Final Report

Recommendations of the Task Force on Climate-related Financial Disclosures

TCFD | TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

June 2017

June 15, 2017

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

Dear Chairman Carney,

On behalf of the Task Force on Climate-related Financial Disclosures, I am pleased to present this final report setting out our recommendations for helping businesses disclose climate-related financial information.

As you know, warming of the planet caused by greenhouse gas emissions poses serious risks to the global economy and will have an impact across many economic sectors. It is difficult for investors to know which companies are most at risk from climate change, which are best prepared, and which are taking action.

The Task Force's report establishes recommendations for disclosing clear, comparable and consistent information about the risks and opportunities presented by climate change. Their widespread adoption will ensure that the effects of climate change become routinely considered in business and investment decisions. Adoption of these recommendations will also help companies better demonstrate responsibility and foresight in their consideration of climate issues. That will lead to smarter, more efficient allocation of capital, and help smooth the transition to a more sustainable, low-carbon economy.

The industry Task Force spent 18 months consulting with a wide range of business and financial leaders to hone its recommendations and consider how to help companies better communicate key climate-related information. The feedback we received in response to the Task Force's draft report confirmed broad support from industry and others, and involved productive dialogue among companies and banks, insurers, and investors. This was and remains a collaborative process, and as these recommendations are implemented, we hope that this dialogue and feedback continues.

Since the Task Force began its work, we have also seen a significant increase in demand from investors for improved climate-related financial disclosures. This comes amid unprecedented support among companies for action to tackle climate change.

I want to thank the Financial Stability Board for its leadership in promoting better disclosure of climate-related financial risks, and for its support of the Task Force's work. I am also grateful to the Task Force members and Secretariat for their extensive contributions and dedication to this effort.

The risk climate change poses to businesses and financial markets is real and already present. It is more important than ever that businesses lead in understanding and responding to these risks—and seizing the opportunities—to build a stronger, more resilient, and sustainable global economy.

Sincerely,

Michael R. Bloomberg

Executive Summary

Financial Markets and Transparency

One of the essential functions of financial markets is to price risk to support informed, efficient capital-allocation decisions. Accurate and timely disclosure of current and past operating and financial results is fundamental to this function, but it is increasingly important to understand the governance and risk management context in which financial results are achieved. The financial crisis of 2007-2008 was an important reminder of the repercussions that weak corporate governance and risk management practices can have on asset values. This has resulted in increased demand for transparency from organizations on their governance structures, strategies, and risk management practices. Without the right information, investors and others may incorrectly price or value assets, leading to a misallocation of capital.

> Increasing transparency makes markets more efficient and economies more stable and resilient.
> —Michael R. Bloomberg

Financial Implications of Climate Change

One of the most significant, and perhaps most misunderstood, risks that organizations face today relates to climate change. While it is widely recognized that continued emission of greenhouse gases will cause further warming of the planet and this warming could lead to damaging economic and social consequences, the exact timing and severity of physical effects are difficult to estimate. The large-scale and long-term nature of the problem makes it uniquely challenging, especially in the context of economic decision making. Accordingly, many organizations incorrectly perceive the implications of climate change to be long term and, therefore, not necessarily relevant to decisions made today.

The potential impacts of climate change on organizations, however, are not only physical and do not manifest only in the long term. To stem the disastrous effects of climate change within this century, nearly 200 countries agreed in December 2015 to reduce greenhouse gas emissions and accelerate the transition to a lower-carbon economy. The reduction in greenhouse gas emissions implies movement away from fossil fuel energy and related physical assets. This coupled with rapidly declining costs and increased deployment of clean and energy-efficient technologies could have significant, near-term financial implications for organizations dependent on extracting, producing, and using coal, oil, and natural gas. While such organizations may face significant climate-related risks, they are not alone. In fact, climate-related risks and the expected transition to a lower-carbon economy affect most economic sectors and industries. While changes associated with a transition to a lower-carbon economy present significant risk, they also create significant opportunities for organizations focused on climate change mitigation and adaptation solutions.

For many investors, climate change poses significant financial challenges and opportunities, now and in the future. The expected transition to a lower-carbon economy is estimated to require around $1 trillion of investments a year for the foreseeable future, generating new investment opportunities.[1] At the same time, the risk-return profile of organizations exposed to climate-related risks may change significantly as such organizations may be more affected by physical impacts of climate change, climate policy, and new technologies. In fact, a 2015 study estimated the value at risk, as a result of climate change, to the total global stock of manageable assets as

[1] International Energy Agency, *World Energy Outlook Special Briefing for COP21*, 2015.

ranging from $4.2 trillion to $43 trillion between now and the end of the century.[2] The study highlights that "much of the impact on future assets will come through weaker growth and lower asset returns across the board." This suggests investors may not be able to avoid climate-related risks by moving out of certain asset classes as a wide range of asset types could be affected. Both investors and the organizations in which they invest, therefore, should consider their longer-term strategies and most efficient allocation of capital. Organizations that invest in activities that may not be viable in the longer term may be less resilient to the transition to a lower-carbon economy; and their investors will likely experience lower returns. Compounding the effect on longer-term returns is the risk that present valuations do not adequately factor in climate-related risks because of insufficient information. As such, long-term investors need adequate information on how organizations are preparing for a lower-carbon economy.

Furthermore, because the transition to a lower-carbon economy requires significant and, in some cases, disruptive changes across economic sectors and industries in the near term, financial policymakers are interested in the implications for the global financial system, especially in terms of avoiding financial dislocations and sudden losses in asset values. Given such concerns and the potential impact on financial intermediaries and investors, the G20 Finance Ministers and Central Bank Governors asked the Financial Stability Board to review how the financial sector can take account of climate-related issues. As part of its review, the Financial Stability Board identified the need for better information to support informed investment, lending, and insurance underwriting decisions and improve understanding and analysis of climate-related risks and opportunities. Better information will also help investors engage with companies on the resilience of their strategies and capital spending, which should help promote a smooth rather than an abrupt transition to a lower-carbon economy.

Task Force on Climate-related Financial Disclosures

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). 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 32-member Task Force is global; 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. In its work, the Task Force drew on member expertise, stakeholder engagement, and existing climate-related disclosure regimes to develop a singular, accessible framework for climate-related financial disclosure.

The Task Force developed four widely adoptable recommendations on climate-related financial disclosures that are applicable to organizations across sectors and jurisdictions (Figure 1). Importantly, the Task Force's recommendations apply to financial-sector organizations, including banks, insurance companies, asset managers, and asset owners. Large asset owners and asset managers sit at the top of the investment chain and, therefore, have an

Figure 1

Key Features of Recommendations

- Adoptable by all organizations
- Included in financial filings
- Designed to solicit decision-useful, forward-looking information on financial impacts
- Strong focus on risks and opportunities related to transition to lower-carbon economy

[2] The Economist Intelligence Unit, "The Cost of Inaction: Recognising the Value at Risk from Climate Change," 2015. Value at risk measures the loss a portfolio may experience, within a given time horizon, at a particular probability, and the stock of manageable assets is defined as the total stock of assets held by non-bank financial institutions. Bank assets were excluded as they are largely managed by banks themselves.

important role to play in influencing the organizations in which they invest to provide better climate-related financial disclosures.

In developing and finalizing its recommendations, the Task Force solicited input throughout the process.[3] First, in April 2016, the Task Force sought public comment on the scope and high-level objectives of its work. As the Task Force developed its disclosure recommendations, it continued to solicit feedback through hundreds of industry interviews, meetings, and other touchpoints. Then, in December 2016, the Task Force issued its draft recommendations and sought public comment on the recommendations as well as certain key issues, receiving over 300 responses. This final report reflects the Task Force's consideration of industry and other public feedback received throughout 2016 and 2017. Section E contains a summary of key issues raised by the industry as well as substantive changes to the report since December.

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. 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 organizations, and its recommendations should be useful to organizations in complying more effectively with existing disclosure obligations.[4] In addition, disclosure in mainstream financial filings should foster shareholder engagement and broader use of climate-related financial disclosures, thus promoting a more informed understanding of climate-related risks and opportunities by investors and others. The Task Force also believes that publication of climate-related financial information in mainstream annual financial filings will help ensure that appropriate controls govern the production and disclosure of the required information. More specifically, the Task Force expects the governance processes for these disclosures would be similar to those used for existing public financial disclosures and would likely involve review by the chief financial officer and audit committee, as appropriate.

Importantly, organizations 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 organizations 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.

Core Elements of Climate-Related Financial Disclosures

The Task Force structured its recommendations around four thematic areas that represent core elements of how organizations operate: governance, strategy, risk management, and metrics and targets (Figure 2, p. v). The four overarching recommendations are supported by recommended disclosures that build out the framework with information that will help investors and others understand how reporting organizations assess climate-related risks and opportunities.[5] In addition, there is guidance to support all organizations in developing climate-related financial disclosures consistent with the recommendations and recommended disclosures. The guidance assists preparers by providing context and suggestions for implementing the 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.

[3] See Appendix 2: Task Force Objectives and Approach for more information.

[4] The Task Force encourages organizations where climate-related issues could be material in the future to begin disclosing climate-related financial information outside financial filings to facilitate the incorporation of such information into financial filings once climate-related issues are determined to be material.

[5] See Figure 4 on p. 14 for the Task Force's recommendations and recommended disclosures.

Figure 2

Core Elements of Recommended Climate-Related Financial Disclosures

Governance
The organization's governance around climate-related risks and opportunities

Strategy
The actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning

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

Metrics and Targets
The metrics and targets used to assess and manage relevant climate-related risks and opportunities

Climate-Related Scenarios

One of the Task Force's key recommended disclosures focuses on the resilience of an organization's strategy, taking into consideration different climate-related scenarios, including a 2° Celsius or lower scenario.[6] An organization's disclosure of how its strategies might change to address potential climate-related risks and opportunities is a key step to better understanding the potential implications of climate change on the organization. The Task Force recognizes the use of scenarios in assessing climate-related issues and their potential financial implications is relatively recent and practices will evolve over time, but believes such analysis is important for improving the disclosure of decision-useful, climate-related financial information.

Conclusion

Recognizing that climate-related financial reporting is still evolving, the Task Force's recommendations provide a foundation to improve investors' and others' ability to appropriately assess and price climate-related risk and opportunities. The Task Force's recommendations aim to be ambitious, but also practical for near-term adoption. The Task Force expects to advance the quality of mainstream financial disclosures related to the potential effects of climate change on organizations today and in the future and to increase investor engagement with boards and senior management on climate-related issues.

Improving the quality of climate-related financial disclosures begins with organizations' willingness to adopt the Task Force's recommendations. Organizations already reporting climate-related information under other frameworks may be able to disclose under this framework immediately and are strongly encouraged to do so. Those organizations in early stages of evaluating the impact of climate change on their businesses and strategies can begin by disclosing climate-related issues as they relate to governance, strategy, and risk management practices. The Task Force recognizes the challenges associated with measuring the impact of climate change, but believes that by moving climate-related issues into mainstream annual financial filings, practices and techniques will evolve more rapidly. Improved practices and techniques, including data analytics, should further improve the quality of climate-related financial disclosures and, ultimately, support more appropriate pricing of risks and allocation of capital in the global economy.

[6] A 2° Celsius (2°C) scenario lays out an energy system deployment pathway and an emissions trajectory consistent with limiting the global average temperature increase to 2°C above the pre-industrial average. The Task Force is not recommending organizations use a specific 2°C scenario.

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A Introduction

A Introduction

1. Background

It is widely recognized that continued emission of greenhouse gases will cause further warming of the Earth and that warming above 2° Celsius (2°C), relative to the pre-industrial period, could lead to catastrophic economic and social consequences.[7] As evidence of the growing recognition of the risks posed by climate change, in December 2015, nearly 200 governments agreed to strengthen the global 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," referred to as the Paris Agreement.[8] The large-scale and long-term nature of the problem makes it uniquely challenging, especially in the context of economic decision making. Moreover, the current understanding of the potential financial risks posed by climate change—to companies, investors, and the financial system as a whole—is still at an early stage.

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There is a growing demand for decision-useful, climate-related information by a range of participants in the financial markets.[9] Creditors and investors are increasingly demanding access to risk information that is consistent, comparable, reliable, and clear. There has also been increased focus, especially since the financial crisis of 2007-2008, on the negative impact that weak corporate governance can have on shareholder value, resulting in increased demand for transparency from organizations on their risks and risk management practices, including those related to climate change.

The growing demand for decision-useful, climate-related information has resulted in the development of several climate-related disclosure standards. Many of the existing standards, however, focus on disclosure of climate-related information, such as greenhouse gas (GHG) emissions and other sustainability metrics. Users of such climate-related disclosures commonly cite the lack of information on the financial implications around the climate-related aspects of an organization's business as a key gap. Users also cite inconsistencies in disclosure practices, a lack of context for information, use of boilerplate, and non-comparable reporting as major obstacles to incorporating climate-related risks and opportunities (collectively referred to as climate-related issues) as considerations in their investment, lending, and insurance underwriting decisions over the medium and long term.[10] In addition, evidence suggests that the lack of consistent information hinders investors and others from considering climate-related issues in their asset valuation and allocation processes.[11]

In general, inadequate information about risks can lead to a mispricing of assets and misallocation of capital and can potentially give rise to concerns about financial stability since markets can be vulnerable to abrupt corrections.[12] Recognizing these concerns, the G20 (Group of 20) Finance Ministers and Central Bank Governors requested that the Financial Stability Board (FSB) "convene public- and private-sector participants to review how the financial sector can take account of climate-related issues."[13] In response to the G20's request, the FSB held a meeting of public- and private-sector representatives in September 2015 to consider the implications of climate-related issues for the financial sector. "Participants exchanged views on the existing work of the financial sector, authorities, and standard setters in this area and the challenges they face,

[7] Intergovernmental Panel on Climate Change, *Fifth Assessment Report,* Cambridge University Press, 2014.
[8] United Nations Framework Convention on Climate Change, "The Paris Agreement," December 2015.
[9] Avery Fellow, "Investors Demand Climate Risk Disclosure," Bloomberg, February 2013.
[10] Sustainability Accounting Standards Board (SASB), *SASB Climate Risk Technical Bulletin#: TB001-10182016*, October 2016.
[11] Mercer LLC, *Investing in a Time of Climate Change,* 2015.
[12] Mark Carney, "Breaking the tragedy of the horizon—climate change and financial stability," September 29, 2015.
[13] "Communiqué from the G20 Finance Ministers and Central Bank Governors Meeting in Washington, D.C. April 16-17, 2015," April 2015.

areas for possible further work, and the possible roles the FSB and others could play in taking that work forward. The discussions continually returned to a common theme: the need for better information."[14]

In most G20 jurisdictions, companies with public debt or equity have a legal obligation to disclose material risks in their financial reports—including material climate-related risks. However, the absence of a standardized framework for disclosing climate-related financial risks makes it difficult for organizations to determine what information should be included in their filings and how it should be presented. Even when reporting similar climate-related information, disclosures are often difficult to compare due to variances in mandatory and voluntary frameworks. The resulting fragmentation in reporting practices and lack of focus on financial impacts have prevented investors, lenders, insurance underwriters, and other users of disclosures from accessing complete information that can inform their economic decisions. Furthermore, because financial-sector organizations' disclosures depend, in part, on those from the companies in which they invest or lend, regulators face challenges in using financial-sector organizations' existing disclosures to determine system-wide exposures to climate-related risks.

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In response, the FSB established the industry-led Task Force on Climate-related Financial Disclosures (TCFD or Task Force) in December 2015 to design a set of recommendations for consistent "disclosures that will help financial market participants understand their climate-related risks."[15] See Box 1 (p. 3) for more information on the Task Force.

2. The Task Force's Remit

The FSB called on the Task Force to develop climate-related disclosures that "could promote more informed investment, credit [or lending], and insurance underwriting decisions" and, in turn, "would enable stakeholders to understand better the concentrations of carbon-related assets in the financial sector and the financial system's exposures to climate-related risks."[16,17] The FSB noted that disclosures by the financial sector in particular would "foster an early assessment of these risks" and "facilitate market discipline." Such disclosures would also "provide a source of data that can be analyzed at a systemic level, to facilitate authorities' assessments of the materiality of any risks posed by climate change to the financial sector, and the channels through which this is most likely to be transmitted."[18]

The FSB also emphasized that "any disclosure recommendations by the Task Force would be voluntary, would need to incorporate the principle of materiality and would need to weigh the balance of costs and benefits."[19] As a result, in devising a principle-based framework for voluntary disclosure, the Task Force sought to balance the needs of the users of disclosures with the challenges faced by the preparers. The FSB further stated that the Task Force's climate-related financial disclosure recommendations should not "add to the already well developed body of existing disclosure schemes."[20] In response, the Task Force drew from existing disclosure frameworks where possible and appropriate.

