
Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures

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A Introduction

A Introduction

1. Background

In December 2015, the Financial Stability Board (FSB) established the industry-led Task Force on Climate-related Financial Disclosures (TCFD or 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.”^{1,2}

To fulfill its remit, the Task Force developed a framework with four widely adoptable recommendations on climate-related financial disclosures applicable to organizations across sectors and industries, as described in the Task Force’s report—[Recommendations of the Task Force on Climate-related Financial Disclosures](#). The Task Force’s final report reflects its consideration of public feedback received throughout 2016 and 2017. The Task Force solicited this feedback in several ways, including two public consultations, resulting in over 500 responses, hundreds of industry interviews, several focus groups, and multiple webinars.

An important aspect of the Task Force’s recommendations is their inclusion in organizations’ mainstream (i.e., public) annual financial filings. In most G20 jurisdictions, public companies have a legal obligation to disclose material information in their financial filings—including material climate-related information. The Task Force believes climate-related risks and opportunities are or could be material for many organizations; and its report and this Annex should be useful to organizations in complying with existing disclosure obligations more effectively. Furthermore, the Task Force encourages organizations where climate-related risks and opportunities 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.

This Annex contains the following information:

- directions on the application of the recommendations;
- information on assessing financial impacts of climate-related risks and opportunities (collectively referred to as climate-related issues);
- recommendations and supporting recommended disclosures that describe information investors, lenders, and insurance underwriters need to make economic decisions;
- guidance that provides context and suggestions for implementing the recommendations;
- *supplemental* guidance that highlights important considerations for the financial sector and non-financial industries potentially most affected by climate change; and
- alignment of the recommended disclosures with other frameworks.

In addition, the Task Force developed seven principles for effective disclosure, which are included in [Section F](#), to help guide current and future developments in climate-related financial reporting. 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-related risks and opportunities on organizations. The Task Force encourages organizations adopting its recommendations to consider these principles as they develop their climate-related financial disclosures.

¹ FSB, “[Proposal for a Disclosure Task Force on Climate-Related Risks](#),” November 9, 2015.

² 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.

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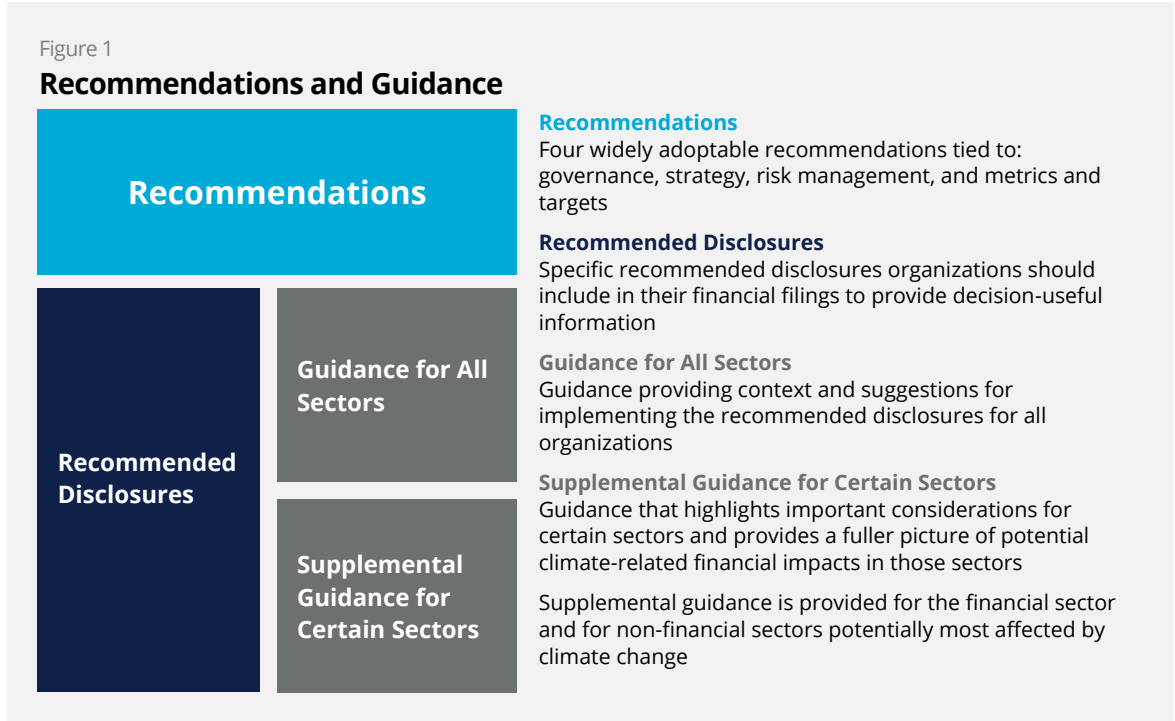
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2. Structure of Recommendations

The Task Force developed four widely adoptable recommendations that are supported by key climate-related financial disclosures—referred to as recommended disclosures. In addition, there is guidance to support all organizations in developing disclosures consistent with the recommendations as well as *supplemental* guidance for specific sectors and industries. This structure is depicted in [Figure 1](#) below.



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The Task Force also developed supplemental guidance to assist preparers in the financial sector and non-financial industries potentially most affected by climate change and the transition to a lower-carbon economy (referred to as non-financial groups). [Figure 2](#) shows 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 four non-financial groups.

Figure 2

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				■	■				■		
	Ag, Food, and Forest Products				■	■				■		

3. Application of Recommendations

a. Who should disclose?

To promote more informed investing, lending, and insurance underwriting decisions, the Task Force recommends all financial and non-financial organizations with public debt or equity implement its recommendations. Because climate-related risks and opportunities are relevant for organizations across *all* sectors, the Task Force encourages all organizations to implement 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.

b. Which recommendations involve an assessment of materiality?

The disclosures related to the Strategy and Metrics and Targets recommendations involve an assessment of materiality. For asset managers and asset owners, the Task Force recommends including carbon footprinting information in reports to clients and beneficiaries independent of a materiality assessment.

c. Where should preparers disclose?

Preparers of climate-related financial disclosures should provide such disclosures in their mainstream (i.e., public) annual financial filings.³ 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 information related to the Strategy and Metrics and Targets recommendations in other reports when the information is not deemed material and not included in financial filings.⁴ Other reports include 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.

Asset owners and asset managers should report to their beneficiaries and clients, respectively, through existing means of financial reporting, where relevant and where feasible. Asset owners and asset managers are also encouraged to disclose publicly via their websites or other public avenues of disclosure.

d. How should material information be determined?

Organizations should determine materiality for climate-related issues consistent with how they determine the materiality of other information included in their annual financial filings. The Task Force cautions organizations against prematurely concluding that climate-related risks and opportunities are not material based on perceptions of the longer-term nature of some climate-related risks.

When providing disclosures outside mainstream financial filings, asset managers and asset owners should consider materiality in the context of their respective mandates and investment performance for clients and beneficiaries.

e. Who should review climate-related financial disclosures prior to release?

Because these disclosures should be included in mainstream financial filings, the governance processes should 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. Organizations that provide climate-related financial disclosures in reports other than financial filings should follow internal governance processes that are the same or similar to those used for financial reporting.

³ 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.

⁴ 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).

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f. What should preparers do if they choose to omit a recommended disclosure?

If a recommended disclosure is not made, preparers should provide their rationale for omitting the disclosure.

g. What reporting period should preparers use?

Preparers should report information for the same period covered by their mainstream financial filings.

h. How should preparers define short, medium, and long term?

The Task Force is not specifying time frames for short, medium, and long term given that the timing of climate-related impacts on businesses will vary. Instead, the Task Force recommends preparers define 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.

i. What if certain disclosures are incompatible with national disclosure requirements?

Organizations need to 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, organizations are encouraged to disclose those elements through other reports.

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4. Assessing Financial Impacts of Climate-Related Risks and Opportunities

While climate change affects nearly all economic sectors, the level of exposure and the impact of climate-related risks differ by sector, industry, geography, and organization.⁵ Furthermore, 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 the 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, which may inhibit the identification of such risks; (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 climate-related risks.⁶

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 issues are likely to affect an organization’s future financial position as reflected in its income statement, cash flow statement, and balance sheet.

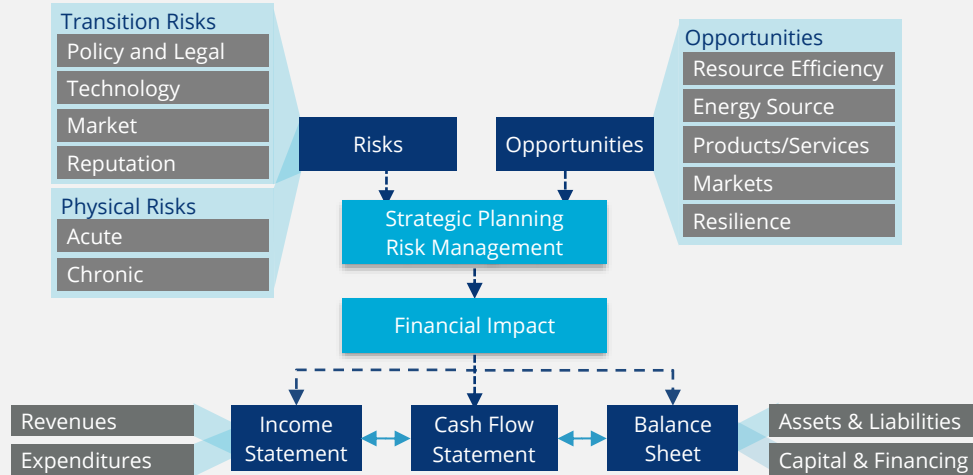
Fundamentally, the financial impacts of climate-related issues on an organization are driven by the specific climate-related risks and opportunities to which the organization is exposed and its strategic and risk management decisions on seizing those opportunities and managing those risks (i.e., through mitigation, transfer, acceptance, or control). Once an organization assesses its climate-related issues and determines its response to those issues, it can then consider actual and potential financial impacts on revenues, expenditures, assets and liabilities, and capital and financing. [Figure 3](#) (p. 5) outlines the main climate-related risks (transition and physical) and opportunities organizations should consider as part of their strategic planning or risk management to determine potential financial implications. In addition, [Appendix 1](#) provides tables with examples of (1) climate-related risks and their potential financial impacts and (2) climate-related opportunities and their potential financial impacts.

⁵ SASB research demonstrates that 72 out of 79 Sustainable Industry Classification System (SICS™) industries are significantly affected in some way by climate-related risk, as described in SASB’s Climate Risk Technical Bulletin.

⁶ World Business Council for Sustainable Development, “[Sustainability and enterprise risk management: The first step towards integration](#),” January 18, 2017.

Figure 3

Climate-Related Risks, Opportunities, and Financial Impact



Climate-related issues can affect several important aspects of an organization’s financial position, both now and in the future. For example, climate-related issues may have implications for an organization’s businesses and capital expenditures. In turn, capital expenditures will determine the nature and amount of long-lived assets and the proportion of debt and equity to be funded on an organization’s balance sheet. Climate-related issues may also carry implications for future cash flows (operating, investing, and financing activities). An organization, therefore, should consider how climate-related issues affect its current financial position and may potentially affect its future financial positions in terms of four major categories of financial impact, as described in [Figure 4](#).

Figure 4

Major Categories of Financial Impact

Income Statement	Balance Sheet
<p>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.</p> <p>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.</p> <p>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.</p>	<p>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 affected by climate-related issues. It is important for organizations to provide an indication of the potential impact on their assets and liabilities, especially long-lived assets. This should focus on existing and committed future activities and decisions requiring new investment, restructuring, write-downs, or impairment.</p> <p>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 research and development (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.</p>

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To assist organizations in understanding which financial impacts are likely to be most relevant to them, [Figure 5](#) provides a high-level overview of four areas—revenues, expenditures, assets and liabilities, and capital and financing—where organizations in the financial sector and non-financial groups may be affected.⁷ Whether an individual organization is or may be affected financially by climate-related issues usually depends on:

- the organization’s exposure to, and anticipated effects of, specific climate-related risks and opportunities;
- the organization’s planned responses to manage (i.e., mitigate, transfer, accept, or control) its risks or seize opportunities; and
- the implications of the organization’s planned responses on its income statement, cash flow statement, and balance sheet.

Figure 5
Evidence of Financial Impact

Groups and Industries		Revenues	Expenditures	Assets and Liabilities	Capital and Financing
Financial	Banks	■		■	
	Insurers	■	■	■	
	Asset Owners	■		■	
	Asset Managers	■		■	
Energy	Oil and Gas	■	■	■	■
	Coal		■	■	■
	Electric Utilities	■	■		■
Transportation	Air Freight		■		■
	Passenger Air Transportation		■		■
	Maritime Transportation		■		■
	Rail Transportation		■		■
	Trucking Services		■		■
	Automobiles and Components	■	■		■
Materials and Buildings	Metals and Mining		■		■
	Chemicals	■	■		■
	Construction Materials	■	■		■
	Capital Goods	■	■		
	Real Estate Management and Development	■	■	■	■
Ag, Food, and Forest	Beverages		■		■
	Agriculture	■	■	■	■
	Packaged Foods and Meats		■	■	■
	Paper and Forest Products	■	■	■	■

⁷ [Figure 5](#) is largely, but not solely, based on select content from the Sustainability Accounting Standards Board (SASB) “Financial Impacts of Climate Risk” table in its Climate Risk Technical Bulletin. SASB also prepares detailed industry research briefs (see [Appendix 3](#)).

a. Exposure to Climate-Related Risks and Opportunities

Exposure, in this context, refers to an organization's vulnerability to negative impacts or capability of realizing positive impacts from the transition to a lower-carbon economy and/or the physical aspects of climate change. When considering its exposure to climate-related risks and opportunities, an organization should consider the exposure of its value chain as well.

The complexity and uncertainty associated with climate change make it difficult to identify the specific touchpoints and time frames in which climate change may affect an organization. As a starting point, an organization should assess its value chain over a reasonable time frame as it relates to the following:⁸

- climate-related risks including (1) transition risks such as policy constraints on emissions, imposition of carbon tax, water restrictions, land use restrictions or incentives, and market demand and supply shifts and (2) physical risks such as the disruption of operations or destruction of property and
- climate-related opportunities such as access to new markets and new technology (e.g., carbon capture and storage technology).

Importantly, an organization should assess its climate-related risks and opportunities within the context of its businesses, operations, and physical locations in order to determine potential financial implications. In making such an assessment, an organization should consider (1) current and anticipated policy constraints and incentives in relevant jurisdictions, technology changes and availability, and market changes and (2) whether an organization's physical locations or suppliers are particularly vulnerable to physical impacts from climate change. For example, an organization may have high emissions, but if anticipated policy in the organization's jurisdiction fails to constrain emissions in a binding manner, the organization may determine financial impacts are minimal over its planning horizon.

