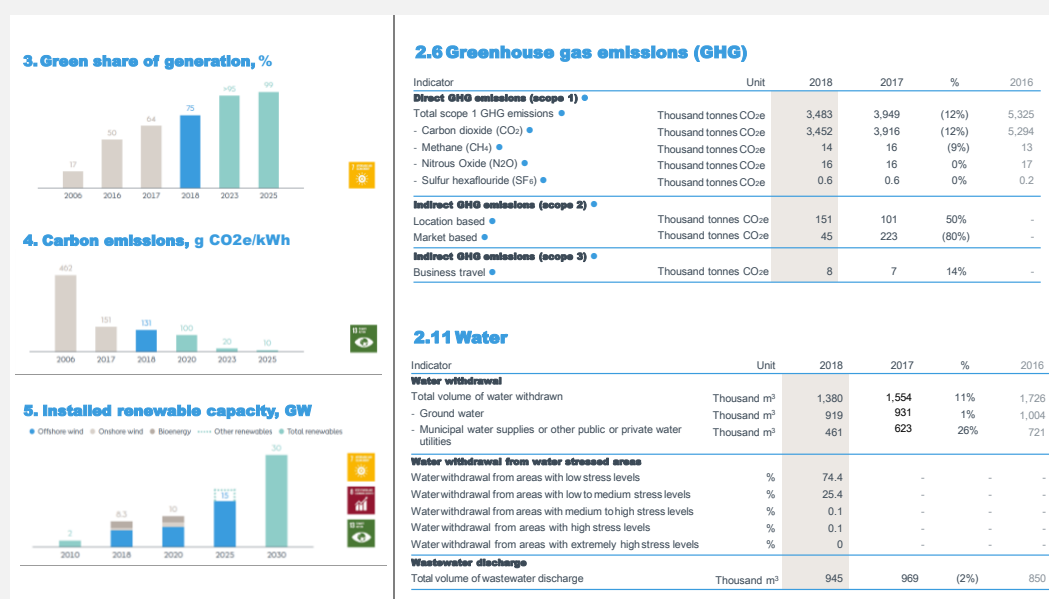
In the annual report, Ørsted reports and sets targets on green energy share, carbon emissions intensity, and offshore wind capacity (Figure 76). These are also the company's strategic targets and are newly tied with the executive compensation. Ten years ago, Ørsted was one of the most coal-intensive utilities in Europe, and now the company is targeting a complete phase-out of coal by 2023. Ørsted's ESG report also discloses the company's GHG emissions by type (including Scope 1, Scope 2, and Scope 3 emissions), energy consumption by type, and water stress exposure (Figure 76). The report outlines detailed accounting policies on the methodologies and calculations for all metrics, which allows for greater comparability across different companies' disclosures.

Metrics and Targets

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

Figure 76

Excerpts from Annual Report and ESG Performance Report



Ørsted, [Annual Report 2018](#), pp. 26-27

Ørsted, [ESG Performance Report 2018](#), pp. 16, 21

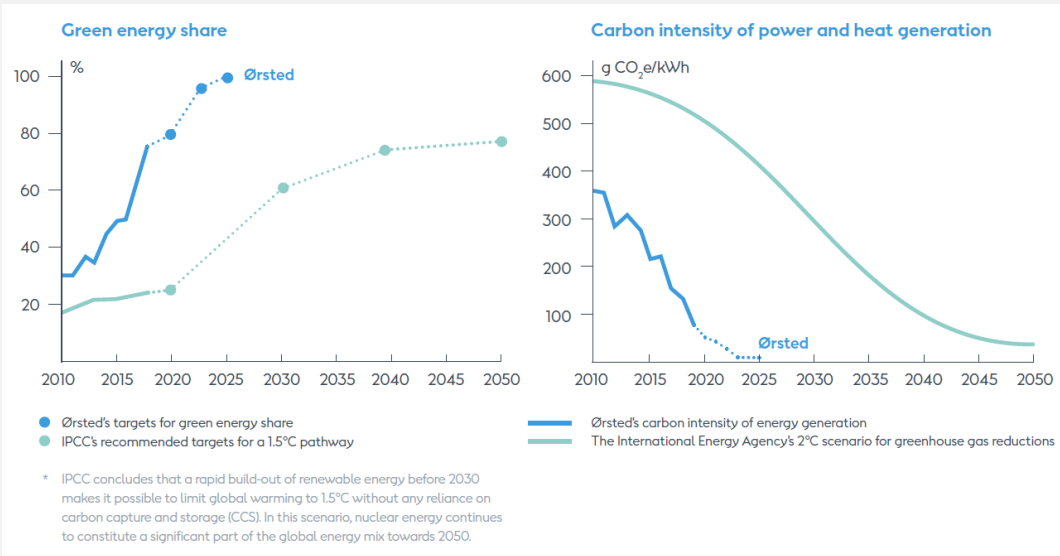
Disclosure Assessment: Metrics and Targets

Ørsted's metrics are in line with TCFD's recommended metrics for consideration for the Energy Group, including GHG emissions, energy, and water. The disclosures on Ørsted's metrics and targets provide decision-useful insights into how the company is transforming from black to

green energy and the potential climate-related opportunities through offshore wind deployment or avoided carbon emissions. The company's targets are stepwise medium- and long-term targets and give investors better visibility on Ørsted's pathway to achieving these targets and help determine management's track record. For example, in 2006, less than 20% of energy came from renewable sources. In 2018, the company has reached 75% and targets over 80% by 2020, over 95% by 2023, and over 99% by 2025. Ørsted has also raised its offshore wind build-out target from 11-12GW to 15GW by 2025 and targets to reach over 30GW renewable energy by 2030.

Ørsted also puts its targets into context for investors. For example, Ørsted's green energy share target is above the IPCC's recommended path for raising the renewable share of global power generation to limit global temperature increases to 1.5°C (Figure 77). Similarly, the company's own carbon intensity of energy generation is well below the International Energy Agency's 2°C scenario.

Figure 77
Excerpt from Sustainability Report



Ørsted, *Sustainability Report 2018*, p. 9

Conclusion

Overall, Ørsted has made laudable efforts to align and implement reporting on climate-related risks and opportunities with the TCFD recommendations during its first year of endorsement. The reports provide a helpful level of specificity in the information provided around its strategy and climate-related metrics and targets. Disclosures on the company's strategic transformation help investors understand its new growth opportunities. As noted, incorporating a scenario analysis that reflects the financial impacts of the identified climate-related risks and opportunities would further help investors.

3. Portfolio Manager's Perspective on a Utilities Company

The AES Corporation operates as a diversified power generation and utility company. It owns and operates power plants to generate and sell power to customers, such as utilities, industrial users, and other intermediaries. The company also owns and operates utilities to generate or purchase, distribute, transmit, and sell electricity to end-user customers.

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Introduction

The focus of this review is to assess AES’s disclosure of strategy and consideration of climate-related scenarios in its November 2018 [AES Climate Scenario Report](#). In this report, AES assesses its portfolio through stress tests using three climate-related scenarios, providing information in alignment with the TCFD recommendations, and notes that it is the first publicly-traded owner of utilities and power companies in the U.S. to do so. As part of this report, AES extended the commitment to building a sustainable organization by reducing its carbon intensity (tons of CO2/MWh) by 70 percent from 2016 levels by 2030.

AES also expressed how it is fundamentally shifting its portfolio in a manner that both reduces carbon intensity and exposure to carbon price risk. Ultimately, four Clean Energy Growth Platforms are determined to be core to its strategy: renewables, energy storage solutions, liquefied natural gas (LNG), and energy efficiency.

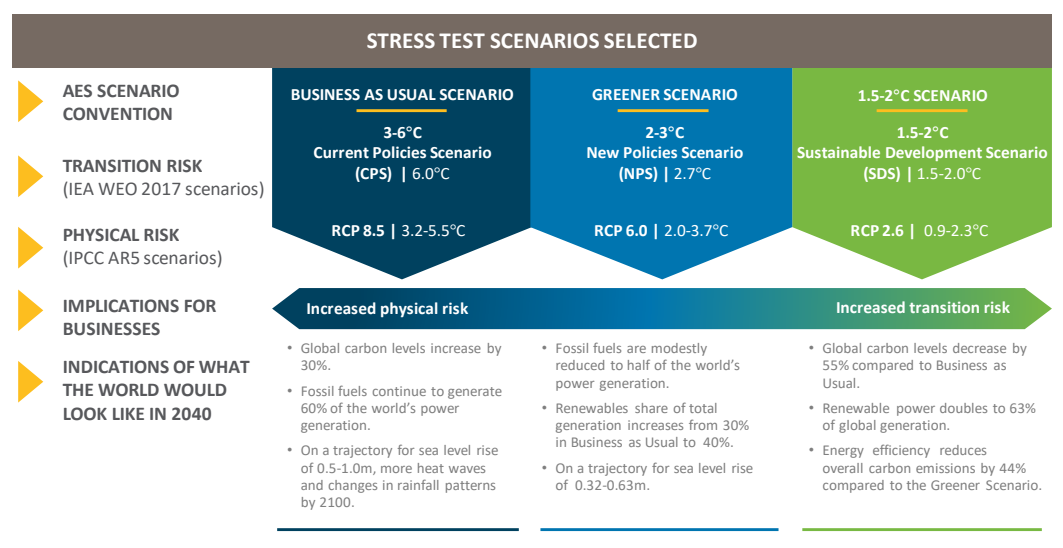
Disclosure Example: Strategy

To stress test⁵⁸ its portfolio, AES identified third-party scenarios covering varying degrees of climate-related transition and physical risk. AES used the International Energy Agency’s (IEA) 2017 World Energy Outlook (WEO) for transition risk scenarios, and for physical risk scenarios, they selected the Representative Concentration Pathways (RCPs) established by the Intergovernmental Panel on Climate Change’s (IPCC) Fifth Assessment Report (AR5). The three stress test scenarios are a “Business as Usual Scenario” of 3-6°C, a “Greener Scenario” of 2-3°C, and a “1.5-2°C Scenario” in line with the TCFD recommendation on Strategy ([Figure 78](#)).

Strategy

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

Figure 78
Excerpt from Climate Scenario Report



AES, [AES Climate Scenario Report](#), p. 6

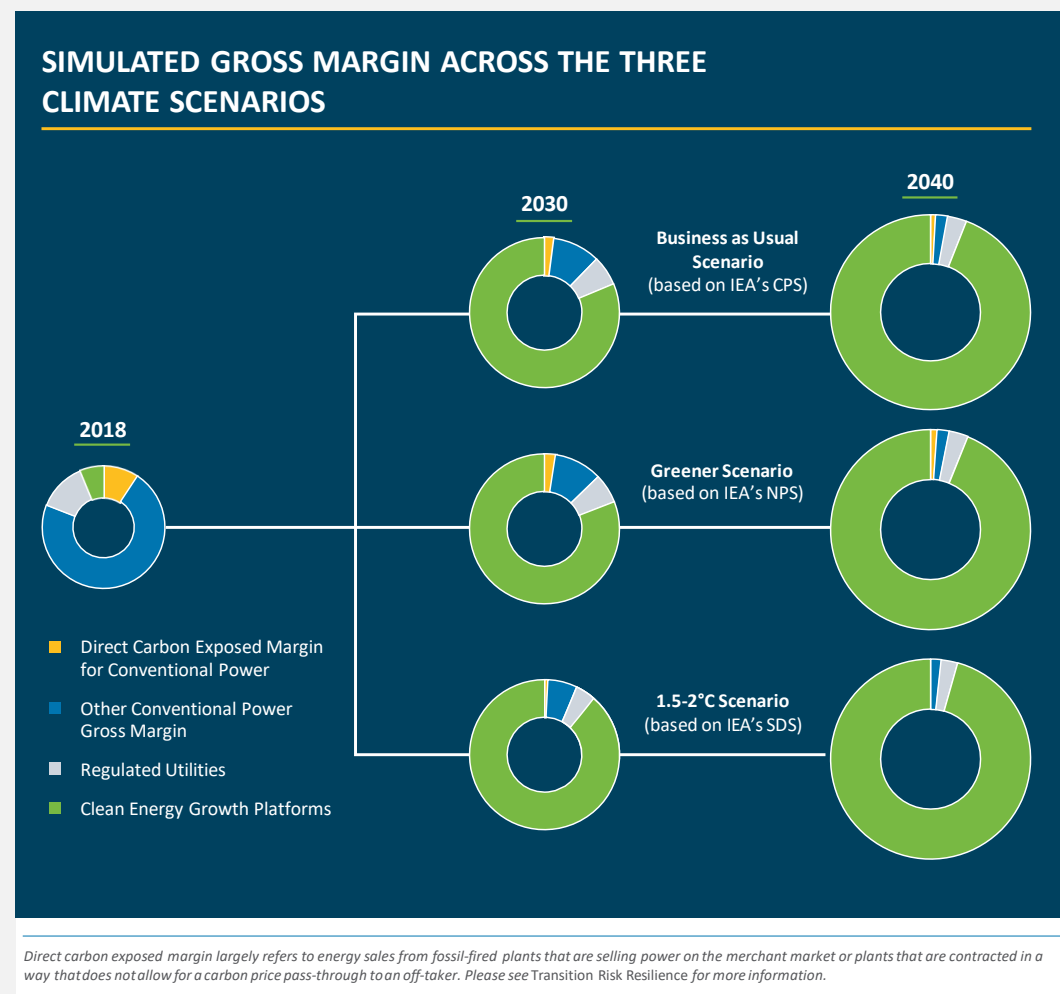
AES developed its climate resilience stress test to provide an in-depth financial analysis assessing the sensitivity of gross margin across its entire business—from every individual plant, up through its strategic business units. The results of the stress test show simulated gross margin across the three scenarios for both 2030 and 2040, with a large reduction in conventional power and clean

⁵⁸ Stress testing is a form of scenario analysis.

energy platforms constituting a significant majority of gross margin under all scenarios and timeframes (Figure 79). The stress test highlights the effectiveness of the company's efforts to mitigate climate-related risk given the decreasing portion of its margin that is directly exposed to carbon pricing as the company moves from the simulated Business as Usual Scenario of 3-6°C to the 1.5-2°C Scenario.

Figure 79

Excerpt from Climate Scenario Report



AES, [AES Climate Scenario Report](#), p. 7

In addition, on page 6, AES states that its “portfolio is not only resilient, but positioned for growth” and explains underlying rationale using potential carbon prices and estimates of carbon-exposed margin (Figure 80, p. 86). This addresses the TCFD recommendation to describe strategic resilience, taking scenarios into account, and provides confidence to readers of the Climate Scenario Report due to the inclusion of specific examples. Additionally, AES provides an evaluation of three types of its business including the strengths of each and the impact to each in a 1.5-2°C scenario. Under a 1.5-2°C scenario AES will continue to be a leading provider of renewables and by 2040, conventional power (fossil fuel and hydro) will make up a small portion of its portfolio. Even under such scenario, these fossil fuel plants that will continue to operate under PPAs will continue to receive capacity payments and are expected to continue to provide reasonable returns.

Figure 80

Excerpt from Climate Scenario Report

OUR PORTFOLIO IS NOT ONLY RESILIENT, BUT POSITIONED FOR GROWTH

Given our modest exposure to direct carbon risk and our pivot toward Clean Energy Growth Platforms, transition risk can enhance our upside potential.