The FSB also noted the Task Force should determine whether the target audience of users of climate-related financial disclosures should extend beyond investors, lenders, and insurance underwriters. Investors, lenders, and insurance underwriters ("primary users") are the appropriate target audience. These primary users assume the financial risk and reward of the

[14] FSB, "FSB to establish Task Force on Climate-related Financial Disclosures," December 4, 2015.
[15] Ibid.
[16] FSB, "Proposal for a Disclosure Task Force on Climate-Related Risks," November 9, 2015.
[17] The term carbon-related assets is not well defined, but is generally considered to refer to assets or organizations with relatively high direct or indirect GHG emissions. The Task Force believes further work is needed on defining carbon-related assets and potential financial impacts.
[18] FSB, "Proposal for a Disclosure Task Force on Climate-Related Risks," November 9, 2015.
[19] Ibid.
[20] Ibid.

decisions they make. The Task Force recognizes that many other organizations, including credit rating agencies, equity analysts, stock exchanges, investment consultants, and proxy advisors also use climate-related financial disclosures, allowing them to push information through the credit and investment chain and contribute to the better pricing of risks by investors, lenders, and insurance underwriters. These organizations, in principle, depend on the same types of information as primary users.

This report presents the Task Force's recommendations for climate-related financial disclosures and includes supporting information on climate-related risks and opportunities, scenario analysis, and industry feedback that the Task Force considered in developing and then finalizing its recommendations. In addition, the Task Force developed a "stand-alone" document—Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures (Annex)—for organizations to use when preparing disclosures consistent with the recommendations. The Annex provides supplemental guidance for the financial sector as well as for non-financial groups potentially most affected by climate change and the transition to a lower-carbon economy. The supplemental guidance assists preparers by providing additional context and suggestions for implementing the recommended disclosures.

The Task Force's recommendations provide a foundation for climate-related financial disclosures and aim to be ambitious, but also practical for near-term adoption. The Task Force expects that reporting of climate-related risks and opportunities will evolve over time as organizations, investors, and others contribute to the quality and consistency of the information disclosed.

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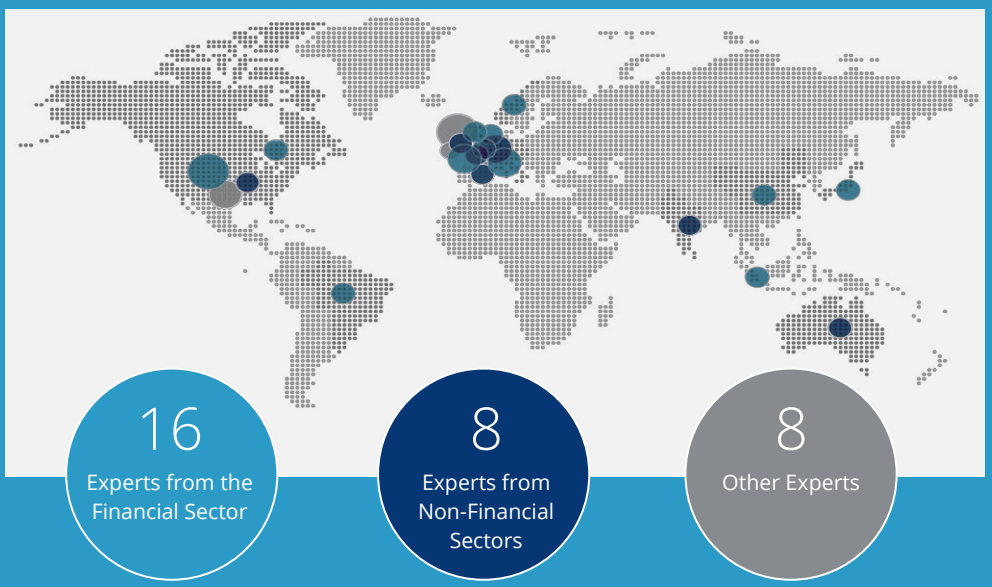
Box 1

Task Force on Climate-related Financial Disclosures

The Task Force membership, first announced on January 21, 2016, has international representation and spans various types of organizations, including banks, insurance companies, asset managers, pension funds, large non-financial companies, accounting and consulting firms, and credit rating agencies—a unique collaborative partnership between the users and preparers of financial reports.

In its work, the Task Force drew on its members' expertise, stakeholder engagement, and existing climate-related disclosure regimes to develop a singular, accessible framework for climate-related financial disclosure. See Appendix 1 for a list of the Task Force members and Appendix 2 for more information on the Task Force's approach.

The Task Force is comprised of 32 global members representing a broad range of economic sectors and financial markets and a careful balance of users and preparers of climate-related financial disclosures.



B Climate-Related Risks, Opportunities, and Financial Impacts

B Climate-Related Risks, Opportunities, and Financial Impacts

Through its work, the Task Force identified a growing demand by investors, lenders, insurance underwriters, and other stakeholders for decision-useful, climate-related financial information. Improved disclosure of climate-related risks and opportunities will provide investors, lenders, insurance underwriters, and other stakeholders with the metrics and information needed to undertake robust and consistent analyses of the potential financial impacts of climate change.

The Task Force found that while several climate-related disclosure frameworks have emerged across different jurisdictions in an effort to meet the growing demand for such information, there is a need for a standardized framework to promote alignment across existing regimes and G20 jurisdictions and to provide a common framework for climate-related financial disclosures. An important element of such a framework is the consistent categorization of climate-related risks and opportunities. As a result, the Task Force defined categories for climate-related risks and climate-related opportunities. The Task Force's recommendations serve to encourage organizations to evaluate and disclose, as part of their annual financial filing preparation and reporting processes, the climate-related risks and opportunities that are most pertinent to their business activities. The main climate-related risks and opportunities that organizations should consider are described below and in Tables 1 and 2 (pp. 10-11).

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1. Climate-Related Risks

The Task Force divided climate-related risks into two major categories: (1) risks related to the *transition* to a lower-carbon economy and (2) risks related to the *physical* impacts of climate change.

a. Transition Risks

Transitioning to a lower-carbon economy may entail extensive policy, legal, technology, and market changes to address mitigation and adaptation requirements related to climate change. Depending on the nature, speed, and focus of these changes, transition risks may pose varying levels of financial and reputational risk to organizations.

Policy and Legal Risks

Policy actions around climate change continue to evolve. Their objectives generally fall into two categories—policy actions that attempt to constrain actions that contribute to the adverse effects of climate change or policy actions that seek to promote adaptation to climate change. Some examples include implementing carbon-pricing mechanisms to reduce GHG emissions, shifting energy use toward lower emission sources, adopting energy-efficiency solutions, encouraging greater water efficiency measures, and promoting more sustainable land-use practices. The risk associated with and financial impact of policy changes depend on the nature and timing of the policy change.[21]

Another important risk is litigation or legal risk. Recent years have seen an increase in climate-related litigation claims being brought before the courts by property owners, municipalities, states, insurers, shareholders, and public interest organizations.[22] Reasons for such litigation include the failure of organizations to mitigate impacts of climate change, failure to adapt to climate change, and the insufficiency of disclosure around material financial risks. As the value of loss and damage arising from climate change grows, litigation risk is also likely to increase.

[21] Organizations should assess not only the potential direct effects of policy actions on their operations, but also the potential second and third order effects on their supply and distribution chains.

[22] Peter Seley, "Emerging Trends in Climate Change Litigation," *Law 360,* March 7, 2016.

Technology Risk

Technological improvements or innovations that support the transition to a lower-carbon, energy-efficient economic system can have a significant impact on organizations. For example, the development and use of emerging technologies such as renewable energy, battery storage, energy efficiency, and carbon capture and storage will affect the competitiveness of certain organizations, their production and distribution costs, and ultimately the demand for their products and services from end users. To the extent that new technology displaces old systems and disrupts some parts of the existing economic system, winners and losers will emerge from this "creative destruction" process. The timing of technology development and deployment, however, is a key uncertainty in assessing technology risk.

Market Risk

While the ways in which markets could be affected by climate change are varied and complex, one of the major ways is through shifts in supply and demand for certain commodities, products, and services as climate-related risks and opportunities are increasingly taken into account.

Reputation Risk

Climate change has been identified as a potential source of reputational risk tied to changing customer or community perceptions of an organization's contribution to or detraction from the transition to a lower-carbon economy.

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b. Physical Risks

Physical risks resulting from climate change can be event driven (acute) or longer-term shifts (chronic) in climate patterns. Physical risks may have financial implications for organizations, such as direct damage to assets and indirect impacts from supply chain disruption. Organizations' financial performance may also be affected by changes in water availability, sourcing, and quality; food security; and extreme temperature changes affecting organizations' premises, operations, supply chain, transport needs, and employee safety.

Acute Risk

Acute physical risks refer to those that are event-driven, including increased severity of extreme weather events, such as cyclones, hurricanes, or floods.

Chronic Risk

Chronic physical risks refer to longer-term shifts in climate patterns (e.g., sustained higher temperatures) that may cause sea level rise or chronic heat waves.

2. Climate-Related Opportunities

Efforts to mitigate and adapt to climate change also produce opportunities for organizations, for example, through resource efficiency and cost savings, the adoption of low-emission energy sources, the development of new products and services, access to new markets, and building resilience along the supply chain. Climate-related opportunities will vary depending on the region, market, and industry in which an organization operates. The Task Force identified several areas of opportunity as described below.

a. Resource Efficiency

There is growing evidence and examples of organizations that have successfully reduced operating costs by improving efficiency across their production and distribution processes, buildings, machinery/appliances, and transport/mobility—in particular in relation to energy efficiency but also including broader materials, water, and waste management.[23] Such actions can

[23] UNEP and Copenhagen Centre for Energy Efficiency, *Best Practices and Case Studies for Industrial Energy Efficiency Improvement*, February 16, 2016.

result in direct cost savings to organizations' operations over the medium to long term and contribute to the global efforts to curb emissions.[24] Innovation in technology is assisting this transition; such innovation includes developing efficient heating solutions and circular economy solutions, making advances in LED lighting technology and industrial motor technology, retrofitting buildings, employing geothermal power, offering water usage and treatment solutions, and developing electric vehicles.[25]

b. Energy Source

According to the International Energy Agency (IEA), to meet global emission-reduction goals, countries will need to transition a major percentage of their energy generation to low emission alternatives such as wind, solar, wave, tidal, hydro, geothermal, nuclear, biofuels, and carbon capture and storage.[26] For the fifth year in a row, investments in renewable energy capacity have exceeded investments in fossil fuel generation.[27] The trend toward decentralized clean energy sources, rapidly declining costs, improved storage capabilities, and subsequent global adoption of these technologies are significant. Organizations that shift their energy usage toward low emission energy sources could potentially save on annual energy costs.[28]

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c. Products and Services

Organizations that innovate and develop new low-emission products and services may improve their competitive position and capitalize on shifting consumer and producer preferences. Some examples include consumer goods and services that place greater emphasis on a product's carbon footprint in its marketing and labeling (e.g., travel, food, beverage and consumer staples, mobility, printing, fashion, and recycling services) and producer goods that place emphasis on reducing emissions (e.g., adoption of energy-efficiency measures along the supply chain).

d. Markets

Organizations that pro-actively seek opportunities in new markets or types of assets may be able to diversify their activities and better position themselves for the transition to a lower-carbon economy. In particular, opportunities exist for organizations to access new markets through collaborating with governments, development banks, small-scale local entrepreneurs, and community groups in developed and developing countries as they work to shift to a lower-carbon economy.[29] New opportunities can also be captured through underwriting or financing green bonds and infrastructure (e.g., low-emission energy production, energy efficiency, grid connectivity, or transport networks).

e. Resilience

The concept of climate resilience involves organizations developing adaptive capacity to respond to climate change to better manage the associated risks and seize opportunities, including the ability to respond to transition risks and physical risks. Opportunities include improving efficiency, designing new production processes, and developing new products. Opportunities related to resilience may be especially relevant for organizations with long-lived fixed assets or extensive supply or distribution networks; those that depend critically on utility and infrastructure networks or natural resources in their value chain; and those that may require longer-term financing and investment.

[24] Environmental Protection Agency Victoria (EPA Victoria), "Resource Efficiency Case Studies: Lower your Impact."

[25] As described by Pearce and Turner, circular economy refers to a system in which resource input and waste, emission, and energy leakage are minimized. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling. This is in contrast to a linear economy which is a "take, make, dispose" model of production.

[26] IEA, "Global energy investment down 8% in 2015 with flows signaling move towards cleaner energy," September 14, 2016.

[27] Frankfurt School-United Nations Environmental Programme Centre and Bloomberg New Energy Finance, "Global Trends in Renewable Energy Investment 2017," 2017.

[28] Ceres, "Power Forward 3.0: How the largest US companies are capturing business value while addressing climate change," 2017.

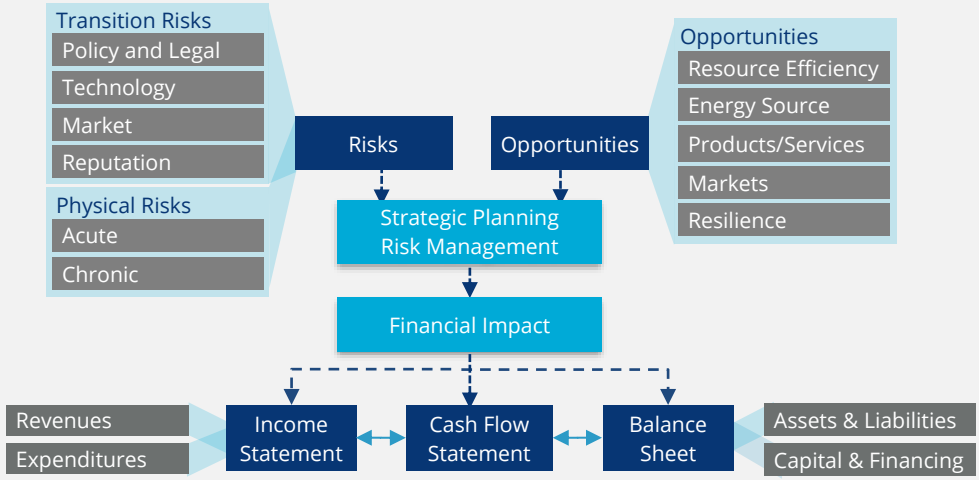
[29] G20 Green Finance Study Group. *G20 Green Finance Synthesis Report*. 2016. The proposal to launch the Green Finance Study Group was adopted by the G20 Finance Ministers and Central Bank Deputies in December 2015.

3. Financial Impacts

Better disclosure of the financial impacts of climate-related risks and opportunities on an organization is a key goal of the Task Force's work. In order to make more informed financial decisions, investors, lenders, and insurance underwriters need to understand how climate-related risks and opportunities are likely to impact an organization's future financial position as reflected in its income statement, cash flow statement, and balance sheet as outlined in Figure 1. While climate change affects nearly all economic sectors, the level and type of exposure and the impact of climate-related risks differs by sector, industry, geography, and organization.[30]

Figure 1

Climate-Related Risks, Opportunities, and Financial Impact



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Fundamentally, the financial impacts of climate-related issues on an organization are driven by the specific climate-related risks and opportunities to which the organization is exposed and its strategic and risk management decisions on managing those risks (i.e., mitigate, transfer, accept, or control) and seizing those opportunities. The Task Force has identified four major categories, described in Figure 2 (p. 9), through which climate-related risks and opportunities may affect an organization's current and future financial positions.

The financial impacts of climate-related issues on organizations are not always clear or direct, and, for many organizations, identifying the issues, assessing potential impacts, and ensuring material issues are reflected in financial filings may be challenging. Key reasons for this are likely because of (1) limited knowledge of climate-related issues within organizations; (2) the tendency to focus mainly on near-term risks without paying adequate attention to risks that may arise in the longer term; and (3) the difficulty in quantifying the financial effects of climate-related issues.[31] To assist organizations in identifying climate-related issues and their impacts, the Task Force developed Table 1 (p. 10), which provides examples of climate-related risks and their potential financial impacts, and Table 2 (p. 11), which provides examples of climate-related opportunities and their potential financial impacts. In addition, Section A.4 in the Annex provides more information on the major categories of financial impacts—revenues, expenditures, assets and liabilities, and capital and financing—that are likely to be most relevant for specific industries.

[30] SASB research demonstrates that 72 out of 79 Sustainable Industry Classification System (SICS™) industries are significantly affected in some way by climate-related risk.

[31] World Business Council for Sustainable Development, "Sustainability and enterprise risk management: The first step towards integration." January 18, 2017.