Table 1 (p. 8) shows six broad categories of metrics that may help an organization understand its vulnerability or resilience to various transition and physical risks. For example, organizations with high emissions in their operations and supply chains, high water use, unsustainable land use practices, or facilities in geographically "at-risk" areas, such as coastal zone locations, may be more vulnerable to transition and physical risks. Alternatively, organizations that are energy and water efficient, have low emissions, or use sustainable land practices may be less vulnerable to climate-related risks, depending on the policy, technological, and geographic constraints that they face.

b. Responses to Climate-Related Risks and Opportunities

After assessing its exposure to climate-related risks and opportunities, an organization needs to choose how to respond to the identified risks and opportunities, including the following:

- the risk management actions it plans to undertake (i.e., mitigate, transfer, accept, or control);
- capital expenditures (CapEx) on new technology or facilities that may be warranted; and
- R&D expenditures that may be necessary.

These are largely strategic and financial planning decisions around the operating and capital expenditures the organization plans to undertake in response to climate-related risks and opportunities. In some cases, these responses may be directly motivated by specific climate-related issues, and in other cases, climate-related issues may be an additional, but not exclusive, motivational factor around other business drivers. It is important for an organization to recognize that accepting

⁸ An important aspect for organizations to consider is the time horizon for assessing exposures. While the common perception is that climate-related risks are "long term," arising in 10, 20, or 30 years, this may not be the case. Policies, technology innovation, and markets are likely to adjust and shift in advance of many foreseeable climate trends. Likewise, more frequent and severe storms, floods, and droughts are occurring today. Organizations, therefore, should carefully consider the time horizon they use to evaluate their exposures and possibly assess them over a range of time horizons to capture potential exposures arising in the short, medium, and longer term.

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climate-related risks (i.e., “no response”) may also carry potential financial implications, such as a loss in revenue, reduced asset valuations or write-offs, or increased costs.

Table 1

Categories of Climate-Related Metrics and Associated Risk Types

Category	Subcategory	Risk Type	Description of Metric
Greenhouse Gas (GHG) Emissions	Emission Level	Transition	Total emissions (by type of GHG, by source, by Scope)
	Emission Intensity	Transition	Emissions per output scaling factor (e.g., revenues, sales, units produced)
	Embedded Emissions	Transition	Emissions per unit of fossil fuel reserves
Energy/ Fuel	Energy Usage	Transition	Total energy consumption (megawatt hour [MWh] or gigajoules [GJ] per year)
	Energy Intensity	Transition	Total energy consumed per output scaling factor (e.g., revenues, sales, units produced, floor area)
	Energy Mix	Transition	Percent of energy by type of energy source (e.g., renewable, hydro, coal, oil, natural gas) (MWh or GJ)
Water	Water Usage	Physical	Total freshwater withdrawn (cubic meters)
	Water Intensity	Physical	Amount used per output scaling factor (e.g., revenues, sales, units produced) (cubic meters)
	Water Source	Physical	Amount withdrawn from areas of high baseline water stress (cubic meters) Amount treated and recycled (cubic meters)
Land Use	Land Cover	Physical	Percent of land by cover type (e.g., grassland, forest, cultivated, pasture, urban) Annual change in cover type
	Land Use Practices	Transition	Percent of land used for agriculture tillage, grazing practices, sustainability practices, or conservation practices
Location	Coastal Zone	Physical	Locations within a coastal zone
	Flood Zone	Physical	Locations within a designated flood zone
Risk Adaptation & Mitigation	R&D	—	Amount invested in developing low-carbon products, services and/or technology
	CapEx	—	Amount invested in deployment of low-carbon technology, energy efficiencies, etc. Amount invested in resiliency capabilities

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c. Effectiveness of Responses

Financial impacts associated with climate-related risks and opportunities depend on not only an organization’s level of exposure and planned responses, but also on how effective its responses are in realizing targeted opportunities and mitigating or otherwise managing risks. An organization, therefore, should monitor implementation of its responses against both internal targets and external factors to assess their effectiveness from a financial perspective (e.g., the impact on future revenues, expenditures, assets and liabilities, and capital and financing).

d. Linking It All Together

Determining the financial impacts of climate-related risks and opportunities generally involves an organization assessing (1) its exposures, (2) its planned responses, and (3) its response effectiveness. Analyses should focus on the following:

- the exposure and potential financial impact if no action is undertaken and

- the financial implications of mitigating risks and maximizing opportunities in the context of an organization's overall business strategy and environment.

Forward-looking analyses are especially important, but challenging. Efforts to mitigate and adapt to climate change are without historical precedent, and many aspects about the timing and magnitude of climate change in specific contexts are uncertain. For these reasons, the Task Force believes scenario analysis is an important tool for organizations to use in their strategic planning processes. Scenario analysis and other strategic planning tools can help organizations consider a broader range of assumptions, uncertainties, and potential future states when assessing financial implications of climate change.

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B Recommendations

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The Task Force's recommendations are structured around four thematic areas that are core elements of how organizations operate—governance, strategy, risk management, and metrics and targets (Figure 6). 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 assess climate-related issues (Figure 7, p. 12).

Figure 6

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

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The Task Force recommends that organizations provide climate-related financial disclosures in their mainstream (i.e., public) annual financial filings and 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 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.⁹ Because these organizations are more likely than others to be financially impacted over time, investors are interested in monitoring how these organizations' strategies evolve.

Importantly, the recommendations were developed to apply broadly across sectors and jurisdictions and should not be seen as superseding national disclosure requirements. Organizations should make financial disclosures in accordance with their national disclosure requirements for financial filings.

⁹ 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).

Figure 7

Recommendations and Supporting Recommended Disclosures

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

C Guidance for All Sectors

C Guidance for All Sectors

The Task Force 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.

1. 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 material climate-related issues receive appropriate board and management attention.

Governance

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

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Recommended Disclosure a)

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

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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.

2. 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 potentially arising in 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 A1](#) and [A2](#) (pp. 72-73).

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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.

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 in the [Task Force's report](#) for information on applying scenarios to forward-looking analysis.

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3. 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 in 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 A1](#) and [A2](#) (pp. 72-73), as appropriate.

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.

4. 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.

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 A1](#) and [A2](#) (pp. 72-73).

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 lower-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.¹⁰

GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.¹¹ As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.¹²

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¹⁰ 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.

¹¹ 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.

¹² 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.

Metrics and Targets

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

GHG emissions and associated 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 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.

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5. Alignment of Recommended Disclosures with Other Frameworks

Governance Recommended Disclosures

a)	G20/OECD Principles of Corporate Governance	5.a.4, 5.a.9, 6.a, 6.d.1, 6.d.2, 6.d.3, 6.d.4, 6.d.7, 6.e.2, 6.f
	CDP Climate Change Questionnaire 2017	CC1.1a
	GRI 102: General Disclosures	102-18, 102-19, 102-20, 102-26, 102-27, 102-29, 102-31, 102-32
	CDSB Climate Change Reporting Framework	4.16, 4.17
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-03
b)	International Integrated Reporting Framework	3.4, 3.41, 4.8, 4.9
	GRI 102: General Disclosures	102-29, 102-31, 102-32
	CDP Climate Change Questionnaire 2017	CC1.1, CC1.1a, CC1.2, CC1.2a, CC2.2, CC2.2a, CC2.2b
	CDSB Climate Change Reporting Framework	2.8, 2.9, 4.12, 4.13, 4.16, 4.17
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-01, REQ-03

Strategy Recommended Disclosures

a)	G20/OECD Principles of Corporate Governance	5.a.7, 5.a.8
	CDP Climate Change Questionnaire 2017	CC2.1b, CC2.1c, CC5.1, CC6.1
	CDSB Climate Change Reporting Framework	4.6, 4.9, 4.10, 4.11, 4.14

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Strategy Recommended Disclosures		
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-02, REQ-06
	GRI 102: General Disclosures	102-15
	International Integrated Reporting Framework	3.5, 3.17, 4.6, 4.7, 4.23, 4.24, 4.25, 4.26
b)	G20/OECD Principles of Corporate Governance	5.a.2, 5.a.7, 5.a.8
	CDP Climate Change Questionnaire 2017	CC2.2, CC2.2a, CC2.2b, CC3.2, CC3.3, CC5.1, CC6.1
	GRI 201: Economic Performance	201-2
	CDSB Climate Change Reporting Framework	2.8, 2.9, 2.10, 4.6, 4.7, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-01, REQ-02, REQ-06
	International Integrated Reporting Framework	3.3, 3.5, 3.39, 4.12, 4.23, 4.28, 4.29, 4.34, 4.35, 4.37
c)	CDP Climate Change Questionnaire 2017	CC2.2a
	CDSB Climate Change Reporting Framework	4.7
Risk Management Recommended Disclosures		
a)	G20/OECD Principles of Corporate Governance	5.a.2, 5.a.7
	CDP Climate Change Questionnaire 2017	CC2.1, CC2.1a, CC2.1b, CC2.1c, CC2.1c, CC5.1, CC6.1
	GRI 201: Economic Performance	201-2
	CDSB Climate Change Reporting Framework	4.6, 4.7, 4.8, 4.9, 4.11
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-01, REQ-02, REQ-03
b)	G20/OECD Principles of Corporate Governance	5.a.2, 5.a.7
	CDP Climate Change Questionnaire 2017	CC2.1c, CC5.1c
	CDSB Climate Change Reporting Framework	4.12, 4.13, 4.16, 4.17
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-01, REQ-02, REQ-03
	International Integrated Reporting Framework	4.23, 4.24, 4.25, 4.26, 4.40, 4.41, 4.42
c)	G20/OECD Principles of Corporate Governance	5.a.2, 5.a.7 6.d.1, 6.f
	CDP Climate Change Questionnaire 2017	CC2.1
	CDSB Climate Change Reporting Framework	4.6, 4.7
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-01, REQ-02, REQ-03, REQ-06
	International Integrated Reporting Framework	2.7, 2.8, 2.9

Metrics and Targets Recommended Disclosures

a)	G20/OECD Principles Of Corporate Governance	6.d.1, 6.d.7
	CDP Climate Change Questionnaire 2017	CC2.1c, CC2.1d, CC2.3, CC12
	GRI 102: General Disclosures	102-30
	CDSB Climate Change Reporting Framework	2.36, 2.37, 2.38, 4.14, 4.15
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-01, REQ-04, REQ-05, REQ-06
	International Integrated Reporting Framework	3.52, 3.53, 4.30, 4.31, 4.32, 4.38, 4.53
b)	CDP Climate Change Questionnaire 2017	CC7, CC7.2, CC8, CC9, CC10, CC12, CC14
	GRI 102: General Disclosures	102-29, 102-30
	GRI 201: Economic Performance	201-2
	CDSB Climate Change Reporting Framework	4.19.1, 4.19.2, 4.29, 4.30, 4.31, 4.32, 4.33
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-04, REQ-05
c)	CDP Climate Change Questionnaire 2017	CC3.1, CC3.2, CC3.3
	CDSB Climate Change Reporting Framework	4.12, 4.13, 4.14, 4.15
	CDSB Framework for Reporting Environmental Information & Natural Capital	REQ-01
	International Integrated Reporting Framework	4.53, 4.60, 4.61, 4.62

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A key element of the FSB's proposal for the Task Force was the development of climate-related disclosures that “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.”¹³ The FSB’s proposal also noted that disclosures by the financial sector would:

- “foster an early assessment of [climate-related] risks” and “facilitate market discipline” and
- “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.”

The Task Force organized the financial sector into four major industries, largely based on activities performed, as follows: banks (lending), insurance companies (underwriting), asset managers (asset management), and asset owners, which include public- and private-sector pension plans, endowments, and foundations (investing). Given the important role of the financial sector as preparers of climate-related financial disclosures described in the FSB’s proposal, the Task Force identified certain areas where supplemental guidance was warranted, as shown in Figure 8. This supplemental guidance is intended to provide additional context for the financial sector when preparing disclosures consistent with the Task Force’s recommendations.

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Figure 8

Supplemental Guidance for the Financial Sector

Industries	Governance		Strategy			Risk Management			Metrics and Targets		
	a)	b)	a)	b)	c)	a)	b)	c)	a)	b)	c)
Banks			■			■			■		
Insurance Companies				■	■	■	■		■		
Asset Owners				■	■	■	■		■	■	
Asset Managers				■		■	■		■	■	

¹³ FSB, “Proposal for a Disclosure Task Force on Climate-Related Risks,” November 9, 2015.

1. Banks

Banks are exposed to climate-related risks and opportunities through their lending and other financial intermediary activities as well as through their own operations. As financial intermediaries, banks may assume exposure to material climate-related risks through their borrowers, customers, or counterparties. Banks that provide loans or trade the securities of companies with direct exposure to climate-related risks (e.g., fossil fuel producers, intensive fossil fuel consumers, real property owners, or agricultural/food companies) may accumulate climate-related risks via their credit and equity holdings. In particular, asset-specific credit or equity exposure to large fossil fuel producers or users could present risks that merit disclosure or discussion in a bank's financial filings. In addition, as the markets for lower-carbon and energy-efficient alternatives grow, banks may assume material exposures in their lending and investment businesses. Banks could also become subject to litigation related to their financing activities or via parties seeking damages or other legal recourse. Investors, lenders, insurance underwriters, and other stakeholders need to be able to distinguish among banks' exposures and risk profiles so that they can make informed financial decisions.

Governance

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

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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.

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 potentially arising in each time horizon (short, medium, and long term) that could have a material financial impact on the organization and distinguish whether the climate-related risks are transition or physical risks, 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 A1](#) and [A2](#) (pp. 72-73).

Supplemental Guidance for Banks

Banks should describe significant concentrations of credit exposure to carbon-related assets.¹⁴ Additionally, banks should consider disclosing their climate-related risks (transition and physical) in their lending and other financial intermediary business activities.

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.

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¹⁴ Recognizing that the term carbon-related assets is not well defined, the Task Force encourages banks to use a consistent definition to support comparability. For purposes of disclosing information on significant concentrations of credit exposure to carbon-related assets under this framework, the Task Force suggests banks define carbon-related assets as those assets tied to the energy and utilities sectors under the Global Industry Classification Standard, excluding water utilities and independent power and renewable electricity producer industries.

Strategy

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

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 in the [Task Force's report](#) for information on applying scenarios to forward-looking analysis.

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.

Supplemental Guidance for Banks

Banks should consider characterizing their climate-related risks in the context of traditional banking industry risk categories such as credit risk, market risk, liquidity risk, and operational risk.

Banks should also consider describing any risk classification frameworks used (e.g., the Enhanced Disclosure Task Force's framework for defining "Top and Emerging Risks").¹⁵

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 A1 and A2](#) (pp. 72-73), as appropriate.