The stress test highlights the effectiveness of our efforts to mitigate climate change risk given the decreasing portion of our margin that is directly exposed to carbon pricing as we move from the simulated Business as Usual Scenario (3-6°C) to a 1.5-2°C Scenario. In the results that follow, direct carbon exposed margin refers to margin that has the potential to be directly and negatively affected by, or has been subject to, a price on carbon. Even in the 1.5-2°C Scenario, where carbon prices reach \$125/tonne for emerging economies and \$140/tonne for advanced economies by 2040, our direct carbon exposed margin is virtually zero. Under this scenario, our existing thermal plants are considered to be retired at the end of their anticipated useful life or contracted for reliability with the off-taker bearing the cost of carbon. The majority of the margin from these plants comes from capacity payments, which are not directly carbon exposed. These payments are essentially for availability and are received regardless of the amount of energy generated. However, these plants have indirect carbon exposure if the credit quality of our off-takers deteriorates due to carbon pricing.

AES, [AES Climate Scenario Report](#), p. 7

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Disclosure Assessment: Strategy

The AES climate resilience stress test is especially valuable to users of the Climate Scenario Report because AES was able to separately assess three different scenarios instead of just one. It is useful to see the potential results of more than one scenario because the stress tests are not intended to be treated as forecasts, either within the company or by readers of its disclosure. Instead, the scenarios show that AES has given serious consideration to making its strategy resilient to various future climate-related risks and opportunities.

The stress tests demonstrate to users that AES has enhanced its resilience by taking three strategic actions: a fundamental shift in its portfolio to clean energy sources and services, geographical diversification of its exposure, and strong PPA contracts that protect margin. Specific descriptions of AES's strategic actions to address climate-related risks and opportunities are decision useful because they allow users to assess how the company is positioning itself to mitigate carbon policy risks while ensuring a continued focus on predictable cash flows and strong revenue and margins.

Not only does AES provide an assessment demonstrating that its strategy is likely resilient, it also provides several key weaknesses to consider and recommendations to improve stress tests, including:

- Detailed and consistent visibility into assumptions and outputs across all three scenarios;
- Greater country level (and sub-country) specificity;
- Increased clarity around assumptions for energy storage and energy efficiency; and
- Quantitative likelihood or probability measures for severe weather events.

Describing weaknesses and recommendations for improvement can provide confidence to users that AES has taken the assessment seriously and intends to continue assessing the resilience of its strategy in the future. Furthermore, in the future, as third-party established scenarios are enhanced, AES has committed to look to update its modeling and stress tests to take these enhancements into account.

Conclusion

Overall, the AES Climate Scenario Report is comprehensive in its approach to disclosing the resilience of its strategy, including potential strategic actions, while taking into consideration different climate-related scenarios. The disclosure provides decision-useful information by describing specific information on stress testing scenarios and AES's current and future strategy. In addition, the Climate Scenario Report demonstrates that AES takes climate-related issues seriously and is dedicated to preparing its business for the future.

4. Credit Analyst's Perspective on an Oil and Gas Company

Royal Dutch Shell, plc (Shell) is a British-Dutch integrated oil and gas company headquartered in the Netherlands and incorporated in the United Kingdom. Shell has operations in more than 70 countries and produces 3.7 million barrels of oil equivalent daily alongside its roughly 3 million barrels per day global refining throughput capacity.

The primary documents reviewed for this assessment were Shell's [2018 Annual Report and Form 20-F](#) (annual report), which is an integrated report that incorporates by reference Shell's Energy Transition Report, its 2017 Sustainability Report, and [greenhouse gas emissions webpage](#).⁵⁹

The areas of focus for this assessment are disclosures related to the Task Force's Strategy and Metrics and Targets recommendations.

Introduction

Shell's annual report combines financial and non-financial material and contains four major sections: Strategic Report; Governance; Financial Statements and Supplements, and; Additional Information. The annual report seeks to incorporate the TCFD's recommendations, including discussion of the energy transition and Shell's portfolio resilience. To that end, Shell joined the Oil and Gas Preparer Forum, convened by the World Business Council for Sustainable Development with input from the TCFD Secretariat, to identify examples of effective disclosure practices in the oil and gas industry and describe how disclosures may evolve over time.

Shell provides an appendix to the executive summary of its Energy Transition Report in which it lists each of the TCFD recommendations and supporting recommended disclosures and provides listings of reports, publications, and websites that address the specified disclosures. [Box 3](#) (p. 89) provides excerpts from this appendix related to the Strategy and Metrics and Targets recommendations. This appendix provides a useful reference to track what the company discloses and in which documents the disclosures are located.

In its annual report, Shell broadly discusses its governance and management of climate-related risks and opportunities, the risks and opportunities climate change presents its portfolio, its strategy for adapting its operations to climate change and an accounting of its performance.

This review focuses on Shell's disclosures on its strategy around identifying and managing climate-related risks and opportunities and the metrics it uses to assess and manage these risks and opportunities.

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⁵⁹ Royal Dutch Shell, [2018 Annual Report and Form 20-F](#), March 14, 2019. Shell's 2018 sustainability report was not available when this analysis was prepared.

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Disclosure Example: Strategy

In discussing its strategy on climate change, Shell identifies four key risks: societal, commercial, regulatory and physical. It then defines the time horizons it uses for business planning and identifying risks—short term (up to three years), medium term (three years up to around 10 years), and long term (beyond 10 years). In describing the long term, Shell states its “current portfolio is not representative of [its] performance or the potential risks. Decision making and risk identification on the thematic structure of the future portfolio are guided by associated emerging questions.” This is consistent with the long-term uncertainties facing the oil and gas sector generally and indicates to readers of its annual report that Shell’s businesses are likely to change considerably over the long term.

As part of its long-term strategy, Shell aims to cut its and its customers’ GHG emissions generated by the production and use of energy from Shell’s products by “around half” from 2017 levels by 2050, with an interim goal of 20% (compared with 2016 levels) by 2035. Shell acknowledges that its 2050 target is aspirational and that it does not yet have a defined path to reach either its 2035 goal or 2050 goal and that achieving these goals will depend, in part, on “societal progress.”

Disclosure Assessment: Strategy

As part of its long-term strategy, Shell provides guidance on its strategic approach and investment decision-making for its upstream business in its Energy Transition Report, listing the resiliency-enhancing factors it considers when making investment decisions (Figure 81). These criteria help the reader assess how Shell intends to maintain and grow its existing hydrocarbon businesses in a way that will preserve its competitiveness and returns. They also indicate how the company plans to improve its GHG intensity and develop clean technologies that might mitigate the carbon intensity of its oil and gas businesses over the long term. This guidance is limited to the upstream and there is no comparable framework provided for its other businesses.

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 81

Excerpt from Energy Transition Report

We will continue to assess and adjust investments to sustain our oil and gas resources, with significant flexibility to respond to expected demand, prices and other relevant factors.

When making investments we consider the following factors to enhance resilience:

- Short-cycle investment and flexibility to allow production to increase or decrease in response to changes in demand or price (for example in Shales);
- Focusing on projects that generate positive cash flow in a short period of time (for example, by adding new wells to existing deep-water fields);

- Improving capital efficiency to lower break-even prices;
- Considering specific performance standards on CO₂ intensity for various asset classes when investing in new assets;
- Deploying technologies to further drive resilience, including the use of CCS and renewables in Upstream assets;
- GHG and energy management to lower CO₂ intensity and potential costs from carbon prices in our operating assets.

Royal Dutch Shell, [Energy Transition Report](#), p. 39

Excerpt from Energy Transition Report

STRATEGY:

Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation'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.	Annual Report (page 65-66): "Our strategy on climate change" CDP submission: describes detailed examples
b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy and financial planning.	Annual Report (pages 65-66): "Our strategy on climate change" Shell Energy Transition Report (page 24): "Our resilience in the medium term, to 2030"
c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	Shell Energy Transition Report (page 50): "Changing our portfolio in the long term, after 2030" Sky Scenario: describes our scenarios approach

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 Report sections: "Environmental data" and "Our Executive Scorecard"
b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	Greenhouse gas webpage: www.shell.com/ghg provides our performance data on Scope 1, 2 and 3 Shell Energy Transition Report (page 24): "Our resilience in the medium term, to 2030"
c) Describe the targets used by the organization to manage climate-related risks, opportunities, and performance against targets.	Annual Report (pages 65-66): "Our strategy on climate change"

Royal Dutch Shell, [Energy Transition Report](#), p. 77

Disclosure Example: Metrics and Targets

In its Sustainability Report, Shell provides a section titled "Our Performance and Data." The section provides considerable data and a downloadable spreadsheet of sustainability performance data. The disclosed data cover metrics on a host of topics, including GHG emissions (direct and indirect) and flaring and energy intensity (see [Figure 82](#), p. 90). In addition, the spreadsheet provides ten years of comparable GHG emissions data with an accompanying explanation of the scope and methodology. These disclosures are extensive and cover other topics (not shown in [Figure 82](#), p. 90) as well, such as acid gases and VOCs (volatile organic compounds) emissions, ozone-depleting emissions, spills and discharges, and several metrics around water stewardship.

Metrics and Targets

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

Figure 82

Excerpt from Sustainability Report

Environmental data

	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Greenhouse gas emissions (GHGs)										
Direct total GHGs (million tonnes CO ₂ equivalent) [A]	73	70	72	76	73	72	74	76	69	75
Carbon dioxide (CO ₂) (million tonnes)	70	67	68	73	71	69	71	72	66	72
Methane (CH ₄) (thousand tonnes)[B]	123	138	132	126	120	93	133	128	127	126
Nitrous oxide (N ₂ O) (thousand tonnes)	1	1	1	1	1	1	1	2	2	2
Hydrofluorocarbons (HFCs) (tonnes)	23	21	18	16	17	23	22	23	25	23
Energy indirect total GHGs (million tonnes CO ₂ equivalent) [C]	12	11	9	10	10	9	10	9	9	n/c
Flaring										
Flaring (Upstream) (million tonnes CO ₂ equivalent) [D]	8.2	7.6	11.8	13.0	7.4	7.7	10.0	10.4	7.8	8.8
Flaring (Upstream) (million tonnes hydrocarbon flared) [D]	2.5	2.3	3.5	3.8	2.1	2.3	3.4	3.6	2.6	2.8
Nigeria [E]	0.8	0.5	0.9	1.3	1.1	1.5	2.0	2.4	1.9	2.3
Rest of the world [E]	1.7	1.8	2.6	2.5	1.0	0.8	1.4	1.2	0.7	0.5
Energy intensity										
Upstream excl. oil sands, LNG and GTL (gigajoules per tonne production) [D], [F]	1.05	1.02	0.83	0.87	0.89	0.83	0.75	0.74	0.76	0.74
Refineries: Refinery Energy Index [G]	94.8	95.4	95.4	94.9	95.6	98.4	100.8	101.8	102.2	98.9
Chemical plants: Chemicals Energy Index	88.2	91.0	91.6	90.3	89.8	91.7	90.8	89.3	92.0	93.0

[A] Greenhouse gas emissions (GHG) comprise carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride. The data are calculated using locally regulated methods where they exist. Where there is no locally regulated method, the data are calculated using the 2009 API Compendium, which is the recognised industry standard under the GHG Protocol Corporate Accounting and Reporting Standard. There are inherent limitations to the accuracy of such data. Oil and gas industry guidelines (IPIECA/API/IOGP) indicate that several sources of uncertainty can contribute to the overall uncertainty of a corporate emissions inventory. 2015-2017 emissions are calculated using Global Warming Potential factors from the IPCC's Fourth Assessment Report. Data for prior years were calculated using Global Warming Potential factors from the IPCC's Second Assessment Report.

[B] We have updated our 2015-2016 figures following review of data.

[C] These emissions were calculated using the market-based approach in line with the GHG Protocol Corporate Accounting and Reporting Standard.

[D] The term upstream in this context includes assets and activities from our Upstream, Integrated Gas and Oil Sands operations.

[E] Nigeria includes SPDC onshore operations (0.6 million tonnes flared in 2017) and SNEPCo offshore operations (0.1 million tonnes flared in 2017). Flaring from the Majnoon field in Iraq and from Malaysia amounted to 0.9 and 0.1 million tonnes of hydrocarbons respectively in 2017. Due to the rounding of numbers, flaring volumes for Nigeria and the rest of the world might not add up to the exact total volume of flaring.

[F] Since 2012, data are prepared in accordance with IPIECA/API/IOGP guidance 2010. Data for prior years are not directly comparable.

[G] Data are indexed to 2002, based on Solomon Associates Energy Intensity Index 2006 methodology.

Royal Dutch Shell, [2017 Sustainability Report](#), p. 68

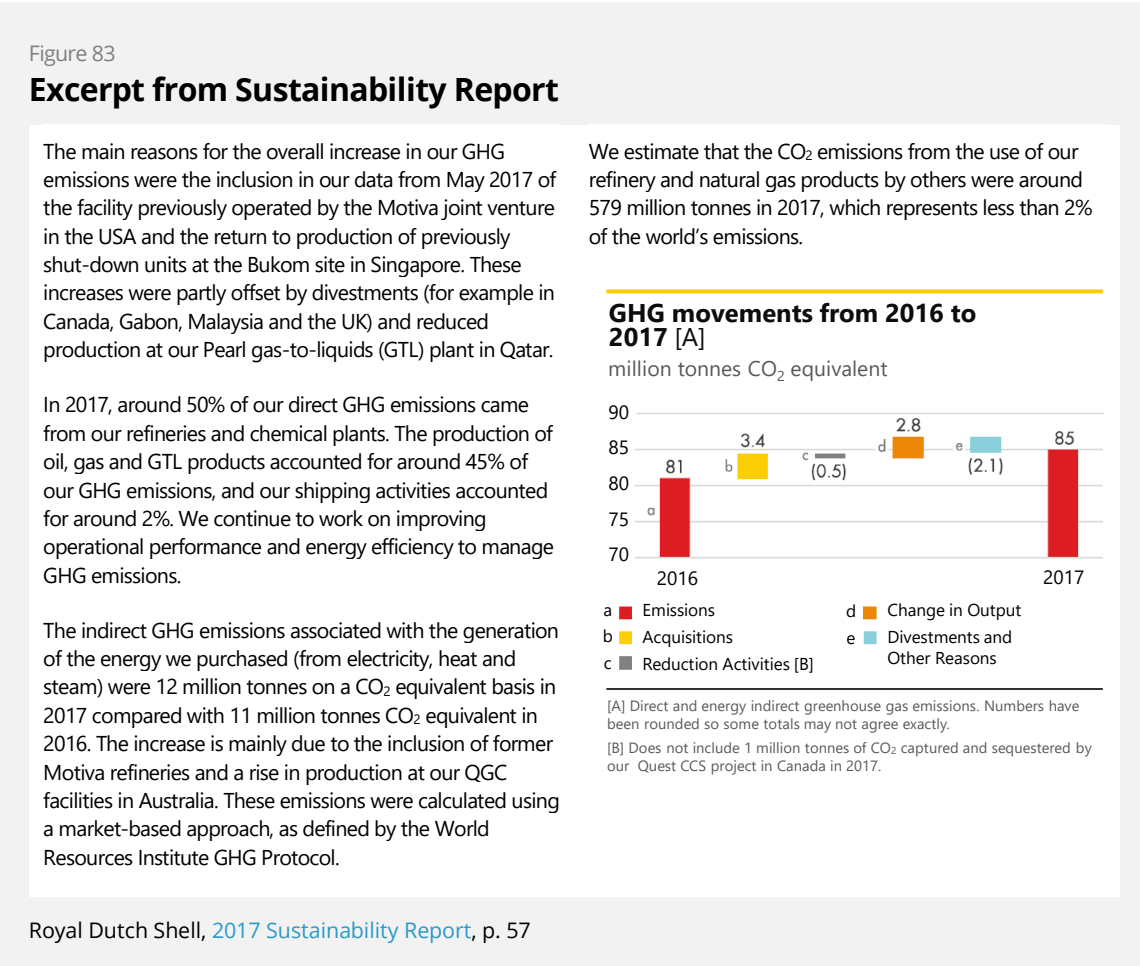
Disclosure Assessment: Metrics and Targets

Shell provides a breakdown of its emissions by scope type, which includes emissions under operational control (100% of emission from companies and joint ventures where it is the operator) and equity basis (equity share of emissions from companies and joint ventures). The direct (Scope 1) emissions come from the facilities under the operational control or the equity boundary. The energy indirect (Scope 2) emissions come from the facilities of others that provide electricity or heat and steam to our operations.