Figure 2

Major Categories of Financial Impact

Income Statement	Balance Sheet
Revenues. Transition and physical risks may affect demand for products and services. Organizations should consider the potential impact on revenues and identify potential opportunities for enhancing or developing new revenues. In particular, given the emergence and likely growth of carbon pricing as a mechanism to regulate emissions, it is important for affected industries to consider the potential impacts of such pricing on business revenues. **Expenditures.** An organization's response to climate-related risks and opportunities may depend, in part, on the organization's cost structure. Lower-cost suppliers may be more resilient to changes in cost resulting from climate-related issues and more flexible in their ability to address such issues. By providing an indication of their cost structure and flexibility to adapt, organizations can better inform investors about their investment potential. It is also helpful for investors to understand capital expenditure plans and the level of debt or equity needed to fund these plans. The resilience of such plans should be considered bearing in mind organizations' flexibility to shift capital and the willingness of capital markets to fund organizations exposed to significant levels of climate-related risks. Transparency of these plans may provide greater access to capital markets or improved financing terms.	**Assets and Liabilities.** Supply and demand changes from changes in policies, technology, and market dynamics related to climate change could affect the valuation of organizations' assets and liabilities. Use of long-lived assets and, where relevant, reserves may be particularly affected by climate-related issues. It is important for organizations to provide an indication of the potential climate-related impact on their assets and liabilities, particularly long-lived assets. This should focus on existing and committed future activities and decisions requiring new investment, restructuring, write-downs, or impairment. **Capital and Financing.** Climate-related risks and opportunities may change the profile of an organization's debt and equity structure, either by increasing debt levels to compensate for reduced operating cash flows or for new capital expenditures or R&D. It may also affect the ability to raise new debt or refinance existing debt, or reduce the tenor of borrowing available to the organization. There could also be changes to capital and reserves from operating losses, asset write-downs, or the need to raise new equity to meet investment.

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The Task Force encourages organizations to undertake both historical and forward-looking analyses when considering the potential financial impacts of climate change, with greater focus on forward-looking analyses as the efforts to mitigate and adapt to climate change are without historical precedent. This is one of the reasons the Task Force believes scenario analysis is important for organizations to consider incorporating into their strategic planning or risk management practices.

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Table 1

Examples of Climate-Related Risks and Potential Financial Impacts

Type	Climate-Related Risks[32]	Potential Financial Impacts
Transition Risks	**Policy and Legal**	
	– Increased pricing of GHG emissions – Enhanced emissions-reporting obligations – Mandates on and regulation of existing products and services – Exposure to litigation	– Increased operating costs (e.g., higher compliance costs, increased insurance premiums) – Write-offs, asset impairment, and early retirement of existing assets due to policy changes – Increased costs and/or reduced demand for products and services resulting from fines and judgments
	Technology	
	– Substitution of existing products and services with lower emissions options – Unsuccessful investment in new technologies – Costs to transition to lower emissions technology	– Write-offs and early retirement of existing assets – Reduced demand for products and services – Research and development (R&D) expenditures in new and alternative technologies – Capital investments in technology development – Costs to adopt/deploy new practices and processes
	Market	
	– Changing customer behavior – Uncertainty in market signals – Increased cost of raw materials	– Reduced demand for goods and services due to shift in consumer preferences – Increased production costs due to changing input prices (e.g., energy, water) and output requirements (e.g., waste treatment) – Abrupt and unexpected shifts in energy costs – Change in revenue mix and sources, resulting in decreased revenues – Re-pricing of assets (e.g., fossil fuel reserves, land valuations, securities valuations)
	Reputation	
	– Shifts in consumer preferences – Stigmatization of sector – Increased stakeholder concern or negative stakeholder feedback	– Reduced revenue from decreased demand for goods/services – Reduced revenue from decreased production capacity (e.g., delayed planning approvals, supply chain interruptions) – Reduced revenue from negative impacts on workforce management and planning (e.g., employee attraction and retention) – Reduction in capital availability
Physical Risks	**Acute**	– Reduced revenue from decreased production capacity (e.g., transport difficulties, supply chain interruptions) – Reduced revenue and higher costs from negative impacts on workforce (e.g., health, safety, absenteeism) – Write-offs and early retirement of existing assets (e.g., damage to property and assets in "high-risk" locations) – Increased operating costs (e.g., inadequate water supply for hydroelectric plants or to cool nuclear and fossil fuel plants) – Increased capital costs (e.g., damage to facilities) – Reduced revenues from lower sales/output – Increased insurance premiums and potential for reduced availability of insurance on assets in "high-risk" locations
	– Increased severity of extreme weather events such as cyclones and floods	
	Chronic	
	– Changes in precipitation patterns and extreme variability in weather patterns – Rising mean temperatures – Rising sea levels	

[32] The sub-category risks described under each major category are not mutually exclusive, and some overlap exists.

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Table 2

Examples of Climate-Related Opportunities and Potential Financial Impacts

Type	Climate-Related Opportunities[33]	Potential Financial Impacts
Resource Efficiency	– Use of more efficient modes of transport – Use of more efficient production and distribution processes – Use of recycling – Move to more efficient buildings – Reduced water usage and consumption	– Reduced operating costs (e.g., through efficiency gains and cost reductions) – Increased production capacity, resulting in increased revenues – Increased value of fixed assets (e.g., highly rated energy-efficient buildings) – Benefits to workforce management and planning (e.g., improved health and safety, employee satisfaction) resulting in lower costs
Energy Source	– Use of lower-emission sources of energy – Use of supportive policy incentives – Use of new technologies – Participation in carbon market – Shift toward decentralized energy generation	– Reduced operational costs (e.g., through use of lowest cost abatement) – Reduced exposure to future fossil fuel price increases – Reduced exposure to GHG emissions and therefore less sensitivity to changes in cost of carbon – Returns on investment in low-emission technology – Increased capital availability (e.g., as more investors favor lower-emissions producers) – Reputational benefits resulting in increased demand for goods/services
Products and Services	– Development and/or expansion of low emission goods and services – Development of climate adaptation and insurance risk solutions – Development of new products or services through R&D and innovation – Ability to diversify business activities – Shift in consumer preferences	– Increased revenue through demand for lower emissions products and services – Increased revenue through new solutions to adaptation needs (e.g., insurance risk transfer products and services) – Better competitive position to reflect shifting consumer preferences, resulting in increased revenues
Markets	– Access to new markets – Use of public-sector incentives – Access to new assets and locations needing insurance coverage	– Increased revenues through access to new and emerging markets (e.g., partnerships with governments, development banks) – Increased diversification of financial assets (e.g., green bonds and infrastructure)
Resilience	– Participation in renewable energy programs and adoption of energy-efficiency measures – Resource substitutes/diversification	– Increased market valuation through resilience planning (e.g., infrastructure, land, buildings) – Increased reliability of supply chain and ability to operate under various conditions – Increased revenue through new products and services related to ensuring resiliency

[33] The opportunity categories are not mutually exclusive, and some overlap exists.

C Recommendations and Guidance

C Recommendations and Guidance

1. Overview of Recommendations and Guidance

To fulfill its remit, the Task Force developed four widely adoptable recommendations on climate-related financial disclosures applicable to organizations across sectors and jurisdictions. In developing its recommendations, the Task Force considered the challenges for preparers of disclosures as well as the benefits of such disclosures to investors, lenders, and insurance underwriters. To achieve this balance, the Task Force engaged in significant outreach and consultation with users and preparers of disclosures and drew upon existing climate-related disclosure regimes. The insights gained from the outreach and consultations directly informed the development of the recommendations.

The Task Force structured its recommendations around four thematic areas that represent core elements of how organizations operate—governance, strategy, risk management, and metrics and targets. The four overarching recommendations are supported by key climate-related financial disclosures—referred to as recommended disclosures—that build out the framework with information that will help investors and others understand how reporting organizations think about and assess climate-related risks and opportunities. In addition, there is guidance to support all organizations in developing climate-related financial disclosures consistent with the recommendations and recommended disclosures as well as *supplemental* guidance for specific sectors. The structure is depicted in Figure 3 below, and the Task Force's recommendations and supporting recommended disclosures are presented in Figure 4 (p. 14).

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Figure 3

Recommendations and Guidance

Recommendations
Four widely adoptable recommendations tied to: governance, strategy, risk management, and metrics and targets

Recommended Disclosures
Specific recommended disclosures organizations should include in their financial filings to provide decision-useful information

Guidance for All Sectors
Guidance providing context and suggestions for implementing the recommended disclosures for all organizations

Supplemental Guidance for Certain Sectors
Guidance that highlights important considerations for certain sectors and provides a fuller picture of potential climate-related financial impacts in those sectors

Supplemental guidance is provided for the financial sector and for non-financial sectors potentially most affected by climate change

The Task Force's supplemental guidance is included in the Annex and covers the financial sector as well as non-financial industries potentially most affected by climate change and the transition to a lower-carbon economy (referred to as non-financial groups). The supplemental guidance provides these preparers with additional context and suggestions for implementing the recommended disclosures and should be used in conjunction with the guidance for all sectors.

Figure 4

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.
Recommended Disclosures	**Recommended Disclosures**	**Recommended Disclosures**	**Recommended Disclosures**
a) Describe the board's oversight of climate-related risks and opportunities.	a) Describe the climate-related risks and opportunities the organization 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.

Figure 5 provides a mapping of the recommendations (governance, strategy, risk management, and metrics and targets) and recommended disclosures (a, b, c) for which supplemental guidance was developed for the financial sector and non-financial groups.

- **Financial Sector.** The Task Force developed supplemental guidance for the financial sector, which it organized into four major industries largely based on activities performed. The four industries are banks (lending), insurance companies (underwriting), asset managers (asset management), and asset owners, which include public- and private-sector pension plans, endowments, and foundations (investing).[34] The Task Force believes that disclosures by the financial sector could foster an early assessment of climate-related risks and opportunities, improve pricing of climate-related risks, and lead to more informed capital allocation decisions.
- **Non-Financial Groups.** The Task Force developed supplemental guidance for non-financial industries that account for the largest proportion of GHG emissions, energy usage, and water usage. These industries were organized into four groups (i.e., non-financial groups)—Energy; Materials and Buildings; Transportation; and Agriculture, Food, and Forest Products—based on similarities in climate-related risks as shown in Box 2 (p. 16). While this supplemental guidance focuses on a subset of non-financial industries, organizations in other industries with similar business activities may wish to review and consider the issues and topics contained in the supplemental guidance.

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Figure 5

Supplemental Guidance for Financial Sector and Non-Financial Groups

	Industries and Groups	Governance		Strategy			Risk Management			Metrics and Targets		
		a)	b)	a)	b)	c)	a)	b)	c)	a)	b)	c)
Financial	Banks			■			■			■		
	Insurance Companies				■	■	■	■		■		
	Asset Owners				■	■	■	■		■	■	
	Asset Managers				■		■	■		■	■	
Non-Financial	Energy				■	■				■		
	Transportation				■	■				■		
	Materials and Buildings				■	■				■		
	Agriculture, Food, and Forest Products				■	■				■		

[34] The use of the term "insurance companies" in this report includes re-insurers.

Box 2

Determination of Non-Financial Groups

In an effort to focus supplemental guidance on those non-financial sectors and industries with the highest likelihood of climate-related financial impacts, the Task Force assessed three factors most likely to be affected by both transition risk (policy and legal, technology, market, and reputation) and physical risk (acute and chronic)—GHG emissions, energy usage, and water usage.

The underlying premise in using these three factors is that climate-related physical and transition risks will likely manifest themselves primarily and broadly in the form of constraints on GHG emissions, effects on energy production and usage, and effects on water availability, usage, and quality. Other factors, such as waste management and land use, are also important, but may not be as determinative across a wide range of industries or may be captured in one of the primary categories.

In taking this approach, the Task Force consulted a number of sources regarding the ranking of various sectors and industries according to these three factors. The various rankings were used to determine an overall set of sectors and industries that have significant exposure to transition or physical risks related to GHG emissions, energy, or water. The sectors and industries were grouped into four categories of industries that have similar economic activities and climate-related exposures.

These four groups and their associated industries are intended to be indicative of the economic activities associated with these industries rather than definitive industry categories. Other industries with similar activities and climate-related exposures should consider the supplemental guidance as well.

The Task Force validated its approach using a variety of sources, including:

1. The TCFD Phase I report public consultation, soliciting more than 200 responses which ranked Energy, Utilities, Materials, Industrials and Consumer Staples/Discretionary, in that order, as the Global Industry Classification Standard (GICS) sectors most important for disclosure guidelines to cover.
2. Numerous sector-specific disclosure guidance documents to understand various breakdowns by economic activity, sector, and industries, including from the following sources: CDP, GHG Protocol, Global Real Estate Sustainability Benchmark (GRESB), Global Reporting Initiative (GRI), Institutional Investors Group on Climate Change (IIGCC), IPIECA (the global oil and gas industry association for environmental and social issues), and the Sustainability Accounting Standards Board (SASB).
3. The Intergovernmental Panel on Climate Change (IPCC) report "Climate Change 2014 – Mitigation of Climate Change" that provides an analysis of global direct and indirect emissions by economic sector. The IPCC analysis highlights the dominant emissions-producing sectors as Energy; Industry; Agriculture, Forestry, and Other Land Use; and Transportation and Buildings (Commercial and Residential).
4. Research and documentation from non-governmental organizations (NGOs) and industry organizations that provide information on which industries have the highest exposures to climate change, including those from Cambridge Institute of Sustainability Leadership, China's National Development and Reform Commission (NDRC), Environmental Resources Management (ERM), IEA, Moody's, S&P Global Ratings, and WRI/UNEPFI.

Based on its assessment, the Task Force identified the four groups and their associated industries, listed in the table below, as those that would most benefit from supplemental guidance.

Energy	Transportation	Materials and Buildings	Agriculture, Food, and Forest Products
– Oil and Gas – Coal – Electric Utilities	– Air Freight – Passenger Air Transportation – Maritime Transportation – Rail Transportation – Trucking Services – Automobiles and Components	– Metals and Mining – Chemicals – Construction Materials – Capital Goods – Real Estate Management and Development	– Beverages – Agriculture – Packaged Foods and Meats – Paper and Forest Products

2. Implementing the Recommendations

a. Scope of Coverage

To promote more informed investing, lending, and insurance underwriting decisions, the Task Force recommends all organizations with public debt or equity implement its recommendations. Because climate-related issues are relevant for other types of organizations as well, the Task Force encourages all organizations to implement these recommendations. In particular, the Task Force believes that asset managers and asset owners, including public- and private-sector pension plans, endowments, and foundations, should implement its recommendations so that their clients and beneficiaries may better understand the performance of their assets, consider the risks of their investments, and make more informed investment choices.

b. Location of Disclosures and Materiality

The Task Force recommends that organizations provide climate-related financial disclosures in their mainstream (i.e., public) annual financial filings.[35] In most G20 jurisdictions, public companies have a legal obligation to disclose material information in their financial filings—including material climate-related information; and the Task Force's recommendations are intended to help organizations meet existing disclosure obligations more effectively.[36] The Task Force's recommendations were developed to apply broadly across sectors and jurisdictions and should not be seen as superseding national disclosure requirements. Importantly, organizations 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 organizations 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 that most information included in financial filings is subject to a materiality assessment. However, because climate-related risk is a non-diversifiable risk that affects nearly all industries, many investors believe it requires special attention. For example, in assessing organizations' financial and operating results, many investors want insight into the governance and risk management context in which such results are achieved. The Task Force believes disclosures related to its Governance and Risk Management recommendations directly address this need for context and should be included in annual financial filings.

For disclosures related to the Strategy and Metrics and Targets recommendations, the Task Force believes organizations should provide such information in annual financial filings when the information is deemed material. Certain organizations—those in the four non-financial groups that have more than one billion U.S. dollar equivalent (USDE) in annual revenue—should consider disclosing such information in other reports when the information is not deemed material and not included in financial filings.[37] Because these organizations are more likely than others to be financially impacted over time, investors are interested in monitoring how these organizations' strategies evolve.

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[35] 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.

[36] The Task Force encourages organizations where climate-related issues could be material in the future to begin disclosing climate-related financial information outside financial filings to facilitate the incorporation of such information into financial filings once climate-related issues are determined to be material.

[37] The Task Force chose a one billion USDE annual revenue threshold because it captures organizations responsible for over 90 percent of Scope 1 and 2 GHG emissions in the industries represented by the four non-financial groups (about 2,250 organizations out of roughly 15,000).

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. Likewise, asset managers and asset owners should consider materiality in the context of their respective mandates and investment performance for clients and beneficiaries.[38]

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

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c. 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 6), which are described more fully in Appendix 3. When used by organizations 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 organizations. The Task Force encourages organizations to consider these principles as they develop climate-related financial disclosures.

Figure 6

Principles for Effective Disclosures

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

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 organizations in making clear the linkages between climate-related issues and their governance, strategy, risk management, and metrics and targets.

[38] The Task Force recommends asset managers and asset owners include carbon footprinting information in their reporting to clients and beneficiaries, as described in Section D of the Annex, to support the assessment and management of climate-related risks.

