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

December 14, 2016

TCFD | 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 an 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, as described in the Task Force's report—Recommendations of the Task Force on Climate-related Financial Disclosures.

> The Task Force developed this Annex for use by organizations in developing climate-related financial disclosures consistent with its recommendations.

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The Annex contains the following information:

- directions on the application of the recommendations;
- recommendations and supporting recommended disclosures that describe information that investors, lenders, and insurance underwriters need to make economic decisions;
- guidance to assist preparers by providing context and suggestions for implementing the recommended disclosures;
- *supplemental* guidance that highlights important sector-specific considerations for the financial sector and non-financial sectors potentially most affected by climate change; and
- alignment of the recommended disclosures with other frameworks.

The Task Force's recommended disclosures solicit information that is primarily forward-looking, which reflects the Task Force's desire to improve climate-related financial disclosures where appropriate and further develop the limited disclosure of financial risks posed by climate-related impacts. In addition, the Task Force recommends that preparers of climate-related financial disclosures provide such disclosures in their mainstream (i.e., public) financial filings. The Task Force believes publication of climate-related financial information in mainstream financial filings will create a wider user base of such disclosures and, in turn, a wider understanding of organizations' climate-related risks and opportunities, including across the financial sector.

The Task Force believes its work provides a foundation for climate-related financial disclosures that is flexible enough to accommodate evolving practices. The Task Force's recommendations aim to be ambitious, but also practical for near-term adoption.

[1] 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.

[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. The Task Force believes further work is needed on defining carbon-related assets and their potential financial impacts.

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. This structure is depicted in Figure 1 below.

Figure 1

Recommendations and Guidance

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

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

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

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

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

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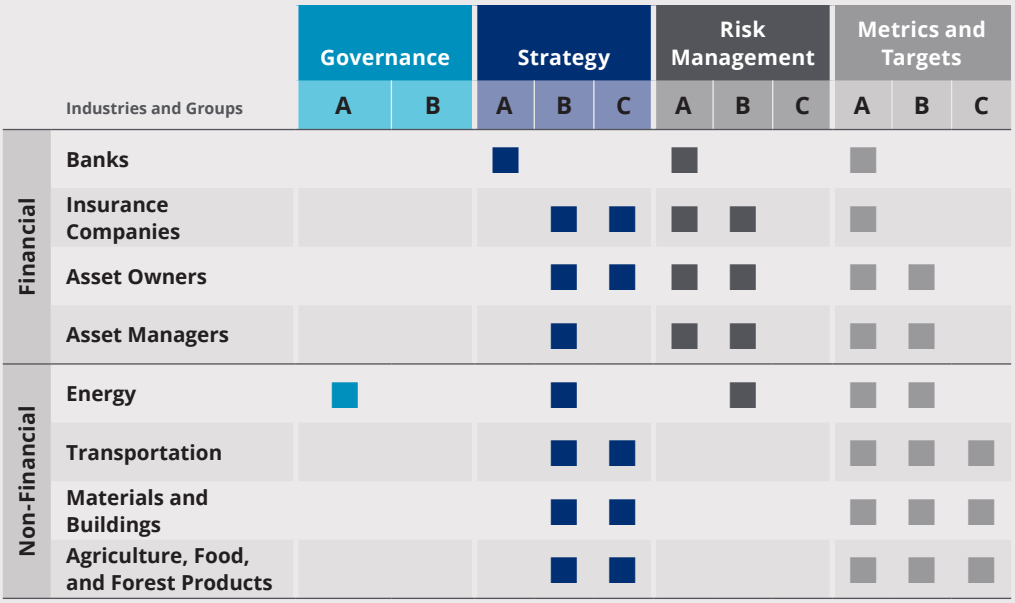
The Task Force developed supplemental guidance to assist preparers in the financial sector and other sectors potentially most affected by climate change and the transition to a low-carbon economy. Figure 2 provides a mapping of the recommendations (governance, strategy, etc.) and recommended disclosures (a, b, c) for which supplemental guidance was developed to the relevant industries and groups in the financial and non-financial sectors.

Figure 2

Supplemental Guidance for Financial and Non-financial Sectors



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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 other organizations to implement these recommendations as well. In addition, the Task Force believes that asset managers and asset owners, including public- and private-sector pension plans, insurance companies, endowments, and foundations, should implement its recommendations.

b. Where should preparers disclose?

Preparers of climate-related financial disclosures should provide such disclosures in their mainstream (i.e., public) financial filings. The Task Force recognizes that organizations may want more experience with scenario analysis before including such information in financial filings. While disclosure in mainstream financial filings should be the ultimate goal of preparers, disclosure related to scenario analysis via other forms (e.g., website, sustainability report) may be an *interim* step on the path to disclosure in mainstream financial filings.

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Asset owners and asset managers should report to their beneficiaries and clients, respectively, through their 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 (e.g., sustainability or annual reports).

c. Who should review climate-related financial disclosures?

Because these disclosures should be included in mainstream financial reports or other public documents, 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. For those organizations that do not have publicly traded debt or equity securities, including some asset managers and asset owners, these climate-related financial disclosures should follow similar review and approval protocols currently used by those organizations for similar communications.

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

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

e. What reporting period should preparers use?

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

f. 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 that preparers define the 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. For non-financial organizations, this is likely the useful life of the asset. For financial sector organizations, this is likely the tenor of financial assets, taking into consideration that tenor may be affected by potential liquidity risks.

B Recommendations

B Recommendations

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 3). The four overarching recommendations are supported by key climate-related financial disclosures—referred to as recommended disclosures—that build out the framework with information that will help investors and others understand how reporting organizations think about and assess climate-related risks and opportunities as described in Figure 4 (p. 8).

To underpin its recommendations and help guide current and future developments in climate-related financial reporting, the Task Force developed seven principles for effective disclosure, which are included in Section F. When used by organizations in preparing their climate-related financial disclosures, these principles can help achieve high-quality and decision-useful disclosures that enable users to understand the impact of climate change on organizations. The Task Force encourages organizations adopting its recommendations to consider these principles as they develop their climate-related financial disclosures.

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Figure 3

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

An important aspect of the Task Force's recommended disclosures is their inclusion in organizations' mainstream (i.e., public) financial filings. Publication of climate-related financial information in mainstream financial filings will help to ensure that appropriate controls govern the production and disclosure of the required information. Further, users of climate-related financial disclosures will be able to access current information in a timely way, as mainstream financial filings require publication at least annually.

Some of the Task Force's recommended disclosures are line item disclosures and some involve an assessment of materiality. The Task Force believes it is important to an understanding of an organization's financial and operating results to have insight into the governance and risk management context in which such results are achieved. The recommended disclosures related to governance and risk management directly address this need for context. For the recommended disclosures that involve an assessment of materiality, organizations should determine materiality for climate-related issues consistent with how they determine the materiality of other risks affecting their business and consistent with their financial filing requirements. 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.

Figure 4

Recommendations and Supporting Recommended Disclosures

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

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 often interested in understanding the role an organization's board plays in overseeing climate-related risks and opportunities (also referred to as climate-related issues) as well as management's role in assessing and managing climate-related issues.[3] Such information supports users' evaluations of whether material climate-related issues receive appropriate board and management attention.

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

[3] Climate-related risks can be divided into two major categories: transition risks and physical risks. See Tables A1 and A2 (pp. 100-101) for more information.

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.	
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 physical or transition 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. 100-101).
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 disclose 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.
Recommended Disclosure c) Describe the potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Organizations should describe how their strategies are likely to perform under various forward-looking, climate-related scenarios (e.g., potential effects under different scenarios) and any resulting changes to their strategies and financial plans, risk management activities, or targets/metrics to mitigate risks and take advantage of opportunities.

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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. 100-101), 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.

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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.	
Recommended Disclosure a) Describe the 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. 100-101). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable. Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy. Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics.
Recommended Disclosure b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	**Guidance for All Sectors** Organizations should provide their Scope 1 and Scope 2 GHG emissions and, if appropriate, Scope 3 GHG emissions and the related risks.[4] GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[5] As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.[6]
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 low-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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[4] 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.

[5] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions.

[6] For industries with high energy consumption, metrics related to emission intensity are important to provide. For example, emissions per unit of economic output (e.g., unit of production, number of employees, or value-added) is widely used. See sector-specific supplemental guidance for more information.