The company has begun to track Scope 3 GHG emissions—those resulting from the use of Shell's products, estimated to be 579 million tonnes in 2017. These data do not appear in the table listing Scope 1 and Scope 2 GHG emissions, nor is there historical context. Given the very large share of Shell's Scope 3 emissions relative to its total Scope 1, Scope 2, and Scope 3 emissions (almost 88% in 2017), more context around Scope 3 emissions would be helpful. Providing Scope 1, Scope 2,

and Scope 3 emissions data is essential in tracking Shell’s progress in achieving its long term strategic goal to cut its and its customers’ GHG emissions generated by the production and use of energy from Shell’s products by “around half” from 2017 levels by 2050.

Shell does provide a useful reconciliation and narrative of changes in Scope 1 and Scope 2 emissions (Figure 83). This analysis helps the reader understand the underlying cause of increased emissions in 2017, which is that increased emissions were largely a function of greater activity rather than higher intensity.



5. Buy Side Analyst’s Perspective on a Technology Company

Salesforce is a U.S. customer relationship management (CRM) software company. Since its inception in 1999, Salesforce has adopted a forward-thinking, innovative approach to the delivery of technology products and solutions. The multiple cloud-based platforms the company offers have provided a solution to one of the most pressing business challenges: managing data. In addition, about a third of the company’s revenue is aligned to the Sustainable Development Goals (SDGs), which serves to highlight the positive momentum behind Salesforce.

Introduction

For this assessment, we have reviewed the company’s 2018 Annual Report, FY18 Stakeholder Impact Report, CDP Climate Change 2018 Report (CDP Report), and Step Up Commitments whitepaper and the areas of focus are disclosures related to governance as well as metrics and

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targets.⁶⁰ Using the company’s reports, we highlight two examples of disclosures that are aligned to the TCFD recommendations. From our analysis, we view Salesforce as a good performer on environmental metrics compared to its peers.

Disclosure Example: Governance

Part of our assessment of Salesforce focused on recommended disclosure b) under the Governance recommendation, which asks companies to describe management’s role in assessing and managing climate-related risks and opportunities. The guidance related to this recommended disclosure asks companies to consider including the following information in their disclosures:

Governance

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

- whether the organization has assigned climate-related responsibilities to management-level positions or committees; and, if so, whether such management positions or committees report to the board or a committee of the board and whether those responsibilities include assessing and/or managing climate-related issues;
- a description of the associated organizational structure(s);
- processes by which management is informed about climate-related issues; and
- how management (through specific positions and/or management committees) monitors climate-related issues.

For Salesforce, the environment is a key stakeholder and it has the power to reduce the impact that it as a company as well as its customers have on the planet. Indeed, in his annual letter to shareholders, chief executive Marc Benioff highlights the company’s achievements in 2018:

“In fiscal year 2018, Salesforce achieved net-zero greenhouse gas emissions and began delivering a carbon-neutral cloud for all our customers.”

Benioff also sets out the company’s ambitions for the future—a goal that is aligned to the company’s long-term growth strategy and financial and operational priorities:

“We also strive to play a meaningful role in creating a sustainable, low-carbon future by delivering a carbon neutral cloud, operating as a net-zero greenhouse gas emissions company and by working to achieve our goal of 100 percent renewable energy for our global operations.”

These powerful statements, which are presented as part of the annual report alongside other climate-related information, demonstrate the importance of the environment to the company and its chief executive.

As shown in [Figure 84](#) (p. 93), Salesforce addresses several elements of the guidance associated with disclosing management’s role in assessing and managing climate-related risks and opportunities in its CDP Report.

⁶⁰ Salesforce, [2018 Annual Report](#), March 9, 2018; Salesforce, [FY18 Stakeholder Impact Report](#), May 15, 2018; and Salesforce, [CDP Report](#), and Salesforce, “[Salesforce’s Step Up Commitments](#),” September 2018.

Figure 84

Excerpts from CDP Climate Change Report

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
Scheduled – some meetings	Reviewing and guiding strategy Reviewing and guiding major plans of action	The Governance Committee periodically reviews the Company's environmental, social and governance, or "ESG," initiatives. The environmental sustainability program is on the agenda at some scheduled meetings of the Governance Committee. The committee has provided oversight to review and guide overall environmental strategy and has reviewed and guided major plans of action. Two senior leaders that oversee the environmental sustainability program, an Executive Vice President and Senior Director, provide a report to the Governance committee at least once per year on our performance against climate targets. The most recent report included a review of the current state (two Virtual Purchase Power Agreements online) and next steps towards reaching the company's 100% renewable energy target. The board committee reviewed and provided feedback on the overall strategy for achieving this goal. Emissions associated with our electricity footprint account for 90% of our total emissions, therefore transitioning to low-carbon sources of energy will help us address our climate-related risks and opportunities.

Name of the position(s) and/or committee(s)	Responsibility	Frequency of reporting to the board on climate-related issues
Chief Financial Officer (CFO)	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly
Other C-Suite Officer, please specify (Chief Philanthropy Officer/EVP Corp Rel.) full title is "Chief Philanthropy Officer and Executive Vice President Corporate Relations"	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly
Sustainability committee	Both assessing and managing climate-related risks and opportunities	More frequently than quarterly

Salesforce, [CDP Climate Change 2018 Report](#), item C1.1b and item C1.2

Disclosure Assessment: Governance

Salesforce addresses the TCFD recommendation on governance. In particular, the company's disclosures allows us to assess the governance and the decision-making authority, the assignment of accountability, and the leadership focused on meeting such requirements.

The company states that there is board-level oversight of climate-related issues. The Nominating and Governance Committee of the Board of Directors holds meetings regularly to review climate-related issues. The committee is responsible for ESG issues, of which climate-related issues are considered to be a key factor for the company. It also has oversight of the environmental sustainability program. This program is overseen by two senior management figures, an Executive Vice President and a Senior Director, and they provide a report to the Nominating and Governance Committee at least annually on the company performance versus its climate targets.

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The company states that there is board-level oversight of climate-related issues. The Nominating and Governance Committee of the Board of Directors holds meetings regularly to review climate-related issues. The committee is responsible for ESG issues, of which climate-related issues are considered to be a key factor for the company. It also has oversight of the environmental sustainability program. This program is overseen by two senior management figures, an Executive Vice President and a Senior Director, and they provide a report to the Nominating and Governance Committee at least annually on the company performance versus its climate targets.

The CFO, Chief Philanthropy Officer and Executive Vice President (EVP) of Corporate Relations, and the Sustainability Committee are responsible for assessing and managing climate-related risks and opportunities. They report climate-related issues to the Board of Directors at least quarterly. Meanwhile, members of the Sustainability Committee span a variety of key business functions, including, but not limited to, the Risk Management Committee, Real Estate & Workplace Services, Data Center Infrastructure, Legal, Compliance, and Supply Chain Responsibility, Procurement. The Salesforce Sustainability Team works with the Salesforce Risk Management team on an annual basis to evaluate climate-related transition and physical risks across a time horizon of up to five years, in alignment with their company-wide process. The company's Risk Management team subsequently presents the associated risks and opportunities to key stakeholders within the company highlighting the significance of the risks as appropriate.

In addition, Salesforce has acknowledged that the CFO receives non-monetary recognition by increasing the company's disclosures of climate-related risks and opportunities. For example, the CFO enjoys a reputation boost when the company reaches a major milestone, such as achieving net-zero greenhouse gas emissions. Moreover, the bonus of the Chief Philanthropy Officer and EVP of Corporate Relations is tied to achieving the company's environmental sustainability goals, including its net-zero and renewable energy goals. This monetary reward is also applicable to environment/sustainability managers that deliver various environmental targets and projects.

We also note that the company's energy procurement for fiscal year 2018 was reviewed by Ernst & Young. This was included in its Independent Accountants' Review Report. The company recently received an A grade standard for 2018, up from B in the previous year, from CDP.

The integration of climate-related issues includes a Sustainability Department: it continually tracks key environmental metrics that aim to inform decision-makers on the risks and opportunities of climate change. Meanwhile, the installation of a blackwater recycling system in the Salesforce Tower, San Francisco highlights the level at which sustainable low-impact solutions are having an influence on decision-making. There is also a Sustainability Review Board.

Disclosure Example: Metrics and Targets

Part of our assessment of Salesforce focused on recommended disclosure c) under the Metrics and Targets recommendation, which asks companies to describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets. The guidance related to this recommended disclosure is outlined below.

Metrics and Targets

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

- Organizations should describe their key climate-related targets such as those related to GHG emissions, water usage, energy usage, etc., in line with anticipated regulatory requirements or market constraints or other goals.
- In describing their targets, organizations should consider including the following:
 - whether the target is absolute or intensity based,

- time frames over which the target applies,
 - base year from which progress is measured, and
 - key performance indicators used to assess progress against targets.
- Where not apparent, organizations should provide a description of the methodologies used to calculate targets and measures.

Figure 85 and Figure 86 provide excerpts of some of Salesforce's metrics and targets.

Figure 85

Excerpt from Stakeholder Impact Report

Commitment to Clean and Renewable Energy

The cloud runs on electricity, which today comes predominantly from the burning of fossil fuels, a major source of global greenhouse gas emissions.

Since making our first public commitment in 2013 to achieve 100% renewable energy for our data centers, which we expanded to cover our offices in 2015, Salesforce has focused on procuring electricity from clean and renewable sources of energy. A little more than four years later we're proud to be halfway toward that goal.¹

IN FY18, WE PROCURED ELECTRICITY FROM RENEWABLE ENERGY RESOURCES EQUIVALENT TO 50%* OF WHAT WE USED GLOBALLY, PREDOMINANTLY THROUGH LARGE-SCALE, LONG-TERM CONTRACTS WITH NEW RENEWABLE ENERGY PROJECTS.

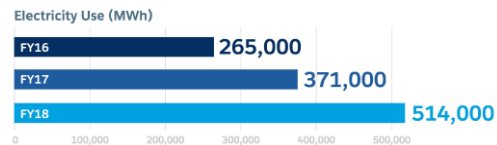
We focus on directly catalyzing the construction of new sources of clean and renewable energy, whether through [wind and solar](#) contracts or through [local utilities](#).

As a cloud leader, we have a responsibility to address our negative impacts on the climate.

We aim to achieve 100% renewable energy globally on an annual basis. However, the ultimate goal is something bigger and more complex.

WE WANT A FUTURE IN WHICH CLEAN AND RENEWABLE ENERGY IS POWERING OUR DATA CENTERS AND OFFICES AROUND THE CLOCK.

Reaching this goal will take time, the deployment of new technologies, financial investment, and regulatory changes. That's why we engage on key policies that help enable the clean energy transition.



* Reviewed by Ernst & Young LLP. Please refer to pages 51-53 for its Independent Accountants' Review Report.

¹ 100% renewable energy here means sourcing renewable electricity from renewable energy sources equivalent to what we use globally on an annual basis.

Salesforce, [FY18 Stakeholder Impact Report](#), p. 19

Figure 86

Excerpt from Step Up Commitments

Clean Energy

By 2022, achieve 100% Renewable Energy

[...]

Sustainable Real Estate

After 2020, all major, new Salesforce office interiors will align with LEED Platinum v4 standards and pursue Net Zero Carbon certification

[...]

Supply Chain

By 2025, 50% of Salesforce suppliers (by emissions) to set emissions reduction targets

[...]

Salesforce, [Step Up Commitments](#), pp. 1-2

Note: some content, denoted by "[...]," was deleted in order to fit the page

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Disclosure Assessment: Metrics and Targets

Salesforce addresses recommended disclosure c) under the Metrics and Targets TCFD recommendation. In particular, the company's disclosures allow us to assess the company's long-term ambition in this area.

In March 2013, the company made its first public commitment to achieve 100% renewable energy for its data centers. This was expanded in 2015 to cover its offices as well. Salesforce has made progress: as of fiscal year 2018, it reported that it is halfway towards reaching this goal. In fiscal year 2018, the company achieved net-zero greenhouse gas emissions and delivered a carbon-neutral cloud for customers. In addition, Salesforce participates in a number of environmental coalitions and working groups, such as:

- RE100
- Net Zero by 2050
- Step Up Declaration
- World Green Building Council's Net-Zero Buildings
- Science Based Targets
- Responsible Corporate Engagement in Climate Policy
- Powering Past Coal Alliance
- Paris Solutions Campaign
- Task Force on Climate-related Disclosures
- The Corporate Colocation and Cloud Buyers' Principles
- Improve Water Security

In many cases, to become a member of these coalitions and working groups, a company must meet specific targets and standards. Salesforce also acted as a founding member of some of these initiatives. The depth and breadth of the company's commitments are significant: they span supply chain, sustainable real estate, clean energy, transportation, investing in climate impact, water leadership, advocacy, and collaboration. The commitments are outlined in their Step Up Commitments whitepaper. They state the commitments "have the potential to catalyze the reduction of over 100 million metric tons of greenhouse gas emissions, before 2030."⁶¹

In 2018, the company completed a climate change risk assessment under a 2°C scenario. In addition, it increased the levels of disclosure on environmental information within its public filings including the annual report and proxy statement. The company acquired third-party verification for its Scope 1, Scope 2, and Scope 3 reported emissions. It also has an absolute emissions target, which is considered a science-based target.

Conclusion

Salesforce is a good example of a company whose reporting is in line with the TCFD recommendations on governance and metrics and targets. That said, there is still room for improvement, including areas where we have identified the company's strong business practices.

Overall, we have identified the company as a good performer on environmental metrics compared to its peers, which in turn contributes positively to our assessment of the corporate behavior of the company. Corporate behavior is one of six measures that we use to assess a company's attractiveness. The environmental characteristics are evaluated against an appropriate peer group using industry specific metrics.

⁶¹ Salesforce, "Salesforce's Step Up Commitments," September 2018.

We applaud the steps that Salesforce has taken thus far on sustainability (including climate change), but encourage them to disclose further details on the specific opportunities that have been identified from climate stewardship.