3. Guidance for All Sectors

The Task Force has developed guidance to support all organizations in developing climate-related financial disclosures consistent with its recommendations and recommended disclosures. The guidance assists preparers by providing context and suggestions for implementing the recommended disclosures. Recognizing organizations have differing levels of capacity to disclose under the recommendations, the guidance provides descriptions of the types of information that should be disclosed or considered.

a. Governance

Investors, lenders, insurance underwriters, and other users of climate-related financial disclosures (collectively referred to as "investors and other stakeholders") are interested in understanding the role an organization's board plays in overseeing climate-related issues as well as management's role in assessing and managing those issues. Such information supports evaluations of whether climate-related issues receive appropriate board and management attention.

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Governance Disclose the organization's governance around climate-related risks and opportunities.	
Recommended Disclosure a) Describe the board's oversight of climate-related risks and opportunities.	**Guidance for All Sectors** In describing the board's oversight of climate-related issues, organizations should consider including a discussion of the following: – processes and frequency by which the board and/or board committees (e.g., audit, risk, or other committees) are informed about climate-related issues, – whether the board and/or board committees consider climate-related issues when reviewing and guiding strategy, major plans of action, risk management policies, annual budgets, and business plans as well as setting the organization's performance objectives, monitoring implementation and performance, and overseeing major capital expenditures, acquisitions, and divestitures, and – how the board monitors and oversees progress against goals and targets for addressing climate-related issues.
Recommended Disclosure b) Describe management's role in assessing and managing climate-related risks and opportunities.	**Guidance for All Sectors** In describing management's role related to the assessment and management of climate-related issues, organizations should consider including the following information: – 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.

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b. Strategy

Investors and other stakeholders need to understand how climate-related issues may affect an organization's businesses, strategy, and financial planning over the short, medium, and long term. Such information is used to inform expectations about the future performance of an organization.

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 Disclosure a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	**Guidance for All Sectors** Organizations should provide the following information: – a description of what they consider to be the relevant short-, medium-, and long-term time horizons, taking into consideration the useful life of the organization's assets or infrastructure and the fact that climate-related issues often manifest themselves over the medium and longer terms, – a description of the specific climate-related issues for each time horizon (short, medium, and long term) that could have a material financial impact on the organization, and – a description of the process(es) used to determine which risks and opportunities could have a material financial impact on the organization. Organizations should consider providing a description of their risks and opportunities by sector and/or geography, as appropriate. In describing climate-related issues, organizations should refer to Tables 1 and 2 (pp. 10-11).
Recommended Disclosure b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Building on recommended disclosure (a), organizations should discuss how identified climate-related issues have affected their businesses, strategy, and financial planning. Organizations should consider including the impact on their businesses and strategy in the following areas: – Products and services – Supply chain and/or value chain – Adaptation and mitigation activities – Investment in research and development – Operations (including types of operations and location of facilities) Organizations should describe how climate-related issues serve as an input to their financial planning process, the time period(s) used, and how these risks and opportunities are prioritized. Organizations' disclosures should reflect a holistic picture of the interdependencies among the factors that affect their ability to create value over time. Organizations should also consider including in their disclosures the impact on financial planning in the following areas: – Operating costs and revenues – Capital expenditures and capital allocation – Acquisitions or divestments – Access to capital If climate-related scenarios were used to inform the organization's strategy and financial planning, such scenarios should be described.

The Task Force updated its guidance for all sectors for its Strategy and Metrics and Targets recommendations in October 2021. Please refer to the Task Force's 2021 Annex for the latest guidance.

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 Disclosure c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	**Guidance for All Sectors** Organizations should describe how resilient their strategies are to climate-related risks and opportunities, taking into consideration a transition to a lower-carbon economy consistent with a 2°C or lower scenario and, where relevant to the organization, scenarios consistent with increased physical climate-related risks. Organizations should consider discussing: – where they believe their strategies may be affected by climate-related risks and opportunities, – how their strategies might change to address such potential risks and opportunities, and – the climate-related scenarios and associated time horizon(s) considered. Refer to Section D for information on applying scenarios to forward-looking analysis.

The Task Force updated its guidance for all sectors for its Strategy and Metrics and Targets recommendations in October 2021. Please refer to the Task Force's 2021 Annex for the latest guidance.

c. Risk Management

Investors and other stakeholders need to understand how an organization's climate-related risks are identified, assessed, and managed and whether those processes are integrated into existing risk management processes. Such information supports users of climate-related financial disclosures in evaluating the organization's overall risk profile and risk management activities.

Risk Management

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

Recommended Disclosure a) Describe the organization's processes for identifying and assessing climate-related risks.	**Guidance for All Sectors** Organizations should describe their risk management processes for identifying and assessing climate-related risks. An important aspect of this description is how organizations determine the relative significance of climate-related risks in relation to other risks. Organizations should describe whether they consider existing and emerging regulatory requirements related to climate change (e.g., limits on emissions) as well as other relevant factors considered. Organizations should also consider disclosing the following: – processes for assessing the potential size and scope of identified climate-related risks and – definitions of risk terminology used or references to existing risk classification frameworks used.
Recommended Disclosure b) Describe the organization's processes for managing climate-related risks.	**Guidance for All Sectors** Organizations should describe their processes for managing climate-related risks, including how they make decisions to mitigate, transfer, accept, or control those risks. In addition, organizations should describe their processes for prioritizing climate-related risks, including how materiality determinations are made within their organizations. In describing their processes for managing climate-related risks, organizations should address the risks included in Tables 1 and 2 (pp. 10-11), as appropriate.

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Risk Management

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

Recommended Disclosure c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	**Guidance for All Sectors** Organizations should describe how their processes for identifying, assessing, and managing climate-related risks are integrated into their overall risk management.

d. Metrics and Targets

Investors and other stakeholders need to understand how an organization measures and monitors its climate-related risks and opportunities. Access to the metrics and targets used by an organization allows investors and other stakeholders to better assess the organization's potential risk-adjusted returns, ability to meet financial obligations, general exposure to climate-related issues, and progress in managing or adapting to those issues. They also provide a basis upon which investors and other stakeholders can compare organizations within a sector or industry.

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Metrics and Targets

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

Recommended Disclosure a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	**Guidance for All Sectors** Organizations should provide the key metrics used to measure and manage climate-related risks and opportunities, as described in Tables 1 and 2 (pp. 10-11). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable. Where climate-related issues are material, organizations should consider describing whether and how related performance metrics are incorporated into remuneration policies. Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy. Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics.
Recommended Disclosure b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	**Guidance for All Sectors** Organizations should provide their Scope 1 and Scope 2 GHG emissions and, if appropriate, Scope 3 GHG emissions and the related risks.[39] GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[40] As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.[41] GHG emissions and associated metrics should be provided for historical

The Task Force updated its guidance for all sectors for its Strategy and Metrics and Targets recommendations in October 2021. Please refer to the Task Force's 2021 Annex for the latest guidance.

[39] Emissions are a prime driver of rising global temperatures and, as such, are a key focal point of policy, regulatory, market, and technology responses to limit climate change. As a result, organizations with significant emissions are likely to be impacted more significantly by transition risk than other organizations. In addition, current or future constraints on emissions, either directly by emission restrictions or indirectly through carbon budgets, may impact organizations financially.

[40] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions. Organizations may use national reporting methodologies if they are consistent with the GHG Protocol methodology.

[41] For industries with high energy consumption, metrics related to emission intensity are important to provide. For example, emissions per unit of economic output (e.g., unit of production, number of employees, or value-added) is widely used. See the Annex for examples of metrics.

Metrics and Targets

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

	periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate the metrics.
Recommended Disclosure c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	**Guidance for All Sectors** 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. Other goals may include efficiency or financial goals, financial loss tolerances, avoided GHG emissions through the entire product life cycle, or net revenue goals for products and services designed for a lower-carbon economy. 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.

The Task Force updated its guidance for all sectors for its Strategy and Metrics and Targets recommendations in October 2021. Please refer to the Task Force's 2021 Annex for the latest guidance.

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Some organizations are affected by risks associated with climate change today. However, for many organizations, the most significant effects of climate change are likely to emerge over the medium to longer term and their timing and magnitude are uncertain. This uncertainty presents challenges for individual organizations in understanding the potential effects of climate change on their businesses, strategies, and financial performance. To appropriately incorporate the potential effects in their planning processes, organizations need to consider how their climate-related risks and opportunities may evolve and the potential implications under different conditions. One way to do this is through scenario analysis.

Scenario analysis is a well-established method for developing strategic plans that are more flexible or robust to a range of plausible future states. The use of scenario analysis for assessing the potential business implications of climate-related risks and opportunities, however, is relatively recent. While several organizations use scenario analysis to assess the potential impact of climate change on their businesses, only a subset have disclosed their assessment of forward-looking implications publicly, either in sustainability reports or financial filings.[42]

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The disclosure of organizations' forward-looking assessments of climate-related issues is important for investors and other stakeholders in understanding how vulnerable individual organizations are to transition and physical risks and how such vulnerabilities are or would be addressed. As a result, the Task Force believes that organizations should use scenario analysis to assess potential business, strategic, and financial implications of climate-related risks and opportunities and disclose those, as appropriate, in their annual financial filings.

> Scenario analysis is an important and useful tool for understanding the strategic implications of climate-related risks and opportunities.

This section provides additional information on using scenario analysis as a tool to assess potential implications of climate-related risks and opportunities. In addition, a technical supplement, The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities, on the Task Force's website provides further information on the types of climate-related scenarios, the application of scenario analysis, and the key challenges in implementing scenario analysis.

1. Overview of Scenario Analysis

Scenario analysis is a process for identifying and assessing the potential implications of a range of plausible future states under conditions of uncertainty. Scenarios are hypothetical constructs and not designed to deliver precise outcomes or forecasts. Instead, scenarios provide a way for organizations to consider how the future might look if certain trends continue or certain conditions are met. In the case of climate change, for example, scenarios allow an organization to explore and develop an understanding of how various combinations of climate-related risks, both transition and physical risks, may affect its businesses, strategies, and financial performance over time.

Scenario analysis can be qualitative, relying on descriptive, written narratives, or quantitative, relying on numerical data and models, or some combination of both. Qualitative scenario analysis

[42] Some organizations in the energy sector and some large investors have made public disclosures describing the results of their climate-related scenario analysis, including discussing how the transition might affect their current portfolios. In some instances, this information was published in financial filings.

explores relationships and trends for which little or no numerical data is available, while quantitative scenario analysis can be used to assess measurable trends and relationships using models and other analytical techniques.[43] Both rely on scenarios that are internally consistent, logical, and based on explicit assumptions and constraints that result in plausible future development paths.

As summarized in Figure 7, there are several reasons why scenario analysis is a useful tool for organizations in assessing the potential implications of climate-related risks and opportunities.

Figure 7

Reasons to Consider Using Scenario Analysis for Climate Change

1. Scenario analysis can help organizations consider issues, like climate change, that have the following characteristics:
   - Possible outcomes that are highly uncertain (e.g., the **physical** response of the climate and ecosystems to higher levels of GHG emissions in the atmosphere)
   - Outcomes that will play out over the medium to longer term (e.g., timing, distribution, and mechanisms of the **transition** to a lower-carbon economy)
   - Potential disruptive effects that, due to uncertainty and complexity, are substantial
2. Scenario analysis can enhance organizations' strategic conversations about the future by considering, in a more structured manner, what may unfold that is different from business-as-usual. Importantly, it broadens decision makers' thinking across a range of plausible scenarios, including scenarios where climate-related impacts can be significant.
3. Scenario analysis can help organizations frame and assess the potential range of plausible business, strategic, and financial impacts from climate change and the associated management actions that may need to be considered in strategic and financial plans. This may lead to more robust strategies under a wider range of uncertain future conditions.
4. Scenario analysis can help organizations identify indicators to monitor the external environment and better recognize when the environment is moving toward a different scenario state (or to a different stage along a scenario path). This allows organizations the opportunity to reassess and adjust their strategies and financial plans accordingly.[44]
5. Scenario analysis can assist investors in understanding the robustness of organizations' strategies and financial plans and in comparing risks and opportunities across organizations.

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2. Exposure to Climate-Related Risks

The effects of climate change on specific sectors, industries, and individual organizations are highly variable. It is important, therefore, that all organizations consider applying a basic level of scenario analysis in their strategic planning and risk management processes. Organizations more significantly affected by transition risk (e.g., fossil fuel-based industries, energy-intensive manufacturers, and transportation activities) and/or physical risk (e.g., agriculture, transportation

[43] For example, see Mark D. A. Rounsevell, Marc J. Metzger, *Developing qualitative scenario storylines for environmental change assessment,* WIREs Climate Change 2010, 1: 606-619. doi: 10.1002/wcc.63, 2010 and Oliver Fricko, et. al., *Energy sector water use implications of a 2º C climate policy,* Environmental Research Letters, 11: 1-10, 2016.

[44] J.N. Maack, *Scenario analysis: a tool for task managers,* Social Analysis: selected tools and techniques, Social Development Papers, Number 36, the World Bank, June 2001, Washington, DC.

and building infrastructure, insurance, and tourism) should consider a more in-depth application of scenario analysis.

a. Exposure to Transition Risks

Transition risk scenarios are particularly relevant for resource-intensive organizations with high GHG emissions within their value chains, where policy actions, technology, or market changes aimed at emissions reductions, energy efficiency, subsidies or taxes, or other constraints or incentives may have a particularly direct effect.

A key type of transition risk scenario is a so-called 2°C scenario, which lays out a pathway and an emissions trajectory consistent with holding the increase in the global average temperature to 2°C above pre-industrial levels. In December 2015, nearly 200 governments agreed to strengthen the global 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," referred to as the Paris Agreement.[45] As a result, a 2°C scenario provides a common reference point that is generally aligned with the objectives of the Paris Agreement and will support investors' evaluation of the potential magnitude and timing of transition-related implications for individual organizations; across different organizations within a sector; and across different sectors.

b. Exposure to Physical Risks

A wide range of organizations are exposed to climate-related physical risks. Physical climate-related scenarios are particularly relevant for organizations exposed to acute or chronic climate change, such as those with:

- long-lived, fixed assets;
- locations or operations in climate-sensitive regions (e.g., coastal and flood zones);
- reliance on availability of water; and
- value chains exposed to the above.

Physical risk scenarios generally identify extreme weather threats of moderate or higher risk before 2030 and a larger number and range of physical threats between 2030 and 2050. Although most climate models deliver scenario results for physical impacts beyond 2050, organizations typically focus on the consequences of physical risk scenarios over shorter time frames that reflect the lifetimes of their respective assets or liabilities, which vary across sectors and organizations.

3. Recommended Approach to Scenario Analysis

The Task Force believes that all organizations exposed to climate-related risks should consider (1) using scenario analysis to help inform their strategic and financial planning processes and (2) disclosing how resilient their strategies are to a range of plausible climate-related scenarios. The Task Force recognizes that, for many organizations, scenario analysis is or would be a largely qualitative exercise. However, organizations with more significant exposure to transition risk and/or physical risk should undertake more rigorous qualitative and, if relevant, quantitative scenario analysis with respect to key drivers and trends that affect their operations.

A critical aspect of scenario analysis is the selection of a set of scenarios (not just one) that covers a reasonable variety of future outcomes, both favorable and unfavorable. In this regard, the Task Force recommends organizations use a 2°C or lower scenario in addition to two or three other

[45] United Nations Framework Convention on Climate Change. "The Paris Agreement," December 2015.

scenarios most relevant to their circumstances, such as scenarios related to Nationally Determined Contributions (NDCs), physical climate-related scenarios, or other challenging scenarios.[46] In jurisdictions where NDCs are a commonly accepted guide for an energy and/or emissions pathway, NDCs may constitute particularly useful scenarios to include in an organization's suite of scenarios for conducting climate-related scenario analysis.

For an organization in the initial stages of implementing scenario analysis or with limited exposure to climate-related issues, the Task Force recommends disclosing how resilient, qualitatively or directionally, the organization's strategy and financial plans may be to a range of relevant climate change scenarios. This information helps investors, lenders, insurance underwriters, and other stakeholders understand the robustness of an organization's forward-looking strategy and financial plans across a range of possible future states.

Organizations with more significant exposure to climate-related issues should consider disclosing key assumptions and pathways related to the scenarios they use to allow users to understand the analytical process and its limitations. In particular, it is important to understand the critical parameters and assumptions that materially affect the conclusions drawn. As a result, the Task Force believes that organizations with significant climate-related exposures should *strive* to disclose the elements described in Figure 8.

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Figure 8

Disclosure Considerations for Non-Financial Organizations

Organizations with more significant exposure to climate-related issues should consider disclosing key aspects of their scenario analysis, such as the ones described below.