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¹⁵ The Enhanced Disclosure Task Force was established by the FSB in to make recommendations on financial risk disclosures for banks. It defined a top risk as "a current, emerged risk which has, across a risk category, business area or geographical area, the potential to have a material impact on the financial results, reputation or sustainability of the business and which may crystallise within a short, perhaps one year, time horizon." An emerging risk was defined as "one which has large uncertain outcomes which may become certain in the longer term (perhaps beyond one year) and which could have a material effect on the business strategy if it were to occur."

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.

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 A1](#) and [A2](#) (pp. 72-73).

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 lower-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.

Supplemental Guidance for Banks

Banks should provide the metrics used to assess the impact of (transition and physical) climate-related risks on their lending and other financial intermediary business activities in the short, medium, and long term. Metrics provided may relate to credit exposure, equity and debt holdings, or trading positions, broken down by:

- Industry¹⁶
- Geography
- Credit quality (e.g., investment grade or non-investment grade, internal rating system)
- Average tenor

Banks should also provide the amount and percentage of carbon-related assets relative to total assets as well as the amount of lending and other financing connected with climate-related opportunities.¹⁷

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¹⁶ Industry should be based on the Global Industry Classification Standard or national classification systems aligned with financial filing requirements.

¹⁷ Recognizing the term carbon-related assets is not well defined, the Task Force encourages banks to use a consistent definition to support comparability. For purposes of disclosing amounts and percentages of carbon-related assets relative to total assets under this framework, the Task Force suggests banks define carbon-related assets as those assets tied to the energy and utilities sectors under the Global Industry Classification Standard, excluding water utilities and independent power and renewable electricity producer industries.

Metrics and Targets

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

<p>Recommended Disclosure b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.</p>	<p>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.¹⁸ GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.¹⁹ As appropriate, organizations should consider providing related, generally accepted, industry-specific GHG efficiency ratios.²⁰ GHG emissions and associated 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 the metrics.</p>
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<p>Recommended Disclosure c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.</p>	<p>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:</p> <ul style="list-style-type: none"> – 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.
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Alignment of Supplemental Guidance with Other Frameworks

Risk Management Recommended Disclosures

a)	EDTF, Enhancing the Risk Disclosures of Banks	Recommendations 18, 22, 23, 24, 25, 26, 30
	SASB, Commercial Banks: Sustainability Accounting Standard	FN0101-16

Metrics and Targets Recommended Disclosures

a)	EDTF, Enhancing the Risk Disclosures of Banks	Recommendations 26, 28
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¹⁸ 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 more strongly impacted 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.

¹⁹ 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.

²⁰ 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.

2. Insurance Companies²¹

For insurance companies, climate-related risks and opportunities constitute a key topic affecting the industry's core business (e.g., weather-related risk transfer business). The scientific consensus is that a continued rise in average global temperatures will have a significant effect on weather-related natural catastrophes and will account for an increasingly large share of natural catastrophe losses.²²

Users of climate-related financial disclosures are specifically interested in how insurance companies are evaluating and managing climate-related risks and opportunities in their underwriting and investment activities. Such disclosure will support users in understanding how insurance companies are incorporating climate-related risks into their strategy, risk management, underwriting processes, and investment decisions. This guidance applies to the liability (underwriting) side of insurance activities. For insurance companies' investment activities, refer to the supplemental guidance for asset owners.

Governance

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

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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.

²¹ Insurance companies include both insurers and re-insurers.

²² Intergovernmental Panel on Climate Change, *Fifth Assessment Report (AR5)*, Cambridge University Press, 2014.

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 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,
- specific climate-related issues for each time horizon (short, medium, and long term) that could have a material financial impact on the organization and distinguish whether the climate-related risks are transition or physical risks, 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 A1](#) and [A2](#) (pp. 72-73).

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.

Supplemental Guidance for Insurance Companies

Insurance companies should describe the potential impacts of climate-related risks and opportunities, as well as provide supporting quantitative information where available, on their core businesses, products, and services, including:

- information at the business division, sector, or geography levels;
- how the potential impacts influence client, cedent, or broker selection; and
- whether specific climate-related products or competencies are under development, such as insurance of green infrastructure, specialty climate-related risk advisory services, and climate-related client engagement.

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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 in the [Task Force's report](#) for information on applying scenarios to forward-looking analysis.

Supplemental Guidance for Insurance Companies

Insurance companies that perform climate-related scenario analysis on their underwriting activities should provide the following information:

- description of the climate-related scenarios used, including the critical input parameters, assumptions and considerations, and analytical choices. In addition to a 2°C scenario, insurance companies with substantial exposure to weather-related perils should consider using a greater than 2°C scenario to account for physical effects of climate change and
- time frames used for the climate-related scenarios, including short-, medium-, and long-term milestones.

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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.

Supplemental Guidance for Insurance Companies

Insurance companies should describe the processes for identifying and assessing climate-related risks on re-/insurance portfolios by geography, business division, or product segments, including the following risks:

- physical risks from changing frequencies and intensities of weather-related perils,
- transition risks resulting from a reduction in insurable interest due to a decline in value, changing energy costs, or implementation of carbon regulation, and
- liability risks that could intensify due to a possible increase in litigation.

Risk Management

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

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 A1](#) and [A2](#) (pp. 72-73), as appropriate.

Supplemental Guidance for Insurance Companies

Insurance companies should describe key tools or instruments, such as risk models, used to manage climate-related risks in relation to product development and pricing.

Insurance companies should also describe the range of climate-related events considered and how the risks generated by the rising propensity and severity of such events are managed.

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.

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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 A1](#) and [A2](#) (pp. 72-73).

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 lower-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.

Supplemental Guidance for Insurance Companies

Insurance companies should provide aggregated risk exposure to weather-related catastrophes of their property business (i.e., annual aggregated expected losses from weather-related catastrophes) by relevant jurisdiction.

Metrics and Targets

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

<p>Recommended Disclosure b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.</p>	<p>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.²³ GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.²⁴ As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.²⁵ GHG emissions and associated 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 the metrics.</p>
<p>Recommended Disclosure c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.</p>	<p>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:</p> <ul style="list-style-type: none"> – 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. <p>Where not apparent, organizations should provide a description of the methodologies used to calculate targets and measures.</p>

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Alignment of Supplemental Guidance with Other Frameworks

Strategy Recommended Disclosures

b)	ClimateWise, The ClimateWise Principles	Subprinciples 3.2, 3.4, 4.1, 4.2
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Risk Management Recommended Disclosures

a)	SASB, Insurance: Sustainability Accounting Standard	FN0301-17.65
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Metrics and Targets Recommended Disclosures

a)	UNEP FI, Principles for Sustainable Insurance	Principle 1
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²³ 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 more strongly impacted 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.

²⁴ 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.

²⁵ 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.

3. Asset Owners

Asset owners are a diverse group that include public- and private-sector pension plans, re-/insurance companies, endowments, and foundations and invest assets on their own behalf or on behalf of their beneficiaries. Asset owners invest according to a mandate or investment strategy set out by their oversight body or their beneficiaries. Asset owners have various investment horizons that influence their risk tolerance and investment strategies. Many asset owners have broadly diversified investment portfolios across investment strategies, asset classes, and regions and portfolios with thousands of underlying individual company and government exposures. Asset owners may hire asset managers to invest on their behalf.²⁶

Whether asset owners invest directly or through asset managers, asset owners bear the potential transition and physical risks to which their investments are exposed. Similarly, asset owners can benefit from the potential returns on the investment opportunities associated with climate change.

Asset owners sit at the top of the investment chain and, therefore, have an important role to play in influencing the organizations in which they invest to provide better climate-related financial disclosures. Disclosure of climate-related risks and opportunities by asset owners allows beneficiaries and other audiences to assess the asset owner's investment considerations and approach to climate change. This may include an assessment of the asset owner's integration of appropriate climate-related financial information into its investment activities in various ways, for example, in setting investment strategy, making new investment decisions, and managing its existing portfolio. By encouraging climate-related financial disclosures by asset owners, beneficiaries and other stakeholders will be in a position to better understand exposures to climate-related risks and opportunities. Further, climate-related financial disclosures by asset owners may encourage better disclosures across the investment chain—from asset owners to asset managers to underlying companies—thus enabling all organizations and individuals to make better-informed investment decisions.

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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.

²⁶ In this role, asset managers also act as fiduciaries. Asset managers invest within the guidelines specified by the asset owner for a given mandate set out in the investment management agreement or the product specification.

Governance

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

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.

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 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,
- specific climate-related issues for each time horizon (short, medium, and long term) that could have a material financial impact on the organization and distinguish whether the climate-related risks are transition or physical risks, 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 A1](#) and [A2](#) (pp. 72-73).

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

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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.

- 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.

Supplemental Guidance for Asset Owners

Asset owners should describe how climate-related risks and opportunities are factored into relevant investment strategies. This could be described from the perspective of the total fund or investment strategy or individual investment strategies for various asset classes.

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 in the [Task Force's report](#) for information on applying scenarios to forward-looking analysis.

Supplemental Guidance for Asset Owners

Asset owners that perform scenario analysis should consider providing a discussion of how climate-related scenarios are used, such as to inform investments in specific assets.

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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.

Supplemental Guidance for Asset Owners

Asset owners should describe, where appropriate, engagement activity with investee companies to encourage better disclosure and practices related to climate-related risks to improve data availability and asset owners' ability to assess climate-related risks.

Risk Management

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

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 A1](#) and [A2](#) (pp. 72-73), as appropriate.

Supplemental Guidance for Asset Owners

Asset owners should describe how they consider the positioning of their total portfolio with respect to the transition to a lower-carbon energy supply, production, and use. This could include explaining how asset owners actively manage their portfolios' positioning in relation to this transition.

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.

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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 A1](#) and [A2](#) (pp. 72-73).

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 lower-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.

Supplemental Guidance for Asset Owners

Asset owners should describe metrics used to assess climate-related risks and opportunities in each fund or investment strategy. Where relevant, asset owners should also describe how these metrics have changed over time.

Where appropriate, asset owners should provide metrics considered in investment decisions and monitoring.

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 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.²⁷

GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.²⁸ As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.²⁹

GHG emissions and associated 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 the metrics.

Supplemental Guidance for Asset Owners

Asset owners should provide the weighted average carbon intensity, where data are available or can be reasonably estimated, for each fund or investment strategy.

In addition, asset owners should provide other metrics they believe are useful for decision making along with a description of the methodology used. See [Table 2](#) (p. 43) for common carbon footprinting and exposure metrics, including weighted average carbon intensity.

Note: 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. 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. The Task Force recognizes that some asset owners may be able to report weighted average carbon intensity for only a portion of their investments given data availability and methodological issues.

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.

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²⁷ 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 more strongly impacted 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.

²⁸ 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.

²⁹ 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.

4. Asset Managers

Asset managers, also known as investment managers, are hired by clients to invest assets on their behalf. In this role, asset managers act as fiduciaries. Asset managers invest within the guidelines specified by their clients for a given mandate set out in an investment management agreement or product specification. Importantly, the investment results, whether positive or negative, belong to the client.³⁰

Asset managers' clients, as owners of the underlying assets, bear the major portion of the potential transition and physical risks to which their investments are exposed. Similarly, asset managers' clients will benefit from the potential returns on the investment opportunities associated with the transition to a lower-carbon economy. The relevance of climate-related risks and opportunities to an asset manager and its asset owner clients will depend on a number of variables, including its investment styles and objectives, the asset classes in which it invests, the investment mandates, as well as other factors.

In the case where an asset manager is a public company, it has two distinct audiences for its climate-related financial disclosures. The first audience is its shareholders, who need to understand enterprise-level risks and opportunities and how these are managed. The second is its clients, for whom product-, investment strategy-, or client-specific disclosures are more relevant.

Asset managers' clients rely on reporting from asset managers to understand how climate-related risks and opportunities are managed within each of their portfolios. The guidance provided below addresses considerations for asset managers when reporting to their clients.

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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.

³⁰ Introductory language sourced from: Blackrock, "BlackRock Worldwide Leader in Asset and Risk Management," 2016.

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 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,
- specific climate-related issues for each time horizon (short, medium, and long term) that could have a material financial impact on the organization and distinguish whether the climate-related risks are transition or physical risks, 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 A1](#) and [A2](#) (pp. 72-73).

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.

Supplemental Guidance for Asset Managers

Asset managers should describe how climate-related risks and opportunities are factored into relevant products or investment strategies.

Asset managers should also describe how each product or investment strategy might be affected by the transition to a lower-carbon economy.

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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 in the [Task Force's report](#) for information on applying scenarios to forward-looking analysis.

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.

Supplemental Guidance for Asset Managers

Asset managers should describe, where appropriate, engagement activity with investee companies to encourage better disclosure and practices related to climate-related risks in order to improve data availability and asset managers' ability to assess climate-related risks.

Asset managers should also describe how they identify and assess material climate-related risks for each product or investment strategy. This might include a description of the resources and tools used in the process.

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 A1 and A2](#) (pp. 72-73), as appropriate.

Supplemental Guidance for Asset Managers

Asset managers should describe how they manage material climate-related risks for each product or investment strategy.

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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.

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 A1](#) and [A2](#) (pp. 72-73).

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 lower-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.

Supplemental Guidance for Asset Managers

Asset managers should describe metrics used to assess climate-related risks and opportunities in each product or investment strategy. Where relevant, asset managers should also describe how these metrics have changed over time.

Where appropriate, asset managers should provide metrics considered in investment decisions and monitoring.

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.³¹

GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.³² As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.³³

GHG emissions and associated metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide

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³¹ 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 more strongly impacted by transition risk than other organizations. In addition, current or future constraints on emissions, either directly in emission restrictions or indirectly through carbon budgets, may impact organizations financially.

³² 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.

³³ 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.

Metrics and Targets

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

a description of the methodologies used to calculate or estimate the metrics.

Supplemental Guidance for Asset Managers

Asset managers should provide the weighted average carbon intensity, where data are available or can be reasonably estimated, for each product or investment strategy.

In addition, asset managers should provide other metrics they believe are useful for decision making along with a description of the methodology used. See [Table 2](#) (p. 43) for common carbon footprinting and exposure metrics, including weighted average carbon intensity.

Note: 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. 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. The Task Force recognizes that some asset managers may be able to report weighted average carbon intensity for only a portion of the assets they manage given data availability and methodological issues.

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.