6. Buy Side Analyst's Perspective on an Integrated Oil and Gas Company

Repsol is an international integrated energy company. Its upstream oil and gas business reported reserves of 2.34 billion barrels of oil equivalent and production of 261 million barrels of oil equivalent in 2018, with roughly half of this from Latin America, a quarter from North America, and the rest from Asia and Oceania, Europe, and Africa. It also has a downstream business comprising refining, chemicals, trading and gas, marketing, liquefied petroleum gas (LPG), and specialized products. Within this, Repsol's refining capacity is 370 million barrels of oil equivalent per year, principally in Spain (88% of refining capacity) as well as Peru (12%).

Introduction

Repsol's [Integrated Management Report](#) is the principal source of reference for investors on the group's approach to climate change, complemented by the company's [Annual Corporate Governance Report](#) and sustainability reports.⁶² During 2018, Repsol provided investors with both a [strategy update](#) (June 2018) and an [ESG investor day presentation](#) (November 2018). Together, these form the basis of the climate change reporting in the Integrated Management Report.⁶³

Repsol describes a clear approach to climate change governance that confirms the ultimate responsibility of the board and executives for delivery, assessment, and management of climate-related risks and opportunities.

Repsol's updated corporate strategy focuses on increasing its upstream oil and gas production while also developing increased market share on natural gas in Spain and investments in low carbon generation. While the corporate strategy is clear on short- and medium-term timeframes it is much less evident how the company will meet its climate objectives for 2040.

Repsol has published a short-term target for GHG emissions reduction to 2020 and a longer-term objective for carbon intensity (including use of products) to 2040. While the company generally describes scenario analysis work that it has conducted, current disclosure does not provide clarity on the link between scenario analysis and the selected targets.

Disclosure Example: Governance

Repsol provides a general description of the constituents and the activities of its Sustainability Committee, which has a minimum of three directors, compared to an overall board size of 14 members, with a majority being external directors ([Figure 87](#), p. 98). The Sustainability Committee's duties include:

- shaping of corporate policies, objectives and guidelines on environmental, safety and social responsibility matters;
- analyzing and reporting to the Board of Directors on the expectations of stakeholders and supervising the relations with them;
- proposing the approval of a Sustainability Policy to the Board of Directors; and
- reviewing and evaluating the management and control systems for non-financial risks.

Governance

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

⁶² Repsol, [2018 Integrated Management Report](#), February 2019 and Repsol, [2018 Annual Corporate Governance Report](#), February 2019.

⁶³ Repsol, ["Strategic Update,"](#) June 2018 and Repsol, ["Walking the Talk on Energy Transition,"](#) November 2018.

Figure 87

Excerpt from Annual Corporate Governance Report

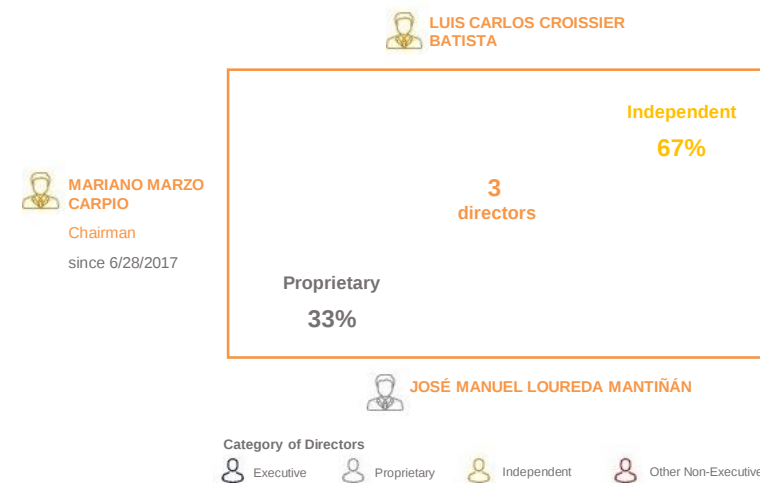
4.5. Sustainability Committee

This Committee is an internal body for information and advisory purposes created by the Board of Directors, without executive functions, but with information, advisory and proposal powers within its area of activity.

Composition

The Committee consists of no fewer than three Directors, the majority of which must be Non-Executive. Its members are appointed by the Board of Directors, taking into account the expertise, skills and experience of the Directors and the duties of the Committee. Members will be appointed for a term of four years. Without prejudice to one or more re-elections, they will be relieved of their duties at the end of the term, when their tenure as a Director ceases, or when agreed by the Board of Directors, subject to a prior report by the Nomination Committee. One of the members of this Committee will be appointed Chairman and the Secretary will be the Secretary to the Board.

The current composition of the Sustainability Committee is as follows:



Competences and activities in 2018

The duties of this Committee include, among others, being familiar with and shaping the Group's policies, objectives and guidelines on environmental, safety and social responsibility matters, analyzing and reporting to the Board of Directors on the expectations of the Company's various stakeholders and supervising the relations with them, proposing to the Board of Directors the approval of a Sustainability Policy and reviewing and evaluating the management and control systems for non-financial risks.

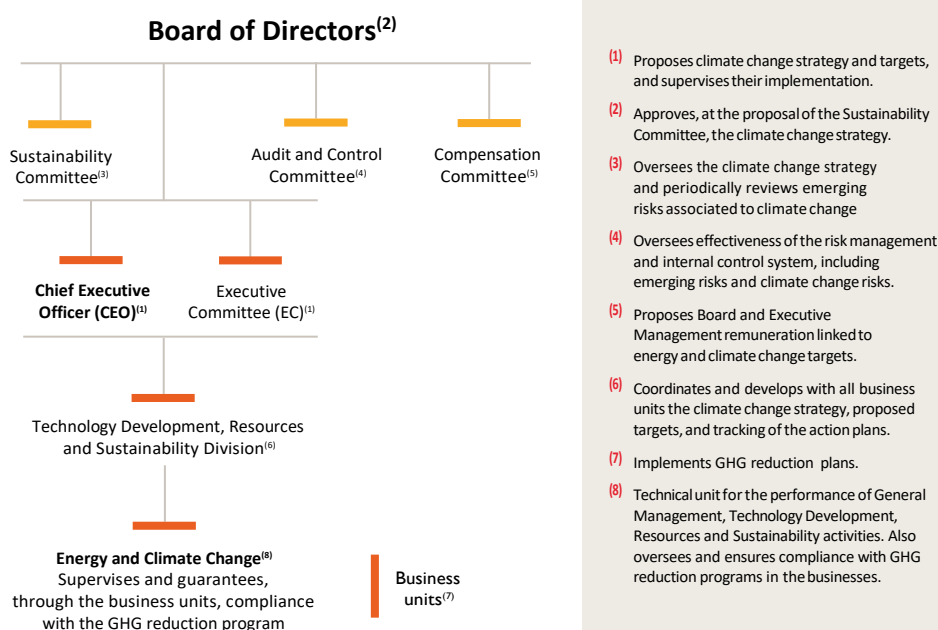
Repsol, [Annual Corporate Governance Report 2018](#), p. 66

Repsol's Annual Corporate Governance Report indicates that during 2018 the Sustainability Committee reviewed the establishment of climate targets for 2025, analyzed and monitored performance indicators, and undertook training on energy transition. In addition, the Integrated Management Report provides commentary on the role of the Executive Committee as it relates to climate change, including the Executive Committee's reporting to the board ([Figure 88](#), p. 99). Repsol states that the Executive Committee has direct responsibility in the management of matters related to climate change, including strategic decisions, multi-year objectives, and annual targets.

Figure 88

Excerpt from Integrated Management Report

Governance in climate change



Repsol, [Integrated Management Report 2018](#), p. 62

Disclosure Assessment: Governance

It is helpful that Repsol makes this link between its board oversight and executive management with respect to climate change. The information disclosed aligns with the TCFD recommended disclosures on governance. Repsol confirms that at least twice a year, or as often as necessary, the Sustainability Committee and Executive Committee review information on execution of the climate change and emissions strategy. The Director of Sustainability, who reports directly to the CEO, coordinates the proposed objectives and monitoring of action plans with all business units involved in developing the climate change strategy.

Repsol provides a general description of how GHG emissions reduction targets impact remuneration. These are reported as having a weight between 5% and 20% of total company targets in the variable remuneration of employees up to the Executive Directors. Repsol also has a long-term bonus for the 2018-2021 period, of which 5% is linked to compliance with the GHG emission reduction plan. More details on these targets and relevant performance measures would be desirable.

Disclosure Example: Strategy

Repsol's business strategy is defined in five-year plans that are reviewed on an annual basis. Repsol's Integrated Management Report describes the strategic plan for the period 2016-2020. This is based on the strategy update announced in June 2018, which was required because several strategic targets had been met early and, in the normal course of events, would not have been

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.

presented for another two years. The new strategy includes a component described as "thriving in the energy transition."

With its strategic direction on energy transition, Repsol begins to link its corporate strategy to climate change. In the short term, this is addressed by actions leveraging competitive advantages, reducing carbon footprint, and building new capabilities. There is a significant reliance on the company developing its existing reserves, increasing upstream production by 5%, with a focus on natural gas (currently 63% of production but representing 73% of reserves). Alongside this, Repsol has set GHG emissions reduction targets to reduce carbon intensity by 3% (2016-2020) and absolute CO₂ emissions by 2.1Mt (2014-2020). Repsol also commits capital expenditure of €2.5 billion to low carbon business in the period between 2016-2020.

In the medium term, Repsol provides business level targets to 2025, comprising (1) 25% market share in wholesale gas in Spain; (2) 5% market share in Spanish retail gas and power; and (3) 4.5GW capacity in low carbon generation (Figure 89).

Figure 89

Excerpt from Integrated Management Report

Investments

	Wholesale Gas	Wholesale gas and electricity	Low emissions generation
Top capability	Leverage our industrial self consumption as the largest gas consumer in Spain	Strong brand and ~10M clients base with direct contact	Technical capabilities and experience in managing large scale projects
Roadmap	Create a successful wholesale gas business, ensuring a competitive gas supply Developing new business through gas flexibility Deliver a competitive gas offer for our future retail clients	To become a relevant Spanish low carbon multi-energy retailer Progressively sophisticate our offer including advanced energy services and solutions	Develop a strong position in Spain achieving a low carbon integrated business Technological vocation oriented to solar, wind, CCGT and other low carbon technologies Diversify in emerging countries that yield higher returns
Targets by 2025	>15% Market share ¹	>5% Market share ² 2.5M Clients ³	~4.5 GW Capacity

(1) Market share in Spain includes consumption by our refineries.

(2) Market share in Spain by number of customers.

(3) Not adjusted for dual customers.

Repsol, [Integrated Management Report 2018](#), p. 20

Disclosure Assessment: Strategy

This disclosure shows the preparations that the company is making in the transition of its business activities towards lower-carbon forms of energy. The focus on natural gas appears to be a sensible approach, but does not radically re-orient the business. It is helpful that targets to reduce operational GHG emissions accompany this. Investments in retail gas and power, and in direct forms of renewable energy generation, appear to represent first steps to widen the options for the company as it steers into a low-carbon economy.

Investors would gain more insight on this longer-term direction if the company were more explicit in describing the actions, uncertainties, and dependencies with respect to the execution of its strategy.

Disclosure Example: Metrics and Targets

Repsol provides additional detail on its GHG emissions performance and targets for the short, medium, and long term in its Integrated Management Report.

Repsol provides a graphic—including in [Figure 90](#)—showing its progress on the reduction of GHG emissions from 2006-2017, and onto this it maps the targets it has for the short term (to 2020) and medium term (to 2025).

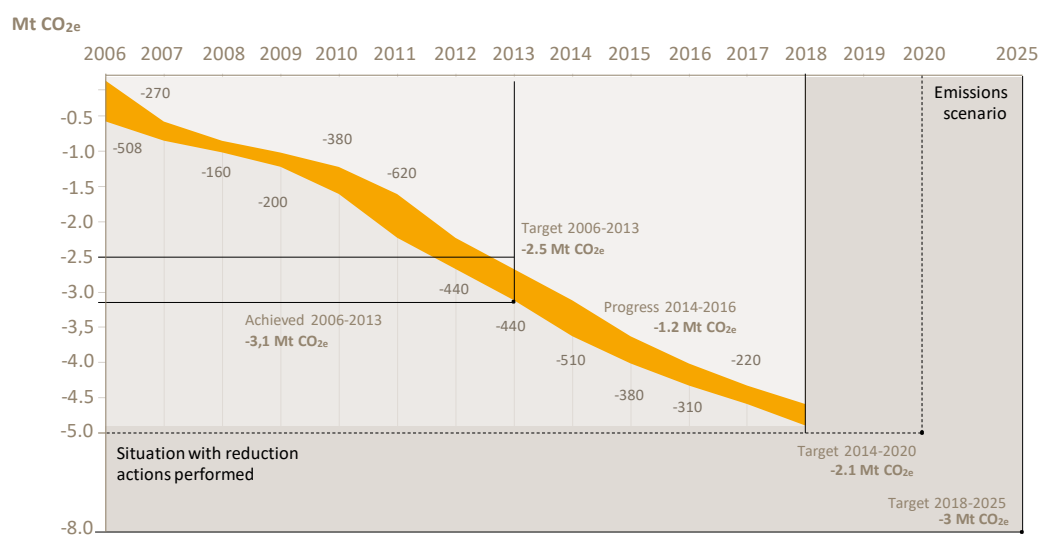
Metrics and Targets

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

Figure 90

Excerpt from Integrated Management Report

Reduction of CO₂e emissions [millions of tons]



Repsol, [Integrated Management Report 2018](#), p. 67

In this section the company also provides detailed figures on Scope 1 (direct) GHG emissions, split between the upstream business and its different downstream activities (refining, chemical and other). It also provides group-wide figures for Scope 2 (indirect) GHG emissions and Scope 3 for categories related to purchase of goods and services, transportation and distribution of products, and emissions deriving from the sale of products ([Figure 91](#), p. 102). In addition, Repsol provides metrics on energy consumption (by activity), energy intensity (upstream and refining), and GHG emissions intensity (group, Scope 1, and Scope 2).