1. The scenarios used, including the 2°C or lower scenario[47]
2. Critical input parameters, assumptions, and analytical choices for the scenarios used, including such factors as:
   - Assumptions about possible technology responses and timing (e.g., evolution of products/services, the technology used to produce them, and costs to implement)
   - Assumptions made around potential differences in input parameters across regions, countries, asset locations, and/or markets
   - Approximate sensitivities to key assumptions
3. Time frames used for scenarios, including short-, medium-, and long-term milestones (e.g., how organizations consider timing of potential future implications under the scenarios used)
4. Information about the resiliency of the organization's strategy, including strategic performance implications under the various scenarios considered, potential qualitative or directional implications for the organization's value chain, capital allocation decisions, research and development focus, and potential material financial implications for the organization's operating results and/or financial position

[46] 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.

[47] The objective of the Paris Agreement is to hold 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. The IEA is developing a 1.5°C scenario that organizations may find useful.

4. Applying Scenario Analysis

While the Task Force recognizes the complexities of scenario analysis and the potential resources needed to conduct it, organizations are encouraged to use scenario analysis to assess climate-related risks and opportunities. For organizations just beginning to use scenario analysis, a qualitative approach that progresses and deepens over time may be appropriate.[48] Greater rigor and sophistication in the use of data and quantitative models and analysis may be warranted for organizations with more extensive experience in conducting scenario analysis. Organizations may decide to use existing external scenarios and models (e.g., those provided by third-party vendors) or develop their own, in-house modeling capabilities. The choice of approach will depend on an organization's needs, resources, and capabilities.

In conducting scenario analysis, organizations should *strive* to achieve:

- transparency around parameters, assumptions, analytical approaches, and time frames;
- comparability of results across different scenarios and analytical approaches;
- adequate documentation for the methodology, assumptions, data sources, and analytics;
- consistency of methodology year over year;
- sound governance over scenario analysis conduct, validation, approval, and application; and
- effective disclosure of scenario analysis that will inform and promote a constructive dialogue between investors and organizations on the range of potential impacts and resilience of the organization's strategy under various plausible climate-related scenarios.

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In applying scenario analysis, organizations should consider general implications for their strategies, capital allocation, and costs and revenues, both at an enterprise-wide level and at the level of specific regions and markets where specific implications of climate change for the organization are likely to arise. Financial-sector organizations should consider using scenario analysis to evaluate the potential impact of climate-related scenarios on individual assets or investments, investments or assets in a particular sector or region, or underwriting activities.

The Task Force's supplemental guidance recognizes that organizations will be at different levels of experience in using scenario analysis. However, it is important for organizations to use scenario analysis and develop the necessary organizational skills and capabilities to assess climate-related risks and opportunities, with the expectation that organizations will evolve and deepen their use of scenario analysis over time. The objective is to assist investors and other stakeholders in better understanding:

- the degree of robustness of the organization's strategy and financial plans under different plausible future states of the world;
- how the organization may be positioning itself to take advantage of opportunities and plans to mitigate or adapt to climate-related risks; and
- how the organization is challenging itself to think strategically about longer-term climate-related risks and opportunities.

[48] Organizations considering undertaking scenario analysis may wish to conduct various sensitivity analyses around key climate factors as a precursor to scenario analysis, recognizing that sensitivity analysis and scenario analysis are different, but complementary, processes.

5. Challenges and Benefits of Conducting Scenario Analysis

Scenario analysis is a well-established method for developing strategic plans that are more flexible and robust to a range of plausible future states. As previously discussed (Figure 7, p. 26) it is particularly useful for assessing issues with possible outcomes that are highly uncertain, that play out over the medium to longer term, and that are potentially disruptive. Scenario analysis can help to better frame strategic issues, assess the range of potential management actions that may be needed, engage more productively in strategic conversations, and identify indicators to monitor the external environment. Importantly, climate-related scenario analysis can provide the foundation for more effective engagement with investors on an organization's strategic and business resiliency.

Conducting climate-related scenario analysis, however, is not without challenges. First, most scenarios have been developed for global and macro assessments of potential climate-related impacts that can inform policy makers. These climate-related scenarios do not always provide the ideal level of transparency, range of data outputs, and functionality of tools that would facilitate their use in a business or investment context.

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Second, the availability and granularity of data can be a challenge for organizations attempting to assess various energy and technology pathways or carbon constraints in different jurisdictions and geographic locations.

Third, the use of climate-related scenario analysis to assess potential business implications is still at an early stage. Although a handful of the largest organizations and investors are using climate-related scenario analysis as part of their strategic planning and risk management processes, many organizations are just beginning to explore its use. Sharing experiences and approaches to climate-related scenario analysis across organizations, therefore, is critical to advancing the use of climate-related scenario analysis. Organizations may be able to play an important role in this regard by facilitating information and experience exchanges among themselves; collectively developing tools, data sets, and methodologies; and working to set standards. Organizations across many different sectors will inevitably need to learn by doing. Some may seek guidance from other industry participants and experts on how to apply climate-related scenarios to make forward-looking analyses of climate-related risks and opportunities.

Addressing these challenges and advancing the use of climate-related scenario analysis will require further work. These challenges, however, are not insurmountable and can be addressed. Organizations should undertake scenario analysis in the near term to capture the important benefits for assessing climate-related risks and opportunities and improve their capabilities as tools and data progress over time.

E Key Issues Considered and Areas for Further Work

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The diverse perspectives of Task Force members as well as outreach efforts, including two public consultations, resulting in over 500 responses, hundreds of industry interviews, several focus groups, and multiple webinars, provided valuable insight into the challenges that different organizations—both financial and non-financial—may encounter in preparing disclosures consistent with the Task Force's recommendations. The Task Force considered these issues and others in developing and then finalizing its recommendations and sought to balance the burden of disclosure on preparers with the need for consistent and decision-useful information for users (i.e., investors, lenders, and insurance underwriters). This section describes the key issues considered by the Task Force, significant public feedback received by the Task Force related to those issues, the ultimate disposition of the issues, and, in some cases, areas where further work may be warranted. Figure 9 summarizes areas the Task Force identified, through its own analysis as well as through public feedback, as warranting further research and analysis or the development of methodologies and standards.

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Figure 9

Key Areas for Further Work

Relationship to Other Reporting Initiatives	Encourage standard setting organizations and others to actively work toward greater alignment of frameworks and to support adoption
Scenario Analysis	Further develop applicable 2°C or lower transition scenarios and supporting outputs, tools, and user interfaces Develop broadly accepted methodologies, datasets, and tools for scenario-based evaluation of physical risk by organizations Make datasets and tools publicly available and provide commonly available platforms for scenario analysis
Data Availability and Quality and Financial Impact	Undertake further research and analysis to better understand and measure how climate-related issues translate into potential financial impacts for organizations in financial and non-financial sectors Improve data quality and further develop standardized metrics for the financial sector, including better defining carbon-related assets and developing metrics that address a broader range of climate-related risks and opportunities Increase organizations' understanding of climate-related risks and opportunities
Example Disclosures[49]	Provide example disclosures to assist preparers in developing disclosures consistent with the Task Force's recommendations

[49] In response to the second consultation, organizations asked for example disclosures to gain a better understanding of how the recommended information may be disclosed. The Task Force acknowledges the development of these examples as an area of further work.

1. Relationship to Other Reporting Initiatives

Through the Task Force's outreach efforts, some organizations expressed concern that multiple disclosure frameworks and mandatory reporting requirements increase the administrative burden of disclosure efforts. Specifically, the additional time, cost, and effort required to analyze and disclose new climate-related information could penalize those with less capacity to respond.

The Task Force considered existing voluntary and mandatory climate-related reporting frameworks in developing its recommendations and provides information in the Annex on the alignment of existing frameworks, including those developed by the CDP (formerly the Carbon Disclosure Project), Climate Disclosure Standards Board (CDSB), the Global Reporting Initiative (GRI), the International Integrated Reporting Council (IIRC), and the Sustainability Accounting Standards Board (SASB), with the Task Force's recommended disclosures. The Task Force expects preparers disclosing climate-related information under other regimes will be able to use existing processes and content when developing disclosures based on the Task Force's recommendations.

The Task Force's recommendations provide a common set of principles that should help existing disclosure regimes come into closer alignment over time. Preparers, users, and other stakeholders share a common interest in encouraging such alignment as it relieves a burden for reporting entities, reduces fragmented disclosure, and provides greater comparability for users. The Task Force also encourages standard setting bodies to support adoption of the recommendations and alignment with the recommended disclosures.

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2. Location of Disclosures and Materiality

In considering possible reporting venues, the Task Force reviewed existing regimes for climate-related disclosures across G20 countries. While many G20 countries have rules or regulatory guidance that require climate-related disclosure for organizations, most are *not* explicitly focused on climate-related *financial* information.[50] In addition, the locations of these disclosures vary significantly and range from surveys sent to regulators to sustainability reports to annual financial filings (see Appendix 4).

The Task Force also reviewed financial filing requirements applicable to public companies across G20 countries and found that in most G20 countries, issuers have a legal obligation to disclose material information in their financial reports—which includes material, climate-related information. Such reporting may take the form of a general disclosure of material information, but many jurisdictions require disclosure of material information in specific sections of the financial filing (e.g., in a discussion on risk factors).[51]

Based on its review, the Task Force determined that preparers of climate-related financial disclosures should provide such disclosures in their mainstream (i.e., public) annual financial filings.[52] The Task Force believes publication of climate-related financial information in mainstream financial filings will foster broader utilization of such disclosures, promoting an informed understanding of climate-related issues by investors and others, and support shareholder engagement. Importantly, in determining whether information is material, the Task Force believes organizations should determine materiality for climate-related issues consistent with how they determine the materiality of other information included in their financial filings. In addition, the Task Force cautions organizations against prematurely concluding that climate-

[50] Organization for Economic Co-operation and Development (OECD) and CDSB, *Climate Change Disclosure in G20 Countries: Stocktaking of Corporate Reporting Schemes,* November 18, 2015.

[51] N. Ganci, S. Hammer, T. Reilly, and P. Rodel, *Environmental and Climate Change Disclosure under the Securities Laws: A Multijurisdictional Survey,* Debevoise & Plimpton, March 2016.

[52] To the extent climate-related disclosures are provided outside of financial filings, organizations are encouraged to align the release of such reports with their financial filings.

related risks and opportunities are not material based on perceptions of the longer-term nature of some climate-related risks.

As part of the Task Force's second public consultation, some organizations expressed concern about disclosing information in financial filings that is not clearly tied to an assessment of materiality. The Task Force recognizes organizations' concerns about disclosing information in annual financial filings that is not clearly tied to an assessment of materiality. However, the Task Force believes disclosures related to the Governance and Risk Management recommendations should be provided in annual financial filings. Because climate-related risk is a non-diversifiable risk that affects nearly all sectors, many investors believe it requires special attention. For example, in assessing organizations' financial and operating results, many investors want insight into the governance and risk management context in which such results are achieved. The Task Force believes disclosures related to its Governance and Risk Management recommendations directly address this need for context and should be included in annual financial filings.

For disclosures related to the Strategy and Metrics and Targets recommendations, the Task Force believes organizations should provide such information in annual financial filings when the information is deemed material. Certain organizations—those in the four non-financial groups that have more than one billion USDE in annual revenue—should consider disclosing information related to these recommendations in other reports when the information is not deemed material and not included in financial filings.[53,54] Because these organizations are more likely than others to be affected financially over time due to their significant GHG emissions or energy or water dependencies, investors are interested in monitoring how the organizations' strategies evolve.

In addition, the Task Force recognizes reporting by asset managers and asset owners to their clients and beneficiaries, respectively, generally occurs outside mainstream financial filings (Figure 10). For purposes of adopting the Task Force's recommendations, asset managers and asset owners should use their existing channels of financial reporting to their clients and beneficiaries where relevant and feasible. Likewise, asset managers and asset owners should consider materiality in the context of their respective mandates and investment performance for clients and beneficiaries.

Figure 10

Reporting by Asset Owners

The financial reporting requirements and practices of asset owners vary widely and differ from what is required of organizations with public debt or equity. Some asset owners have no public reporting, while others provide extensive public reporting. For purposes of adopting the Task Force's recommendations, asset owners should use their existing channels of financial reporting to their beneficiaries and others where relevant and feasible.

Reporting by Asset Managers

Reporting to clients by asset managers also takes different forms, depending on the requirements of the client and the types of investments made. For example, an investor in a mutual fund might receive quarterly, or download from the asset manager's website, a "fund fact sheet" that reports, among other information, the top holdings by value, the top performers by returns, and the carbon footprint of the portfolio against a stated benchmark. An investor in a segregated account might receive more detailed reporting, including items such as the aggregate carbon intensity of the portfolio compared with a benchmark, the portfolio's exposure to green revenue (and how this changes over time), or insight into portfolio positioning under different climate scenarios. The Task Force appreciates that climate-related risk reporting by asset managers is in the very early stages and encourages progress and innovation by the industry.

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[53] The Task Force chose a one billion USDE annual revenue threshold because it captures organizations responsible for over 90% of Scope 1 and 2 GHG emissions in the industries represented by the four non-financial groups (about 2,250 organizations out of roughly 15,000).

[54] "Other reports" should be 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 substantially similar to those used for financial reporting.

3. Scenario Analysis

As part of the Task Force's second public consultation, many organizations said scenario analysis is a useful tool to help assess risks and understand potential implications of climate change; however, they also identified areas where the Task Force's recommendations and guidance could be improved. In particular, organizations asked the Task Force to identify standardized climate-related scenarios for organizations to use and clarify the information related to scenarios that should be disclosed. They also noted expectations around disclosures and climate-related scenario analysis should be proportionate to the size of the reporting entity and not onerous for smaller organizations. In addition, some organizations noted that the disclosures related to strategy could put organizations at greater risk of litigation given the high degree of uncertainty around the future timing and magnitude of climate-related impacts.

In finalizing its recommendations and guidance, the Task Force clarified organizations should describe how resilient their strategies are to climate-related risks and opportunities, taking into consideration a transition to a lower-carbon economy consistent with a 2°C or lower scenario and, where relevant, scenarios consistent with more extreme physical risks. To address concerns about proportionality, the Task Force established a threshold for organizations in the four non-financial groups that should perform more robust scenario analysis and disclose additional information on the resiliency of their strategies.

On the issue of recommending specific standardized or reference climate-related scenarios for organizations to use, Task Force members agreed that while such an approach is intuitively appealing, it is not a practical solution at this time. Existing, publicly available climate-related scenarios are not structured or defined in such a way that they can be easily applied consistently across different industries or across organizations within an industry.

The Task Force recognizes that incorporating scenario analysis into strategic planning processes will improve over time as organizations "learn by doing." To facilitate progress in this area, the Task Force encourages further work as follows:

- further developing 2°C or lower transition scenarios that can be applied to specific industries and geographies along with supporting outputs, tools, and user interfaces;
- developing broadly accepted methodologies, data sets, and tools for scenario-based evaluation of physical risk by organizations;
- making these data sets and tools publicly available to facilitate use by organizations, reduce organizational transaction costs, minimize gaps between jurisdictions in terms of technical expertise, enhance comparability of climate-related risk assessments by organizations, and help ensure comparability for investors; and
- creating more industry specific (financial and non-financial) guidance for preparers and users of climate-related scenarios.

4. Data Availability and Quality and Financial Impact

The Task Force developed supplemental guidance for the four non-financial groups that account for the largest proportion of GHG emissions, energy usage, and water usage; and, as part of that supplemental guidance, the Task Force included several illustrative metrics around factors that may be indicative of potential financial implications for climate-related risks and opportunities. As part of the second public consultation, several organizations provided feedback on the illustrative metrics, and common themes included (1) improving the comparability and consistency of the metrics, (2) clarifying the links among the metrics, climate-related risks and opportunities, and potential financial implications, (3) simplifying the metrics, and (4) providing additional guidance on the metrics, including how to calculate key metrics. Organizations also raised concerns about

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the lack of standardized data and metrics in the financial sector, which complicates preparers' ability to develop decision-useful metrics and users' ability to compare metrics across organizations.

The Task Force recognizes these concerns as well as broader challenges related to data availability and quality, as described below.

- The gaps in emissions measurement methodologies, including Scope 3 emissions and product life-cycle emissions methodologies, make reliable and accurate estimates difficult.[55,56]
- The lack of robust and cost-effective tools to quantify the potential impact of climate-related risks and opportunities at the asset and project level makes aggregation across an organization's activities or investment portfolios problematic and costly.
- The need to consider the variability of climate-related impacts across and within different sectors and markets further complicates the process (and magnifies the cost) of assessing potential climate-related financial impacts.
- The high degree of uncertainty around the timing and magnitude of climate-related risks makes it difficult to determine and disclose the potential impacts with precision.