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Alignment of Supplemental Guidance with Other Frameworks

Strategy Recommended Disclosures

b)	PRI, Reporting Framework 2016 Strategy and Governance	SG12.1, SG12.2
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Risk Management Recommended Disclosures

a)	SASB, Asset Management & Custody Activities: Sustainability Accounting Standard	FN0103-15
	PRI, Reporting Framework 2017 Strategy and Governance	SG13.2

Metrics and Targets Recommended Disclosures

a)	AODP, Global Climate Risk Survey 2017 for Asset Managers	2.13, 3.01
	SASB, Asset Management & Custody Activities: Sustainability Accounting Standard	FN0103-18
	PRI, Reporting Framework 2017 Strategy and Governance	SG13.3
b)	PRI, Reporting Framework 2017 Strategy and Governance	SG13.3

5. Carbon Footprinting and Exposure Metrics

Table 2 below provides descriptions, formulas, and additional information for common carbon footprinting and exposure metrics. The table includes the weighted average carbon intensity metric that the Task Force recommends asset owners and asset managers report to their beneficiaries and clients as well as other metrics such organizations should consider reporting.

Table 2

Common Carbon Footprinting and Exposure Metrics

Metric	Supporting Information	
Weighted Average Carbon Intensity	<i>Description</i>	Portfolio's exposure to carbon-intensive companies, expressed in tons CO ₂ e / \$M revenue. <i>Metric recommended by the Task Force.</i>
	<i>Formula</i>	$\sum_n^i \left(\frac{\text{current value of investment}_i}{\text{current portfolio value}} + \frac{\text{issuer's Scope 1 and Scope 2 GHG emissions}_i}{\text{issuer's \$M revenue}_i} \right)$
	<i>Methodology</i>	Unlike the next three metrics, Scope 1 and Scope 2 GHG emissions are allocated based on portfolio weights (the current value of the investment relative to the current portfolio value), rather than the equity ownership approach (as described under methodology for Total Carbon Emissions). Gross values should be used.
	<i>Key Points</i> + / -	<ul style="list-style-type: none"> + Metric can be more easily applied across asset classes since it does not rely on equity ownership approach. + The calculation of this metric is fairly simple and easy to communicate to investors. + Metric allows for portfolio decomposition and attribution analysis. - Metric is sensitive to outliers. - Using revenue (instead of physical or other metrics) to normalize the data tends to favor companies with higher pricing levels relative to their peers.
Total Carbon Emissions	<i>Description</i>	The absolute greenhouse gas emissions associated with a portfolio, expressed in tons CO ₂ e.
	<i>Formula</i>	$\sum_n^i \left(\frac{\text{current value of investment}_i}{\text{issuer's market capitalization}_i} * \text{issuer's Scope 1 and Scope 2 GHG emissions}_i \right)$
	<i>Methodology</i>	Scope 1 and Scope 2 GHG emissions are allocated to investors based on an equity ownership approach. Under this approach, if an investor owns 5 percent of a company's total market capitalization, then the investor owns 5 percent of the company as well as 5 percent of the company's GHG (or carbon) emissions. While this metric is generally used for public equities, it can be used for other asset classes by allocating GHG emissions across the total capital structure of the investee (debt and equity).
	<i>Key Points</i>	<ul style="list-style-type: none"> + Metric may be used to communicate the carbon footprint of a portfolio consistent with the GHG protocol. + Metric may be used to track changes in GHG emissions in a portfolio. + Metric allows for portfolio decomposition and attribution analysis. - Metric is generally not used to compare portfolios because the data are not normalized. - Changes in underlying companies' market capitalization can be misinterpreted.
Carbon Footprint	<i>Description</i>	Total carbon emissions for a portfolio normalized by the market value of the portfolio, expressed in tons CO ₂ e / \$M invested.
	<i>Formula</i>	$\frac{\sum_n^i \left(\frac{\text{current value of investment}_i}{\text{issuer's market capitalization}_i} * \text{issuer's Scope 1 and Scope 2 GHG emissions}_i \right)}{\text{current portfolio value (\$M)}}$

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Table 2

Common Carbon Footprinting and Exposure Metrics (continued)

Metric	Supporting Information	
Carbon Footprint (continued)	<i>Methodology</i>	Scope 1 and Scope 2 GHG emissions are allocated to investors based on an equity ownership approach as described under methodology for Total Carbon Emissions. The current portfolio value is used to normalize the data.
	<i>Key Points</i> + / -	<ul style="list-style-type: none"> + Metric may be used to compare portfolios to one another and/or to a benchmark. + Using the portfolio market value to normalize data is fairly intuitive to investors. + Metric allows for portfolio decomposition and attribution analysis. – Metric does not take into account differences in the size of companies (e.g., does not consider the carbon efficiency of companies). – Changes in underlying companies' market capitalization can be misinterpreted.
Carbon Intensity	<i>Description</i>	Volume of carbon emissions per million dollars of revenue (carbon efficiency of a portfolio), expressed in tons CO ₂ e / \$M revenue.
	<i>Formula</i>	$\frac{\sum_n^i \left(\frac{\text{current value of investment}_i}{\text{issuer's market capitalization}_i} * \text{issuer's Scope 1 and Scope 2 GHG emissions}_i \right)}{\sum_n^i \left(\frac{\text{current value of investment}_i}{\text{issuer's market capitalization}_i} * \text{issuer's \$M revenue}_i \right)}$
	<i>Methodology</i>	Scope 1 and Scope 2 GHG emissions are allocated to investors based on an equity ownership approach as described under methodology for Total Carbon Emissions. The company's (or issuer's) revenue is used to adjust for company size to provide a measurement of the efficiency of output.
	<i>Key Points</i> + / -	<ul style="list-style-type: none"> + Metric may be used to compare portfolios to one another and/or to a benchmark. + Metric takes into account differences in the size of companies (e.g., considers the carbon efficiency of companies). + Metric allows for portfolio decomposition and attribution analysis. – The calculation of this metric is somewhat complex and may be difficult to communicate. – Changes in underlying companies' market capitalization can be misinterpreted.
Exposure to Carbon-Related Assets	<i>Description</i>	The amount or percentage of carbon-related assets ³⁴ in the portfolio, expressed in \$M or percentage of the current portfolio value.
	<i>Formula for Amount</i>	$\sum \$M \text{ current value of investments in carbon-related assets}$
	<i>Formula for Percentage</i>	$\frac{\sum \text{current value of investments in carbon-related assets}}{\text{current portfolio value}} * 100$
	<i>Methodology</i>	This metric focuses on a portfolio's exposure to sectors and industries considered the most GHG emissions intensive. Gross values should be used.
	<i>Key Points</i> + / -	<ul style="list-style-type: none"> + Metric can be applied across asset classes and does not rely on underlying companies' Scope 1 and Scope 2 GHG emissions. – Metric does not provide information on sectors or industries other than those included in the definition of carbon-related assets (i.e., energy and utilities sectors under the Global Industry Classification Standard excluding water utilities and independent power and renewable electricity producer industries).

Note: The term "portfolio" used in the table above is defined as "fund or investment strategy" for asset owners and "product or investment strategy" for asset managers.

³⁴ Recognizing that the term carbon-related assets is not well defined, the Task Force encourages asset owners and asset managers to use a consistent definition to support comparability. The Task Force suggests defining carbon-related assets as those assets tied to the energy and utilities sectors under the Global Industry Classification Standard, excluding water utilities and independent power and renewable electricity producer industries.

E Supplemental Guidance for Non- Financial Groups

E Supplemental Guidance for Non-Financial Groups

While every industry could experience potential financial impacts from climate-related risks and opportunities, the Task Force developed supplemental guidance for non-financial industries (and their related supply and distribution chains) more likely to be financially impacted than others due to their exposure to certain transition and physical risks around greenhouse gas (GHG) emissions, energy, or water dependencies associated with their operations and products.³⁵ These non-financial industries are grouped into four key areas (referred to as non-financial groups): Energy; Transportation; Materials and Buildings; and Agriculture, Food, and Forest Products.³⁶ Supplemental guidance for the non-financial groups is provided for select recommended disclosures related to strategy and metrics and targets, as shown in Figure 9.

Figure 9

Supplemental Guidance for Non-Financial Groups

Groups	Governance		Strategy			Risk Management			Metrics and Targets		
	a)	b)	a)	b)	c)	a)	b)	c)	a)	b)	c)
Energy				■	■				■		
Transportation				■	■				■		
Materials and Buildings				■	■				■		
Ag, Food, and Forest Products				■	■				■		

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The Task Force developed supplemental guidance for the non-financial groups to provide such organizations further background and information to consider when developing disclosures consistent with the Task Force's recommendations. This supplemental guidance should be read and applied in conjunction with the guidance for all sectors.

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.

³⁵ SASB, "SASB Climate Risk Technical Bulletin #: TB001-10182016," October 2016.

³⁶ 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.

Governance

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

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.

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 potentially arising in 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 A1](#) and [A2](#) (pp. 72-73).

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

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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.

- 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.

Supplemental Guidance for Non-Financial Groups

Organizations should consider discussing how climate-related risks and opportunities are integrated into their (1) current decision making and (2) strategy formulation, including planning assumptions and objectives around climate change mitigation, adaptation, or opportunities such as:

- Research and development (R&D) and adoption of new technology.
- Existing and committed future activities such as investments, restructuring, write-downs, or impairment of assets.
- Critical planning assumptions around legacy assets, for example, strategies to lower carbon-, energy-, and/or water-intensive operations.
- How GHG emissions, energy, and water issues, if applicable, are considered in capital planning and allocation; this could include a discussion of major acquisitions and divestments, joint-ventures, and investments in technology, innovation, and new business areas in light of changing climate-related risks and opportunities.
- The organization's flexibility in positioning/repositioning capital to address emerging climate-related risks and opportunities.

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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 in the [Task Force's report](#) for information on applying scenarios to forward-looking analysis.

Supplemental Guidance for Non-Financial Groups

Organizations with more than one billion U.S. dollar equivalent (USDE) in annual revenue should consider conducting more robust scenario analysis to assess the resilience of their strategies against a range of climate-related scenarios, including a 2°C or lower scenario and, where relevant to the organization, scenarios consistent with increased physical climate-related risks.^{37,38}

Organizations should consider discussing the implications of different policy assumptions, macro-economic trends, energy pathways, and technology assumptions used in publicly available climate-related scenarios to assess the resilience of their

³⁷ The Task Force expects the application of scenarios as a tool for forward-looking assessments of climate-related risk will evolve over time as scenarios, tools, and data are further developed and refined.

³⁸ Inclusion of a 2°C or lower scenario is intended to serve as an anchor point for all organizations that aligns with current international climate agreements, recognizing that the Paris Agreement currently says "well below 2 degrees."

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.

strategies.³⁹

For the climate-related scenarios used, organizations should consider providing information on the following factors to allow investors and others to understand how conclusions were drawn from scenario analysis:

- Critical input parameters, assumptions, and analytical choices for the climate-related scenarios used, particularly as they relate to key areas such as policy assumptions, energy deployment pathways, technology pathways, and related timing assumptions.
- Potential qualitative or quantitative financial implications of the climate-related scenarios, if any.⁴⁰

Risk Management

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

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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 A1](#) and [A2](#) (pp. 72-73), as appropriate.

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.

³⁹ This will help identify the key characteristics that are relevant to assessing long-term strategy (e.g., changes in regulation, technology, and physical impact).

⁴⁰ In discussing potential qualitative or quantitative financial implications, the Task Force is not asking organizations to provide a financial forecast (for which scenario analysis is not appropriate). Organizations are asked to provide an indication of direction or ranges of potential financial implications, for example, directionally where key financial aspects such as CapEx, R&D, supply chains, or revenue might be headed.

Metrics and Targets

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

<p>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.</p>	<p>Guidance for All Sectors Organizations should provide the key metrics used to measure and manage climate-related risks and opportunities as described in Tables A1 and A2 (pp. 72-73). 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 lower-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.</p> <hr/> <p>Supplemental Guidance for Non-Financial Groups For all relevant metrics, organizations should consider providing historical trends and forward-looking projections (by relevant country and/or jurisdiction, business line, or asset type). Organizations should also consider disclosing metrics that support their scenario analysis and strategic planning process and that are used to monitor the organization's business environment from a strategic and risk management perspective. Organizations should consider providing key metrics related to GHG emissions, energy, water, land use, and, if relevant, investments in climate adaptation and mitigation that address potential financial aspects of shifting demand, expenditures, asset valuation, and cost of financing. Illustrative examples of metrics for each of the four non-financial groups are provided in the tables listed below.</p> <ul style="list-style-type: none"> – Energy Group: Table 3 (pp. 54-55) – Transportation Group: Table 4 (pp. 57-58) – Materials and Buildings Group: Table 5 (pp. 60-61)⁴¹ – Agriculture, Food, and Forest Group: Table 6 (pp. 64-65)
<p>Recommended Disclosure b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.</p>	<p>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.⁴² GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.⁴³ As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.⁴⁴ GHG emissions and associated 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 the metrics.</p>

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⁴¹ The TCFD Secretariat corrected an error in Table 5 on December 15, 2017. Metric ton (MT) of carbon dioxide emissions (CO2e) was shown as an illustrative metric for real estate, but it should have been shown as an illustrative metric for metals and mining.

⁴² 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 more strongly impacted by transition risk than other organizations. In addition, current or future constraints on emissions, either directly in emission restrictions or indirectly through carbon budgets, may impact organizations financially.

⁴³ 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.

⁴⁴ 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.

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 c)

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

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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.

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The Task Force also developed illustrative metrics for each of the four key non-financial groups. The following sections provide a description of how each group may be affected by climate-related issues along with examples of metrics that may be relevant to the group. Importantly, the metrics provided are for illustrative purposes to help organizations consider the types of metrics best suited for their activities and operations.

Organizations should define metrics and targets that are tailored to their particular climate-related risks and opportunities and that address the key financial disclosure areas in the Task Force's supplemental guidance. In determining the most relevant and useful metrics, organizations are encouraged to engage with their key stakeholders, including investors, and review publicly available frameworks.⁴⁵ Again, the examples provided are illustrative to assist organizations in thinking about appropriate metrics. The examples are not intended to imply additional or duplicative metrics for an organization's existing suite of metrics if existing metrics achieve the intended disclosure objective.

⁴⁵ A number of frameworks currently exist that provide a range of metrics that an organization may find useful in disclosing various aspects of climate-related risks and opportunities for the organization. See, for example, GHG Protocol, Global Reporting Initiative, ISO Standards, Sustainability Accounting Standards Board, Climate Disclosure Standards Board, World Resources Institute, World Business Council for Sustainable Development, CDP, and various industry-specific guidance.

1. Energy Group

Energy is a critical element in the economy, serving as a primary or necessary input in most economic activities. This group comprises organizations extracting, processing, producing, and distributing fossil fuels or electric energy to other sectors of the economy. It includes, but is not limited to, industries listed in [Figure 10](#).

While many climate-related issues impact the Energy Group, organizations in this group should consider providing disclosures related to financial implications of potential physical impacts (e.g., reliance on water in areas of high water stress, severe storm/flood mitigations) and transition impacts (e.g., policy requirements, carbon prices, new technology, changes in market demand) of climate-related risks and opportunities.