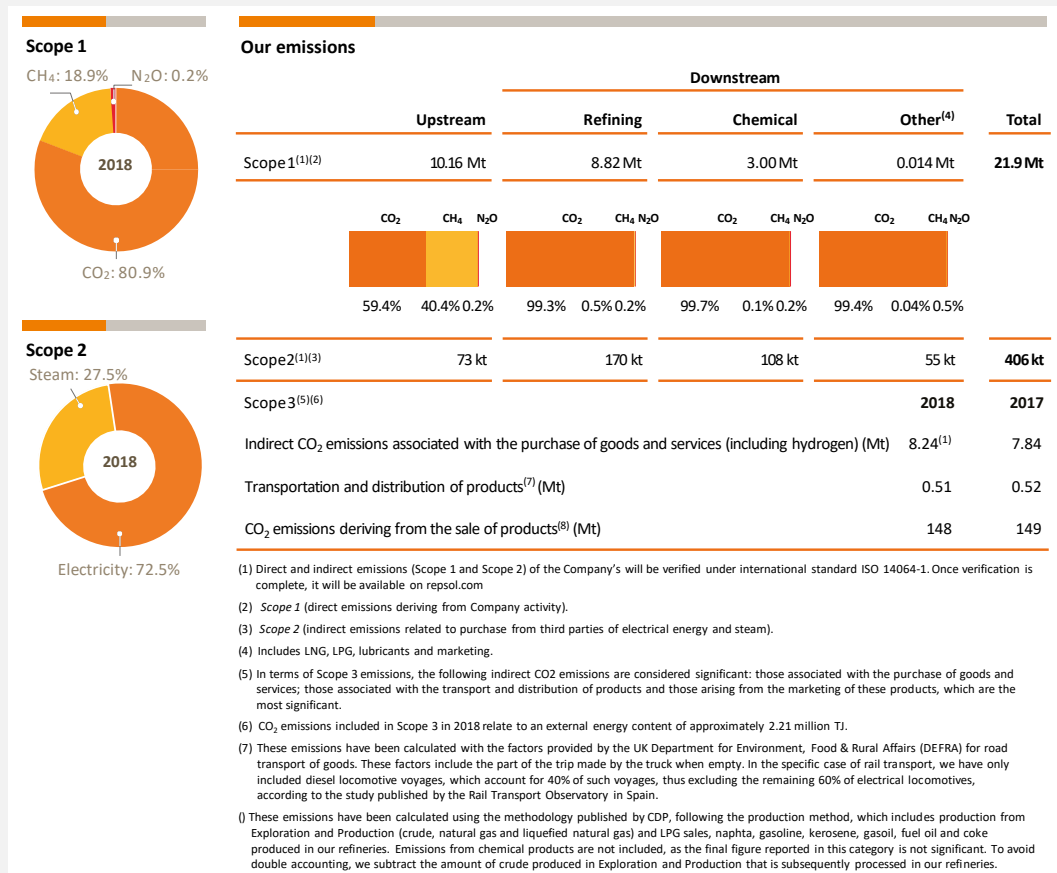
For group-wide target setting, Repsol has defined a long-term carbon intensity indicator in terms of tCO₂/GJ. This covers GHG Scope 1 (direct) and Scope 2 (indirect) as well as Scope 3, including GHG emissions resulting from the sale of products. Using this measure, it articulates its targets as follows:

- a short-term target to reduce its carbon intensity by 3% by 2020 and
- a long-term intention to reduce its carbon intensity by 40% by 2040.

Complementing this, Repsol has stated a target for reducing methane emissions in its operated assets by 25% by the year 2025.

Figure 91

Excerpt from Integrated Management Report



Repsol, [Integrated Management Report 2018](#), p. 68

Disclosure Assessment: Metrics and Targets

Repsol's reporting of GHG emissions data is helpful in allowing investors to put current emissions and future targets and objectives into context. From this, it is possible to get a better understanding of the source of Repsol's GHG emissions and how these connect to the company's emissions reduction actions. The historic emissions reduction chart also makes it clear to investors the historic pace of GHG emissions (when climate change was not so much of a focus) and the extent to which the company is accelerating or slowing its emissions reduction activities in the coming years. In this case, it is clear that Repsol is aiming to maintain the rate of emissions reduction. One of the weaknesses of the chart, however, is the absence of explanation as to why the lines for CO₂ reductions are expressed as an area (dark orange). Nevertheless, the messaging is clear, and nothing suggests that the company cannot achieve these targets.

Where Repsol's discussion of actions and performance becomes less concrete is in how it will achieve its long-term intention of a 40% reduction in carbon intensity (expressed as the ratio of tCO₂e/GJ).

Repsol's disclosure on the process to define this target and the conditions that would be required to achieve it lacks clarity. The company does reference climate-related scenario analysis work that it has carried out, but the description of outcomes is limited. Its description of its long-term

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intention is limited to an assertion that it is consistent with the Paris Agreement ambition. A closer connection between scenarios and intention would help investors understand how close Repsol aims to be to a 2°C outcome.

Furthermore, there are a variety of ways in which an energy company, such as Repsol, could achieve a carbon intensity objective of this type. These include shrinking the level of investment in upstream activities, reducing the size of refining operations, or accelerating the growth of lower carbon energy generation and distribution businesses. Investors would be helped by a clearer discussion of the relative merits that Repsol's management sees in the individual levers, how they view their room for maneuvering, and implications for capital allocation.

In addition, one of the ways that Repsol could strengthen its long-term GHG emissions reduction objective would be to disclose a group figure of carbon intensity on the same basis as its 2040 intention.

7. Buy Side Analyst's Perspective on a Technology Company

SAP is a global software company headquartered in Germany. It is the world's largest provider of enterprise application software and serves over 425,000 customers in 180 countries. SAP's software is used by 92% of the Forbes Global 2000 companies. This assessment reviews disclosures in SAP's [2018 Integrated Report](#) (integrated report) aligned with the TCFD recommendations related to strategy and metrics and targets.⁶⁴

Introduction

SAP's integrated report provides the company's full year financial, environmental, and social performance and is designed to comply with the Global Reporting Initiative (GRI) guidance for integrating material financial and non-financial information. SAP has produced an integrated report since 2012 and included metrics and targets related to its contribution to the UN SDGs for the first time in 2018. The report contains five sections: To Our Stakeholders; Combined Management Report; Consolidated Financial Statements; Further Information on Economic, Environmental, and Social Performance; and Additional Information.

SAP's integrated report does not appear to have been designed to specifically respond to the recommendations of the TCFD, but due to its long-held commitment to sustainability as a driver of its financial performance, many of the key elements recommended by the TCFD are included. SAP has provided investors with decision-useful climate-related disclosures in this report by providing stakeholders with audited Scope 1, Scope 2, and Scope 3 emissions figures (direct, indirect and supply chain/customer use emissions), setting ambitious targets, and embedding performance on environmental metrics in its corporate strategy.

Future iterations of SAP's integrated report could be made even more relevant to investors by improving presentation of key metrics and progress against targets and by incorporating climate-related risk into its strategic risk framework. Assessing the resilience of the organization's strategy in light of various climate-related scenarios, including a 2°C or lower scenario, would help SAP and its investors to better understand its exposure to climate-related risks and opportunities.

Disclosure Example: Strategy

SAP links its sustainability to its corporate performance throughout its integrated report and demonstrates the mechanisms by which sustainability, including climate-related issues, affect its commercial success. This is evidenced by the letter from CEO Bill McDermott that opens the report by discussing the importance of

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.

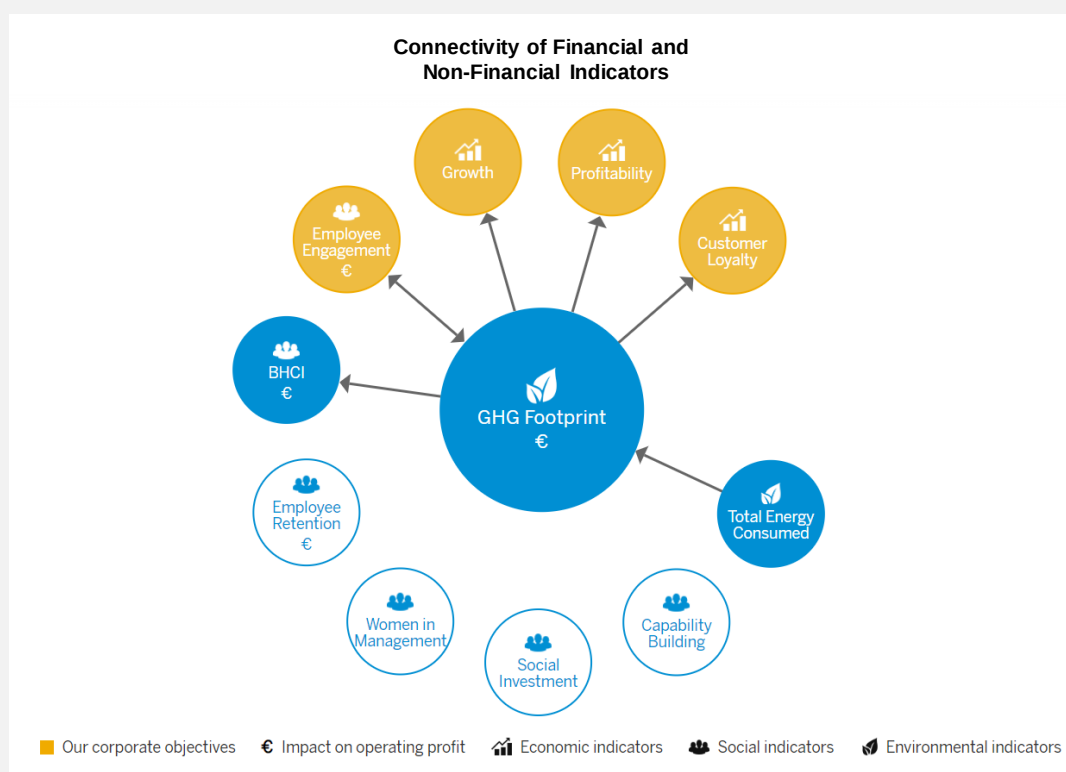
⁶⁴ SAP, [2018 SAP Integrated Report](#), February 28, 2019.

customer trust to their success, highlighting, among other things, that “[w]hile growing the entire size of the company by 10%, we beat our ambition to shrink our carbon footprint by nearly 5%.” The theme continues on page 54 in the Strategy and Business Model sub-section, which includes a diagram showing the impact on the company noting that its “purpose comes to life through our contribution to the SDGs.”

SAP goes further than describing the importance of stewardship of the environment and climate-related risk to the company’s mission and purpose. The report describes the financial impact of various value drivers, including carbon emissions. SAP identifies that growth is affected by emissions because “...customers increasingly ask their suppliers to act sustainably.” By mapping the ways in which emission reductions drive value (Figure 92), SAP demonstrates careful consideration of climate-related risk and its priority in its strategic planning.

Figure 92

Excerpt from the SAP Integrated Report Website



SAP, [Interactive Integrated Report 2018](#)

Another way that the company evidences the role of climate-related risk in its businesses, strategy, and financial planning is by its commitment to offsetting emissions to reach its targets and its use of internal carbon pricing for aspects of its carbon footprint, namely business travel, which according to the interactive chart generator accounts for 64% of its Scope 3 GHG emissions. On page 78 of the integrated report, SAP states that, “[i]n 2018, we overachieved our annual target to reduce our emissions to 333 kilotons (kt) of CO₂ by 23 kt. This result stems primarily from compensation with carbon emission offsets. Our focus on carbon emissions has contributed to a cumulative cost avoidance of €272.8 million in the past three years, compared to a business-as-usual scenario based on 2007.”

Disclosure Assessment: Strategy

It is clear that sustainability is important to SAP given its reporting and actions. By committing to offset any overshoot in SAP's emissions, leadership embeds an organization-wide financial incentive to reduce emissions. This is supported further by using an internal carbon price applied to business air travel, which can drive reductions at the business-unit level and earmarks funds for the purchase of offsets. Internal carbon pricing can be used to communicate the financial imperative to reduce emissions throughout a large organization like SAP. This approach exhibits climate leadership and demonstrates to investors that the organization is more likely to be resilient in the face of any forthcoming carbon pricing policy.

The company highlights the significance of environmental sustainability to its business purpose and the benefits for its competitive position of being a sustainable company and providing carbon-neutral services to its clients, including its "green cloud." The company is, however, more limited in explicitly connecting climate-related risk, including the risks in its supply chain and regulatory risk, to its financial performance. For example, enhancing the list of key strategic objectives in the integrated report by including objectives related to climate would provide a stronger connection between SAP's strategy and its management of climate-related issues.

SAP links its emissions-reduction efforts directly to its financial performance by modeling the financial impact of those reductions on its operating profits. The integrated report states, "[d]ocumenting the financial impact of non-financial indicators helps us move closer to achieving our sustainability goals. Rather than simply stating the business case for social or environmental change, we now have the numbers to back it up." SAP calculates that each 1% reduction in carbon emissions would result in a €6 million increase in operating profit.⁶⁵ This serves the dual purpose of showing investors that SAP has carefully considered the impact of carbon emissions on its business and also provides further data that investors might use as an indication of SAP's future performance if it meets its emissions reductions goals.

SAP has provided investors with decision-useful information in its disclosure of the actual and potential risks and opportunities associated with climate change. Throughout its report, SAP highlights the benefits of reducing its carbon footprint, including the impact on employee engagement, cost reductions in operations, and the market advantage of providing low-carbon solutions to its customers. SAP has implemented an internal carbon price on some of its emissions, and it has ambitious annual targets commensurate with its 2025 and 2050 targets, as well as a robust off-setting program. To enhance these disclosures, SAP's report would benefit from scenario analysis, which could demonstrate to investors how its efforts to reduce emissions and provide low-carbon products might affect its position in a variety of climate change scenarios.

Disclosures in SAP's integrated report and in its un-audited materials suggest that scenario analysis could show investors that its efforts to be a sustainable company are likely to reduce its climate-related risks in the long-term. For instance, analysis presented on SAP's website suggests that the company could be well-positioned in a carbon-constrained, low-warming (1.5°C or 2°C scenario) or a high-warming scenario (e.g., 4°C). SAP cites research by Accenture which estimates that technology could reduce emissions by 12.6 GT by 2030; of which SAP's products could account for up to 7.6 GT indirectly. On the other hand, in the Climate Action section of SAP's website, the company points to the role its technology could play in adaptation to the effects of climate change. Combined with its target setting and quality carbon metrics, SAP could likely make a compelling case that the company is prepared to weather climate-related risks and seize opportunities in the transition to a low-carbon economy. Such an analysis would likely also help the company to refine its strategy by laying out the strategic implications of climate-related risks and opportunities in the short, medium, and long term.

⁶⁵ This is outside the scope of the KMPG Independent Assurance report.

Disclosure Example: Metrics and Targets

SAP's integrated report provides detailed information on GHG emissions and performance against emissions targets for 2018 and in preceding years. Financial and environmental disclosures contained in the report are audited by KPMG. Carbon emissions data are included early in the report in the Key Facts section (Figure 93), alongside key financial information, and are easily accessible to investors and other stakeholders seeking to assess SAP's exposure to climate-related risk and access data that can be used to compare SAP to other companies.

Metrics and Targets

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

Figure 93

Excerpt from Integrated Report

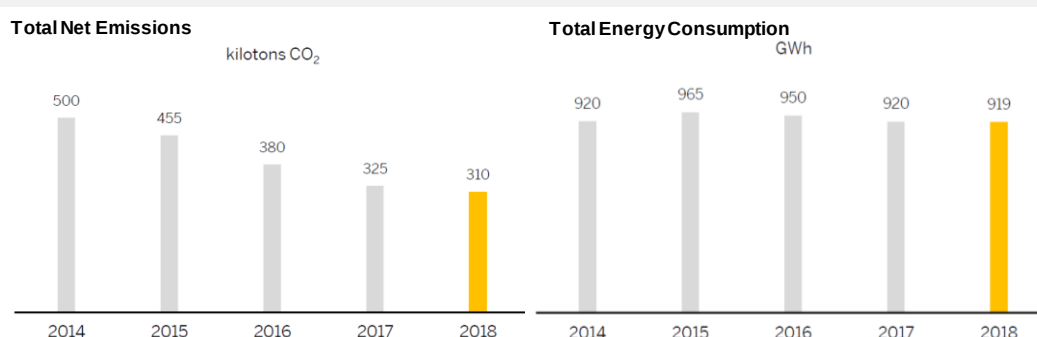
	2018	2017	Δ in %
Environment			
Net Greenhouse gas emissions (in kilotons)	310	325	-5
Total energy consumption (in GWh)	919	920	0
Total data center electricity (in GWh)	318	265	20

SAP, [2018 Integrated Report](#), p. 4

Following these disclosures, SAP dedicates a section of the Combined Management Report to energy and emissions, explaining the central role carbon reductions and environmental stewardship play in its strategy and culture. In that section, SAP details its annual figures for total net emissions, total energy consumption, data center electricity, and the role of the green cloud as a key part of its strategy (Figure 94). The report notes, “[a]t SAP, we have tied our business strategy to our environmental strategy by creating a “green cloud” powered by 100% renewable electricity. As more business moves to the cloud, data centers are a key part of how SAP provides solutions to our customers. By using our green cloud services, customers can significantly reduce their carbon footprint.”