5. Alignment of Recommended Disclosures with Other Frameworks

Governance Recommended Disclosures with Other Frameworks		
a)	**G20/OECD Principles of Corporate Governance**	5.a.4, 5.a.9, 6.a, 6.d.1, 6.d.4, 6.d.7, 6.e.2, 6.f
	CDP Climate Change Questionnaire 2016	CC1.1/CC1.1a, CC1.2/CC1.2a, CC2.2/CC2.2a, CC2.2.b
	GRI G4 Sustainability Reporting Guidelines	G4-34a, G4-35a, G4-36, G4-42a, G4-43a, G4-45a, G4-47a, G4.48a
	CDSB Climate Change Reporting Framework	REQ-03
	IIRC <Integrated Reporting> Framework	3.10, 4.8
b)	**GRI G4 Sustainability Reporting Guidelines Questions**	G4-45a, G4-47a, G4.48a

Strategy Recommended Disclosures		
a)	**G20/OECD Principles of Corporate Governance**	5.a.7, 5.a.8
	CDSB Climate Change Reporting Framework Requirements	REQ-2, REQ-4.6, REQ-4.9, REQ-4.10, REQ-4.11, REQ-4.14
	IIRC <Integrated Reporting> Framework	3.3, 3.17, 4.23
b)	**G20/OECD Principles of Corporate Governance**	5.a.2, 5.a.7, 5.a.8
	CDP Climate Change Questionnaire 2016	CC2.2/CC2.2a, CC2.2b, CC5.1, CC6.1
	GRI G4 Sustainability Reporting Guidelines	G4-EC2a
	CDSB Climate Change Reporting Framework Requirements	REQ-01, REQ-2, REQ-06, REQ-2.8, REQ-4.3, REQ- 4.6, REQ-4.9, REQ-4.10, REQ-4.11
	IIRC <Integrated Reporting> Framework Questions	3.3, 3.39, 4.23, 4.34

Risk Management Recommended Disclosures		
a)	**G20/OECD Principles of Corporate Governance**	5.a.2, 5.a.7, 6.f
	GRI G4 Sustainability Reporting Guidelines	G4-EC2a
	CDSB Climate Change Reporting Framework Requirements	REQ-06
b)	**G20/OECD Principles of Corporate Governance**	5.a.2, 5.a.7
c)	**G20/OECD Principles of Corporate Governance**	5.a.2, 5.a.7 6.d.1, 6.f
	CDSB Climate Change Reporting Framework Requirements	REQ-01, REQ-06, REQ-2.36, REQ-4.12, REQ- 4.14

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Metrics and Targets Recommended Disclosures		
a)	**G20/OECD Principles of Corporate Governance**	6.d.1, 6.d.7
	CDP Climate Change Questionnaire 2016	CC2.1c/CC2.1d
	GRI G4 Sustainability Reporting Guidelines	G4-46a
	CDSB Climate Change Reporting Framework Requirements	REQ-4.6
b)	**G20/OECD Principles of Corporate Governance**	5.a.2, 5.a.7
	CDP Climate Change Questionnaire 2016	CC2.1c/CC2.1d, CC5.1, CC6.1
	GRI G4 Sustainability Reporting Guidelines	G4-45a, G4-46a, G4-EC2a
	CDSB Climate Change Reporting Framework Requirements	REQ-02, REQ-2.36, REQ-4.3, REQ-4.6, REQ-4.12, REQ-4.16, REQ-06
	IIRC <Integrated Reporting> Framework Questions	3.3, 3.6, 3.17, 3.39, 4.23
c)	**CDP Climate Change Questionnaire 2016**	CC2.1/CC2.1a

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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."[7] 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. The four industries are banks, insurance companies, asset managers, and asset owners (which include public- and private-sector pension plans, insurance companies, endowments, and foundations).

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 5. 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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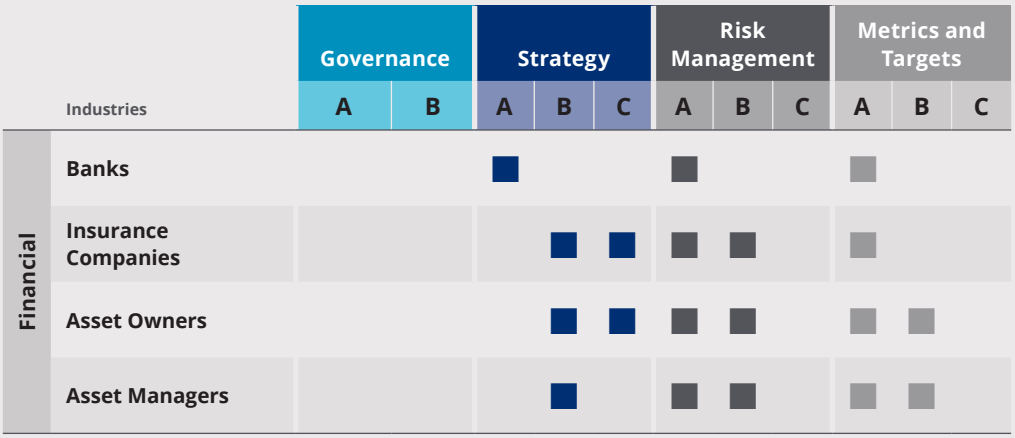
Figure 5

Supplemental Guidance for the Financial Sector



[7] 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.

Supplemental Guidance for Banks

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 low-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.

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

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Strategy

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

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 physical or transition 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. 100-101). **Supplemental Guidance for Banks** Banks should describe significant concentrations of credit exposure to carbon-related assets.[8] Additionally, banks should consider disclosing their (physical and transition) climate-related risks 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 disclose 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.
Recommended Disclosure c) Describe the potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Organizations should describe how their strategies are likely to perform under various forward-looking, climate-related scenarios (e.g., potential effects under different scenarios) and any resulting changes to their strategies and financial plans, risk management activities, or targets/metrics to mitigate risks and take advantage of opportunities.

[8] 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. The Task Force believes further work is needed on defining carbon-related assets and their potential financial impacts.

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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 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").[9]
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. 100-101), 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.

[9] 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 or 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.

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Metrics and Targets

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

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. 100-101). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable. Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy. Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics. **Supplemental Guidance for Banks** Banks should provide the metrics used to assess the impact of (physical and transition) 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: – Industry[10] – 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.[11]
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.[12] GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[13] As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.[14]

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

[11] 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. The Task Force believes further work is needed on defining carbon-related assets and their potential financial impacts.

[12] 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.

[13] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions.

[14] 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 (continued) Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.	
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 low-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.

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Alignment of Recommended Disclosures 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

Supplemental Guidance for Insurance Companies

2. Insurance Companies[15]

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.[16]

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.	
Recommended Disclosure a) Describe the board's oversight of climate-related risks and opportunities.	**Guidance for All Sectors** In describing the board's oversight of climate-related issues, organizations should consider including a discussion of the following: – processes and frequency by which the board and/or board committees (e.g., audit, risk, or other committees) are informed about climate-related issues, – whether the board and/or board committees consider climate-related issues when reviewing and guiding strategy, major plans of action, risk management policies, annual budgets, and business plans as well as setting the organization's performance objectives, monitoring implementation and performance, and overseeing major capital expenditures, acquisitions, and divestitures, and – how the board monitors and oversees progress against goals and targets for addressing climate-related issues.
Recommended Disclosure b) Describe management's role in assessing and managing climate-related risks and opportunities.	**Guidance for All Sectors** In describing management's role related to the assessment and management of climate-related issues, organizations should consider including the following information: – whether the organization has assigned climate-related responsibilities to management-level positions or committees; and, if so, whether such management positions or committees report to the board or a committee of the board and whether those responsibilities include assessing and/or managing climate-related issues, – a description of the associated organizational structure(s), – processes by which management is informed about climate-related issues, and – how management (through specific positions and/or management committees) monitors climate-related issues.

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[15] Insurance companies include both insurers and re-insurers.

[16] Intergovernmental Panel on Climate Change, Fifth Assessment Report (AR5), Cambridge University Press, 2014. http://www.ipcc.ch/report/ar5/.

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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.

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 physical or transition 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. 100-101).
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 disclose 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.

Strategy (continued)

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

Recommended Disclosure c) Describe the potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Organizations should describe how their strategies are likely to perform under various forward-looking, climate-related scenarios (e.g., potential effects under different scenarios) and any resulting changes to their strategies and financial plans, risk management activities, or targets/metrics to mitigate risks and take advantage of opportunities. **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.

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.

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Risk Management (continued)

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. 100-101), 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.

Metrics and Targets

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

Recommended Disclosure a) Describe the 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. 100-101). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable. Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy. Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics. **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 jurisdictions.