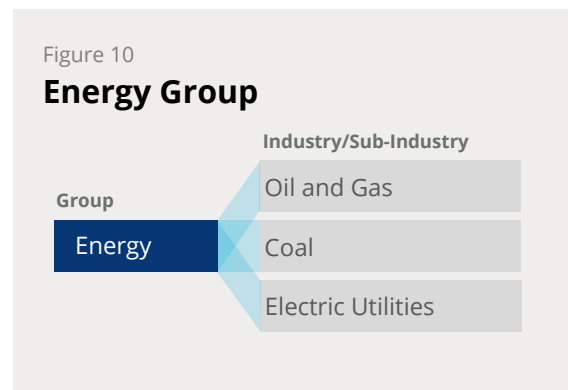
As fossil fuel and electricity providers, the organizations in this group generally have significant financial exposure around transition issues related to GHG emissions and, in many cases, are dependent on the availability of water. For example, a majority of the current electricity supply comes from non-renewable fossil fuel resources, resulting in a significant exposure to transitions around global GHG emissions—either directly through utility companies' own energy use for production or indirectly through combustion of fossil fuels.⁴⁶ Electric utilities, therefore, face significant transition risk (i.e., the financial risk arising from the changes in asset valuations caused by the structural shift toward a low-carbon energy system). This is because the utility sector's asset valuations are at risk from the disruptive impact of the policy, technology, and portfolio changes that will occur over the next two to three decades as policies, technology, and markets shift to a low-carbon energy system.

In addition to GHG emissions, both hydroelectric power generation and cooling for nuclear and non-nuclear power generation use large quantities of water.⁴⁷ Physical risks affecting water supplies creates a potentially important exposure for this industry.

Oil, gas, and coal extraction face similar transition risks as key suppliers to electric utilities. These industries also rely on water to a significant degree.^{48,49,50}

These characteristics make the Energy Group particularly sensitive to physical, policy, or technological changes affecting fossil fuel demand, energy production and usage, emission constraints, and water availability. The regulatory and competitive landscape that surrounds electric utilities also differs significantly between jurisdictions, thus making assessment of climate-related risks very challenging.

As a result, both the transition risks and physical risks associated with climate change may impact the operating costs and asset valuation of organizations engaged in energy activities. In particular, organizations within the Energy Group are generally capital intensive, require major financial investments in fixed assets and supply chain management, and have longer business strategy/capital



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⁴⁶ According to International Energy Agency (IEA) data, CO₂ emissions from fuel combustion across all energy sectors and activities totaled 32.2 Gigatons (Gt) in 2015, thereby accounting for 60 percent of total anthropogenic GHG emissions. The power-generation sector on its own accounted for 13.6Gt, representing 42 percent of all CO₂ emissions from energy and 25 percent of all anthropogenic GHG emissions. To put this into context, the next most important industrial sector was transportation, which accounted for 7.4Gt (23 percent of all CO₂ emissions from fuel combustion, and 14 percent of total anthropogenic GHG emissions). IEA, *CO₂ Emissions from Fuel Combustion: Highlights*. 2015.

⁴⁷ Michelle T.H. van Vilet, et al., "Power-generation system vulnerability and adaptation to changes in climate and water resources." *Nature Climate Change* 6 (2016): 375-380.

⁴⁸ IPIECA, *Water Resource Management in the Petroleum Industry*, 2005.

⁴⁹ International Council on Mining and Metals (ICMM), *In Brief: Water stewardship framework*, London: International Council on Mining and Metals, 2014.

⁵⁰ World Resources Institute (WRI), *Water-Energy Nexus: Business Risks and Rewards*, Washington, DC, 2016.

allocation planning horizons relative to many other sectors—horizons that may be particularly affected by climate-related risks and opportunities. This requires careful assessment of climate-related risks and opportunities to inform decisions about future sustainability and profitability.

Transparent and decision-useful climate-related disclosures are crucial to fully understand the impact of climate change on business strategy and financial plans in energy activities. Consequently, disclosures should focus on qualitative and quantitative assessments and potential impacts of the following:

- changes in compliance and operating costs, risks, or opportunities (e.g., older, less-efficient facilities or un-exploitable fossil fuel reserves in the ground);
- exposure to regulatory changes or changing consumer and investor expectations (e.g., expansion of renewable energy in the mix of energy supply); and
- changes in investment strategies (e.g., opportunities for increased investment in renewable energy, carbon-capture technologies, and more efficient water usage).

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Table 3














Energy Group Metrics – Illustrative Examples

Energy Group organizations should consider providing key GHG emissions, energy, water, land use, and low-carbon alternative metrics on the financial aspects related to revenue, costs, assets, liabilities, and capital allocation. [Appendix 2](#) includes definitions of the abbreviations used in “Unit of Measure.”

ENERGY GROUP METRICS – ILLUSTRATIVE EXAMPLES								
Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion	Oil and Gas	Coal	Electric Utilities
Revenues	GHG Emissions	Estimated Scope 3 emissions, including methodologies and emission factors used	MT of CO ₂ e	GRI: 305-3 CDP: EU4.3	(Relatively) high carbon emissions in the value chain may accelerate development of alternative technologies in a low-carbon economy. The level of emissions informs vulnerability to a significant decrease in future earning capacity.			
Revenues	Risk Adaptation & Mitigation	Revenues/savings from investments in low-carbon alternatives (e.g., R&D, equipment, products or services)	Local currency	CDP: CC3.2, 3.3, CC6.1 SASB: NR0103-14	New products and revenue streams from climate-related products and services and the return on investments of CapEx projects that create operational efficiencies.			
Expenditures	GHG Emissions	Describe current carbon price or range of prices used	Local currency	CDP: CC2.2 SASB: NR0101-22, NR0201-16	Internal carbon prices used, affecting the assessment of an organization’s key assets, provide investors with a proper understanding of the reasonableness of assumptions made as input for their risk assessment.			
Expenditures	Risk Adaptation & Mitigation	Expenditures (OpEx) for low-carbon alternatives (e.g., R&D, equipment, products, or services)	Local currency	GRI: G4-OG2 CDP: EU4.3	Expenditures for new technologies are needed to manage transition risk. The level of expenditures provides an indication of the level to which future earning capacity of core business might be affected.			
Expenditures	Risk Adaptation & Mitigation	Proportion of capital allocation to long-lived assets versus short-term assets	Percentage	N/A	Impacts of climate change are subject to uncertainty in terms of extent and timing. Understanding the allocation to long- versus short-lived assets informs the potential of an organization to adapt to emerging climate-related risks and opportunities.			
Expenditures	Water	Percent water withdrawn in regions with high or extremely high baseline water stress	Percentage	SASB: IF0101-06	Water stress can result in increased cost of supply, impacts to operations, and increased regulation/reduced access to water withdrawal. The percent withdrawn in high water-stress areas informs the risk of significant costs or limitations to production capacity.			
Expenditures	GHG Emissions	Amount of gross global Scope 1 emissions from: (1) combustion, (2) flared hydrocarbons, (3) process emissions, (4) directly vented releases, and (5) fugitive emissions/leaks	MT of CO ₂ e	SASB: NR0101-01	Relatively significant Scope 1 emissions are expected to drive regulations (including carbon prices) that require lower emissions from products. This can result in a significant decrease in future earning capacity.			

Table 3

Energy Group Metrics – Illustrative Examples *(continued)***ENERGY GROUP METRICS – ILLUSTRATIVE EXAMPLES**

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion	Oil and Gas	Coal	Electric Utilities
Expenditures	Energy/Fuel	Indicative costs of supply for current and committed future projects (e.g., through a cost curve or indicative price range. This could be broken down by product, asset, or geography)	Local currency	CDP: CC3.3	Cost of supply is important because in a market with falling demand, low-cost products will continue to be brought to market. Understanding the cost of supply informs investors about portfolio vulnerability and thus earning capacity.			
Assets	Water	Assets committed in regions with high or extremely high baseline water stress	Number of assets, value, percentage of total assets	SASB: IF0101-06	Water stress can result in interruptions to or limitations on production capacity or early curtailment of operating facilities. The value of assets in high water-stress areas informs the potential implications for asset valuation.			
Assets	Risk Adaptation & Mitigation	Investment (CapEx) in low-carbon alternatives (e.g., capital equipment or assets)	Local currency	GRI: G4-OG2 CDP: EU4.3	Investments in new technologies are needed to manage transition risk. The level of investment provides an indication of the level to which future earning capacity of core business might be affected.			
Assets	GHG Emissions	A breakdown of reserves by type and an indication of associated emissions factors to provide insight into potential future emissions	Amount of reserves MT of CO ₂ e per unit of reserves	SASB: NR0101-23	Transition to a low-carbon economy may affect the value of reserves or long-lived assets. Providing insight into potential future emissions can help to inform investors about the potential impacts of regulatory measures and demand changes on earning capacity.			
Capital	Risk Adaptation & Mitigation	Capital payback periods or return on capital deployed	Years, percentage return on investment	CDP: CC3.3	Impacts of climate change are subject to uncertainty in terms of extent and timing. Understanding the capital payback periods or return on capital deployed informs the vulnerability of the organization to emerging climate-related risks and opportunities and the flexibility to continue the current technology portfolio at lower financial returns in a transition period to low-carbon technologies.			

2. Transportation Group

The Transportation Group includes, but is not limited to, industries listed in [Figure 11](#).

Transportation is critical to the economy and drives a significant portion of emissions and demand for energy through the production and, more important, the use phase. The industry is under increasing policy and regulatory pressure to achieve emission targets for the use phase. Increasing constraints on emissions fuel efficiency will continue to impact costs in this group, particularly around investments in innovation (new technologies and efficiencies).⁵¹

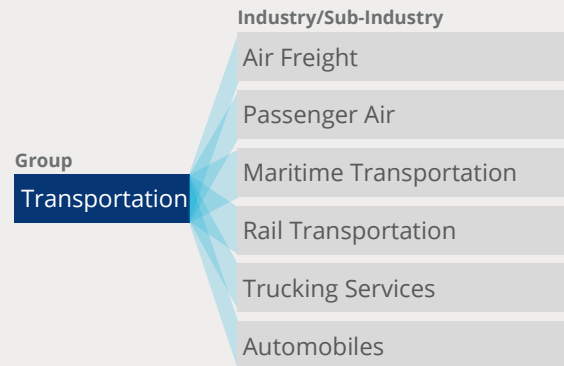
The Transportation Group, therefore, will likely face financial challenges from two major drivers. First, policymakers are setting stricter targets for emissions and fuel efficiency from transportation carriers. Second, new technology around low-emission/fuel-efficient carriers (e.g., electric cars) is creating a shift in the competitive and investment landscape. New technological innovations and new market entrants can weaken companies' market position, resulting in lower revenues, higher costs, and narrower margins. The effects of these two drivers may be compounded by the length of product cycles for transportation products, such as cars and trucks, and especially for air and rail and marine equipment. As with the Energy Group, investments in long-lived assets (e.g., manufacturing facilities, airplanes, ships) and longer planning horizons are relevant factors that must be taken into account when considering the climate-related risks and opportunities.

Consequently, disclosures should focus on qualitative and quantitative assessments and potential impacts of the following:

- financial risks around current plant and equipment, such as potential early write-offs of equipment and R&D investments or early phasing out of current products due to policy constraints or shifts or the emergence of new technology;
- investments in research and development of new technologies and potential shifts in demand for various types of transportation carriers; and
- opportunities to use new technologies to address lower-emissions standards and increased fuel-efficiency requirements, including transport vehicles (cars, ships, planes, rail) that run on a range of traditional and alternative fuels.

Figure 11

Transportation Group



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⁵¹ Moody's Global Credit Research, "Moody's: Auto sector faces rising credit risks due to carbon transition," September 20, 2016.

Table 4

Transportation Group Metrics – Illustrative Examples

Transportation Group organizations should consider providing key metrics related to the implications of GHG emissions and energy/fuel on the financial aspects related to revenue, costs, assets, liabilities, and capital allocation. [Appendix 2](#) includes definitions of the abbreviations used in “Unit of Measure.”

TRANSPORTATION GROUP METRICS – ILLUSTRATIVE EXAMPLES						Air Freight	Passenger Air	Maritime	Rail	Trucking	Automobiles
Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion						
Revenues	Energy/Fuel	Sales-weighted average fleet fuel economy, by region and weight/number of people transported	MPG, L/Km, gCO ₂ e/Km, Kg transported	SASB: TR0101-09	Fuel costs and associated emissions are high-priority issues for transportation companies. Understanding how an organization is managing a transition to more efficient equipment will provide insight into potential cost and regulatory impacts.	■	■	■	■	■	■
Revenues	Risk Adaptation & Mitigation	Revenues/savings from investments in low-carbon alternatives (e.g., R&D, equipment, products or services)	Local currency	CDP: CC3.2, 3.3, CC6.1 SASB: TR0102-4	New products and revenue streams from climate-related products and services and the return on investments of CapEx projects that create operational efficiencies.	■	■	■	■	■	■
Revenues	Risk Adaptation & Mitigation	Vehicle sales (historical, current and projected) by category (e.g., gas vehicles, diesel vehicles, battery electric vehicles, plug-in hybrid electric vehicles, alternative-powered vehicles (LPG, CNG, fuel cells, compressed air))	Number of vehicles sold, value of vehicles sold	SASB: TR0101-10	New technologies are needed to manage transition risk, and demand will grow for lower-carbon product alternatives. Organizations with stronger offerings of low-carbon alternative products in their core business will be better positioned for success in the low carbon economy.						■
Revenues	Risk Adaptation & Mitigation	Energy Efficiency Design Index (EEDI) for new ships	Grams of CO ₂ e per ton-nautical mile	SASB: TR0301-05	Per the IMO, all ships built since January 2013 should be compliant with EEDI efficiency standards. A larger percentage of EEDI equipment within an organization’s fleet (i.e., lower emissions-intensity fleet overall) would indicate better positioning for transition to a low-carbon economy where efficiency regulations could financially affect organizations.			■			
Expenditures	Risk Adaptation & Mitigation	Expenditures (OpEx) for R&D for low-carbon transportation equipment or transportation services	Local currency	SASB: TR0201-F (Age of fleet)	Expenditures for new technologies are needed to manage transition risk. The level of expenditures provides an indication of the level to which future earning capacity of core business might be affected.	■	■	■	■	■	■

Table 4

Transportation Group Metrics – Illustrative Examples *(continued)*

TRANSPORTATION GROUP METRICS – ILLUSTRATIVE EXAMPLES

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion	Air Freight	Passenger Air	Maritime	Rail	Trucking	Automobiles
Expenditures	Energy/Fuel	Total fuel consumed and percent renewable for road, airlines, marine, rail	GJ, percentage	SASB: TR0201,2-03, TR0301-03, TR0401-03	In the transition to a low-carbon economy, fossil fuels will phase out whereas renewable energy will phase in. The percentage of these energy sources embedded in current assets informs the level to which future earning capacity of core business might be affected or asset value impaired.	■	■	■	■	■	■
Expenditures	GHG Emissions	Road vehicles—Geographic breakdown of GHG emissions and/or emission intensity of products for key geographies against regulatory requirements/targets	MT of CO ₂ e or CO ₂ e/Km	CDP: AU2.3	Part of transition risk is the potential implementation of product-efficiency regulations by geography. It is important to understand how organizations are operating within these geographies and the potential exposure/impact of noncompliance.					■	■
Assets	GHG Emissions	Life cycle reporting of GHG emissions of Transportation products (air, ship, rail, truck, auto)	MT of CO ₂ e	SASB: TR0101-01/02/03, TR0102-02/05/06	How an organization manages its product life cycle emissions and utilization of raw materials will provide insight into the organization's ability to adapt to a low-carbon economy.	■	■	■	■	■	■
Assets	Risk Adaptation & Mitigation	Investments (CapEx) in low-carbon transportation equipment or transportation services	Local currency	SASB: TR0201-F (Age of fleet)	Investments in new technologies are needed to manage transition risk. The level of investment provides an indication of the level to which future earning capacity of core business might be affected.	■	■	■	■	■	■

3. Materials and Buildings Group

The Materials and Buildings Group includes, but is not limited to, industries listed in [Figure 12](#).