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In finalizing its supplemental guidance, the Task Force addressed the redundancy of the metrics; simplified the non-financial illustrative metrics tables; ensured consistent terminology was used; and clarified the links between the metrics, climate-related risks and opportunities, and potential financial implications. In addition, the Task Force encourages further research and analysis by sector and industry experts to (1) better understand and measure how climate-related issues translate into potential financial impacts; (2) develop standardized metrics for the financial sector, including better defining carbon-related assets; and (3) increase organizations' understanding of climate-related risks and opportunities. As it relates to the broader challenges with data quality and availability, the Task Force encourages preparers to include in their disclosures a description of gaps, limitations, and assumptions made as part of their assessment of climate-related issues.

5. GHG Emissions Associated with Investments

In its supplemental guidance for asset owners and asset managers issued on December 14, 2016, the Task Force asked such organizations to provide GHG emissions associated with each fund, product, or investment strategy normalized for every million of the reporting currency invested. As part of the Task Force's public consultation as well as in discussions with preparers, some asset owners and asset managers expressed concern about reporting on GHG emissions related to their own or their clients' investments given the current data challenges and existing accounting guidance on how to measure and report GHG emissions associated with investments. In particular, they voiced concerns about the accuracy and completeness of the reported data and limited application of the metric to asset classes beyond public equities. Organizations also highlighted that GHG emissions associated with investments cannot be used as a sole indicator for investment decisions (i.e., additional metrics are needed) and that the metric can fluctuate with share price movements since it uses investors' proportional share of total equity.[57]

In consideration of the feedback received, the Task Force has replaced the GHG emissions associated with investments metric in the supplemental guidance for asset owners and asset managers with a weighted average carbon intensity metric. The Task Force believes the weighted

[55] Scope 3 emissions are all indirect emissions that occur in the value chain of the reporting company, including both upstream and downstream emissions. See Greenhouse Gas Protocol, "Calculation Tools, FAQ."

[56] Product life cycle emissions are all the emissions associated with the production and use of a specific product, including emissions from raw materials, manufacture, transport, storage, sale, use, and disposal. See Greenhouse Gas Protocol, "Calculation Tools, FAQ."

[57] Because the metric uses investors' proportional share of total equity, increases in the underlying companies' share prices, *all else equal*, will result in a decrease in the carbon footprinting number even though GHG emissions are unchanged.

average carbon intensity metric, which measures exposure to carbon-intensive companies, addresses many of the concerns raised. For example, the metric can be applied across asset classes, is fairly simple to calculate, and does not use investors' proportional share of total equity and, therefore, is not sensitive to share price movements.

The Task Force acknowledges the challenges and limitations of current carbon footprinting metrics, including that such metrics should not necessarily be interpreted as risk metrics. Nevertheless, the Task Force views the reporting of weighted average carbon intensity as a first step and expects disclosure of this information to prompt important advancements in the development of decision-useful, climate-related risk metrics. In this regard, the Task Force encourages asset owners and asset managers to provide other metrics they believe are useful for decision making along with a description of the methodology used. The Task Force recognizes that some asset owners and asset managers may be able to report the weighted average carbon intensity and other metrics on only a portion of their investments given data availability and methodological issues. Nonetheless, increasing the number of organizations reporting this type of information should help speed the development of better climate-related risk metrics.

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6. Remuneration

In the supplemental guidance for the Energy Group, the Task Force asked such organizations to consider disclosing whether and how performance metrics, including links to remuneration policies, take into consideration climate-related risks and opportunities. As part of its second public consultation, the Task Force asked whether the guidance should extend to organizations beyond those in the Energy group and, if so, to which types of organizations. The majority of organizations that commented on this issue responded that the guidance should be extended to other organizations; and many suggested that the guidance should apply to organizations more likely to be affected by climate-related risks. In consideration of the feedback received, the Task Force revised its guidance to ask organizations, where climate-related risks are material, to consider describing whether and how related performance metrics are incorporated into remuneration policies.

7. Accounting Considerations

As part of its work, the Task Force considered the interconnectivity of its recommendations with existing financial statement and disclosure requirements. The Task Force determined that the two primary accounting standard setting bodies, the International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB), have issued standards to address risks and uncertainties affecting companies. Both International Accounting Standard (IAS) 37 "Provisions, Contingent Liabilities and Contingent Assets" and Accounting Standards Codification (ASC) 450 "Contingencies" provide guidance on how to account for and disclose contingencies. Additionally, IAS 36 "Impairment of Assets" and ASC 360 "Long-lived Asset Impairment" provide guidance on assessing the impairment of long-lived assets. The disclosures of both contingencies and management's assessment and evaluation of long-lived assets for potential impairment are critically important in assisting stakeholders in understanding an organization's ability to meet future reported earnings and cash flow goals.

In most G20 countries, financial executives will likely recognize that the Task Force's disclosure recommendations should result in more quantitative financial disclosures, particularly disclosure of metrics, about the financial impact that climate-related risks have or could have on an organization. Specifically, asset impairments may result from assets adversely impacted by the effects of climate change and/or additional liabilities may need to be recorded to account for regulatory fines and penalties resulting from enhanced regulatory standards. Additionally, cash flows from operations, net income, and access to capital could all be impacted by the effects of

climate-related risks (and opportunities). Therefore, financial executives (e.g., chief financial officers, chief accounting officers, and controllers) should be involved in the organization's evaluation of climate-related risks and opportunities and the efforts undertaken to manage the risks and maximize the opportunities. Finally, careful consideration should be given to the linkage between scenario analyses performed to assess the resilience of an organization's strategy to climate-related risks and opportunities (as suggested in the Task Force's recommendations) and assumptions underlying cash flow analyses used to assess asset (e.g., goodwill, intangibles, and fixed assets) impairments.

8. Time Frames for Short, Medium, and Long Term

As part of the Task Force's second public consultation, some organizations asked the Task Force to define specific ranges for short, medium, and long term. Because the timing of climate-related impacts on organizations will vary, the Task Force believes specifying time frames across sectors for short, medium, and long term could hinder organizations' consideration of climate-related risks and opportunities specific to their businesses. The Task Force is, therefore, not defining time frames and encourages preparers to decide how to define their own time frames according to the life of their assets, the profile of the climate-related risks they face, and the sectors and geographies in which they operate.

In assessing climate-related issues, organizations should be sensitive to the time frames used to conduct their assessments. While many organizations conduct operational and financial planning over a 1-2 year time frame and strategic and capital planning over a 2-5 year time frame, climate-related risks may have implications for an organization over a longer period. It is, therefore, important for organizations to consider the appropriate time frames when assessing climate-related risks.

9. Scope of Coverage

To promote more informed investing, lending, and insurance underwriting decisions, the Task Force recommends all financial and non-financial organizations with public debt and/or equity adopt its recommendations.[58] Because climate-related risks and opportunities are relevant for organizations across all sectors, the Task Force encourages all organizations to adopt these recommendations. In addition, the Task Force believes that asset managers and asset owners, including public- and private-sector pension plans, endowments, and foundations, should implement its recommendations. The Task Force believes climate-related financial information should be provided to asset managers' clients and asset owners' beneficiaries so that they may better understand the performance of their assets, consider the risks of their investments, and make more informed investment choices.

Consistent with existing global stewardship frameworks, asset owners should engage with the organizations in which they invest to encourage adoption of these recommendations. They should also ask their asset managers to adopt these recommendations. Asset owners' expectations in relation to climate-related risk reporting from organizations and asset managers are likely to evolve as data availability and quality improves, understanding of climate-related risk increases, and risk measurement methodologies are further developed.

The Task Force recognizes that several asset owners expressed concern about being identified as the potential "policing body" charged with ensuring adoption of the Task Force's recommendations by asset managers and underlying organizations. The Task Force appreciates that expectations must be reasonable and that asset owners have many competing priorities, but

[58] Thresholds for climate-related financial disclosures should be aligned to the financial disclosure requirements more broadly in the jurisdictions where a preparer is incorporated and/or operates and is required to make financial disclosures.

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encourages them to help drive adoption of the recommendations. Because asset owners and asset managers sit at the top of the investment chain, they have an important role to play in influencing the organizations in which they invest to provide better climate-related financial disclosures.

10. Organizational Ownership

Some organizations have not formalized responsibility for climate-related risk assessment and management. Even for organizations with clearly assigned responsibilities for climate-related issues, the relationship between those responsible for climate-related risk (e.g., "environmental, social and governance" experts, chief investment officers) and those in the finance function can range from regularly scheduled interactions and exchanges of information to minimal or no interaction. According to some preparers, lack of clarity around responsibility for climate-related risk assessments and management, compounded by a lack of integration into organizations' financial reporting processes, could adversely affect implementation of the recommendations.

The Task Force believes that by encouraging disclosure of climate-related financial information in public financial filings, coordination between organizations' climate-related risk experts and the finance function will improve. Similar to the way organizations are evolving to include cyber security issues in their strategic and financial planning efforts, so too should they evolve for climate-related issues.

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The Task Force's recommendations are a foundation for improved reporting of climate-related issues in mainstream financial filings with several resulting benefits (outlined in Figure 11). The recommendations aim to be ambitious, but also practical for near-term adoption. The Task Force expects that reporting of climate-related risks and opportunities will evolve over time as organizations, investors, and others contribute to the quality and consistency of the information disclosed.

Figure 11

Benefits of Recommendations

- Foundation for immediate adoption and flexible enough to accommodate evolving practices
- Promote board and senior management engagement on climate-related issues
- Bring the "future" nature of issues into the present through scenario analysis
- Support understanding of financial sector's exposure to climate-related risks
- Designed to solicit decision-useful, forward-looking information on financial impacts

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1. Evolution of Climate-Related Financial Disclosures

The Task Force recognizes that challenges exist, but all types of organizations can develop disclosures consistent with its recommendations. The recommendations provide a foundation for immediate adoption and are flexible enough to accommodate evolving practices. As understanding, data analytics, and modeling of climate-related issues become more widespread, disclosures can mature accordingly.

Organizations already reporting climate-related financial information under other frameworks may be well positioned to disclose under this framework immediately and are encouraged to do so. For such organizations, significant effort has gone into developing processes and collecting information needed for disclosing under these regimes. The Task Force expects these organizations will be able to use existing processes when providing disclosures in annual financial filings based on the Task Force's recommendations.[59,60] Those with less experience can begin by considering and disclosing how climate-related issues may be relevant in their current governance, strategy, and risk management practices. This initial level of disclosure will allow investors to review, recognize, and understand how organizations consider climate-related issues and their potential financial impact.

Importantly, the Task Force recognizes organizations need to make financial disclosures in accordance with their national disclosure requirements. To the extent certain elements of the recommendations are incompatible with national disclosure requirements for financial filings, the Task Force encourages organizations to disclose those elements through other reports. Such other reports should be 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.

2. Widespread Adoption Critical

In the Task Force's view, the success of its recommendations depends on near-term, widespread adoption by organizations in the financial and non-financial sectors. Through widespread adoption, financial risks and opportunities related to climate change will become a natural part of

[59] The Task Force recognizes the structure and content of financial filings differs across jurisdictions and, therefore, believes organizations are in the best position to determine where and how the recommended disclosures should be incorporated in financial filings.

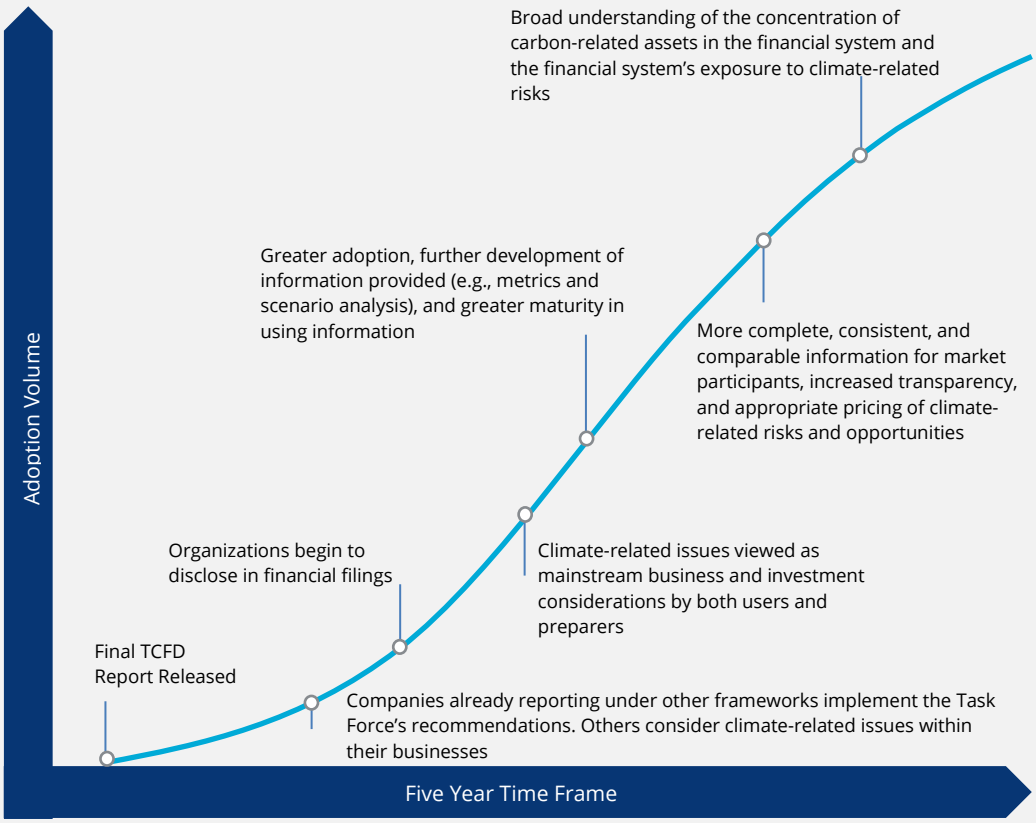
[60] The Task Force encourages organizations where climate-related issues could be material in the future to begin disclosing climate-related financial information outside financial filings to facilitate the incorporation of such information into financial filings once climate-related issues are determined to be material.

organizations' risk management and strategic planning processes. As this occurs, organizations' and investors' understanding of the potential financial implications associated with transitioning to a lower-carbon economy and physical risks will grow, information will become more decision-useful, and risks and opportunities will be more accurately priced, allowing for the more efficient allocation of capital. Figure 12 outlines a possible path for implementation.

Widespread adoption of the recommendations will require ongoing leadership by the G20 and its member countries. Such leadership is essential to continue to make the link between these recommendations and the achievements of global climate objectives. Leadership from the FSB is also critical to underscore the importance of better climate-related financial disclosures for the functioning of the financial system.

Figure 12

Implementation Path *(Illustrative)*



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The Task Force is not alone in its work. A variety of stakeholders, including stock exchanges, investment consultants, credit rating agencies, and others can provide valuable contributions toward adoption of the recommendations. The Task Force believes that advocacy for these standards will be necessary for widespread adoption, including educating organizations that will disclose climate-related financial information and those that will use those disclosures to make financial decisions. To this end, the Task Force notes that strong support by the FSB and G20 authorities would have a positive impact on implementation. With the FSB's extension of the Task Force through September 2018, the Task Force will work to encourage adoption of the recommendations and support the FSB and G20 authorities in promoting the advancement of climate-related financial disclosures.

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Appendix 1: Task Force Members

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Michael Bloomberg
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Founder
Bloomberg LP and Bloomberg Philanthropies

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Executive Director
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Fiona Wild
Vice President, Sustainability and Climate Change
BHP Billiton

Jon Williams
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PwC

Masaaki Nagamura
Head, Corporate Social Responsibility
Tokio Marine Holdings

Martin Skancke
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Storebrand

Steve Waygood
Chief Responsible Investment Officer
Aviva Investors

Michael Wilkins
Managing Director, Environmental & Climate Risk Research
S&P Global Ratings

Deborah Winshel
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BlackRock

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
Special Advisor to the Chair
Former Chair, U.S. Securities and Exchange Commission

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Appendix 2: Task Force Objectives and Approach

1. Objectives

The Task Force engaged with key stakeholders throughout the development of its recommendations to ensure that its work would (1) promote alignment across existing disclosure regimes, (2) consider the perspectives of users and the concerns of preparers of climate-related financial disclosures, and (3) be efficiently implemented by organizations in their financial reporting.

2. Approach

In addition to the expertise of its members, a broad range of external resources informed the Task Force's recommendations, including existing voluntary and mandatory climate-related reporting frameworks, governance and risk management standards, government reports and research, expert resources, and various other stakeholders such as industry participants, trade associations, and non-governmental organizations (NGOs).

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a. Leveraging Expertise

Task Force members come from a range of companies, including large financial companies, large non-financial companies, accounting and consulting firms, and credit rating agencies, and brought a range of practical experience, expertise, and global perspectives on preparing and using climate-related financial disclosures. Through eight plenary meetings, Task Force members contributed significantly to developing a consensus-based, industry-led approach to climate-related financial disclosure.