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Metrics and Targets (continued) Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.	
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.[17] GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[18] As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.[19]
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 low-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 Recommended Disclosures with Other Frameworks

Strategy Recommended Disclosures		
b)	**ClimateWise, The ClimateWise Principles**	Subprinciples 3.2, 3.4, 4.1, 4.2

Risk Management Recommended Disclosures		
a)	**SASB, Insurance: Sustainability Accounting Standard**	FN0301-17.65

Metrics and Targets Recommended Disclosures		
a)	**UNEP FI, Principles for Sustainable Insurance**	Principle 1

[17] 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.

[18] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions.

[19] 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.

Supplemental Guidance for Asset Owners

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.[20]

Whether asset owners invest directly or through asset managers, asset owners bear the potential physical and transition climate-related 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.

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.

[20] 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 (continued)

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.

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 physical or transition 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. 100-101).

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Strategy (continued)

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

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 disclose 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 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 potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Organizations should describe how their strategies are likely to perform under various forward-looking, climate-related scenarios (e.g., potential effects under different scenarios) and any resulting changes to their strategies and financial plans, risk management activities, or targets/metrics to mitigate risks and take advantage of opportunities. **Supplemental Guidance for Asset Owners** Asset owners that perform scenario analysis should provide the following: – a discussion of how climate-related scenarios are used, such as to inform investments in specific assets, and – description of climate-related scenarios used and associated time frames.

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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.
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. 100-101), 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.

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. 100-101). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable. Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy. Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics. **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.
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.[21] GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[22] As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.[23] **Supplemental Guidance for Asset Owners** Asset owners should provide GHG emissions, where data are available, associated with each fund or investment strategy normalized for every million of the reporting currency invested.[24] *Note: The Task Force acknowledges the challenges and limitations of reporting GHG emissions associated with investments, including that GHG emissions should not necessarily be interpreted as a risk metric. The Task Force views the reporting of GHG emissions associated with investments 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 such information for only a portion of their investments given data availability and methodological issues.*

[21] 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.

[22] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions.

[23] 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.

[24] Greenhouse Gas Protocol, "Category 15: Investments." Technical Guidance for Calculating Scope 3 Emissions (version 1.0). 2013. http://ghgprotocol.org/sites/default/files/ghgp/Scope3_Calculation_Guidance.pdf.

Metrics and Targets (continued)

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

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 low-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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Supplemental Guidance for Asset Managers

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.[25]

Asset managers' clients, as owners of the underlying assets, bear the major portion of the potential physical and transition climate-related 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 low-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, unless otherwise specified.

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.

[25] Introductory language on Asset Managers sourced from: Blackrock. "BlackRock Worldwide Leader in Asset and Risk Management." 2016. https://www.blackrock.com/corporate/en-at/literature/whitepaper/viewpoint-blackrock-worldwide-leader-in-asset-management.pdf.

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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.

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 physical or transition 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. 100-101).
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 disclose 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 low-carbon economy.
Recommended Disclosure c) Describe the potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Organizations should describe how their strategies are likely to perform under various forward-looking, climate-related scenarios (e.g., potential effects under different scenarios) and any resulting changes to their strategies and financial plans, risk management activities, or targets/metrics to mitigate risks and take advantage of opportunities.

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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 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. 100-101), as appropriate. **Supplemental Guidance for Asset Managers** Asset managers should describe how they manage material climate-related risks for each product or investment strategy.
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.

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. 100-101). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable. Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy. Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics. **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.[26] GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[27] As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.[28] **Supplemental Guidance for Asset Managers** Asset managers should provide GHG emissions, where data are available, associated with each product or investment strategy normalized for every million of the reporting currency invested.[29] *Note: The Task Force acknowledges the challenges and limitations of reporting GHG emissions associated with investments, including that GHG emissions should not necessarily be interpreted as a risk metric. The Task Force views the reporting of GHG emissions associated with investments 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 such information for only portion of the assets they manage given data availability and methodological issues.*

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[26] 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.

[27] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions.

[28] 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.

[29] Greenhouse Gas Protocol, "Category 15: Investments." Technical Guidance for Calculating Scope 3 Emissions (version 1.0). 2013. http://ghgprotocol.org/sites/default/files/ghgp/Scope3_Calculation_Guidance.pdf.

Metrics and Targets (continued)

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

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 low-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 Guidance with Other Frameworks

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

Risk Management Recommended Disclosures		
a)	**SASB, Asset Management & Custody Activities: Sustainability Accounting Standard**	FN0103-15
	PRI, Reporting Framework 2016 Strategy and Governanc:	SG12.2
b)	**PRI, Reporting Framework 2016 Strategy and Governance**	Module Indicator SG12.2

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 2016 Strategy and Governance	SG12.3
b)	**PRI, Reporting Framework 2016 Strategy and Governance**	SG12.3

E Supplemental Guidance for Non-Financial Sectors

E Supplemental Guidance for Non-Financial Sectors

While every sector and industry could experience potential financial impacts from climate-related risks and opportunities, the Task Force identified a number of key non-financial sectors and industries (and their related supply and distribution chains) more likely to be financially impacted than others due to their material greenhouse gas (GHG) emissions, energy, and/or water dependencies associated with their operations and/or products.[30] These non-financial sectors and industries are grouped into four key areas: Energy; Transportation; Materials and Buildings; and Agriculture, Food, and Forest Products.[31]

The Task Force developed supplemental guidance for non-financial sectors in specific areas as shown in Figure 6. This supplemental guidance for non-financial sectors is intended to provide further background for organizations with relevant economic activity in these areas to consider when formulating their disclosure under the Task Force's four disclosure recommendations: governance, strategy, risk management, and metrics and targets.

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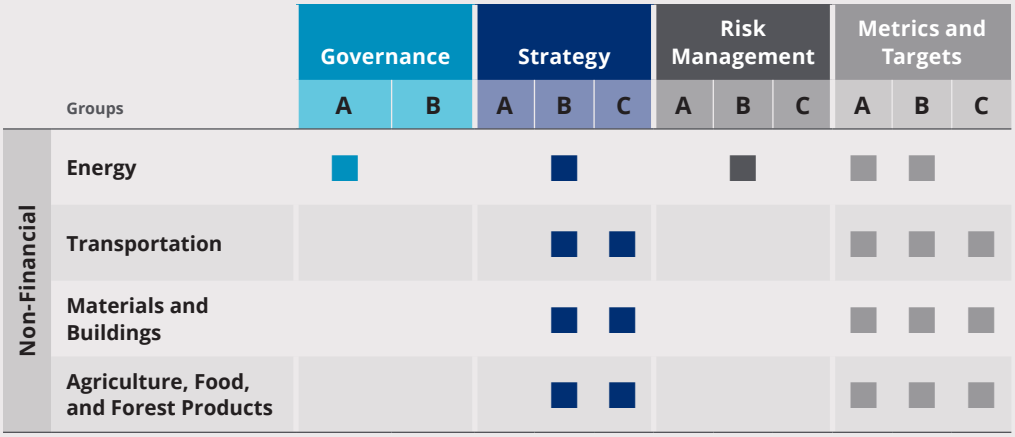
Figure 6

Supplemental Guidance for Non-Financial Sectors



In line with the risks and opportunities outlined in Tables A1 and A2 (pp. 100-101), organizations should disclose relevant information related to the financial implications of significant physical risks (e.g., reliance on water in areas of high water stress, severe weather events, or flooding), transition risks (e.g., policy, technology or market changes), and related opportunities.

Climate-related risks can affect several different important aspects of an organization's financial position. The future shape of an organization's balance sheet will be influenced by its investment and capital expenditure plans and projects. These projects will determine the nature and amount of long-lived assets, how such assets are funded, including the proportion of debt/equity needed and the risks associated with the future cash flows from those assets and the future revenue and cost trends for the business. Organizations in the four non-financial groups, therefore, should carefully consider the current and forward-looking financial implications of transition and physical risks and opportunities in the following areas to help them determine their relevance for informing investors:

[30] SASB, "SASB Technical Bulletin 2016-01—Climate Risk," working draft. 2016. http://using.sasb.org/sasb-climate-risk-framework.

[31] 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.