Materials and Buildings Group organizations are typically capital intensive, require high investments in plants, equipment, and buildings that are (relatively) fixed in terms of location, and dependent on sources of raw and refined materials. This may reduce the flexibility of organizations in this group to adapt to risks of climate change.

Many of this group's activities result in financial exposures around high GHG emissions and high energy consumption. Furthermore, a number of industries in this group are dependent on water availability and/or vulnerable to the effects of acute or chronic physical risks from weather events.

Since the group is capital intensive and the plants and facilities have a long life span, accelerated R&DDD (research, development, demonstration, and deployment) is critically important. Thus, disclosures relating to R&DDD plans and progress are valuable to see the current and future situation and risks of organizations in the group.

Consequently, disclosures should focus on qualitative and quantitative assessments and potential impacts of the following:

- Stricter constraints on emissions and/or pricing carbon emissions and related impact on costs.
- The construction materials and real estate sectors should assess risks related to the increasing frequency and severity of acute weather events or increasing water scarcity that impact their operating environment.
- Opportunities for products (or services) that improve efficiency, reduce energy use, and support closed-loop product solutions.



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Materials and Buildings Group – Illustrative Examples

Materials and Buildings Group organizations should consider providing key metrics related to the implications of GHG emissions, energy, and water on the financial aspects related to revenue, costs, assets, and financing costs. [Appendix 2](#) includes definitions of the abbreviations used in “Unit of Measure.”

MATERIALS AND BUILDINGS GROUP METRICS - ILLUSTRATIVE EXAMPLES						Metals and Mining	Chemicals	Construction Materials	Capital Goods	Real Estate
Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion					
Revenues	Risk Adaptation & Mitigation	Revenues/savings from investments in low-carbon alternatives (e.g., R&D, equipment, products or services)	Local currency	CDP: CC3.2, 3.3, CC6.1 SASB: IF0403-1	New products and revenue streams from climate-related products and services and the return on investments of CapEx projects that create operational efficiencies.	■	■	■	■	■
Expenditures	Risk Adaptation & Mitigation	Expenditures (OpEx) for low-carbon alternatives (e.g., R&D, technology, products, or services)	Local currency	GRI 302-5	Expenditures for new technologies are needed to manage transition risk. The level of expenditures provides an indication of the level to which the future earning capacity of the core business might be affected.	■	■	■	■	■
Expenditures	Energy/Fuel	Total energy consumed, broken down by source (e.g., purchased electricity and renewable sources)	GJ	SASB: IF0402-02 GRI: 302-1	The metals and mining industries are energy- and emission-intensive industries. Buildings also account for a large portion of energy and fuel consumption, particularly in relation to heating. Understanding the levels of energy consumption by source provides an indication of the potential impact of regulatory measures in relation to the use of certain energy sources as well as the transition risks in a low-carbon economy scenario.	■	■	■	■	■
Expenditures	Energy/Fuel	Total fuel consumed—percentage from coal, natural gas, oil, and renewable sources	GJ	SASB: NR0302-04		■	■	■	■	■
Expenditures	Energy/Fuel	Total energy intensity—by tons of product, amount of sales, number of products depending on informational value	GJ	GRI 302-3	In the transition to a low-carbon economy, the energy-efficiency levels achieved in production provide investors with an indication of the vulnerability of the product portfolio to transition risk and thus earning capacity.	■	■	■	■	■
Expenditures	Energy/Fuel	Building energy intensity (by occupants or square area)	GJ	SASB: IF0402-02; GRI: G4-CRE1; GRESB: Q25.2	In the transition to a low-carbon economy, the energy efficiency of properties provides investors with an indication of the vulnerability of the portfolio to transition risk and thus earning capacity of real estate portfolios.					■
Expenditures	Water	Percent of fresh water withdrawn in regions with high or extremely high baseline water stress	Percentage	SASB: NR0401-05	Water stress can result in increased cost of supply, factual inability to produce, and/or legislation to regulate water withdrawal for production. The percent withdrawn in high water-stress areas informs the risk of significant costs or limitations to production capacity.	■	■	■	■	■

Table 5

Materials and Buildings Group – Illustrative Examples *(continued)*

MATERIALS AND BUILDINGS GROUP METRICS - ILLUSTRATIVE EXAMPLES						Metals and Mining	Chemicals	Construction Materials	Capital Goods	Real Estate
Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion					
Expenditures	Water	Building water intensity (by occupants or square area)	Cubic meters	GRI: G4-CRE2; GRESB: Q27.2	Water stress can result in increased cost of supply, factual inability to deliver water to real estate tenants, and/or legislation to regulate water withdrawal for consumption. The building water intensity informs the (transition) risk of significant costs or limitations to this service capacity.					
Expenditures	GHG Emissions	GHG emissions intensity from buildings (by occupants or square area) and from new construction and redevelopment	GJ	GRI: G4-CRE3/ CRE4	In the transition to a low-carbon economy, the carbon efficiency of the properties provides investors with an indication of the vulnerability of the product portfolio to transition risk and thus earning capacity of real estate portfolios.					
Assets	Location	Area of buildings, plants or properties located in designated flood hazard areas	Percentage probability, costs to insure in local currency Square meters or acres	GRESB: Q15.1, 15.2 SASB: IF0401-13, 02-13 SASB: IF0402-13	Flooding risks can result in physical damage to properties, affecting their serviceability. Understanding the potential impacts of flooding risks and the related financial implications informs investors about potential changes to the earning capacity of real estate portfolios.					
Assets	GHG Emissions	A breakdown of reserves and an indication of associated emissions factors to provide insight into potential future emissions	Metric ton (MT) of carbon dioxide emissions (CO ₂ e)	SASB: NR0101-23	A transition to a low-carbon economy may affect the value of reserves. Providing insight into potential future emissions can help to inform investors about the potential impacts of regulatory measures and demand changes on earning capacity.					
Assets	Risk Adaptation & Mitigation	For each property type, the percentage certified as sustainable	Percentage	GRESB: NC5.2/ CA2/Q30.1/ Q30.2/Q31	Regulatory measures such as carbon pricing as well as transition to low-carbon properties may affect the financial viability of existing properties. Understanding the percentage certified as sustainable (against relevant indices) provides investors with an indication about the potential impact of regulatory measures and demand changes on earning capacity of real estate portfolios.					
Assets	Risk Adaptation & Mitigation	Investment (CapEx) in low-carbon alternatives (e.g., capital equipment or assets)	Local currency	GRI 302-5	Investments in new technologies are needed to manage transition risk. The level of investment provides an indication of the level to which the future earning capacity of the core business might be affected.					

4. Agriculture, Food, and Forest Products Group

The Agriculture, Food, and Forest Products Group includes, but is not limited to, industries listed in [Figure 13](#).

Climate-related risks and opportunities in this group largely emanate from GHG emissions and water and waste management driven by land use, production practices, and changing land-use patterns.⁵²

The absolute and relative impacts of climate-related transition and physical risks will vary between producers and processors of food and fiber.

Producers, such as agriculture and forestry enterprises, will likely be

impacted financially to a somewhat greater degree by GHG and water risks (including extreme weather events and shifts in precipitation patterns) than processors. Agriculture and forest producers generate significant non-point GHG emissions, primarily through land-use practices and changes to them (e.g., grazing, soil tillage practices, conservation practices, feedlot practices, deforestation, or afforestation).⁵³

Processors, such as food, beverage, and fiber processors (e.g., paper), will likely be impacted relatively less by direct GHG emissions (Scope 1), but more by indirect GHG emissions (Scope 3) arising from their supply and distribution chains. Processors will also have a similar emphasis on water and waste risks and opportunities as compared with producers. Beverage production and paper production, for example, depend on access to significant water resources and, in the case of beverage production, high-quality water resources. Risks and opportunities around waste include residual materials such as paper and wood waste, waste water, and post-processing animal byproducts.

Assessing the impacts of climate-related risks and opportunities for the Agriculture, Food, and Forest Products Group involves a number of interactions and trade-offs among the climate-related aspects of land use, water, waste, carbon sequestration, biodiversity, and conservation, complicated by short-run competing goals around food security (e.g., maintaining production sufficient to meet the rising demand for food, fiber, fodder, and biofuels).

Policies and regulations around land use and conservation requirements, for example, may constrain or preclude certain uses of land and water resources (e.g., deforestation, riparian rights, tillable land). Such policies may lead to significant asset impairment if forest or agricultural lands cannot be used to produce food or fiber.

Opportunities in the Agriculture, Food, and Forest Products Group largely fall into three categories:



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⁵² According to the Inter-Governmental Panel on Climate Change (IPCC), agriculture and forestry is responsible for “just under a quarter of anthropogenic GHG emissions mainly from deforestation and agricultural emissions from livestock, soil, and nutrient management. Anthropogenic forest degradation and biomass burning (forest fires and agricultural burning) also represent relevant contributions.” (IPCC. “Agriculture, Forestry and Other Land Use (AFOLU),” In: *Climate Change 2014: Mitigation of Climate Change*, 2014. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change). Agriculture is also a heavy user of water, primarily for irrigation.

⁵³ For more information, see definitions of *land use change* and *indirect land use change* on page 1,265 of the IPCC’s [Climate Change 2014: Mitigation of Climate Change](#).

- Increasing efficiency by lowering the level of carbon and water intensity per unit of output (e.g., through drought-resistant hybrids, nutrient-efficient genetically modified organisms (GMOs), feed and feed practices that reduce livestock methane emissions).
- Reducing inputs and residual waste for a given level of output (e.g., nutrient management practices, tillage practices, conservation practices, biofuels, food waste reduction).
- Developing new products and services with lower carbon and water intensity (e.g., bioplastics).

Disclosures, therefore, should focus on qualitative and quantitative information related to both the group's policy and market risks in the areas of GHG emissions and water, and its opportunities around carbon sequestration, increasing food and fiber production, and reducing waste, including:

- Efforts to reduce GHG emissions and water intensity, including such non-point GHG sources as crop nutrient processes, livestock management processes, erosion, tillage practices, watershed practices, and forest management.
- Efforts to improve sustainability through better recycling of outputs and residual waste (e.g., wood products, food waste, and animal byproducts).
- Climate-related impacts on food and fiber production (e.g., extreme weather or water events).
- Opportunities that capture shifts in business and consumer trends toward food and fiber products, processes and services that produce lower emissions and are less water-/waste-intensive while maintaining adequate food security (e.g., bioplastics, GMOs, new uses for wood/animal byproducts).

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Table 6

Agriculture, Food, and Forest Products Group Metrics – Illustrative Examples

Agriculture, Food, and Forest Products Group organizations should consider providing key metrics related to the implications of GHG emissions, energy and water on the financial aspects related to revenue, costs, assets, liabilities, and capital allocation. [Appendix 2](#) includes definitions of the abbreviations used in “Unit of Measure.”

AGRICULTURE, FOOD, AND FOREST PRODUCTS GROUP METRICS – ILLUSTRATIVE EXAMPLES						Beverages	Agriculture	Packaged Foods and Meats	Paper and Forest Products
Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion				
Revenues	Risk Adaptation & Mitigation	Revenues/savings from investments in low-carbon alternatives (e.g., R&D, equipment, products or services)	Local currency	CDP: CC3.2, 3.3, 6.1	New products and revenue streams from climate-related products and services and the return on investments of CapEx projects that create operational efficiencies.	■	■	■	■
Expenditures	Risk Adaptation & Mitigation	Expenditures (OpEx) for low-carbon/water alternatives (e.g., R&D, equipment, products, or services)	Local currency	GRI: G4-OG2 CDP: EU4.3	Expenditures for new technologies are needed to manage transition risk. The level of expenditures provides an indication of the level to which future earning capacity of core business might be affected.	■	■	■	■
Expenditures	Water	Total water withdrawn and total water consumed	Cubic meters	SASB: CN0101-06	Water stress can result in increased cost of supply, factual inability to produce, and/or legislation to regulate water withdrawal for production. The quantity of water consumed and percent withdrawn in high water-stress areas inform the risk of significant costs or limitations to production capacity.	■	■	■	■
Expenditures	Water	Percent of water withdrawn and consumed in regions with high or extremely high baseline water stress	Percentage	SASB: CN0101-06		■	■	■	■
Assets	Water	Amount of assets committed in regions with high or extremely high baseline water stress	Number of assets, value, percentage of total assets	SASB: IF0101-06	Water stress can result in limitations to production capacity or enforced demolition of assets. The level of assets in high water-stress areas informs the potential implications on asset valuation.	■	■	■	■
Assets	GHG Emissions	Non-mechanical (Scope 1): Emissions from biological processes	MT of CO ₂ e	CDP: FBT 1.3c	For agriculture, non-mechanical emissions sources are greater than mechanical sources. Reliance on biological systems means emissions or removals of GHGs generally occurs through much more complex mechanisms than emissions from mechanical equipment used on farmland. It is important to understand the scope of an organization's land-related biological emissions, as well as recent or potential changes due to continuous processes and/or discrete events, to assess the financial and regulatory impact on an organization's production and land use.	■	■	■	■

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Agriculture, Food, and Forest Products Group Metrics – Illustrative Examples *(continued)***AGRICULTURE, FOOD, AND FOREST PRODUCTS GROUP METRICS – ILLUSTRATIVE EXAMPLES**

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion	Beverages	Agriculture	Packaged Foods and Meats	Paper and Forest Products
Assets	GHG Emissions/Land Use	Land use change (Scope 1): Changes of carbon stocks as a result of land use and land use changes (e.g., from the conversion of native habitats into farmlands)	MT of CO ₂ e	CDP: FBT 1.3c	For agriculture, non-mechanical emissions sources are greater than mechanical sources. Reliance on biological systems means emissions or removals of GHGs generally occurs through much more complex mechanisms than emissions from mechanical equipment used on farmland. It is important to understand the scope of an organization's land-related biological emissions, as well as recent or potential changes due to continuous processes and/or discrete events, to assess the financial and regulatory impact on an organization's production and land use.		■	■	■
Expenditures	GHG Emissions	Mechanical (Scope 1): Emissions from equipment or machinery operated on farms/plants	MT of CO ₂ e	SASB: CN0101-01, CDP FBT 1.3b	Relatively high carbon emissions in the value chain are expected to result in regulations (including carbon prices) to drive lower emissions from products. This can result in a significant decrease in future earning capacity.		■		■
Expenditures	GHG Emissions	Purchased energy (Scope 2): Emissions from purchased heat, steam, and electricity consumed on the farm /plant	MT of CO ₂ e	CDP: FBT 1.3b			■	■	■
Assets	Risk Adaptation & Mitigation	Investment (CapEx) in low-carbon/water alternatives (e.g., capital equipment or assets)	Local currency	GRI: G4-OG2 CDP: EU4.3	Investments in new technologies are needed to manage transition risk. The level of investment provides an indication of the level to which future earning capacity of core business might be affected.	■	■	■	■

F Fundamental Principles for Effective Disclosure

F 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.⁵⁴ 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.