Due to the technically challenging and broad focus of its work, the Task Force also sought input from experts in the field of climate change, particularly in relation to scenario analysis. The Task Force engaged Environmental Resources Management (ERM) to inform its work by developing a technical paper on scenario analysis—The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities. Several members of the Task Force, joined by representatives from 2° Investing Initiative (2°ii), Bloomberg New Energy Finance (BNEF), Bloomberg Quantitative Risk Experts, Carbon Tracker, CDP, and the London School of Economics and Political Science led a working group to oversee ERM's technical considerations. A workshop was also held with experts from Oxford Martin School. Additionally, the International Energy Agency (IEA) provided input regarding how scenario analysis can be conducted and used.

b. Research and Information Gathering

The Task Force's work drew on publications and research conducted by governments, NGOs, industry participants, as well as disclosure regimes with a focus on climate-related issues. The Task Force reviewed existing mandatory and voluntary reporting regimes for climate-related disclosure to identify commonalities and gaps across existing regimes and to determine areas meriting further research and analysis by the Task Force. The work of organizations regarded as standard setters, as well as several organizations active in developing reporting mechanisms for climate-related issues, served as the primary references for the Task Force in developing its recommendations and supporting guidance. The Task Force also considered resources related to sector-specific climate issues in the development of the supplemental guidance.

c. Outreach and Engagement

Engagement with users, preparers, and other stakeholders in relevant industries and sectors across G20 countries and other countries was important in developing the Task Force's recommendations. The Task Force conducted five types of engagement to support this effort: public consultation, industry interviews, focus groups, outreach events, and webinars.

Such engagement served two primary purposes: (1) to raise the level of awareness and educate stakeholders on the Task Force's work and (2) to solicit feedback from stakeholders on the Task Force's proposed recommended disclosures and supplemental guidance for specific sectors. In total, more than 2,700 individuals in 43 countries were included in the Task Force's outreach and engagement (Figure A2.1).

Public Consultations

The Task Force conducted two public consultations. The first followed the April 1, 2016 publication of the Task Force's Phase I Report, which set out the scope and high-level objectives for the Task Force's work. The Task Force solicited input to guide the development of its recommendations for voluntary climate-related financial disclosures. In total, 203 participants from 24 countries responded to the first public consultation. Respondents represented the financial sector, non-financial sectors, NGOs, and other organizations. Public consultation comments indicated support for disclosures on scenario analysis as well as disclosures tailored for specific sectors. Key themes from the first public consultation, which informed the Task Force's recommendations and guidance, are included in Table A2.1 (p. 48).

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Figure A2.1

Outreach and Engagement

Table A2.1

Key Themes of First Public Consultation (Scope of Work)

Key Themes	Survey Response	
Components of Disclosures	The majority of respondents were in agreement that disclosures should: – be forward-looking, – address the ability to achieve targets, with strategies for achievement, and – align with material risks.	
Sector-Specific Disclosures	Respondents were in favor of disclosures for specific sectors	62%
Scenario Analysis	Respondents see scenario analysis as a key component of disclosure	96%

A second public consultation followed the release of the Task Force's report in December 2016. The Task Force conducted the second consultation through an online questionnaire designed to gather feedback on the recommendations, guidance, and key issues identified by the Task Force. The Task Force received 306 responses to its online questionnaire and 59 comment letters on the recommendations and guidance from a variety of organizations in 30 countries.[61] The majority of responses came from Europe (57 percent), followed by North America (20 percent), Asia Pacific (19 percent), South America (four percent), and the Middle East/Africa (less than one percent). Fourty-five percent of respondents provided perspective as users of disclosure, 44 percent as preparers of disclosure, and 11 percent as "other." Respondents came from the financial sector (43 percent), non-financial sectors (18 percent), or other types of organizations (39 percent).[62]

Table A2.2

Responses to Second Public Consultation Questions

Questions	Respondent	Percent Responding "Useful"
How useful are the recommendations and guidance for all sectors in preparing disclosures?	Preparers	75%
How useful is the supplemental guidance in preparing disclosures?	Preparers	66%
If organizations disclose the recommended information, how useful would it be for decision making?	Users	77%
How useful is a description of potential performance across a range of scenarios to understanding climate-related impacts on an organization's businesses, strategy, and financial planning?	Financial	74%
	Non-Financial	17%
	Other	86%
How useful are the illustrative examples of metrics and targets?	Financial	74%
	Non-Financial	33%
	Other	72%
How useful would the disclosure of GHG emissions associated with investments be for economic decision-making?	Financial	68%
	Other	74%

[61] Of the 59 respondents that submitted comment letters, 45 also completed the online questionnaire, resulting in a total of 320 unique responses.

[62] The other types of organizations included research and advocacy NGOs; standard setting NGOs; data analytics, consulting, and research organizations; academia; and accounting associations.

Overall, respondents were generally supportive of the Task Force's recommendations as shown in Table A2.2 (p. 48); however, several provided specific and constructive feedback on the report. The key themes from this feedback are included in Table A2.3. For additional information regarding the results of the second public consultation, please view the TCFD Public Consultation Summary 2017 on the Task Force's website.

Table A2.3

Key Themes of Second Public Consultation (Recommendations)

Key Themes	
Materiality and Location of Disclosures	Clarifying which recommended disclosures depend on materiality assessment and providing flexibility for organizations to provide some or all disclosures in reports other than financial filings.
Scenario Analysis	Improving ease of implementation, and comparability of scenario analysis by specifying standard scenario(s) and providing additional guidance and tools.
Metrics for the Financial Sector	Encouraging further development and standardization of metrics for the financial sector.
Metrics for Non-Financial Sectors	Improving comparability and consistency of the illustrative metrics for non-financial sectors, clarifying the links to financial impact and climate-related risks and opportunities.
Implementation	Providing disclosure examples to support preparers in developing relevant climate-related financial disclosures.

Industry Interviews and Focus Groups

Prior to the December 2016 release of the Task Force's report for public consultation, the Task Force conducted 128 industry interviews with users and preparers of financial statements to gather feedback regarding the Task Force's draft recommendations, supplemental guidance for certain sectors, and other considerations. Industry interview participants included chief financial officers, investment officers, other finance and accounting officers, risk officers, sustainability officers, and others. Forty-three percent of the participants held finance, legal, or risk positions and 39 percent held environmental or sustainability roles.

Task Force representatives conducted two rounds of industry interviews. The initial round of interviews focused on the recommendations and guidance; the second round emphasized specific recommendations and sector-specific guidance. Organizations invited to participate in the interviews met two primary criteria: (1) represented industry and sector leaders likely to be impacted by climate-related risks and opportunities and (2) provided geographic diversity to ensure coverage from each G20 and Financial Stability Board (FSB) represented country.

The interviews provided valuable information that informed the Task Force's recommendations and guidance as reflected in the report issued for public consultation in December 2016. Industry interview themes were consistent with those identified in the second public consultation. Preparers raised concerns about the relationship of the Task Force's recommendations to other reporting initiatives and the accuracy and reliability of information requested. Users commented that establishing consistency in metrics would be beneficial, acknowledged data quality challenges, and provided thoughts on scenario analysis (e.g., would like preparers to use of a range of scenarios, interested in knowing how scenario analysis is used in the organization).

Subsequent to the December 2016 release of the Task Force's report for public consultation, the Task Force conducted five focus groups with 32 individuals from six countries representing organizations in specific sectors and industries to solicit feedback on scenario analysis and carbon footprinting metrics. In the two focus groups for the financial sector, participants expressed support for the Task Force's work, noting current challenges related to quality and consistency in

reported climate-related information. Asset owners and asset managers also provided feedback on the benefits and limitations of different carbon footprinting metrics. In the three focus groups for non-financial sectors, participants in oil and gas and utilities industries provided specific feedback on their use of scenario analysis and challenges related to disclosing certain information in financial filings.

Outreach Events

The Task Force sponsored 18 public outreach events in 13 countries, and Task Force members presented the recommendations at 91 other events including conferences, forums, and meetings sponsored by industry associations, NGOs, government agencies, corporations, and other organizations. The 18 Task Force-sponsored events informed stakeholders of the Task Force's work and recommendations and included panel discussions and keynote speeches by prominent climate-risk and financial experts. Attendees included representatives of financial and non-financial organizations who spanned a variety of corporate functions, including strategy, risk, accounting, portfolio and investment management, corporate sustainability, as well as representatives from industry associations, NGOs, government agencies, research providers, academia, accounting and consulting firms, and media.

Webinars

Prior to the release of the report in December 2016 for public consultation, the Task Force offered seven webinars to educate and increase awareness of the Task Force's efforts as well as to collect additional feedback. Of the seven webinars, the Task Force hosted four webinars and participated in three additional webinars by partnering with the following organizations: Business for Social Responsibility, Global Financial Markets Association, and the National Association of Corporate Directors. These webinars served to supplement the in-person outreach events and offered global stakeholders, regardless of location, an opportunity to engage with the Task Force. The webinars included 538 attendees representing 365 organizations across 23 countries. After the release of the report, the Task Force held three webinars to present its recommendations and to solicit additional feedback. The three webinars included 255 attendees representing 209 organizations across 25 countries. In total, the Task Force offered ten webinars, reaching 793 attendees across 30 countries.

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Appendix 3: Fundamental Principles for Effective Disclosure

To underpin its recommendations and help guide current and future developments in climate-related financial reporting, the Task Force developed a set of principles for effective disclosure.[63] As understanding of, and approaches to, climate-related issues evolve over time, so too will climate-related financial reporting. These principles can help achieve high-quality and decision-useful disclosures that enable users to understand the impact of climate change on organizations. The Task Force encourages organizations adopting its recommendations to consider these principles as they develop climate-related financial disclosures.

The Task Force's disclosure principles are largely consistent with other mainstream, internationally accepted frameworks for financial reporting and are generally applicable to most providers of financial disclosures. They are informed by the qualitative and quantitative characteristics of financial information and further the overall goals of producing disclosures that are consistent, comparable, reliable, clear, and efficient, as highlighted by the FSB in establishing the Task Force. The principles, taken together, are designed to assist organizations in making clear the linkages and connections between climate-related issues and their governance, strategy, risk management, and metrics and targets.

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Principle 1: Disclosures should present relevant information

The organization should provide information specific to the potential impact of climate-related risks and opportunities on its markets, businesses, corporate or investment strategy, financial statements, and future cash flows.

- Disclosures should be eliminated if they are immaterial or redundant to avoid obscuring relevant information. However, when a particular risk or issue attracts investor and market interest or attention, it may be helpful for the organization to include a statement that the risk or issue is not significant. This shows that the risk or issue has been considered and has not been overlooked.
- Disclosures should be presented in sufficient detail to enable users to assess the organization's exposure and approach to addressing climate-related issues, while understanding that the type of information, the way in which it is presented, and the accompanying notes will differ between organizations and will be subject to change over time.
- Climate-related impacts can occur over the short, medium, and long term. Organizations can experience chronic, gradual impacts (such as impacts due to shifting temperature patterns), as well as acute, abrupt disruptive impacts (such as impacts from flooding, drought, or sudden regulatory actions). An organization should provide information from the perspective of the potential impact of climate-related issues on value creation, taking into account and addressing the different time frames and types of impacts.
- Organizations should avoid generic or boilerplate disclosures that do not add value to users' understanding of issues. Furthermore, any proposed metrics should adequately describe or serve as a proxy for risk or performance and reflect how an organization manages the risk and opportunities.

[63] These principles are adapted from those included in the Enhanced Disclosure Task Force's "Enhancing the Risk Disclosures of Banks."

Principle 2: Disclosures should be specific and complete

- An organization's reporting should provide a thorough overview of its exposure to potential climate-related impacts; the potential nature and size of such impacts; the organization's governance, strategy, processes for managing climate-related risks, and performance with respect to managing climate-related risks and opportunities.
- To be sufficiently comprehensive, disclosures should contain historical and future-oriented information in order to allow users to evaluate their previous expectations relative to actual performance and assess possible future financial implications.
- For quantitative information, the disclosure should include an explanation of the definition and scope applied. For future-oriented data, this includes clarification of the key assumptions used. Forward-looking quantitative disclosure should align with data used by the organization for investment decision making and risk management.
- Any scenario analyses should be based on data or other information used by the organization for investment decision making and risk management. Where appropriate, the organization should also demonstrate the effect on selected risk metrics or exposures to changes in the key underlying methodologies and assumptions, both in qualitative and quantitative terms.

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Principle 3: Disclosures should be clear, balanced, and understandable

- Disclosures should be written with the objective of communicating financial information that serves the needs of a range of financial sector users (e.g., investors, lenders, insurers, and others). This requires reporting at a level beyond compliance with minimum requirements. The disclosures should be sufficiently granular to inform sophisticated users, but should also provide concise information for those who are less specialized. Clear communication will allow users to identify key information efficiently.
- Disclosures should show an appropriate balance between qualitative and quantitative information and use text, numbers, and graphical presentations as appropriate.
- Fair and balanced narrative explanations should provide insight into the meaning of quantitative disclosures, including the changes or developments they portray over time. Furthermore, balanced narrative explanations require that risks as well as opportunities be portrayed in a manner that is free from bias.
- Disclosures should provide straightforward explanations of issues. Terms used in the disclosures should be explained or defined for a proper understanding by the users.

Principle 4: Disclosures should be consistent over time

- Disclosures should be consistent over time to enable users to understand the development and/or evolution of the impact of climate-related issues on the organization's business. Disclosures should be presented using consistent formats, language, and metrics from period to period to allow for inter-period comparisons. Presenting comparative information is preferred; however, in some situations it may be preferable to include a new disclosure even if comparative information cannot be prepared or restated.
- Changes in disclosures and related approaches or formats (e.g., due to shifting climate-related issues and evolution of risk practices, governance, measurement methodologies, or accounting practices) can be expected due to the relative immaturity of climate-related disclosures. Any such changes should be explained.

Principle 5: Disclosures should be comparable among organizations within a sector, industry, or portfolio

- Disclosures should allow for meaningful comparisons of strategy, business activities, risks, and performance across organizations and within sectors and jurisdictions.
- The level of detail provided in disclosures should enable comparison and benchmarking of risks across sectors and at the portfolio level, where appropriate.
- The placement of reporting would ideally be consistent across organizations—i.e., in financial filings—in order to facilitate easy access to the relevant information.

Principle 6: Disclosures should be reliable, verifiable, and objective

- Disclosures should provide high-quality reliable information. They should be accurate and neutral—i.e., free from bias.
- Future-oriented disclosures will inherently involve the organization's judgment (which should be adequately explained). To the extent possible, disclosures should be based on objective data and use best-in-class measurement methodologies, which would include common industry practice as it evolves.
- Disclosures should be defined, collected, recorded, and analyzed in such a way that the information reported is verifiable to ensure it is high quality. For future-oriented information, this means assumptions used can be traced back to their sources. This does not imply a requirement for independent external assurance; however, disclosures should be subject to internal governance processes that are the same or substantially similar to those used for financial reporting.

Principle 7: Disclosures should be provided on a timely basis

- Information should be delivered to users or updated in a timely manner using appropriate media on, at least, an annual basis within the mainstream financial report.
- Climate-related risks can result in disruptive events. In case of such events with a material financial impact, the organization should provide a timely update of climate-related disclosures as appropriate.

Reporters may encounter tension in the application of the fundamental principles set out above. For example, an organization may update a methodology to meet the comparability principle, which could then result in a conflict with the principle of consistency. Tension can also arise within a single principle. For example, Principle 6 states that disclosures should be verifiable, but assumptions made about future-oriented disclosures often require significant judgment by management that is difficult to verify. Such tensions are inevitable given the wide-ranging and sometimes competing needs of users and preparers of disclosures. Organizations should aim to find an appropriate balance of disclosures that reasonably satisfy the recommendations and principles while avoiding overwhelming users with unnecessary information.

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Appendix 4: Select Disclosure Frameworks

To the extent there is corporate reporting of climate-related issues, it happens through a multitude of mandatory and voluntary schemes. Although a complete and comprehensive survey of existing schemes is beyond the scope of this report, the Task Force on Climate-related Financial Disclosures (TCFD or Task Force) considered a broad range of existing frameworks, both voluntary and mandatory. The tables in Appendix 4 outline select disclosure frameworks considered by the Task Force and describe a few key characteristics of each framework, including whether disclosures are mandatory or voluntary, what type of information is reported, who the target reporters and target audiences are, where the disclosed information is placed, and whether there are specified materiality standards.[64] These disclosure frameworks were chosen to illustrate the broad range of disclosure regimes around the world; the tables are broken out into disclosure frameworks sponsored by governments, stock exchanges, and non-governmental organizations (NGOs).

The information presented in the tables below (A4.1, A4.2, and A4.3) is based on information released by governments, stock exchanges, and standard setters and is supplemented by the United Nations Environment Programme (UNEP), "The Financial System We Need: Aligning the Financial System with Sustainable Development," October 2015, and the Organization for Economic Co-operation and Development (OECD), "Report to G20 Finance Ministers and Central Bank Governors," September 2015.