Figure 94

Excerpt from Integrated Report



In addition to our long-term commitment for 2025, we have derived annual targets for our internal operational steering. In 2018, we overachieved our annual target to reduce our emissions to 333 kilotons (kt) of CO₂ by 23 kt. This result stems primarily from compensation with carbon emission offsets. Our focus on carbon emissions has contributed to a cumulative cost avoidance of €272.8 million in the past three years, compared to a business-as-usual scenario based on 2007. We achieved 39% of this cost avoidance in 2018.

Strengthening Our “Green Cloud”

At SAP, we have tied our business strategy to our environmental strategy by creating a “green cloud” powered by 100% renewable electricity. As more business moves to the cloud, data centers are a key part of how SAP provides solutions to our customers. By using our green cloud services, customers can significantly reduce their carbon footprint. Given the increasing data center capacity and an increasing energy consumption, our data centers have become a primary focus of our carbon reduction efforts.

SAP, [2018 Integrated Report](#), pp. 78-79

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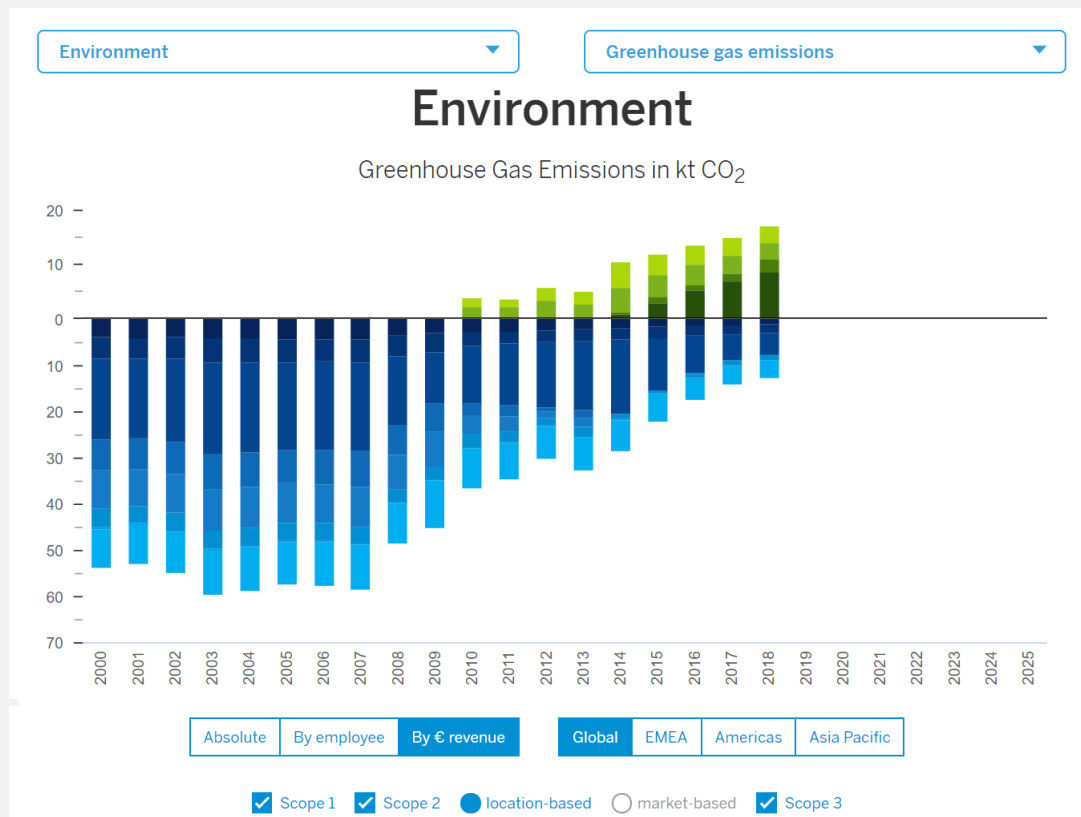
The integrated report also presents SAP's internal targets related to emissions reductions, which cover a variety of time horizons. SAP sets commensurate annual targets to guide operational strategy and measure annual performance. The long-term undertaking to reduce GHG emissions to the company's 2000 levels by 2020 was achieved in 2017. In that year, the company announced a commitment to making its operations (including all direct emissions and select indirect/customer use emissions) carbon neutral by 2025.

SAP is a member of the Science Based Targets Initiative. The integrated report states, "...we were the first German company to release a science-based climate target. This target reflects the level of decarbonization required to keep the global temperature increase below two degrees Celsius compared to pre-industrial temperatures. At SAP, this corresponds to an 85% reduction in our 2016 emissions level by 2050, including energy consumption of our products in use [by] our customers." By using verifiable and externally audited targets to guide its strategy, SAP gives investors comfort that they are managing the company's exposure to climate-related risks and aligning the business strategy to take advantage of climate-related opportunities that may arise.

SAP's 2018 integrated report website provides an interactive chart generator for six types of data: revenue, order entry and profitability; liquidity, cash flow, and equity; employees; environment; financial performance measures; and research and development. In the environment category, users can review Scope 1, Scope 2, and Scope 3 GHG emissions figures from 2000 onward, as well as energy consumption and renewable energy data (Figure 95).

Figure 95

Excerpt from the SAP Integrated Report Website



SAP, [Interactive Chart Generator](#)

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Disclosure Assessment: Metrics and Targets

SAP has excelled in disclosing its emissions metrics in its integrated report and associated online tools. It provides audited Scope 1, Scope 2, and Scope 3 GHG emissions data in line with the GHG Protocol guidelines. It also sets short-, medium-, and long-term targets including an externally verified Science Based Target that provides assurance that if SAP achieves its target to reduce emissions by 85% from 2016 levels by 2050, its emissions will not exceed its proportionate share of a 2°C carbon budget.

Adjustments to the presentation of the emissions data, however, could provide additional information to help users determine the company's resilience to climate-related risks and ability to seize climate-related opportunities. For example, emissions data are mainly presented using aggregate net emissions (including purchased offsets).⁶⁶ The net figures are important and demonstrate a commitment to climate responsibility through offsetting, however, they do not provide insight into the resilience of SAP's strategy to climate-related risks. For instance, net figures reduced significantly by offsets do not represent a full picture of climate-related risk and opportunity. If, for example, a high global carbon price were to take effect, the cost of goods in SAP's supply chain could rise significantly. If the company's strategy relied too heavily on offsets, it may be more vulnerable than competitors who sought carbon reductions throughout their supply chains and efficiencies in their own operations. In future iterations of this report, clearer presentation of the annual gross and net emissions—alongside detail of how those emissions are distributed throughout the company and supply chain—would help investors assess SAP's climate resilience.

SAP provides investors and other stakeholders with useful information on its emissions calculation methodology. SAP details where it has made estimations, how it manages comparability over the years, and how it corrects errors and discloses when those occur. This transparency, in combination with the fact that the data are independently audited, provides investors with the confidence to make investment decisions using the data presented.

SAP's disclosures could be more useful to investors if they were to share more information about GHG emissions targets. While they present information about their progress toward the 2025 target to be carbon neutral, it would be helpful to share progress toward achieving the more wide-reaching Science Based Target, which includes Scope 1, Scope 2, and Scope 3 (value chain and indirect) GHG emissions as well.

Conclusion

Overall, SAP's report provides detailed and audited disclosures of its climate-related risks and sets clear and ambitious targets, providing decision-useful information for investors. In reading the report, investors can also infer that SAP is well-positioned in a carbon-constrained future. By using specific, time-limited, independently verified targets, the company gives confidence to investors that the disclosures are reliable. Clearer presentation of progress against targets would help investors to evaluate the company's climate-related performance. Mapping of non-financial value drivers to financial performance, using internal carbon pricing, and assigning a monetary value to estimate the impact of carbon reductions on operating profits are all valuable to investors seeking to understand SAP's stewardship of climate-related risks and opportunities. The report would be strengthened by further disclosure of the basis for some of its calculations. It could also provide additional decision-useful information by describing the use of climate-related scenario analysis to show SAP management's consideration of climate-related risks and opportunities and to communicate its strategy for mitigating climate-related risk and seizing climate-related opportunities to current and potential investors.

⁶⁶ Figure 94 shows GHG emissions for 2018 as 310 kt CO₂e, which is a 5% reduction in net emissions from the previous year. For SAP's gross emissions figures, please see the Further Information section at the end of the report (p. 235). Investors could also find these figures by summing data in the interactive chart available on the integrated report website.

F Initiatives Supporting TCFD

F Initiatives Supporting TCFD

Today, the TCFD has 785 supporters, including 671 companies and 114 other organizations (e.g., industry associations, governments). The companies represent a broad range of sectors with a combined market capitalization of over \$9.2 trillion. This includes over 374 financial firms, responsible for assets of \$118 trillion. The TCFD has also received support from governments—Belgium, Canada, 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.

Support from market participants continues to play an important role in the adoption of the TCFD recommendations across industries and regions as does the work of various groups and organizations with initiatives that facilitate implementation of the recommendations. Section E of the 2018 status report highlighted many initiatives aimed at helping non-financial companies and financial institutions report in line with the TCFD recommendations, most of which are continuing this work today. In many cases, these initiatives have grown in size and scope and have provided valuable industry-specific insights for implementing the recommendations. Importantly, they have also helped participating companies publish initial reports using the recommendations. The global spread of these initiatives and wide range of companies and organizations working on TCFD implementation is an indication that the framework will have long-lasting and broad market implications.

This section provides updates on existing initiatives and outlines some of the new initiatives and activities that have been launched since the release of the 2018 status report.⁶⁷

1. Implementation Initiatives

As support for the TCFD has grown, engagement across company departments has also spread. This expansion of understanding and acknowledgement of climate-related risks and opportunities has helped spread the message of the TCFD beyond traditional sustainability groups and is being led by a number of different organizations. In addition to facilitating support from more than 60 of their members, and producing TCFD guides for finance groups, Accounting for Sustainability (A4S) has hosted several TCFD implementation workshops around the world for its member base. These events help build support and better climate reporting practices within corporate finance departments, which, in many cases, are less familiar with climate-related issues. The Institute of Chartered Accountants in England and Wales (ICAEW) has hosted workshops and events for its accountant base, which have also traditionally been less familiar with climate-related issues, to learn about and start implementing the recommendations.

The World Economic Forum (WEF) has continued to work with members of its Alliance of CEO Climate Leaders, partnering with law firms to help corporate legal departments better understand climate-related risks. They have also released [climate governance principles](#), in collaboration with PwC, for how corporate boards should address climate-related risk. In addition, the American Bar Association (ABA) Science and Technology Section has publicly supported the TCFD and is working on continuing legal education events for ABA members to better understand the TCFD recommendations. Focusing on board engagement, the Institutional Investors Group on Climate Change (IIGCC) published a [guide](#) for trustees and boards of asset owner organizations to address climate-related risks and opportunities, which builds off of the TCFD recommendations.

Filling an important space in financial market infrastructure, in April 2019, S&P Global Ratings released its [Environmental, Social, and Governance Evaluation Analytical Approach](#). The ESG Evaluation “is a cross-sector, relative analysis of an entity’s capacity to operate successfully in the future and is grounded in how ESG factors could affect stakeholders, potentially leading to a

⁶⁷ Given the significant number of references included in this section (denoted in light blue), footnote citations are not included. However, each of the references is included in [Appendix 4: References](#).

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material direct or indirect financial impact on the entity.”⁶⁸ In addition, if requested, S&P Global Ratings will evaluate the extent to which a company has adopted the TCFD recommendations.

Continuing work to encourage improved disclosure among specific climate-exposed industries, the World Business Council for Sustainable Development (WBCSD) has launched two new TCFD Preparer Forums for the utilities and chemicals industries. Similar to their previous work with oil and gas companies, WBCSD is helping the forum members work as peers to implement the TCFD recommendations, advance the use of metrics and scenario analysis, engage with investors and set strong industry-specific examples for other companies to follow. Guidance gleaned from this work will be published in the second half of 2019.

Focused on the materials and buildings sector, the International Council for Mining and Metals (ICMM) has continued its work to help members implement the TCFD recommendations through its TCFD working group. The Minerals Council of Australia is establishing a Forum for Climate-related Financial Disclosures focused on the Australian mining sector. The forum will progress knowledge and understanding of the TCFD recommendations and approaches to reporting against them within the sector and consistent with Australian law and economic structure.

The United Nations Environment Programme Finance Initiative (UNEP FI) has also continued its work with banks, asset managers, and insurance companies to implement the TCFD recommendations and provide industry guidance. Similar to the guidance that UNEP FI published in 2018 for banks on transition risk and physical risk, UNEP FI recently published an investor guide to scenario analysis, covering 1.5°C, 2°C, and 3°C scenarios, and has guidance for the insurance industry forthcoming. Additionally, UNEP FI is expanding its banking pilot program, increasing the number of participating banks and working on further integrating climate-related information into financial reporting.

Also continuing work in the financial sector, the Institute of International Finance's Sustainable Finance Working Group has a TCFD subgroup focused on initiatives that support members' implementation of the Task Force's recommendations, including identifying and compiling leading disclosure practices to support banks' implementation efforts and exploring ways to help address the lack of data for measuring climate-related risks.

The Cambridge Institute for Sustainability Leadership (CISL) has published several reports to help companies align with the TCFD recommendations. In February 2019, CISL published [Physical risk framework: Understanding the impact of climate change on real estate lending and investment portfolios](#) and [Transition risk framework: Managing the impacts of the low carbon transition on infrastructure investments](#). The former explains how financial institutions can take tools from the insurance industry to conduct climate-related risk analysis, and the latter provides a methodology for managing risks and capture emerging opportunities from the low-carbon transition. In May 2018, CISL published [Sailing from Different Harbours](#)—a review of G20 approaches to TCFD implementation.; and in November 2018, CISL published reports on embedding environmental scenario analysis into financial decision-making in [Mexico](#) and [South Africa](#).

In Mexico, new financial initiatives have launched, with the Asociación de Bancos de México (ABM) and the Inter-American Development Bank (IDB) hosting climate risk workshops with significant attention placed on the TCFD. This work has helped increase awareness for the TCFD in Latin America with additional organizations, such as MEXICO2, a subsidiary of the Mexican stock exchange, Bolsa Mexicana de Valores, bringing the TCFD onto the agenda for their sustainable finance initiatives.