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.

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.

⁵⁴ These principles are adapted from those included in the Enhanced Disclosure Task Force's "Enhancing the Risk Disclosures of Banks."

- 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.

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, analysts). 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.

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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 1: Climate-Related Risks, Opportunities, and Financial Impacts

The central objective of the Task Force’s recommendations is to encourage organizations to evaluate and disclose, as part of their financial filing preparation and reporting processes, the material climate-related risks and opportunities that are most pertinent to their business activities.

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. The Task Force identified certain subcategories under each of these categories.

Transition Risks	Physical Risks
<ul style="list-style-type: none"> – Policy and Legal – Technology – Market – Reputation 	<ul style="list-style-type: none"> – Acute – Chronic

The Task Force divided climate-related opportunities into five major categories related to 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.

Opportunities
<ul style="list-style-type: none"> – Resource Efficiency – Energy Source – Products and Services

[Tables A1](#) and [A2](#) (pp. 72-73) provide examples and potential financial impacts related to the specific categories of climate-related risks and opportunities the Task Force identified. Please note that the sub-category risks and examples described under each major category are not mutually exclusive, and some overlap exists.

Following [Tables A1](#) and [A2](#), [Tables A3](#) and [A4](#) (pp. 74-75) describe selected sources of information related to climate-related risks and opportunities. [Table A5](#) (p. 76) provides additional examples of how organizations could be affected by climate-related financial impacts.

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Table A1

Examples of Climate-Related Risks and Potential Financial Impacts

Type	Climate-Related Risks ⁵⁵	Potential Financial Impacts	
<p>A Introduction</p> <p>B Recommendations</p> <p>C Guidance for All Sectors</p> <p>D Supplemental Guidance for the Financial Sector</p> <p>E Supplemental Guidance for Non-Financial Groups</p> <p>F Fundamental Principles for Effective Disclosure</p> <p>Appendices</p>	Transition Risks	<p>Policy and Legal</p> <ul style="list-style-type: none"> – Increased pricing of GHG emissions – Enhanced emissions-reporting obligations – Mandates on and regulation of existing products and services – Exposure to litigation 	<ul style="list-style-type: none"> – 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
		<p>Technology</p> <ul style="list-style-type: none"> – Substitution of existing products and services with lower emissions options – Unsuccessful investment in new technologies – Costs to transition to lower emissions technology 	<ul style="list-style-type: none"> – 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
		<p>Market</p> <ul style="list-style-type: none"> – Changing customer behavior – Uncertainty in market signals – Increased cost of raw materials 	<ul style="list-style-type: none"> – 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)
		<p>Reputation</p> <ul style="list-style-type: none"> – Shifts in consumer preferences – Stigmatization of sector – Increased stakeholder concern or negative stakeholder feedback 	<ul style="list-style-type: none"> – 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
		<p>Acute</p> <ul style="list-style-type: none"> – Increased severity of extreme weather events such as cyclones and floods 	<ul style="list-style-type: none"> – 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)
		<p>Chronic</p> <ul style="list-style-type: none"> – Changes in precipitation patterns and extreme variability in weather patterns – Rising mean temperatures – Rising sea levels 	<ul style="list-style-type: none"> – 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

⁵⁵ The sub-category risks described under each major category are not mutually exclusive, and some overlap exists.

Table A2

Examples of Climate-Related Opportunities and Potential Financial Impacts

Type	Climate-Related Opportunities ⁵⁶	Potential Financial Impacts
Resource Efficiency	<ul style="list-style-type: none"> – 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 	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – 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 	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – 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 	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – Access to new markets – Use of public-sector incentives – Access to new assets and locations needing insurance coverage 	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – Participation in renewable energy programs and adoption of energy-efficiency measures – Resource substitutes/diversification 	<ul style="list-style-type: none"> – 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

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⁵⁶ The opportunity categories are not mutually exclusive, and some overlap exists.

Table A3

Sectors and Industries Affected by Climate-Related Risks

Source	Description
Mercer Investing in a Time of Climate Change	Highlights the potential variability of climate change on returns across 14 asset classes and 14 industry sectors over a 35-year period. It concludes that median annual returns could vary from +3.5 percent (for renewables) to -4.9 percent (for coal) under different climate scenarios.
Moody's Investors Service Environmental Risks Heat Map	Qualitatively scores 86 rated sectors globally for credit exposure to environmental risks in terms of both the materiality and timing of any likely credit effects. Scoring is based on five subcategories of environmental risk, of which one subcategory is carbon regulation. It identified 13 sectors with very high or high exposure to carbon regulations.
S&P Global Ratings How Environmental and Climate Risks Factor Into Corporate Ratings	Identifies subsectors that are most exposed to environmental and climate-related risks and how ratings have been impacted over a two-year look back period by risk. Highlights nearly 300 cases where such risks affected the rating analysis and around 60 cases where rating revisions were made.
Sustainability Accounting Standards Board Technical Bulletin #: TB001-101816	Profiles climate-related risk across 79 industries related to physical effects, transition to a low-carbon economy, and climate-related regulation. It also considers revenue impacts, cost impacts, asset impacts, and financing impacts. It identifies 72 industries significantly affected by climate-related risk, although the risk manifests itself differently from one industry to the next.
World Resources Institute (WRI) and United Nations Environment Program Finance Initiative (UNEP FI) Proposed Discussion Framework on Carbon Asset Risk	<p>Explores sector-level exposure to three indicators of carbon risk (sector carbon intensity of sales, physical assets life span, and EBIT margin). The report identifies sectors with the highest potential exposure to a low-carbon transition. They include organizations with:</p> <ul style="list-style-type: none"> – fossil fuel assets such as coal and consumable fuels that have high carbon intensity per \$ sales, – fossil-fuel-dependent infrastructure such as utilities, pipelines, airports and railways that have high physical asset life spans, – high-carbon assets facing a shift to low-carbon technologies (e.g., energy-using equipment in the transport sector), and – high carbon assets without low-carbon competitors (e.g., for production of basic materials).

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Examples of Climate-Related Opportunities

Source	Description
Bloomberg New Energy Finance (BNEF) Guide to Green Bonds (available on Bloomberg Terminal)	Provides guidelines for identifying green bonds on the Bloomberg terminal. The classifications are consistent with International Capital Market Association principles and include labeled and unlabeled clean energy-related securities. Using use of proceeds, governance process, project details, management of proceeds, reporting information and assurance, Bloomberg has built a classification system that allows companies and investors to better identify sustainable investment opportunities within their own companies and the markets.
New Energy Exposure Rating (available on Bloomberg Terminal)	Represents BNEF's estimate of the percent of an organization's value that is attributable to its activities in renewable energy, energy smart technologies, carbon capture and storage, and carbon markets. Sector and sub-activities are analyzed within these clean energy areas, which combined with reported segmented revenues and other available financial and energy metrics, contribute to the exposure estimate. The ratings show which organizations have high or low amounts of value derived from these activities, enabling investors and companies to better analyze investment and business growth opportunities.
Climate Bonds Initiative www.climatebonds.net	Develops standards for green bond classifications and provides analysis on climate bond developments. Technical working groups identify key issues and investment opportunities for areas such as solar, wind, low carbon buildings, and others.
FTSE Russell Low Carbon Economy Model	Measures green revenues of 13,400 companies, across 60 subsectors with seven years of data and allows users to track revenues from goods, products, and services that help the world adapt to, mitigate, or remediate the impact of climate change. Revenues from a broad range of large, mid and small capitalization companies in 48 developed and emerging markets are mapped to 60 new green industrial subsectors, with FTSE Russell assigning each company in the model a low carbon industrial indicator factor, representing the ratio of its green revenues to its total revenues.
Global Investor Coalition on Climate Change Climate Change Investment Solutions	Provides asset owners with a range of investment strategies and solutions to address the risks and opportunities associated with climate change. The guide includes a specific framework for considering climate-related investment opportunities, with steps for strategic review, strategic asset allocation, mitigation investment actions, and adaption investment actions and provides examples of opportunities, growth drivers, and investment vehicles for industries ranging from transportation to retail.
International Capital Market Association Green Bond Principles	Provides guidelines for green bond issuers to promote transparency in the developing green bond market. The principles provide issuers with guidance on the key components for bringing a green bond to market, they aid investors by promoting availability of information necessary to evaluate the environmental impact of their green bond investments, and they assist underwriters by moving the market towards expected disclosures that should help facilitate transactions.

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Table A5

Examples of Potential Climate-Related Impacts by Financial Category

Category and Definition	Climate-Related Implications ⁵⁷	Examples of Potential Financial Impacts	Rationale and Illustrative Metrics
Revenue Income from normal business activities, usually from the sale of goods and services	Changing market demand for product and services due to climate-related risks/opportunities, such as a shift in customer preferences. Sensitivity of existing revenue streams, products, and services to constraints on, or perceptions of, carbon intensity, emissions, water intensity, land use. Development of new revenue streams, products, and services in response to climate-related opportunities.	- Revenue from operational disruption +/- Revenue from changing sales of products/services	Drivers of climate change, such as water usage, emissions, and land use are expected to be the focus of regulations (e.g. standards, emission limits, carbon prices), technology development, and market changes. These policy, market, and technology changes may result in a significant shift in an organization's future earning capacity depending on the emissions, energy, and water intensity of its products and services relative to constraints and demands. Example Metrics: <ul style="list-style-type: none"> • Percentage of revenue by product or service line • Energy, emission, water intensity of each product or service line
Expenditures: OpEx Ongoing cost of running a company	Required or discretionary increases in operating expenditures to address climate-related risk mitigation, adaptation, regulatory requirements, or cost of supply/materials. Decreases in expenses as a result of increased energy or water efficiency in response to climate-related risks.	+ R&D in new technology, products, services +/- Purchased energy and water and other costs of supply/materials + Increased production costs due to changing output requirements (e.g., waste treatment, emissions controls) + Costs to improve energy or water conservation and efficiency capabilities + Expenses to address physical risks (e.g., insurance premiums, recovery expenses)	Drivers of climate change, such as water usage, emissions, and land use are expected to be the focus of regulations (e.g., standards, emission limits, carbon prices), technology development, and market changes. These policy, market, and technology changes may result in a significant shift in an organization's cost of supply and operating expenses depending on the emissions, energy, and water intensity and land use of an organization in its business activities. Example Metric: <ul style="list-style-type: none"> • Percentage of R&D expenditures for low-carbon alternatives and energy/water efficiencies
Assets: CapEx An expense where the benefit continues over a long period; non-recurring nature; results in acquisition of permanent assets	Required or discretionary increases in capital expenditures to address climate-related risk mitigation, adaptation, or regulatory requirements.	+ CapEx in equipment or new technologies to manage transition risk, adaptation, and conservation/efficiency efforts + CapEx for physical risk mitigation (e.g., facilities location/hardening, resiliency capabilities) +/- Investment hurdles affected by internal and external carbon prices.	Drivers of climate change, such as water usage, emissions, and land use are expected to be the focus of regulations (e.g., standards, emission limits, carbon prices), technology development, and market changes. These policy, market, and technology changes may result in a significant shift in an organization's planned capital expenditures, including acquisition or disposal of assets, investments in land and facilities, acquisition of new technology, and other shifts, depending on how the organization responds to identified climate-related issues. Example Metrics: <ul style="list-style-type: none"> • Percentage of CapEx allocated to low-carbon/renewable assets, deployment of low-carbon technology, efficiency of facilities • Internal/External carbon price and discount rate used to establish investment hurdle rates

⁵⁷ The information contained in this table is not intended to reflect accounting treatments, but rather seeks to lay out a general understanding of how climate-related risks might affect general financial categories. Importantly, there are a number of relationships among some of the financial implications illustrated in the table. For example, legal liabilities for climate change (a contingent liability) may be realized as an expense if a judgment is rendered. Similarly, expenses on mitigation and adaptation efforts may result in future cost savings (expense reductions).