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[64] These tables were originally included in the Task Force's Phase I Report and have been updated where appropriate.

Table A4.1

Select Disclosure Frameworks: Governments

Region: Framework	Target Reporter	Target Audience	Mandatory or Voluntary	Materiality Standard	Types of Climate-Related Information	Disclosure Location	External Assurance Required
Australia: National Greenhouse and Energy Reporting Act (2007)	Financial and non-financial firms that meet emissions or energy production or consumption thresholds	General public	Mandatory if thresholds are met	Based on emissions above a certain threshold	GHG emissions, energy consumption, and energy production	Report to government	Regulator may, by written notice to corporation, require an audit of its disclosures
European Union (EU): EU Directive 2014/95 regarding disclosure of non-financial and diversity information (2014)	Financial and non-financial firms that meet size criteria (i.e., have more than 500 employees)	Investors, consumers, and other stakeholders	Mandatory; applicable for the financial year starting on Jan. 1, 2017 or during the 2017 calendar year	None specified	Land use, water use, GHG emissions, use of materials, and energy use	Corporate financial report or separate report (published with financial report or on website six months after the balance sheet date and referenced in financial report)	Member States must require that statutory auditor checks whether the non-financial statement has been provided Member States may require independent assurance for information in non-financial statement
France: Article 173, Energy Transition Law (2015)	Listed financial and non-financial firms Additional requirements for institutional investors	Investors, general public	Mandatory	None specified	Risks related to climate change, consequences of climate change on the company's activities and use of goods and services it produces. Institutional investors: GHG emissions and contribution to goal of limiting global warming	Annual report and website	Mandatory review on the consistency of the disclosure by an independent third party, such as a statutory auditor
India: National Voluntary Guidelines on Social, Environmental, and Economic Responsibilities of Business (2011)	Financial and non-financial firms	Investors, general public	Voluntary	None specified	Significant risk, goals and targets for improving performance, materials, energy consumption, water, discharge of effluents, GHG emissions, and biodiversity	Not specified; companies may furnish a report or letter from owner/chief executive officer	Guidelines include third-party assurance as a "leadership indicator" of company's progress in implementing the principles

Table A4.1

Select Disclosure Frameworks: Governments *(continued)*

Region: Framework	Target Reporter	Target Audience	Mandatory or Voluntary	Materiality Standard	Types of Climate-Related Information	Disclosure Location	External Assurance Required
United Kingdom: Companies Act 2006 (Strategic Report and Directors' Report) Regulations 2013	Financial and non-financial firms that are "Quoted Companies," as defined by the Companies Act 2006	Investors / shareholders ("members of the company")	Mandatory	Information is material if its omission or misrepresentation could influence the economic decisions shareholders take on the basis of the annual report as a whole (section 5 of the UK FRC June 2014 Guidance on the Strategic Report)	The main trends and factors likely to affect the future development, performance, and position of the company's business, environmental matters (including the impact of the company's business on the environment), and GHG emissions	Strategic Report and Directors' Report	Not required, but statutory auditor must state in report on the company's annual accounts whether in the auditor's opinion the information given in the Strategic Report and the Directors' Report for the financial year for which the accounts are prepared is consistent with those accounts
United States: NAICs, 2010 Insurer Climate Risk Disclosure Survey	Insurers meeting certain premium thresholds - $100M in 2015	Regulators	Mandatory if thresholds are met	None specified	General disclosures about climate change-related risk management and investment management	Survey sent to state regulators	Not specified
United States: SEC Guidance Regarding Disclosure Related to Climate Change	Financial and non-financial firms subject to Securities and Exchange Commission (SEC) reporting requirements	Investors	Mandatory	US securities law definition	Climate-related material risks and factors that can affect or have affected the company's financial condition, such as regulations, treaties and agreements, business trends, and physical impacts	Annual and other reports required to be filed with SEC	Depends on assurance requirements for information disclosed

Table A4.2

Select Disclosure Frameworks: Exchange Listing Requirements and Indices

Region: Framework	Target Reporter	Target Audience	Mandatory or Voluntary	Materiality Standard	Types of Climate-Related Information	Disclosure Location	External Assurance Required
Australia: Australia Securities Exchange Listing Requirement 4.10.3; Corporate Governance Principles and Recommendations (2014)	Listed financial and non-financial firms	Investors	Mandatory (comply or explain)	A real possibility that the risk in question could substantively impact the listed entity's ability to create or preserve value for security holders over the short, medium or long term	General disclosure of material environmental risks	Annual report must include either the corporate governance statement or company website link to the corporate governance statement on company's website	Not specified, may depend on assurance requirements for annual report
Brazil: Stock Exchange (BM&FBovespa) Recommendation of report or explain (2012)	Listed financial and non-financial firms	Investors, regulator	Voluntary (comply or explain)	Criteria explained in Reference Form (Annex 24) of the Instruction CVM nº 480/09	Social and environmental information including methodology used, if audited/reviewed by an independent entity, and link to information (i.e., webpage)	Discretion of company	Not specified
China: Shenzhen Stock Exchange Social Responsibility Instructions to Listed Companies (2006)	Listed financial and non-financial firms	Investors	Voluntary: social responsibilities Mandatory: pollutant discharge	None specified	Waste generation, resource consumption, and pollutants	Not specified	Not specified; companies shall allocate dedicated human resources for regular inspection of implementation of environmental protection policies
Singapore: Singapore Exchange Listing Rules 711A & 711B and Sustainability Reporting Guide (2016) ("Guide")	Listed financial and non-financial firms	Investors	Mandatory (comply or explain)	Guidance provided in the Guide, paragraphs 4.7-4.11	Material environmental, social, and governance factors, performance, targets, and related information specified in the Guide	Annual report or standalone report, disclosed through SGXNet reporting platform and company website	Not required

Table A4.2

Select Disclosure Frameworks: Exchange Listing Requirements and Indices *(continued)*

Region: Framework	Target Reporter	Target Audience	Mandatory or Voluntary	Materiality Standard	Types of Climate-Related Information	Disclosure Location	External Assurance Required
South Africa: Johannesburg Stock Exchange Listing Requirement Paragraph 8.63; King Code of Governance Principles (2009)	Listed financial and non-financial firms	Investors	Mandatory; (comply or explain)	None specified	General disclosure regarding sustainability performance	Annual report	Required
World, regional, and country-specific indices: S&P Dow Jones Indices Sustainability Index, Sample Questionnaires	Financial and non-financial firms	Investors	Voluntary	None specified	GHG emissions, SOx emissions, energy consumption, water, waste generation, environmental violations, electricity purchased, biodiversity, and mineral waste management	Nonpublic	Disclose whether external assurance was provided and whether it was pursuant to a recognized standard

Table A4.3

Select Disclosure Frameworks: Non-Governmental Organizations

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Framework	Target Reporter	Target Audience	Mandatory or Voluntary	Materiality Standard	Types of Climate-Related Information	Disclosure Location	External Assurance Required
Global: Asset Owners Disclosure Project 2017 Global Climate Risk Survey	Pension funds, insurers, sovereign wealth funds ≥$2bn AUM	Asset managers, investment industry, government	Voluntary	None specified	Information on whether climate change issues are integrated in investment policies, engagement efforts, portfolio emissions intensity for scope 1 emissions, climate change-related portfolio risk mitigation actions	Survey responses; respondents are asked whether responses may be made public	Disclose whether external assurance was provided
Global: CDP Annual Questionnaire (2016)	Financial and non-financial firms	Investors	Voluntary	None specified	Information on risk management procedures related to climate change risks and opportunities, energy use, and GHG emissions (Scope 1-3)	CDP database	Encouraged; information requested about verification and third party certification
Global: CDSB CDSB Framework for Reporting Environmental Information & Natural Capital	Financial and non-financial firms	Investors	Voluntary	Environmental information is material if (1) the environmental impacts or results it describes are, due to their size and nature, expected to have a significant positive or negative effect on the organization's current, past or future financial condition and operational results and its ability to execute its strategy or (2) omitting, misstating, or mis-interpreting it could influence decisions that users of mainstream reports make about the organization	Environmental policies, strategy, and targets, including the indicators, plans, and timelines used to assess performance; material environmental risks and opportunities affecting the organization; governance of environmental policies, strategy, and information; and quantitative and qualitative results on material sources of environmental impact	Annual reporting packages in which organizations are required to deliver their audited financial results under the corporate, compliance or securities laws of the country in which they operate	Not required, but disclose if assurance has been provided over whether reported environmental information is in conformance with the CDSB Framework

Table A4.3

Select Disclosure Frameworks: Non-Governmental Organizations *(continued)*

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Framework	Target Reporter	Target Audience	Mandatory or Voluntary	Materiality Standard	Types of Climate-Related Information	Disclosure Location	External Assurance Required
Global: CDSB Climate Change Reporting Framework, Ed. 1.1 (2012)	Financial and non-financial firms	Investors	Voluntary	Allow "investors to see major trends and significant events related to climate change that affect or have the potential to affect the company's financial condition and/or its ability to achieve its strategy"	The extent to which performance is affected by climate-related risks and opportunities; governance processes for addressing those effects; exposure to significant climate-related issues; strategy or plan to address the issues; and GHG emissions	Annual reporting packages in which organizations are required to deliver their audited financial results under the corporate, compliance or securities laws of the territory or territories in which they operate	Not required unless International Standards on Auditing 720 requires the auditor of financial statements to read information accompanying them to identify material inconsistencies between the audited financial statements and accompanying information
Global: GRESB Infrastructure Asset Assessment & Real Estate Assessment	Real estate asset/portfolio owners	Investors and industry stakeholders	Voluntary	None specified	Real estate sector-specific requirements related to fuel, energy, and water consumption and efficiencies as well as low-carbon products	Data collected through the GRESB Real Estate Assessment disclosed to participants themselves and: • for non-listed property funds and companies, to those of that company or fund's investors that are GRESB Investor Members; • for listed real estate companies, to all GRESB Investor Members that invest in listed real estate securities.	Not required, but disclose whether external assurance was provided
Global: GRI Sustainability Reporting Standards (2016)	Organizations of any size, type, sector, or geographic location	All stakeholders	Voluntary	Topics that reflect the reporting organization's significant economic, environmental, and social impacts or substantively influence the decisions of stakeholders	Materials, energy, water, biodiversity, emissions, effluents and waste, environmental compliance, and supplier environmental assessment	Stand-alone sustainability reports or annual reports or other published materials that include sustainability information	Not required, but advised

Table A4.3

Select Disclosure Frameworks: Non-Governmental Organizations *(continued)*

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Framework	Target Reporter	Target Audience	Mandatory or Voluntary	Materiality Standard	Types of Climate-Related Information	Disclosure Location	External Assurance Required
Global: IIGCC Oil & Gas (2010) Automotive (2009) Electric Utilities (2008)	Oil and gas industries	Investors	Voluntary	None specified	GHG emissions and clean technologies data	Not specified	Not specified
	Automotive industry	Investors	Voluntary	None specified	GHG emissions and clean technologies data	Company's discretion	Not specified
	Electrical utilities	Investors	Voluntary	None specified	GHG emissions and electricity production	Company's discretion	Disclose how GHG emissions information was verified
Global: IIRC International Integrated Reporting Framework (2013)	Public companies traded on international exchanges	Investors	Voluntary	Substantively affect the company's ability to create value over the short, medium, and long term	General challenges related to climate change, loss of ecosystems, and resource shortages	Standalone sustainability or integrated report	Not specified; discussion paper released on issues relating to assurance
Global: IPIECA Oil and gas industry guidance on voluntary sustainability reporting	Oil and gas industries	All stakeholders	Voluntary	Material sustainability issues are those that, in the view of company management and its external stakeholders, affect the company's performance or strategy and/or assessments or decisions about the company	Energy consumption	Sustainability reporting	Not required, but encouraged
Global: PRI Reporting Framework (2016)	Investors	Investors	Voluntary	None specified	Investor practices	Transparency report	Not specified
United States: SASB Conceptual Framework (2013) and SASB Standards (Various)	Public companies traded on US exchanges	Investors	Voluntary	A substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the "total mix" of the information made available	Information on sustainability topics that are deemed material, standardized metrics tailored by industry	SEC filings	Depends on assurance requirements for information disclosed

Appendix 5: Glossary and Abbreviations

Glossary

BOARD OF DIRECTORS (or BOARD) refers to a body of elected or appointed members who jointly oversee the activities of a company or organization. Some countries use a two-tiered system where "board" refers to the "supervisory board" while "key executives" refers to the "management board."[65]

CLIMATE-RELATED OPPORTUNITY refers to the potential positive impacts related to climate change on an organization. Efforts to mitigate and adapt to climate change can produce opportunities for organizations, 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 an 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.

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.[66]

FINANCIAL PLANNING refers to an organization's consideration of how it will achieve and fund its objectives and strategic goals. The process of financial planning allows organizations 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, organizations 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."[67] "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."[68]

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[65] OECD, *G20/OECD Principles of Corporate Governance,* OECD Publishing, Paris, 2015.
[66] Based on Climate Disclosure Standards Board, "CDSB Framework for Reporting Environmental Information and Natural Capital," June 2015.
[67] A. Cadbury, *Report of the Committee on the Financial Aspects of Corporate Governance*, London, 1992.
[68] OECD, *G20/OECD Principles of Corporate Governance*, OECD Publishing, Paris, 2015.

GREENHOUSE GAS (GHG) EMISSIONS SCOPE LEVELS[69]

- **Scope 1** refers to all direct GHG emissions.
- **Scope 2** refers to indirect GHG emissions from consumption of purchased electricity, heat, or steam.
- **Scope 3** refers to other indirect emissions not covered in Scope 2 that occur in the value chain of the reporting company, including both upstream and downstream emissions. Scope 3 emissions could include: the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g., transmission and distribution losses), outsourced activities, and waste disposal. [70]

INTERNAL CARBON PRICE is an internally developed estimated cost of carbon emissions. Internal carbon pricing can be used as a planning tool to help identify revenue opportunities and risks, as an incentive to drive energy efficiencies to reduce costs, and to guide capital investment decisions.

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

NATIONALLY DETERMINED CONTRIBUTION (NDC) refers to the post-2020 actions that a country intends to take under the international climate agreement adopted in Paris.

ORGANIZATION refers to the group, company, or companies, and other entities for which consolidated financial statements are prepared, including subsidiaries and jointly controlled entities.

PUBLICLY AVAILABLE 2°C SCENARIO refers to a 2°C scenario that is (1) used/referenced and issued by an independent body; (2) wherever possible, supported by publicly available datasets; (3) updated on a regular basis; and (4) linked to functional tools (e.g., visualizers, calculators, and mapping tools) that can be applied by organizations. 2°C scenarios that presently meet these criteria include: IEA 2DS, IEA 450, Deep Decarbonization Pathways Project, and International Renewable Energy Agency.

RISK MANAGEMENT refers to a set of processes that are carried out by an organization's board and management to support the achievement of the organization's 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.

SECTOR refers to a segment of organizations 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 organizations 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

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[69] World Resources Institute and World Business Council for Sustainable Development, *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition),* March 2004.
[70] IPCC, *Climate Change 2014 Mitigation of Climate Change,* Cambridge University Press, 2014.

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 an organizational report that gives information about economic, environmental, social, and governance performance and impacts. For companies and organizations, sustainability —the ability to be long-lasting or permanent—is based on performance and impacts in these four key areas.

VALUE CHAIN refers to the upstream and downstream life cycle of a product, process, or service, including material sourcing, production, consumption, and disposal/recycling. Upstream activities include operations that relate to the initial stages of producing a good or service (e.g., material sourcing, material processing, supplier activities). Downstream activities include operations that relate to processing the materials into a finished product and delivering it to the end user (e.g., transportation, distribution, and consumption).

Abbreviations

2°C —2° Celsius

ASC—Accounting Standards Codification

BNEF—Bloomberg New Energy Finance

CDSB—Climate Disclosure Standards Board

ERM—Environmental Resources Management

EU—European Union

FASB—Financial Accounting Standards Board

FSB—Financial Stability Board

G20—Group of 20

GHG—Greenhouse gas

GICS—Global Industry Classification Standard

GRI—Global Reporting Initiative

IAS—International Accounting Standard

IASB—International Accounting Standards Board

IEA—International Energy Agency

IIGCC—Institutional Investors Group on Climate Change

IIRC—International Integrated Reporting Council

IPCC—Intergovernmental Panel on Climate Change

NGO—Non-governmental organization

OECD—Organization for Economic Co-operation and Development

R&D—Research and development

SASB—Sustainability Accounting Standards Board

TCFD—Task Force on Climate-related Financial Disclosures

UN—United Nations

UNEP—United Nations Environment Programme

USDE—U.S. Dollar Equivalent

WRI—World Resources Institute

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