Income Statement

- **Revenues —** As the demand for end products (e.g., energy) evolves due to changes in climate-related policies, technology, and market dynamics, organizations should consider the potential impact on their future revenues and identify potential opportunities for enhancing current revenues 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 energy and emission dependent industries to consider the potential impacts of carbon pricing on existing and future business revenues.
- **Expenditures —** An organization's response to climate-related risks and opportunities depends, in part, on the organization's cost structure. Lower-cost suppliers are likely to be more resilient to cost and demand changes in the market as a result of climate-related risks and opportunities and more flexible in their ability to address such risks and opportunities. By discussing and providing an indication of their cost structure and flexibility in relation to various climate-related risks and opportunities, organizations will be better able to inform investors about the investment potential of a particular organization

Balance Sheet

- **Assets and Liabilities —** Supply and demand changes due to climate-related policy, technological, or market changes also could impact the valuation of an organization's assets or cost of its liabilities going forward. On the asset side, utilization of long-lived assets and, where relevant, reserves may be particularly affected by climate-related risks or opportunities. On the liability side, organizations may face changes in borrowing or other financing costs and various contingent liabilities. It is important for organizations to provide an indication of the climate-related profile of their assets and liabilities, particularly long-lived assets and reserves. This should focus on existing and committed future activities and decisions requiring new investment, restructuring, write-downs, or impairment.
- **Capital —** Organizations may have capital investments that require long periods to pay back. Given this longer time period, the likelihood of risk profiles changing is higher. It is important for the organization and stakeholders to have an understanding of capital allocation and how this relates to climate-related risks and opportunities as well as the organization's flexibility in shifting its capital allocation in the face of changing climate-related risks and opportunities.

Supplemental Guidance for the Energy Group

1. Energy

Energy is an essential ingredient 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 Table 1.

Table 1
Energy Group

Group	Industry/Sub-Industry
Energy	Oil and Gas
	Coal
	Electric Utilities

While many climate-related issues impact the energy sector, Energy Group organizations should consider providing disclosures related to material 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., internal 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 greenhouse gas (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 contribution to global GHG emissions—either directly through the utility companies' own energy use for production or indirectly through combustion of fossil fuels.[32] 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 most 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.[33]

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.[34,35,36]

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 values 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 allocation planning horizons relative to many other

[32] According to International Energy Agency (IEA) data, CO_2 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 CO_2 emissions from energy and hence 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 CO_2 emissions from fuel combustion, and 14 percent of total anthropogenic GHG emissions). IEA, CO_2 Emissions from Fuel Combustion: Highlights. 2015. www.iea.org/publications/freepublications/publication/CO_2EmissionsFromFuelCombustionHighlights2015.pdf.

[33] Michelle T.H., van Vliet, et al. "Power-generation system vulnerability and adaptation to changes in climate and water resources." Nature Climate Change 6 (2016): 375-380. http://www.nature.com/nclimate/journal/v6/n4/full/nclimate2903.html.

[34] IPIECA, Water Resource Management in the Petroleum Industry. 2005. http://www.ipieca.org/sites/default/files/publications/water_mngt.pdf.

[35] International Council on Mining and Metals (ICCM), In Brief: Water stewardship framework. London: International Council on Mining and Metals, 2014. https://www.icmm.com/publications/pdfs/7024.pdf.

[36] 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.

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).

The following guidance provides additional considerations for disclosures by the Energy Group.

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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. **Supplemental Guidance for the Energy Group** Energy Group organizations should consider describing whether and how performance metrics for board and management, including links to remuneration policies, take into consideration 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.

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 physical or transition 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. 100-101).
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 disclose 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 the Energy Group** Energy Group organizations should consider discussing how climate-related risks and opportunities are integrated into their strategy formulation and decision making as well as the key planning assumptions around:

Strategy (continued)

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

(continued) **Recommended Disclosure b)** Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	**Income Statement** – **Revenues —** Energy Group organizations should consider providing carbon-pricing assumptions, including any internal carbon price applied, and how it is determined, and an assessment of the potential impacts on future operational revenues. – **Expenditures —** Energy Group organizations should consider describing the potential impacts of climate-related risks and opportunities on cost of supply and strategy for managing these impacts relative to market demand and competition. This may include discussions of research and development (R&D) expenditures, adoption of new technology, and costs of key inputs. **Balance Sheet** – **Assets/Liabilities —** Energy Group organizations should focus on existing and committed future activities, noting any, if applicable, expected changes to the balance sheet or reserves (e.g., additional investments, restructuring, write-downs, or impairment). Energy Group organizations should consider describing their critical planning assumptions around legacy assets, for example, strategies to lower carbon-, energy-, and/or water-intensive operations. – **Capital —** Energy Group organizations should consider discussing whether applicable, and, if so, how GHG emissions, energy, and water issues are taken into account in capital planning and allocation. This could include a discussion of major acquisitions and divestments, joint-venture requirements, and investments in technology, innovation, and new business areas in light of changing climate-related risks and opportunities. Energy Group organizations should also consider providing an assessment of flexibility in positioning/repositioning capital to address emerging climate-related risks and opportunities.
Recommended Disclosure c) Describe the potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Organizations should describe how their strategies are likely to perform under various forward-looking, climate-related scenarios (e.g., potential effects under different scenarios) and any resulting changes to their strategies and financial plans, risk management activities, or targets/metrics to mitigate risks and take advantage of opportunities. **Supplemental Guidance for the Energy Group** Energy Group organizations should consider describing: – The range and diversity of climate-related scenarios used, including the 2°C scenario used (e.g., whether climate-related scenarios with major disruptions [positive and negative] from business-as-usual [breakthroughs, breakdowns] were considered) – For the 2°C scenario used, any adjustments/differences from publicly available 2°C scenarios. – Quantitatively and qualitatively the critical input parameters, assumptions, and analytical choices for the climate-related scenarios used.[37] – Time frames used for the climate-related scenarios, including near-, medium- and long-term milestones (e.g., how does the organization consider timing of potential future implications under the climate-related scenarios used). – Qualitatively and quantitatively the key implications for the organization's performance under the various climate-related scenarios considered, including implications for the organization's value chain, capital-allocation decisions, R&D, and other financial implications.

[37] These might include internal carbon prices and assumptions of how they develop over time; discount rate used; assumptions about policy responses and timing; assumptions about technology responses and timing; and assumptions made around potential differences in input parameters across regions/countries/asset locations/markets.

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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.
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. 100-101), as appropriate. **Supplemental Guidance for the Energy Group** With specific consideration of the income statement and balance sheet implications described earlier and any significant climate-related risks identified, Energy Group organizations should consider describing actions taken to prevent and mitigate any relevant climate-related risks or take advantage of opportunities (e.g., procurement of low-carbon substitutes as inputs, development of lower-carbon products and services, investment in low-emissions technologies, and other activities to reduce emissions and increase resilience to climate-related impacts).
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.

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. 100-101). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable.

Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy.

Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics.

Supplemental Guidance for the Energy Group
For all relevant metrics, Energy Group 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.

Energy Group organizations should consider providing key metrics related to GHG emissions, energy, water, land use and, if relevant, low-carbon alternatives that address potential financial aspects of shifting demand, cost of supply, reserves, and capital allocation. This could include examples such as:

Revenues
- Investment in low-carbon alternatives (e.g., R&D, equipment, products, or services).

Expenditures
- 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.
- Current internal carbon price or range of prices used in financial planning and analysis.
- Measurement of water used/withdrawn in regions with high or extremely high baseline water stress.[38]

Assets/Liabilities
- If relevant, a breakdown of reserves and/or long lived assets and an indication of associated emissions factors to provide insight into potential future emissions.

Capital
- Relevant metrics to indicate flexibility of capital deployment, portfolio allocation and capital payback. This could include measures such as:
  - proportion of capital allocation to long-lived assets versus short-term assets,
  - capital payback periods or return on capital deployed, and/or
  - investments in low-carbon alternatives (e.g., R&D, technology, products and/or services).

For illustrative examples, please see Table 2 (p. 54).

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[38] Several sources for defining water stress exist. See in particular WRI at http://docs.wri.org/aqueduct/freshwater_sustainability_analyses.pdf . Other sources include Pacific Institute at http://pacinst.org/water-definitions; World Resources Institute (WRI) Aqueduct Project at http://www.wri.org/our-work/project/aqueduct; World Business Council for Sustainable Development (WBCSD), Global Water Tool at http://www.wbcsd.org/work-program/sector-projects/water/global-water-tool.aspx; IPIECA Global Water Tool at http://www.ipieca.org/o-gwatertool; and CEO Water Mandate at http://ceowatermandate.org/disclosure/resources/driving/.