Table A5

Examples of Potential Climate-Related Impacts by Financial Category *(continued)*

Category and Definition	Climate-Related Implications ⁵⁶	Examples of Potential Financial Impacts	Rationale and Illustrative Metrics
Assets: Tangible Land, equipment, facilities, reserves, cash, etc.	Changes in the value of an organization's assets, or the acquisition or sale of assets, as a result of climate-related risks and opportunities.	+/- Value of assets based on emissions, energy or water intensity; carbon price; demand - Write-offs/early retirement of existing assets due to high emissions, energy, water intensity - Physical damage or impairment of assets due to weather events and other acute or chronic physical climate effects	Climate change, especially the transition to a low-carbon economy, may affect the value of an organization's assets (either positively or negatively) depending on how the organization is positioned regarding emissions, energy, water, and land use. Example Metrics: <ul style="list-style-type: none"> • Value, and percent by value, of assets located in coastal or flood zones • Breakdown of assets by associated current or potential future emissions (MT CO₂e), water intensity, or energy intensity
Assets: Intangible Brand, copyrights, goodwill	Changes in an organization's reputation as a result of perceptions about its management of climate-related risks and opportunities.	+/- Brand value +/- Value of copyrights - Reduction or disruption in production capacity (e.g., shutdowns, delayed planning approvals, interruptions to supply chain) - Impacts on workforce management (e.g., employee attraction and retention)	How an organization plans and invests in a transition to a low-carbon economy may positively or negatively affect perceptions about the organization and its reputation, which in turn may affect its future earning capacity, market valuation, employee relationships, and relationships with regulators and customers. Climate-related risks and opportunities also may positively or negatively affect the value of technology patents or copyrights.
Liabilities Contingent Liabilities ⁵⁸	The potential for liability or civil/criminal penalties for the organization's climate-related activities.	+ Legal liability for climate-related risks + Compliance penalties	As laws, regulations, and case law related to an organization's preparedness for climate change evolves, the incident or probability of contingent liabilities arising for an organization may increase. Example Metric: Amount reserved for pending legal actions
Liabilities Current Liabilities (<= 1 year)	Changes in cost and level of current liabilities as a result of climate-related risks and opportunities		Drivers of climate changes, such as water usage, emissions, and land use are expected to be the focus of regulations (e.g. standards, emission limits, carbon prices), technology development, and market changes; These policy, market and technology changes may result in a significant shift in an organization's revenues, cost of supply/materials/production, and capital expenses. An organization's demonstrated ability to manage these changes (positively or poorly) may affect: <ul style="list-style-type: none"> • Access to capital and debt markets • Equity price and risk premium on debt • Creditworthiness • Exposure to divestment risk • Ability/flexibility in responding to climate-related risks and opportunities by being able to competitively tap financing markets
Financing Long-Term Debt Liabilities (> 1 year)	Changes in cost and level of long-term debt as a result of climate-related risks and opportunities	+/- Amount of debt +/- Amount of equity capital +/- Credit rating +/- Stock price	
Financing Equity Capital	Changes in the cost and level of equity capital as a result of climate-related risks and opportunities	+/- Debt interest rates	

⁵⁸ Contingent liabilities are liabilities that may be incurred depending on outcome of an uncertain future event. Likelihood of loss is often described as probable, reasonably possible, or remote; ability to estimate loss is described as known, reasonably estimable, or not reasonably estimable.

Appendix 2: 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.”⁵⁹

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.⁶⁰

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.”⁶¹ “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.”⁶²

GREENHOUSE GAS (GHG) EMISSIONS SCOPE LEVELS⁶³

- **Scope 1** refers to all direct GHG emissions.

⁵⁹ OECD, [G20/OECD Principles of Corporate Governance](#), OECD Publishing, Paris, 2015.

⁶⁰ Based on Climate Disclosure Standards Board, “[CDSB Framework for Reporting Environmental Information and Natural Capital](#).” June 2015.

⁶¹ A. Cadbury, [Report of the Committee on the Financial Aspects of Corporate Governance](#). London, 1992.

⁶² OECD, [G20/OECD Principles of Corporate Governance](#), OECD Publishing, Paris, 2015.

⁶³ World Resources Institute and World Business Council for Sustainable Development, [The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard \(Revised Edition\)](#). March 2004.

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- **Scope 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.⁶⁴

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.

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.

STRATEGY refers to an organization's desired future state. An organization's strategy establishes a foundation against which it can monitor and measure its progress in reaching that desired state. Strategy formulation generally involves establishing the purpose and scope of the organization's activities and the nature of its businesses, taking into account the risks and opportunities it faces and the environment in which it operates.

Abbreviations

AODP—Asset Owners Disclosure Project

CDSB—Climate Disclosure Standards Board

CNG—Compressed natural gas

CO₂—Carbon dioxide

CO₂e—Carbon dioxide equivalent

EDTF—Enhanced Disclosure Task Force

EEDI—Energy Efficiency Design Index

FSB—Financial Stability Board

G20—Group of 20

GHG—Greenhouse gas

GJ—Gigajoules

GMO—Genetically modified organism

GRI—Global Reporting Initiative

IEA—International Energy Agency

IIRC—International Integrated Reporting Council

IPCC—Intergovernmental Panel on Climate Change

Kg—Kilogram

Km—Kilometer

L—Liters

LPG—Liquefied petroleum gas

MPG—Miles per gallon

MT—Metric ton

MWh—Megawatt hour

OECD—Organization for Economic Co-operation and Development

PRI—Principles for Responsible Investment

R&D—Research and development

R&DDD—Research, development, demonstration, and deployment

SASB—Sustainability Accounting Standards Board

TCFD—Task Force on Climate-related Financial Disclosures

UNEP FI—United Nations Environment Programme Finance Initiative

USDE—U.S. Dollar Equivalent

WRI—World Resources Institute

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⁶⁴ IPCC, *Climate Change 2014 Mitigation of Climate Change*, Cambridge University Press, 2014.

Appendix 3: References

- Asset Owners Disclosure Project (AODP). "AODP Global Climate Risk Survey 2017 for Asset Managers." 2016. aodproject.net/wp-content/uploads/2016/10/2017-AODP-Asset-Manager-Climate-Survey-and-Guidance-Notes-V1.pdf.
- Blackrock. "BlackRock Worldwide Leader in Asset and Risk Management." 2016. www.blackrock.com/corporate/en-at/literature/whitepaper/viewpoint-blackrock-worldwide-leader-in-asset-management.pdf.
- Cadbury, A. *Report of the Committee on the Financial Aspects of Corporate Governance*. London, 1992. www.ecgi.org/codes/documents/cadbury.pdf.
- CDP. "Climate Change Questionnaire." 2017. <https://www.cdp.net/en/guidance/guidance-for-companies>.
- CDP AU. "Guidance for reporting companies: sector module guidance; Auto and Auto Component Manufacturing Sector Module 2016." 2016. www.cdp.net/Documents/Guidance/2016/CDP-2016-Auto-Module-Reporting-Guidance.pdf.
- CDP EU. "Guidance for responding companies: sector module guidance; Electric Utilities Sector Module 2016." 2016. www.cdp.net/Documents/Guidance/2016/CDP-2016-Electric-Utility-Module-Reporting-Guidance.pdf.
- CDP FBT. "Guidance for responding companies: sector module guidance; Food, beverage and tobacco sector module 2016." December 2015. www.cdp.net/Documents/Guidance/2016/CDP-2016-FBT-Module-Reporting-Guidance.pdf.
- Climate Disclosure Standards Board (CDSB). "CDSB Framework for Reporting Environmental Information and Natural Capital." June 2015. www.cdsb.net/sites/cdsbnet/files/cdsb_framework_for_reporting_environmental_information_natural_capital.pdf.
- CDSB. "Climate Change Reporting Framework: Advancing and Aligning Disclosure of Climate Change-related Information in Mainstream Reports." Report edition 1.1. October 2012. www.cdsb.net/sites/cdsbnet/files/cdsb_climate_change_reporting_framework_edition_1.1.pdf.
- ClimateWise. "The ClimateWise Principles." Cambridge Institute for Sustainability Leadership. 2013. www.cisl.cam.ac.uk/business-action/sustainable-finance/climatewise/principles.
- Enhanced Disclosure Task Force (EDTF). *Enhancing the Risk Disclosures of Banks*. October 2012. www.fsb.org/wp-content/uploads/r_121029.pdf.
- Financial Stability Board (FSB). "Proposal for a Disclosure Task Force on Climate-Related Risks." November 9, 2015. www.fsb.org/wp-content/uploads/Disclosure-task-force-on-climate-related-risks.pdf.
- Global Reporting Initiative (GRI) Standards. "GRI 102: General Disclosures" and "GRI 201: Economic Performance." October 2016. www.globalreporting.org/standards/gri-standards-download-center/.
- GRI G4-CRE. "G4 Sector Disclosures: Construction and Real Estate." 2014. www.globalreporting.org/resourcelibrary/GRI-G4-Construction-and-Real-Estate-Sector-Disclosures.pdf.
- GRI G4-EN. "Reporting Principles and Standard Disclosures." 2013. www.globalreporting.org/information/g4/Pages/default.aspx.
- GRI G4-EU. "G4 Sector Disclosures: Electric Utilities." 2013. www.globalreporting.org/resourcelibrary/GRI-G4-Electric-Utilities-Sector-Disclosures.pdf.
- GRI G4-OG. "G4 Sector Disclosures: Oil and Gas." 2013. www.globalreporting.org/resourcelibrary/GRI-G4-Oil-and-Gas-Sector-Disclosures.pdf.
- Greenhouse Gas Protocol. "Category 15: Investments." Technical Guidance for Calculating Scope 3 Emissions (version 1.0). 2013. ghgprotocol.org/sites/default/files/ghgp/Scope3_Calculation_Guidance.pdf.
- GRESB NC. "GRESB Real Estate 2017 Reference Guide." April 6, 2017. www.gresb.com/sites/default/files/2017-GRESB-RE-Reference-Guide.pdf.
- GRESB Q. "2016 GRESB Real Estate Assessment." April 1, 2016. gresb-public.s3.amazonaws.com/2016/content/2016-GRESB-RE-Assessment.pdf.
- Intergovernmental Panel on Climate Change (IPCC). "Agriculture, Forestry and Other Land Use (AFOLU)," In: *Climate Change 2014: Mitigation of Climate Change*, 2014. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_full.pdf.
- IPCC. *Fifth Assessment Report (AR5)*. Cambridge University Press, 2014. www.ipcc.ch/report/ar5/.

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- International Council on Mining and Metals (ICMM). *In Brief: Water stewardship framework*. London: International Council on Mining and Metals, 2014. www.icmm.com/website/publications/pdfs/water/2014_water-stewardship-framework.pdf.
- International Energy Agency (IEA). *CO₂ Emissions from Fuel Combustion: Highlights*. 2015. www.iea.org/publications/freepublications/publication/CO2EmissionsFromFuelCombustionHighlights2015.pdf
- International Integrated Reporting Council (IIRC). "International <IR> Framework." December 2013. integratedreporting.org/wp-content/uploads/2015/03/13-12-08-THE-INTERNATIONAL-IR-FRAMEWORK-2-1.pdf.
- IPIECA. *Water Resource Management in the Petroleum Industry*. 2005. www.circleofblue.org/wp-content/uploads/2010/09/water_mngt.pdf.
- Moody's Global Credit Research. "Moody's: Auto sector faces rising credit risks due to carbon transition." September 20, 2016. www.moody.com/research/Moodys-Auto-sector-faces-rising-credit-risks-due-to-carbon--PR_354984.
- Organization for Economic Co-operation and Development (OECD). G20/OECD Principles of Corporate Governance, OECD Publishing. Paris, 2015. dx.doi.org/10.1787/9789264236882-en.
- Principles for Responsible Investment (PRI). "PRI Reporting Framework 2016 Strategy and Governance." November 2015. www.unpri.org/download_report/6316.
- Sustainability Accounting Standards Board (SASB). "Asset Management & Custody Activities: Sustainability Accounting Standard." February 2014. www.sasb.org/wp-content/uploads/2014/02/SASB_PrivStandard_Asset-Management.pdf.
- SASB. "Commercial Banks: Sustainability Accounting Standard." February 2014. www.sasb.org/wp-content/uploads/2014/02/SASB_PrivStandard_Commercial_Banks.pdf.
- SASB. "Insurance: Sustainability Accounting Standard." February 2014. www.sasb.org/wp-content/uploads/2014/02/SASB_PrivStandard_Insurance.pdf.
- SASB. "SASB Climate Risk Technical Bulletin #: TB001-10182016." October 2016. library.sasb.org/climate-risk-technical-bulletin.
- SASB CN0101. "Agricultural Products: Sustainability Accounting Standard." June 2015. www.sasb.org/wp-content/uploads/2015/06/Consumption_I_Standards.pdf.
- SASB IF0101. "Electric Utilities: Sustainability Accounting Standard." March 2016. www.sasb.org/wp-content/uploads/2016/03/IF0101_ElectricUtilities_Standard.pdf.
- SASB IF0402. "Real Estate Owners, Developers & Investment Trusts: Sustainability Accounting Standard." March 2016. www.sasb.org/wp-content/uploads/2016/03/IF0402_REOD_IT_Standard.pdf.
- SASB NR0101. "Integrated Oil & Gas: Technical Bulletin." June 2014. https://www.sasb.org/wp-content/uploads/2014/06/NR0000_SASB_Bulletin_OG_Integrated.pdf.
- SASB NR0302. "Metals & Mining: Sustainability Accounting Standard." June 2014. www.sasb.org/wp-content/uploads/2014/06/NR0302_ProvisionalStandard_MetalsMining.pdf.
- SASB NR0401. "Construction Materials: Sustainability Accounting Standard." June 2014. www.sasb.org/wp-content/uploads/2014/06/NR0401_ProvisionalStandard_ConstructionMaterials.pdf.
- SASB RR0202. "Pulp & Paper Products: Sustainability Accounting Standard." December 2015. www.sasb.org/wp-content/uploads/2015/12/RR0202_Pulp-Paper-Products_Standard.pdf.
- SASB TR0101. "Automobiles: Sustainability Accounting Standard." September 2014. www.sasb.org/wp-content/uploads/2014/09/TR0101_ProvisionalStandard_Automobiles.pdf.
- SASB TR0102. "Auto Parts: Sustainability Accounting Standard." September 2014. www.sasb.org/wp-content/uploads/2014/09/TR0102_ProvisionalStandard_AutoParts.pdf.
- SASB TR0201. "Airlines: Sustainability Accounting Standard." September 2014. www.sasb.org/wp-content/uploads/2014/09/TR0201_ProvisionalStandard_Airlines.pdf.
- SASB TR0301. "Marine Transportation: Sustainability Accounting Standard." September 2014. www.sasb.org/wp-content/uploads/2014/09/TR0301_ProvisionalStandard_Marine.pdf.
- SASB TR0401. "Rail Transportation: Sustainability Accounting Standard." September 2014. www.sasb.org/wp-content/uploads/2014/09/TR0401_ProvisionalStandard_Rail.pdf.
- Task Force on Climate-related Financial Disclosures (TCFD). "Phase I Report of the Task Force on Climate-related Financial Disclosures." March 31, 2016. www.fsb-tcfd.org/wp-content/uploads/2016/03/Phase_I_Report_v15.pdf.

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- van Vliet, Michelle T.H., et al. "Power-generation system vulnerability and adaptation to changes in climate and water resources." *Nature Climate Change* 6 (2016): 375-380. www.nature.com/nclimate/journal/v6/n4/full/nclimate2903.html.
- World Business Council for Sustainable Development. "Sustainability and enterprise risk management: The first step towards integration." January 18, 2017. <http://www.wbcsd.org/contentwbc/download/2548/31131>.
- World Resources Institute (WRI). *Water-Energy Nexus: Business Risks and Rewards*. Washington, DC: 2016. http://www.wri.org/sites/default/files/Water-Energy_Nexus_Business_Risks_and_Rewards.pdf.
- World Resources Institute and World Business Council for Sustainable Development. "The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard" (Revised Edition). March 2004. <http://www.ghgprotocol.org/sites/default/files/ghgp/standards/ghg-protocol-revised.pdf>.

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