⁶⁸ S&P Global Ratings' ESG Evaluation is not a credit rating, a measure of credit risk, or a component of its credit rating methodology. However, the information gathered for an ESG Evaluation can inform the credit analysis of rated entities.

Focusing on global outreach, the World Wildlife Fund (WWF) has hosted several TCFD workshops from Sweden to Kuala Lumpur, bringing together corporations and financial institutions to take first steps in disclosing information in line with the recommendations.

During the second One Planet Summit in September 2018, the [One Planet Lab](#) was launched by the French government as the “ideas laboratory” for the One Planet Summit. It consists of [four working groups](#) covering priority areas: climate, the ocean, biodiversity and finance. Under the finance working group, there is a subgroup focused on promoting the TCFD recommendations. Additionally, the One Planet Sovereign Wealth Fund Working Group, made up of six founding sovereign wealth funds, includes in its [guiding principles](#) that sovereign wealth funds should, “encourage the development and adoption of agreed standards and methods that promote the disclosure of material climate-related data,” for example through the TCFD recommendations.⁶⁹

Many of the initiatives mentioned have developed guides, tools, and documentation that support implementation of the recommendations and allow more organizations to take advantage of the initiatives. These publicly available resources have been compiled on the [TCFD Knowledge Hub](#). The Knowledge Hub was created by CDSB in 2018 as an online aggregator for publicly available resources, events, and case studies relating to the TCFD. CDSB and the Knowledge Hub have greatly increased the number of resources available on the website since it was launched, in particular on some of the more complex facets of the recommendations such as scenario analysis. Currently, there are more than 140 resources on the hub that provide guidance on scenario analysis, out of nearly 500 total resources. The Knowledge Hub is currently undergoing work to provide more clarity on how individual resources can be used, updating the platform with new e-learning tools, improved search capabilities, and other key improvements based off of feedback from the extensive use the platform has received since launching.

2. Alignment of Reporting Frameworks

In its 2018 status report, the Task Force noted that many existing reporting frameworks were beginning to integrate reporting guidance from the TCFD. This work has helped expand the number of companies beginning to report in line with the TCFD, and it has helped alleviate the reporting burden for companies who already use a specific framework for reporting climate-related information. This alignment effort progressed with the launch of the Corporate Reporting Dialogue (CRD) [Better Alignment Project](#) in November 2018. This project will enable participating organizations to map their frameworks to the TCFD recommendations and where possible, align their climate-related metrics across all of their reporting frameworks. The CRD is convened by the International Integrated Reporting Council (IIRC), and the Better Alignment Project will be undertaken by the IIRC, the CDP, the CDSB, the Global Reporting Initiative, and the Sustainability Accounting Standards Board (SASB). With thousands of companies reporting under these frameworks and standards, the impact of alignment with the TCFD could have a significant impact.

Reinforcing the work of the Better Alignment Project, two of the participating organizations—CDSB and SASB—have also published a [TCFD Implementation Guide](#) to enhance robustness, consistency, comparability, and utility of TCFD implementation and reporting. The guide provides practical implementation steps for companies to integrate the TCFD recommendations into their reporting and business processes and includes mock TCFD disclosures for reference.

The Principles for Responsible Investment (PRI), which initially integrated the TCFD recommendations into its 2018 reporting questionnaire on a voluntary basis, has made further updates to better align the questionnaire with the TCFD recommendations and [announced](#) in February that the PRI questions that align with the governance and strategy recommendations of

⁶⁹ Founding members include the Abu Dhabi Investment Authority, Kuwait Investment Authority, New Zealand Superannuation Fund, Norges Bank Investment Management, Public Investment Fund of Saudi Arabia, and the Qatar Investment Authority.

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the TCFD would become mandatory for all PRI signatories beginning in 2020.⁷⁰ The CDP, which also previously [updated its questionnaire](#) to include climate change questions in line with the TCFD recommendations now includes responses to those questions as part of its [CDP scoring](#).

In December 2018, the global insurance companies that constitute ClimateWise revised the [ClimateWise Principles](#) to align fully with the TCFD recommendations. The ClimateWise Principles are a reporting framework for the insurance industry through which ClimateWise members report and are benchmarked annually. Starting in 2019, all members reporting against the ClimateWise Principles will follow the TCFD recommendations.

The 2018 status report referenced exchange groups such as the [Sustainable Stock Exchanges Initiative](#) that have updated their ESG reporting guidance to incorporate the TCFD recommendations. Led by the [London Stock Exchange Group](#), individual exchanges [Bursa Malaysia](#) and the [Hong Kong Exchanges](#) have published ESG reporting guides that provide suggestions for how their listed companies can use the TCFD recommendations when reporting. The Corporate Governance Council of the Australian Securities Exchange has also updated its [Corporate Governance Principles and Recommendations](#) to include climate change risk with the recommendation that organizations use the TCFD recommendations to help determine whether they are exposed to material risks from climate change. Most recently, Nasdaq became a TCFD supporter and has updated its [ESG Reporting Guide](#) which now includes four new recommended disclosures from the TCFD. These actions from exchanges around the world have potential to influence the reporting of the thousands of companies that are listed on supportive exchanges. Other exchanges such as the Japan Exchange Group and Taiwan Stock Exchange have hosted TCFD-focused events, further promoting the TCFD recommendations to their listed companies.

3. Government and Regulatory Efforts

The TCFD remains a voluntary, market-led initiative; however, as the need for more transparency on climate-related risks and opportunities grows more urgent, government organizations, including regulators, have taken further measures to understand how the TCFD's recommended disclosures could be incorporated into their respective reporting requirements. Importantly, as the recommendations have now been finalized for nearly two years, non-financial companies and financial institutions have had time to begin reporting in line with the recommendations. Companies have also been able to experiment internally on which approaches for using the recommendations are most useful. In monitoring this initial reporting, government organizations have access to more information on which methods for reporting exposure to climate-related risks and opportunities are most useful. With this monitoring, many regulatory organizations are taking steps to further understand what the best approach to mandatory disclosure may be, and over 35 regulators and government organizations from around the world have become TCFD supporters.

In January 2019, the European Commission's Technical Expert Group on Sustainable Finance published its recommendations in the [Report on Climate-Related Disclosures](#) on how the Non-Financial Reporting Directive (NFRD) should incorporate the TCFD recommendations. This report was open for public consultation, and comments are being reviewed by the European Commission as it determines how the TCFD recommendations will be integrated into the NFRD. The NFRD covers over 7,000 companies in Europe, with significant potential to set global reporting precedents.

Supporting the European Commission's Action Plan, and in response to the request of the European Commission, the European Financial Reporting Advisory Group (EFRAG) launched a

⁷⁰ In May 2018, the PRI released [guidance for asset owners](#) on implementing the TCFD recommendations,

[Project Task Force on Climate-related Reporting](#) under the European Corporate Reporting Lab to stimulate innovation in climate reporting which will build off of the TCFD recommendations.

In April 2019, the chair of the International Accounting Standards Board noted in a [speech](#) that the work of the TCFD may help companies meet management commentary requirements in terms of how climate change issues may impact their business if that impact is material.

In January 2019, the International Organisation of Securities Commissions (IOSCO) published a [statement](#) expressing the importance of considering ESG issues when reporting material information. In line with the view of the Task Force, IOSCO stated that although ESG factors are sometimes considered non-financial, there may be material short- and long-term impact on businesses and investors. Notably, IOSCO referenced the TCFD as a framework for reporting organizations to consider when disclosing climate-related information, and as IOSCO is comprised of securities and futures markets regulators from over 100 countries, this statement carries significant global implications.

In July 2018, the International Association of Insurance Supervisors (IAIS), a standards-setting organization of insurance supervisors and regulators, in partnership with the Sustainable Insurance Forum (SIF), released its [Issues Paper on Climate Change Risks to the Insurance Sector](#) (Issues Paper). The Issues Paper provides an overview and examples of how climate change risk is currently affecting and may affect the insurance sector in the future and describes how these developments may be of relevance for the supervision and regulation of the sector. The Issues Paper also calls attention to the importance of the TCFD recommendations. Building off the Issues Paper, the IAIS will collaborate with the SIF on a survey and paper examining TCFD implementation and best practices for the insurance sector.

Specific to the financial sector, the United Kingdom's (U.K.'s) Financial Conduct Authority (FCA) published a discussion [paper](#) in October 2018 on climate change and green finance. In the paper, the FCA states that, "[t]here is an opportunity for us to build on the work of the TCFD to help organisations, including firms, manage the transition to a low-carbon economy and encourage the financial services industry to consider the impact of climate change." They went on to welcome input in the context of the TCFD recommendations on new requirements for climate-related reporting in the financial sector.

Under the U.K. Financial Reporting Council, the [Financial Reporting Lab](#) has been running a project working with investors and companies to identify and encourage best practice reporting, including explanations of business models, stress testing and scenario analysis used in the preparation of risk and viability reporting, and the reporting of metrics. This project includes considering how frameworks such as the TCFD's can contribute to best practice reporting.

In April 2019, the Bank of England Prudential Regulation Authority (PRA) published a [supervisory statement](#) to improve banks' and insurers' management of the financial risks from climate change. Markedly, the statement specifies that, "[t]he PRA expects firms to engage with wider initiatives on climate-related financial disclosures and to take into account the benefits of disclosures that are comparable across firms. Various initiatives have done work on this area. For example, the 'Taskforce on Climate-related Financial Disclosures' published recommendations in June 2017, and other initiatives have since then provided tools or case studies for organisations making climate-related financial disclosures. The PRA expects firms to consider engaging with the TCFD framework and other initiatives in developing their approach to climate-related financial disclosures." This statement follows a [consultation paper](#) that the PRA released in October 2018, which highlighted the importance of board-level engagement on climate change.

Recognizing that for the TCFD recommendations to be effective, they must be adopted on a global scale, the City of London Green Finance Initiative, China Green Finance Committee, and PRI have continued their TCFD working group, helping British and Chinese member companies

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implement the recommendations while also informing each jurisdiction’s environmental disclosure guidelines. Notably, two additional observers from China have joined the group.

In France, where climate reporting is already required under Article 173, the Autorité des Marchés Financiers helped lead a TCFD workshop to understand how French companies and financial institutions were beginning to align their Article 173 reporting with the TCFD recommendations.

Acknowledging that companies may benefit from guidance that provides detailed commentary on how to implement the TCFD recommendations, the Japanese Ministry of Economy, Trade and Industry (METI), which launched a TCFD implementation study group last year, has since published such guidance. Their [guidance](#) includes sectoral guidance for five industrial sectors and is also intended to provide evaluative perspectives for financial companies to follow on TCFD reporting. Published in Japanese and English, the guidance sends a strong signal about climate-related reporting from the Japanese government, which has made climate change a key priority of its current G20 presidency.

In alignment with this work, the Japanese Financial Services Agency (JFSA) and METI hosted a series of conferences on climate-related financial disclosure and scenario analysis in February 2019 to further the mainstreaming of the TCFD recommendations in Japan; and in March 2019, the Ministry of the Environment (MOE) released a [“Practical Guide for Scenario Analysis in line with TCFD recommendations.”](#)

In addition, in May 2019, METI, JFSA, and MOE arranged an industry-led TCFD consortium for supporters to further promote quality reporting. Japan has the largest number of TCFD supporters, and this public-private partnership can be seen as a model for promoting adoption of the TCFD recommendations at a national level. With strong support from the METI, JFSA, and MOE, the consortium aims to facilitate constructive dialogues between institutional investors and financial institutions and companies specifically on the climate-related financial disclosures recommended by the TCFD. Keidanren, the Japanese Business Association, has joined the consortium as one of the founding members, signaling to Japanese companies the importance of climate-related financial disclosure.

In March 2019, the Government of Canada joined the governments of Belgium, France, Sweden, and the U.K., in announcing support for the TCFD. The Canadian Minister of Finance disclosed in a [budget report](#) the government’s intentions to “raise awareness of the importance of tracking, managing and disclosing material climate-related risks and opportunities in a consistent and comparable way.” The report also noted that, where appropriate and relevant, the government will encourage adoption of the TCFD recommendations by federal Crown corporations. This builds on earlier work initiated in Canada to further implementation efforts, such as the establishment of the [Investor Leadership Network](#). Launched at the 2018 G7 meeting in Canada and supported by the Canadian government, this network aims to build on existing guidance and best practices to expand the adoption of the TCFD recommendations and help to direct capital flows towards sustainable businesses.

In Sweden, where TCFD support is concentrated among financial firms, the Swedish International Development Cooperation Agency (SIDA), a government agency, has organized TCFD workshops to bring together Swedish financial firms under the Swedish Investors for Sustainable Development and corporations that are part of the Swedish Leadership for Sustainable Development to work on TCFD implementation.

The Network for Greening the Financial System (NGFS), a group of 36 central banks and supervisors and six observers from international organizations, has stated that the TCFD recommendations could be a possible solution for a global standardized framework on climate-related reporting. This was noted in the NGFS’s [First Progress Report](#) released in October 2018 and has been expanded upon in its most recent report published in April 2019, [A call for action: Climate change as a source of financial risk](#). In the latter report, the members of the NGFS pledge

their support for the TCFD, and the NGFS “encourages all companies issuing public debt or equity as well as financial sector institutions to disclose in line with the TCFD recommendations.” This strong statement is bolstered by the NGFS’s recommendation that “policymakers and supervisors consider further actions to foster a broader adoption of the TCFD recommendations and the development of an internationally consistent environmental disclosure framework.” Given the combined authority of these central banks and supervisors, this work is significant for the global adoption of the TCFD recommendations in the banking industry and financial sector at large.

4. Initiatives Related to Scenario Analysis

The NGFS’ focus on the use of climate-related scenarios by both financial institutions and authorities mirrors the attention that has been placed on the topic by many other organizations that are helping non-financial companies and financial institutions implement the TCFD recommendations. Recognizing that the process of performing and reporting on scenario analysis is new for a majority of companies, many industry associations, NGOs, and others are working with companies to disseminate scenario analysis materials applicable to climate-related issues.

PRI has worked with other organizations to help develop climate-related scenario [tools and resources](#) to support asset managers and asset owners’ implementation of the TCFD recommendations. These include the [Paris Agreement Capital Transition Assessment](#) (PACTA), the [Transition Pathway Initiative](#) (TPI), and [2 Degrees of Separation](#). PACTA helps financial institutions understand whether their fixed income and equities portfolios are aligned with the Paris Agreement. The TPI provides sector-level analysis of companies’ management of carbon emissions and alignment with the Paris Agreement. The 2 Degrees of Separation analysis provides company and industry-level analysis of the oil and gas industry, using asset-level data.

The Electric Power Research Institute (EPRI), an industry research group, recently published a [study](#) “to develop a public technical resource that can serve as a scientific foundation for informed dialogue and decision-making on company climate-related policy scenario analysis and emissions goals.”⁷¹ In addition, as part of the Investor Practices Programme, IIGCC published climate scenario [guidance](#) for institutional investors.