Metrics and Targets (continued)

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

Recommended Disclosure b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	**Guidance for All Sectors** Organizations should provide their Scope 1 and Scope 2 GHG emissions and, if appropriate, Scope 3 GHG emissions and the related risks.[39] GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[40] As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.[41] **Supplemental Guidance for the Energy Group** Energy Group organizations should consider providing the following information: **Revenue Changes** – Scope 3 emissions from significant sources, including where appropriate emissions from the use of the organization's products.[42] **Expenditures** – Scope 1 and Scope 2 emissions and fugitive methane (where relevant) emissions by geography to indicate exposure to potential policy changes and any associated implications for expenditures (e.g., remediation, emission reduction, mitigation).
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 low-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.

[39] Emissions are a prime driver of rising global temperatures and, as such, are a key focal point of policy, regulatory, market, and technology responses to limit climate change. As a result, organizations with significant emissions are likely to be 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.

[40] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions.

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

[42] For additional information on estimating petroleum industry value chain (Scope 3) GHG emissions please see: WRI GHG Reporting Protocol www.ghgprotocol.org and IPIECA/API http://www.api.org/~/media/Files/EHS/climate-change/Scope-3-emissions-reporting-guidance-2016.pdf?la=en.

Table 2

Energy Metrics — Illustrative Examples

The specific examples of metrics provided below 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. 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.

In determining the most relevant and useful metrics, organizations are encouraged to engage with their key stakeholders, including investors, and review publicly available frameworks.[43] Again, the examples below 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.

Oil and Gas

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues	Low-Carbon Alternative	Investment in low-carbon alternatives (e.g., R&D, equipment, products, or services)	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 impacted.
Revenues	GHG Emissions	Estimated Scope 3 emissions, including methodologies and emission factors used	Metric ton (MT) of carbon dioxide emissions (CO_2e)	GRI: G4-EN17	(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.
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_2e	SASB: NR0101-01	(Relatively) significant Scope 1 emissions are expected to drive regulations (including carbon prices) to require lower emissions from products. This can result in a significant decrease in future earning capacity.
Expenditures	Energy Use/ Efficiency	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	N/A	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.

[43] 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.

Table 2

Energy Metrics — Illustrative Examples *(continued)*

Oil and Gas *Continued*					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Expenditures	GHG Emissions	Describe current carbon price or range of prices used	Local currency	N/A	Internal carbon prices used, impacting 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.
Assets/ Liabilities	Reserves/ 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_2e per unit of reserves	SASB: NR0101-23	Transition to a low-carbon economy may impact 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/ Liabilities	Reserves/ Assets	Assets committed in regions with high or extremely high baseline water stress	Number of assets, value, percentage of total assets	N/A	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 on asset valuation.
Capital	Reserves/ Assets	Proportion of capital allocation to long-lived assets versus short-term assets	Percentage	N/A	Climate-related change impacts 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.
Capital	Reserves/ Assets	Capital payback periods or return on capital deployed	Years; Percentage return on investment (ROI)	N/A	Climate-related change impacts 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.

Coal					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Revenues	Low-Carbon Alternative	Investment in low-carbon alternatives (e.g., R&D, equipment, products, or services)	Local currency	GRI: G4-OG2/3 CDP: EU4.3	Investments in new technologies are needed to manage transition risk. The level of investments provides an indication of the level to which future earning capacity of core businesses might be impacted.
Revenues	GHG Emissions	Estimated Scope 3 emissions, including methodologies and emission factors used	MT of CO_2e	GRI: G4-EN17	Significant supply chain emissions (Scope 3) may accelerate the development and deployment of low-emissions and alternative technologies or products, leading in changes in demand and revenues.

Table 2

Energy Metrics — Illustrative Examples *(continued)*

Coal *Continued*

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
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	Describe current internal carbon price or range of prices used	Price in local currency	N/A	Internal carbon prices used, impacting 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	Energy Use/ Efficiency	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	N/A	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/ Liabilities	Reserves/ Assets	A breakdown of reserves by type and an indication of associated emissions factors to provide insight into potential future emissions	MT of CO_2e	SASB: NR0101-23	Transition to a low-carbon economy may impact 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/ Liabilities	Reserves/ Assets Water	Amount of assets committed in regions with high or extremely high baseline water stress	Number of assets, value, percentage of total assets	N/A	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 on asset valuation.
Capital	Reserves/ Assets	Proportion of capital allocation to long-lived assets versus short-term assets	Percentage	N/A	Climate-related change impacts 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
Capital	Reserves/ Assets	Capital payback periods or return on capital deployed	Years; Percentage ROI	N/A	Climate-related change impacts 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.

Table 2

Energy Metrics — Illustrative Examples *(continued)*

Electric Utilities					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Revenues	Energy Use/ Efficiency	Percent of electrical generation capacity by source (e.g., coal, gas, solar, wind, uranium)	Percentage; Megawatt (MW)	GRI: G4-EU1	In the transition to a low-carbon economy, fossil fuels will phase out whereas renewable energy will phase in. The percentage lock-in of these energy sources in current assets informs the level to which future earning capacity of core business might be impacted or asset value be impaired.
Revenues	Energy Use/ Efficiency Low-Carbon Alternatives	Total amount invested in renewable energy by type of technology and as a percentage of capital expenditures and acquisitions	Local currency, Percentage	GRI: G4-OG2	Investments in new technologies are needed in the transition to a low-carbon economy. The level of investment in renewable energy provides an indication of the level to which future earning capacity of core business might be impacted.
Revenues	Energy Use/ Efficiency Low-Carbon Alternatives	Total amount of renewable energy generated by source	MWh or Gigajoules (GJ)	GRI: G4-OG3	In the transition to a low-carbon economy, fossil fuels will phase out whereas renewable energy will phase in. The percentage generation of renewable energy informs the level to which future earning capacity of core business might be (positively) impacted.
Revenues	Water	Percent of electrical generation capacity based on hydroelectric generation in regions with high or extremely high baseline water stress;	Percentage	N/A	Water stress can result in factual inability to produce and/or legislation that impacts water availability for power generation. The percent of hydroelectric generation capacity in high-water-stress areas informs the risk of significant limitations to hydroelectric generation capacity.
Expenditures	Energy Use/ Efficiency	Total quantity of energy consumed in operations or other business activities by energy sources	MWh or GJ, Percentage	IPIECA: E2	Cost of energy and energy mix may impact operations and expenditures.
Expenditures	Water	Percent water withdrawn,(esp. in regions with high or extremely high baseline water stress)	Percentage	SASB: IF0101-06	Water stress can result in increased cost of supply 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.
Expenditures	GHG Emissions	Emissions intensity by asset	MT CO_2e/MWh generated	N/A	Regulatory measures such as carbon pricing as well as transition to low-carbon products may impact the financial viability of existing assets. Understanding the levels of carbon emissions by asset informs investors about the potential impacts of regulatory measures and demand changes on earning capacity.

Table 2

Energy Metrics — Illustrative Examples *(continued)*

Electric Utilities *Continued*

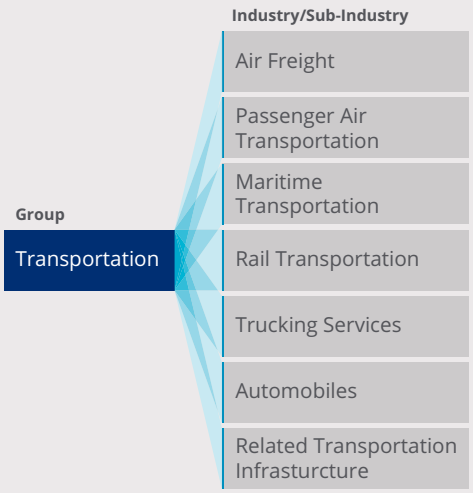
Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Expenditures	GHG Emissions	Describe current internal carbon price or range of prices used	Price in local currency	N/A	Internal carbon prices used, which impact the assessment of an organization's key assets, provide investors with a proper understanding of the reasonableness of assumptions made as input for their risk assessment.
Assets/ Liabilities	Water	Assets committed in regions with high or extremely high baseline water stress	Number of assets, value, percentage of total assets	N/A	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.
Capital	Reserves/ Assets	Proportion of capital allocation to long-lived assets versus short-term assets	Percentage	N/A	(Relatively) high carbon emissions in the value chain will drive alternative technologies in a low-carbon economy. Understanding the allocation to long- versus short-lived assets informs the possibility of an organization to adapt the portfolio in a timely manner to new economic realities.
Capital	Reserves/ Assets	Capital payback periods or return on capital deployed	Years; Percentage ROI	N/A	(Relatively) high carbon emissions in the value chain will drive alternative technologies in a low-carbon economy. Understanding the capital payback periods or return on capital deployed informs the vulnerability of the portfolio to changes in cost levels due to regulatory measures and the flexibility to maintain the current technology portfolio at lower financial returns in a transition period to low-carbon technologies.
Capital	Energy Use/ Efficiency Low-Carbon Alternatives	Capital expenditure planned for the development of renewable electricity capacity and as a percentage of total CapEx planned for power generation in the current CapEx plan	Local currency, Percentage	GRI: G4-OG2 CDP: EU4.3	Investments in new technologies are needed in the transition to a low-carbon economy. The level of investment in renewable electricity capacity provides an indication of the level to which future earning capacity of core business might be (positively) impacted.

Supplemental Guidance for the Transportation Group

2. Transportation

The Transportation Group includes, but is not limited to, industries listed in Table 3.

Table 3
Transportation Group



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 (e.g., by monitoring carbon emissions relative to the distance traveled). Increasing constraints on carbon emissions will continue to impact costs in this group, particularly around investments in innovation (new technologies and efficiencies).[44]

The Transportation Group, therefore, will face challenges from two major drivers. First, policymakers are setting stricter targets for carbon emissions 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 rail and marine equipment and transportation infrastructure. As with the Energy Group, investments in long-lived assets (e.g., manufacturing facilities, airplanes, ships, transportation infrastructure) 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 research and development (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 (includes vehicles that run on a range of traditional and alternative fuels).[45]

The following guidance provides additional considerations for disclosures by the Transportation Group.

[44] Moody's Global Credit Research, "Moody's: Auto sector faces rising credit risks due to carbon transition." September 20, 2016. https://www.moodys.com/research/Moodys-Auto-sector-faces-rising-credit-risks-due-to-carbon--PR_354984.

[45] Only a small portion of vehicles to date use alternative fuels and/or electrical power.

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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.

Strategy

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

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 physical or transition 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. 100-101).

Strategy (continued)

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

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 disclose 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 the Transportation Group
Transportation Group organizations should consider describing the following:

Income Statement

- **Revenues —** Assumptions around emissions and fuel efficiency, including any internal carbon price applied, whether this is on an operational basis (i.e., the short-run marginal cost of carbon) or on a lifecycle basis (i.e., the long-run marginal cost of carbon), and their assessment of the potential impacts on the demand for their carbon-intensive and low-carbon products.
- **Expenditures —** The potential impacts of climate-related risks and opportunities on cost of supply and strategy for managing these impacts relative to market demand and competition. This may include discussions of R&D expenditures, adoption of new technology, and costs of key inputs.

Balance Sheet

- **Assets/Liabilities —** Existing and committed future activities, given that long-lived assets may require additional investments, restructuring, write-downs or impairment. Transportation Group organizations should consider describing their critical planning assumptions around legacy assets, for example strategies and timelines for changes to carbon-intensive facilities or infrastructure, or shifts to lower carbon/fuel intensive assets.
- **Capital —** How climate-related risks and opportunities, particularly in the areas of GHG emissions and energy/fuel usage, are taken into account in capital planning and allocation. This could include a discussion of major acquisitions and divestments, joint venture requirements, and investments in technology, innovation and new business areas in light of changing climate-related risks and opportunities. Transportation Group organizations should also consider providing an assessment of their flexibility in positioning/re-positioning capital to address emerging climate-related risks and opportunities.

Strategy (continued)

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

Recommended Disclosure c) Describe the potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Organizations should describe how their strategies are likely to perform under various forward-looking, climate-related scenarios (e.g., potential effects under different scenarios) and any resulting changes to their strategies and financial plans, risk management activities, or targets/metrics to mitigate risks and take advantage of opportunities. **Supplemental Guidance for the Transportation Group** Transportation Group organizations should consider describing: – The climate-related scenarios used, including the 2°C scenario, and the key assumptions and considerations underlying each climate-related scenario. – For the 2°C scenario used, any adjustments/differences from publicly available 2°C scenarios. – Whether climate-related scenarios with major disruptions (positive and negative) from business-as-usual (breakthroughs, breakdowns) were considered. – Quantitatively and qualitatively the critical input parameters, assumptions, and analytical choices for the climate-related scenarios used. – Time frames used for the climate-related scenarios, including near-, medium- and long-term milestones (e.g., how does the organization consider timing of potential future implications under the climate-related scenarios used). Transportation Group organizations should consider describing qualitatively and quantitatively the conclusion of the organization's climate-related scenario analysis regarding the organization's likely strategic performance under the various climate-related scenarios considered, including implications for the organization's value chain, capital allocation decisions, R&D, and other financial implications.

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. 100-101), as appropriate.

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Risk Management (continued)

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.

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. 100-101). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable. Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy. Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics. **Supplemental Guidance for the Transportation Group** For all relevant metrics, Transportation Group organizations should consider providing historical trends and forward-looking projections (by relevant country and/or jurisdiction and business line). Transportation Group organizations should consider providing key metrics related to the implications of GHG emissions and energy/fuel for the financial aspects related to shifting demand, cost of supply, capital allocation, and long-lived assets. Such metrics could include the following: **Revenues** – Sales-weighted average fleet fuel economy, by region (miles per gallon (MPG), Liter (L)/Kilometer (Km), g carbon dioxide emissions (CO_2e)/Km), and weight or number of passengers transported. **Expenditures** – Total fuel consumed and percent renewable for road, rail, airlines, marine. **Capital** – Relevant metrics to indicate flexibility of capital deployment, portfolio allocation and capital payback. This could include measures such as: proportion of capital allocation to long-lived assets versus short-term assets and capital payback periods or return on capital deployed. – Investments in low-carbon alternatives (e.g., R&D, technology, products and/or services). For illustrative examples, please see Table 4 (pp. 66).

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Metrics and Targets (continued)

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

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.[46] GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[47] As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.[48] **Supplemental Guidance for the Transportation Group** Transportation Group organizations should consider providing sector-specific metrics. For illustrative examples, please see Table 4 (pp. 66).
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 low-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. **Supplemental Guidance for the Transportation Group** For all relevant metrics identified by organizations under recommended disclosures a) and b) above, organizations should also report relevant targets.

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[46] 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.

[47] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions.

[48] 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.

Table 4

Transportation Metrics — Illustrative Examples

The specific examples of metrics provided below 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 sector-specific guidance. 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.

In determining the most relevant and useful metrics, organizations are encouraged to engage with their key stakeholders, including investors, and review publicly available frameworks.[49] Again, the examples below 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.

Air Freight

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues	Low-Carbon Alternatives	Sales-weighted average fleet fuel economy, by region and weight transported	MPG, L/Km, gCO_2e/Km, Kilogram (Kg) transported	SASB: TR0101-09 (Auto)	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.
Expenditures	Energy Use/ Efficiency	Total fuel consumed and percent renewable for road, airlines	Gigajoules (GJ), Percentage	SASB: TR0202-03	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 impacted or asset value impaired.
Capital	Low-Carbon Alternatives	Investments in R&D for low-carbon transportation equipment or transportation services	Local currency	N/A	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 impacted.

[49] 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.

Table 4

Transportation Metrics — Illustrative Examples *(continued)*

Passenger Air Transportation

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues	Low-Carbon Alternatives	Sales-weighted average fleet fuel economy, by region and number of passengers transported	MPG, L/Km, gCO_2e/Km, Kg transported, number of passengers transported	SASB: TR0101-09 (Auto)	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.
Expenditures	Energy Use/ Efficiency	Total fuel consumed and percent renewable for airlines	GJ, Percentage	SASB: TR0201-03	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 impacted or asset value impaired.
Capital	Low-Carbon Alternatives	Investments in R&D for 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 impacted.

Maritime Transportation

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues	Low-Carbon Alternatives	Sales-weighted average fleet fuel economy by region and weight or number of passengers transported	MPG, L/Km, gCO_2e/Km, Kg transported, number of passengers transported	SASB: TR0101-09 (Auto)	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	Low-Carbon Alternatives	Energy Efficiency Design Index (EEDI) for new ships	Grams of CO_2e 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 be financially impactful.
Expenditures	Energy Use/ Efficiency	Total fuel consumed and percent renewable for marine	GJ, Percentage	SASB: TR0301-03	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 impacted or asset value impaired.

Table 4

Transportation Metrics — Illustrative Examples *(continued)*

Maritime Transportation *Continued*

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Capital	Low-Carbon Alternatives	Investments in R&D for low-carbon transportation equipment or transportation services	Local currency	N/A	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 impacted.