IPIECA, the global oil and gas industry association for environmental and social issues, is also working to assist its members in implementing the TCFD recommendations. In September 2018, it published the results of a 31-company [survey](#) that identified increased adoption of scenario analysis. Specific benefits of scenario analysis cited included “greater integration of climate considerations into strategic decision making and executive incentives,” and “viewed positively by external stakeholders,” with 61% of the IPIECA’s survey respondents noting climate change as a top five area of growing interest by stakeholders and investors.

While not specifically a scenario analysis initiative, the [Science Based Targets initiative](#) helps companies implement a low-carbon strategy. Science Based Targets provides companies with a pathway to reduce their greenhouse gas emissions in alignment with the Paris Agreement goals to limit global warming to well below 2°C. The targets are industry specific and address the amount and speed by which emissions need to be reduced, providing practical guidance and support for companies who commit to the initiative.

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⁷¹ EPRI is a non-profit, non-advocacy, scientific research organization with a public benefit mandate.

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Appendix 1: Task Force Members

Chairman and Vice Chairs

Michael Bloomberg

Chair
Founder
Bloomberg LP and Bloomberg Philanthropies

Graeme Pitkethly

Vice Chair
Chief Financial Officer
Unilever

Christian Thimann

Vice Chair
CEO and Chairman of the Management Board
Athora Germany

Yeo Lian Sim

Vice Chair
Special Adviser, Diversity
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Members

Jane Ambachtsheer

Global Head of Sustainability
BNP Paribas Asset Management

Matt Arnold

Managing Director and Global Head of Sustainable
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Managing Director, Head of Sustainable Investors
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David Blood

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Generation Investment Management

Richard Cantor

Chief Risk Officer, Moody's Corporation
Chief Credit Officer, Moody's Investor Service

Koushik Chatterjee

Group Executive Director, Finance and Corporate
Tata Group

Brian Deese

Managing Director, Global Head of Sustainable
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Mary Draves

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Dow

Eric Dugelay

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General Manager, Corporate Sustainability
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Mark Lewis

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Members *(continued)*

Martin Skancke

Chair, Risk Committee
Storebrand

Steve Waygood

Chief Responsible Investment Officer
Aviva Investors

Martin Weymann

Head Sustainability, Emerging & Political Risk
Management, Group Risk Management
Swiss Re

Fiona Wild

Vice President, Sustainability and Climate Change
BHP

Michael Wilkins

Global Head of Sustainable Finance
S&P Global Ratings

Jon Williams

Partner, Sustainability and Climate Change
PwC

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

Mary Schapiro

Vice Chair of Global Public Policy and Special Advisor
to the CEO and Chairman
Bloomberg LP
Former Chair, U.S. Securities and Exchange
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Curtis Ravenel

Global Head, Sustainable Business & Finance
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Appendix 2: Disclosure Selection and Review Methodology

As summarized in [Section B. State of Climate-Related Financial Disclosures](#), the Task Force developed an approach using artificial intelligence (AI) technology to review information on the alignment of 2016, 2017, and 2018 climate-related financial disclosures with the TCFD recommendations. This appendix describes the Task Force's methodology for selecting and reviewing disclosures using AI technology.

1. Companies Included in the Review

The Task Force reviewed financial filings, annual reports, integrated reports, and sustainability reports of 1,126 large companies from 142 countries in eight industries. Six of the eight industries align with groups highlighted in the Task Force's 2017 report: Banking, Insurance, Energy, Materials and Buildings, Transportation, and Agriculture, Food, and Forest Products. Two new industries have been added to the review—Technology and Media and Consumer Goods—to incorporate additional large companies that may be exposed to climate-related risks. The Task Force selected companies included in the AI review using the following methodology.

- Identified universe of public companies—companies with public debt or equity—in the eight selected industries. To ensure we captured a representative sample across the industries, we identified companies in 29 sub-industries loosely based on GICS sub-sectors and industries ([Figure A1](#), p 121).
- Ranked companies by size. The Task Force used annual revenue to identify the largest companies in the 22 non-financial sub-industries and total assets for the seven sub-industries within banking and insurance.
- Selected the 100 largest companies in each of the 29 sub-industries (2,740 in total, as two categories had fewer than 100 companies available for review).
- Removed companies that did not have disclosures available in English.
- Removed companies that did not have annual reports available for review in all three years. This was done to ensure a consistent population of companies and comparable reporting across all three years. The Task Force was asked to deliver the 2019 status report by early June 2019, and not all 2018 disclosures were available by the last date that documents were extracted for review (March 31, 2019).
- Removed companies whose reports could not be sufficiently processed (see [Processed Relevant Reports](#) for more information).

This methodology resulted in a final review population of 1,126 companies.

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 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 reviewed responses to the United Nations Principles for Responsible Investment (UN PRI) 2018 signatory assessment. The

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Task Force recognizes that, in many cases, the responses to the assessment may differ from what is provided to clients and beneficiaries on a confidential basis.

Figure A1

Industry and Sub-Industry of Companies Selected for Review

Industries	Sub-Industries	
Banking 300 Companies	– Regional Banks – Large, Diversified Banks	– Investment and Asset Management Firms
Insurance 337 Companies	– Multi-line Insurance – Property and Casualty Insurance	– Life and Health Insurance – Reinsurance
Energy 300 Companies	– Oil and Gas – Coal	– Utilities
Transportation 503 Companies	– Air Freight – Passenger Air Transportation – Maritime Transportation	– Rail Transportation – Trucking Services – Automobiles
Materials and Buildings 500 Companies	– Chemicals – Construction Materials – Capital Goods	– Metals and Mining – Real Estate Management and Development
Agriculture, Food, & Forest 400 Companies	– Beverages – Agriculture	– Packaged Foods and Meats – Paper and Forest Products
Technology and Media 200 Companies	– Technology Hardware and Equipment	– Interactive Media and Services
Consumer Goods 200 Companies	– Consumer Retailing – Textiles and Apparel	

Total: 2,740 Companies

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2. Documents Reviewed

The Task Force focused primarily on companies' fiscal year 2016, 2017, and 2018 financial filings, annual reports, integrated reports, and sustainability reports. These documents were identified using the Bloomberg Terminal, and other relevant documents provided in the Terminal were reviewed as available. The Task Force only selected documents available in English. Documents were categorized by the year of reporting rather than the approach taken in the TCFD 2018 status report which assessed only the most recently available disclosures.

- **Financial Filings** (including 10-Ks, 20-Fs, annual report and accounts, and registration documents): Reports that describe companies' audited financial results under the corporate, compliance, or securities laws of the jurisdictions in which they operate. While reporting requirements differ internationally, financial filings generally contain financial statements and other information such as governance statements and management commentary.
- **Annual or Integrated Reports**: Reports that describe companies' activities for the preceding year (annual reports) or the broader range of measures that contribute to companies' long-term value and the role they play in society (integrated reports).
- **Sustainability Reports** (including Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG) reports): Reports that describe companies' impact on society, often addressing environmental, social, and governance issues.
- **Other Relevant Documents**: Documents available in the Bloomberg Terminal that are associated with companies' annual reporting or sustainability.

3. Review Methodology

The AI technology used to review disclosures for this report was initially developed for the Task Force's 2018 status report and was updated for use in 2019 as described below.⁷²

Trained the AI Technology

The AI technology was based on a set of statistical language models that were trained to answer questions tied to the recommended disclosures for companies in the review population. The statistical language models underlying the AI technology were trained using passages of text or excerpts identified as aligning with the Task Force's 11 recommended disclosures—"labeled data." To collect this "labeled data" for its 2018 status report, the Task Force formed a small group to manually review publicly available reports from a sample of 150 high-disclosing companies. The small group agreed to use a common standard for reviewing the reports, which included narrowing down each recommended disclosure to a single yes-no question (Figure A2). 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. As part of the process the group performed multiple levels of review to ensure consistency in approach.

Figure A2

AI Review Questions

#	Question	Recommended Disclosure
1	Does the company describe the board's or a board committee's oversight of climate-related risks or opportunities?	<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>

⁷² Please refer to the Task Force's 2018 report for additional information on the development of the AI technology in 2018.

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The “labeled data” was then used to train the AI technology to generalize these human judgements to a much larger set of company reports beyond the initial manually reviewed set. For the reports reviewed by the AI technology, passages of text were assigned a “yes” or “no” for each review question using judgements that are consistent with the training provided by the human reviewers. Importantly, this approach was **not** designed to assess the quality of companies’ climate-related financial disclosures, but rather to provide an indication of the alignment of existing disclosures with the Task Force’s 11 recommended disclosures.

For the 2019 status report, the AI technology went through a second iteration of training to further improve performance. For each recommended disclosure, passages of text were extracted from the AI review at various confidence levels (e.g., passages that were assigned a “yes” with high or low confidence and a “no” with high or low confidence). Reviewers from the AI team then validated these passages by providing “yes” or “no” judgments consistent with the previous manual review process. This generated thousands of additional labels that were used to retrain the initial models and increase confidence in the validity of the results.

Processed Relevant Reports

The Task Force used an automated process to extract passages of text from companies’ reports for the AI technology to review. In some cases, the content of a report could not be sufficiently converted from the original document into the necessary text format. In cases where none of a company’s reports were available in English, or where they could not be sufficiently converted into text format, those companies were removed from the review population. Ultimately, over 51 million passages of text were converted for review.

Validated the AI Results

The AI technology allocated each passage of text with a probability score for each recommended disclosure that indicates the likelihood it would be assigned a “yes” by a human reviewer. The passages were then categorized as either positive or negative results for each recommended disclosure depending on whether that score was over or under a specific confidence level. Each report was marked as having a TCFD-aligned disclosure if at least one passage was categorized as a positive result. Likewise, a company was then marked as having a TCFD-aligned disclosure if at least one report was categorized as a positive result.

Performance and predictive accuracy for each of the models can be assessed by comparing what the AI generates as predictions to the judgements from human reviewers. Two main sources of human reviews were available, the initial full manual review of 150 companies and the manual reviews of individual passages identified using the AI review results across a wider set of companies. [Figure A3](#) provides the confidence intervals calculated from that exercise, presented at the company level for each of the recommended disclosures.

Applied AI Models to Review Population

Finally, the revised AI models were applied to excerpts from the reports of the 1,126 companies, and the results were aggregated for analysis by the 11 recommended disclosures, the eight industries, the size of the companies, and by the regions in which the companies were located.

Figure A3
Company-Level Confidence Intervals (CI)

Recommended Disclosure	CI (+/-)
Governance a	2.3%
Governance b	2.3%
Strategy a	2.0%
Strategy b	2.8%
Strategy c	1.2%
Risk Management a	1.3%
Risk Management b	1.6%
Risk Management c	1.5%
Metrics and Targets a	1.9%
Metrics and Targets b	1.2%
Metrics and Targets c	1.7%

Appendix 3: Glossary and Abbreviations

Glossary

ANNUAL OR INTEGRATED REPORTS refer to reports that describe companies' activities for the preceding year (annual reports) or the broader range of measures that contribute to companies' long-term value and the role they play in society (integrated reports).

BOARD OF DIRECTORS (or BOARD) refers to a body of elected or appointed members who jointly oversee the activities of a company or organization. Some countries use a two-tiered system where "board" refers to the "supervisory board" while "key executives" refers to the "management board."⁷³

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."⁷⁴

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.⁷⁵

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."⁷⁶ "Governance involves a set of relationships between an organization's management, its board, its shareholders, and other stakeholders. Governance provides the structure and processes through which the objectives of the organization are set, progress against performance is monitored, and results are evaluated."⁷⁷

GREENHOUSE GAS (GHG) EMISSIONS SCOPE LEVELS⁷⁸

- Scope 1 refers to all direct GHG emissions.
- Scope 2 refers to indirect GHG emissions from consumption of purchased electricity, heat, or steam.

⁷³ OECD, *G20/OECD Principles of Corporate Governance*, OECD Publishing, Paris, 2015.

⁷⁴ IPCC, "3.4.1.1 Decarbonization trends," *Climate Change 2007: Working Group III: Mitigation of Climate Change*, 2007.

⁷⁵ Based on Climate Disclosure Standards Board, "CDSB Framework for Reporting Environmental Information, Natural Capital and Associated Business Impacts," April 2018.

⁷⁶ A. Cadbury, *Report of the Committee on the Financial Aspects of Corporate Governance*, London, 1992.

⁷⁷ OECD, *G20/OECD Principles of Corporate Governance*, OECD Publishing, Paris, 2015.

⁷⁸ World Resources Institute and World Business Council for Sustainable Development, *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)*, March 2004.

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- 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.⁷⁹

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.⁸⁰

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.

Abbreviations

2°C —2° Celsius	CEO —Chief Executive Officer
3°C —3° Celsius	CFO —Chief Financial Officer
4°C —4° Celsius	CISL —Cambridge Institute for Sustainable Leadership
A4S —Accounting for Sustainability	CRD —Corporate Reporting Dialogue
AI —Artificial Intelligence	CSR —Corporate Social Responsibility
ABA —American Bar Association	EBITDA —Earnings before Interest, Taxes, Depreciation, and Amortization
ABM —Asociación de Banco de México	EBRD —European Bank for Reconstruction and Development
AUM —Assets under management	EFRAG —European Financial Reporting Advisory Group
CCS —Carbon Capture and Storage	EPRI —Electric Power Research Institute
CDSB —Climate Disclosure Standards Board	ESG —Environmental, Social, and Governance

⁷⁹ IPCC, *Climate Change 2014 Mitigation of Climate Change*, Cambridge University Press, 2014.

⁸⁰ Science-Based Targets Initiative, "What is a science-based target."

Abbreviations *continued*

FCA —Financial Conduct Authority (United Kingdom)	METI —Ministry of Economy, Trade, and Industry (Japan)
FSB —Financial Stability Board	MOE —Ministry the Environment (Japan)
G20 —Group of 20	NDC —Nationally-Determined Contributions
GDP —Gross Domestic Product	NFRD —Non-Financial Reporting Directive
GHG —Greenhouse Gas	NGFS —Network for Greening the Financial System
GICS —Global Industry Classification Standard	NGO —Non-governmental organization
GRI —Global Reporting Initiative	NPV —Net present value
IAIS —International Association of Insurance Supervisors	OECD —Organization for Economic Co-operation and Development
ICAEW —Institute of Chartered Accountants in England and Wales	PACTA —Paris Agreement Capital Transition Assessment
ICMM —International Council for Mining and Metals	PRA —Prudential Regulation Authority (Bank of England)
IDB —Inter-American Development Bank	PRI —Principles for Responsible Investment
IEA —International Energy Agency	R&D —Research and Development
IGCC —Investor Group on Climate Change	RCP —Representative Concentration Pathways
IIGCC —Institutional Investors Group for Climate Change	SIF —Sustainable Insurance Forum
IIRC —International Integrated Reporting Council	TCFD —Task Force on Climate-related Financial Disclosures
IOSCO —International Organisation of Securities Commissions	TEG —Technical Expert Group on Sustainable Finance (European Commission)
IPCC —Intergovernmental Panel on Climate Change	UN SDGs —United Nations Sustainable Development Goals
kg —Kilogram	UNEP FI —United Nations Environment Programme Financial Initiative
JFSA —Japanese Financial Services Agency	WBCSD —World Business Council for Sustainable Development
LNG —Liquefied Natural Gas	WEF —World Economic Forum
LPG —Liquefied Petroleum Gas	WEO —World Energy Outlook
MCA —Minerals Council of Australia	WWF —World Wildlife Fund

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