Rail Transportation

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues	Low-Carbon Alternatives	Sales-weighted average fleet fuel economy, by region and weight or number of passengers transported	MPG, L/Km, gCO_2e/Km, Kg transported, number of passengers transported	SASB: TR0101-09 (Auto)	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.
Expenditures	Energy Use/ Efficiency	Total fuel consumed and percent renewable for rail	GJ, Percentage	SASB: 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 impacted or asset value impaired.
Capital	Low-Carbon Alternatives	Investments in R&D for low-carbon transportation equipment or transportation services	Local currency	N/A	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 impacted.

Trucking Transportation

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues	Low-Carbon Alternatives	Sales-weighted average fleet fuel economy by region and weight or number of passengers transported	MPG, L/Km, gCO_2e/Km, Kg transported, number of passengers transported	SASB: TR0101-09 (Auto)	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.
Expenditures	Energy Use/ Efficiency	Total fuel consumed and percent renewable for road	GJ, Percentage	SASB: TR0402-03	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 impacted or asset value impaired.

Table 4

Transportation Metrics — Illustrative Examples *(continued)*

Trucking Transportation *Continued*					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Expenditures	GHG Emissions	Road vehicles—Geographic breakdown of GHG emissions: emissions and/or emission intensity of products for key geographies against regulatory requirements/targets	Metric ton (MT) of CO_2e or CO_2e/Km	CDP: AU2.3 (Auto)	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.
Capital	Low-Carbon Alternatives	Investments in Research and Development for low-carbon transportation equipment or transportation services	Local currency	N/A	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 impacted.

Automobiles					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Revenues	Low-Carbon Alternatives	Sales-weighted average fleet fuel economy, by region and weight or number of passengers transported	MPG, L/Km, gCO_2e/Km, Kg transported, number of passengers transported	SASB: TR0101-09	New technologies are needed to manage transition risk as demand grows 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	Low-Carbon Alternatives	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.
Expenditures	Energy Use/ Efficiency	Total fuel consumed and percent renewable for road, rail, marine	GJ, Percentage		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 impacted or asset value impaired.
Expenditures	GHG Emissions	Road vehicles — Geographical breakdown of GHG emissions: emissions and/or emission intensity of products for key geographies against regulatory requirements/targets	MT of CO_2e or CO_2e/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.

Table 4

Transportation Metrics — Illustrative Examples *(continued)*

Automobiles *Continued*					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Assets/ Liabilities	GHG Emissions	Automobiles —- Life cycle reporting of GHG emissions	MT of CO_2e	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.
Capital	Low-Carbon Alternatives	Investments in Research and Development for low-carbon transportation equipment or transportation services	Local currency	CDP: AU3.4	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 impacted.

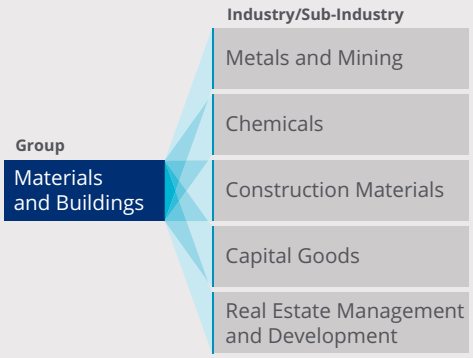
Related Transportation Infrastructure					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Expenditures	Energy Use/ Efficiency	Total fuel consumed and percent renewable	GJ, Percentage	N/A	In the transition to a low-carbon 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 impacted or asset value impaired.
Capital	Low-Carbon Alternatives	Investments in Research and Development for low-carbon transportation equipment or transportation services	Local currency	N/A	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 impacted.

Supplemental Guidance for the Materials and Buildings Group

3. Materials and Buildings

The Materials and Buildings Group includes, but is not limited to, industries listed in Table 5.

Table 5
Materials and Building Group



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 high greenhouse gas (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 the disclosures relating to R&DDD plans and progress are valuable to see the current and future situation and risks of 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.

The following guidance provides additional considerations for disclosures by the Materials and Buildings Group.

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.

Governance (continued)

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.

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 physical or transition 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. 100-101).
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 disclose 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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Strategy (continued)

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

(continued) **Recommended Disclosure b)** Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	**Supplemental Guidance for the Materials and Buildings Group** Materials and Buildings Group organizations should consider providing the following: **Income Statement** – **Revenues —** Carbon pricing assumptions, including any internal carbon price applied, how it is determined, and an assessment of the potential impacts on future revenue. – **Expenditures —** The potential impacts of climate-related risks and opportunities on cost of supply and strategy for managing these impacts relative to their market demand and competition. This may include discussions of research and development (R&D) expenditures, adoption of new technology, and costs of key inputs. **Balance Sheet** – **Assets/Liabilities —** As demand for end products evolves, Materials and Buildings Group organizations should consider providing an indication of the emissions profile of their long-lived assets. This should focus on existing and committed future activities, given that reserves may not be brought to market and long-lived assets may require restructuring, write-downs, or impairment. Materials and Buildings Group organizations should consider describing their critical planning assumptions around legacy assets, for example, strategies and timelines for carbon-intensive facilities or shifts to less intensive carbon/energy/water usage. – **Capital —** How GHG emissions, energy usage, and water issues are taken into account in capital planning and allocation. This could include a discussion of major acquisitions and divestments, joint venture requirements, and investments in technology, innovation, and new business areas in light of changing climate-related risks and opportunities. Materials and Buildings Group organizations should also consider providing an assessment of flexibility in positioning/re-positioning capital to address emerging climate-related risks and opportunities.
Recommended Disclosure c) Describe the potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Organizations should describe how their strategies are likely to perform under various forward-looking, climate-related scenarios (e.g., potential effects under different scenarios) and any resulting changes to their strategies and financial plans, risk management activities, or targets/metrics to mitigate risks and take advantage of opportunities. **Supplemental Guidance for the Materials and Buildings Group** Materials and Buildings Group organizations should consider describing: – The climate-related scenarios used, including the 2°C scenario, and the key assumptions and considerations underlying each climate-related scenario. – For the 2°C scenario used, any adjustments/differences from publicly available 2°C scenarios. – Whether climate-related scenarios with major disruptions (positive and negative) from business-as-usual (breakthroughs, breakdowns) were considered. – Quantitatively and qualitatively the critical input parameters, assumptions, and analytical choices for the climate-related scenarios used. – Time frames used for the climate-related scenarios, including near-, medium- and long-term milestones (e.g., how does the organization consider timing of potential future implications under the climate-related scenarios used). Materials and Buildings Group organizations should consider describing qualitatively and quantitatively the conclusion of the organization's climate-related scenario analysis regarding the organization's likely strategic performance under the various climate-related scenarios considered, including implications for the organization's value chain, capital allocation decisions, R&D, and other financial implications.

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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.
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. 100-101), 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.

Metrics and Targets

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

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. 100-101). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable.

Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy.

Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics.

Supplemental Guidance for the Materials and Buildings Group
For all relevant metrics, Materials and Buildings Group organizations should consider providing historical trends and forward-looking projections (by relevant country and/or jurisdiction and business line).

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 shifting demand, cost of supply, capital allocation, and reserves. Such metrics could include the following:

Revenues
- Total energy intensity — by tons of product, amount of sales, number of products depending on informational value.

Expenditures
- Total energy consumed, broken down by source (e.g., purchased electricity and renewable sources).
- Total fuel consumed — percentage from coal, natural gas, oil, and renewable sources.
- Measurement of water withdrawn in regions with high or extremely high baseline water stress.

Capital
- Relevant metrics to indicate flexibility of capital deployment, portfolio allocation and capital payback. This could include measures such as: proportion of capital allocation to long-lived assets versus short-term assets and capital payback periods or return on capital deployed.
- Investments in low-carbon alternatives (e.g., R&D, technology, products, and/or services).

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.[50]

GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[51]

As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios. [52]

Supplemental Guidance for the Materials and Buildings Group
Materials and Buildings Group organizations should consider providing sector-specific metrics. For illustrative examples, please see Table 6 (pp. 78).

[50] 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.

[51] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions.

[52] 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 (continued)

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

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 low-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. **Supplemental Guidance for Materials and Buildings Group** For all relevant metrics identified by Materials and Buildings Group organizations under recommended disclosures a) and b) above, organizations should also report relevant targets.

Table 6

Materials and Buildings Metrics — Illustrative Examples

The specific examples of metrics provided below 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 sector-specific guidance. 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, liabilities, and capital allocation.

In determining the most relevant and useful metrics, organizations are encouraged to engage with their key stakeholders, including investors, and review publicly available frameworks.[53] Again, the examples below 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.

Metals and Mining

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues Capital	Low-Carbon Alternatives	Investments in low-carbon alternatives (e.g., R&D, technology, products and/or services)	Local currency	N/A	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 impacted.
Expenditures	Energy Use/ Efficiency	Total energy consumed, broken down by source (e.g., purchased electricity and renewable sources)	Gigajoules (GJ)	N/A	The metals and mining industries are energy- and emission-intensive industries. 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 Use/ Efficiency	Total fuel consumed—percentage from coal, natural gas, oil, and renewable sources	GJ	SASB: NR0302-04	
Expenditures	Energy Use/ Efficiency	Total energy intensity—by tons of product, amount of sales, number of products depending on informational value	GJ	N/A	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	Water	Percent of fresh water withdrawn in regions with high or extremely high baseline water stress	Percentage	SASB: NR0302-04	Water stress can result in increased cost of supply, impacts to operations, and increased regulation/reduced access for water withdrawal. The percent withdrawn in high-water-stress areas informs the risk of significant costs or limitations to production capacity.
Assets/ Liabilities	Reserves/ Assets	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_2e)	N/A	A transition to a low-carbon economy may impact 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.

[53] 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.

Table 6

Materials and Buildings Metrics — Illustrative Examples *(continued)*

Chemicals

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues Capital	Low-Carbon Alternatives	Investments in low-carbon alternatives (e.g., R&D, technology, products and/or services)	Local currency	N/A	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 impacted.
Expenditures	Energy Use/ Efficiency	Total energy consumed, broken down by source (e.g., purchased electricity and renewable sources)	GJ	SASB: RT0101-05	The chemicals industries are energy- and carbon-intensive industries. Understanding the levels of energy consumption by source provides an indication of the potential impacts of regulatory measures in relation to the use of certain energy sources and transition risks in a low-carbon economy scenario.
Expenditures	Energy Use/ Efficiency	Total fuel consumed – percentage from coal, natural gas, oil, and renewable sources	GJ	N/A	
Expenditures	Energy Use/ Efficiency	Total energy intensity – by tons of product, amount of sales, number of products depending on informational value	GJ	N/A	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	Water	Percent of fresh water withdrawn in regions with high or extremely high baseline water stress	Percentage	SASB: RT0101-07	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.

Construction Materials

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues/ Capital	Low-Carbon Alternatives	Investments in low-carbon alternatives (e.g., R&D, technology, products and/or services)	Local currency	N/A	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 impacted.
Expenditures	Energy Use/ Efficiency	Total energy consumed, broken down by source (e.g., purchased electricity and renewable sources)	GJ	SASB: NR0401-04	The construction materials industries are energy- and carbon-intensive industries. Understanding the levels of energy consumption by source provides an indication of the potential impacts of regulatory measures in relation to the use of certain energy sources and transition risks in a low-carbon economy scenario.
Expenditures	Energy Use/ Efficiency	Total fuel consumed—percentage from coal, natural gas, oil, and renewable sources	GJ	N/A	

Table 6

Materials and Buildings Metrics — Illustrative Examples *(continued)*

Construction Materials *Continued*

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Expenditures	Energy Use/ Efficiency	Total energy intensity—by tons of product, amount of sales, number of products depending on informational value	GJ	N/A	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	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.

Capital Goods

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues/ Capital	Low-Carbon Alternatives	Investments in low-carbon alternatives (e.g., R&D, technology, products and/or services)	Local currency	N/A	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 impacted.
Expenditures	Energy Use/ Efficiency	Total energy consumed, broken down by source (e.g., purchased electricity and renewable sources)	GJ	SASB: RT0203-01	The capital goods industries are energy- and carbon-intensive industries. Understanding the levels of energy consumption by source provides an indication of the potential impacts of regulatory measures in relation to the use of certain energy sources and transition risks in a low-carbon economy scenario.
Expenditures	Energy Use/ Efficiency	Total fuel consumed—percentage from coal, natural gas, oil, and renewable sources	GJ	N/A	The capital goods industries are energy- and carbon-intensive industries. Understanding the levels of fuel consumption by source provides an indication of the potential impacts of regulatory measures in relation to the use of certain fuels and transition risks in a low-carbon economy scenario.
Expenditures	Energy Use/ Efficiency	Total energy intensity—by tons of product, amount of sales, number of products depending on informational value	GJ	N/A	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	Water	Percent of fresh water withdrawn in regions with high or extremely high baseline water stress	Percentage	N/A	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 6

Materials and Buildings Metrics — Illustrative Examples *(continued)*

Real Estate Development and Management					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Revenues Capital	Low-Carbon Alternatives	Investments in low-carbon alternatives (e.g., R&D, technology, products and/or services)	Local currency	GRI: G4-EN7 GRESB: Q17/ Q18	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 impacted.
Revenues Assets/ Liabilities	Energy Use /Efficiency Low-Carbon Alternatives	For each property type, the percentage certified as sustainable	Percentage	SASB: IF0402-04 GRI: G4-CRE8 GRESB: NC5.2/ CA2/Q30.1/ Q30.2/Q31	Regulatory measures such as carbon pricing as well as transition to low-carbon properties may impact 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.
Expenditures	Energy Use/ Efficiency	Total energy consumed, broken down by source (e.g., purchased electricity, alternative sources, and renewable sources)	GJ	SASB: IF0402-02 GRI:G4-EN3 GRESB: PI3/ Q25.1/Q25.3	The real estate industries are energy- and carbon-intensive industries in terms of the use of the properties. Understanding the levels of energy consumption by source provides an indication of the potential impacts of regulatory measures in relation to the use of certain energy sources and transition risks in a low-carbon economy scenario.
Expenditures	Energy Use/ Efficiency	Total fuel consumed—percentage from coal, natural gas, oil, and renewable sources	GJ	GRESB: Q25.1	
Expenditures	Water	Percent of fresh water withdrawn in regions with high or extremely high baseline water stress	Percentage	SASB: IF0402-06	Water stress can result in increased cost of supply, inability to deliver water to real estate tenants, and/or legislation to regulate water consumption. The percent withdrawn in high-water-stress areas informs the risk of significant costs or limitations to this service capacity.
Expenditures	Energy Use/ Efficiency	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.

Table 6

Materials and Buildings Metrics — Illustrative Examples *(continued)*

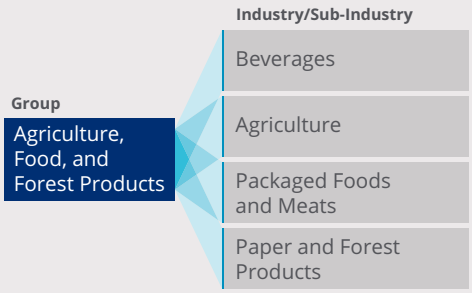
Real Estate Development and Management *Continued*					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Expenditures	Reserves/ Assets Land Use	Metrics on the financial evaluation of flooding risk according to local standards and/or based on elevation of buildings/plants, including the definition of high flooding risk used, the probability of events occurring, and the ability or costs to insure against these risks	Percentage probability, costs to insure in local currency	N/A	Flooding risks can result in physical damage to properties, impacting 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.
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.
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.
Assets/ Liabilities	Reserves/ Assets Land Use	Area of properties located in designated flood hazard areas by property subsector	Square meters or acres	SASB: IF0402-13	Flooding risks can result in physical damage to properties, impacting their serviceability. Understanding the relative size of properties in high-flood-risk areas by subsector informs investors about potential changes to the earning capacity of real estate portfolios.

Supplemental Guidance for the Agriculture, Food, and Forest Products Group

4. Agriculture, Food, and Forest Products

The Agriculture, Food, and Forest Products Group includes, but is not limited to, industries listed in Table 7.

Table 7
Agriculture, Food, and Forest Products Group



Climate-related risks and opportunities in this group largely emanate from greenhouse gas (GHG) emissions and water and waste management driven by land use and production practices and changing land-use patterns.[54]

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

Producers, such as agriculture and forestry enterprises, will likely be impacted 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).[55]

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.

[54] According to the 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." (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. https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_full.pdf). Agriculture is also a heavy user of water, primarily for irrigation.

[55] 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 (IPCC. Climate Change 2014 Mitigation of Climate Change, Cambridge University Press, 2014. https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_full.pdf).

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

- 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), and
- 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).

The following guidance provides additional considerations for disclosures by the Agriculture, Food, and Forest Products Group.

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.

Strategy

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

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 physical or transition 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. 100-101).
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 disclose 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 the Agriculture, Food, and Forest Products Group** Agriculture, Food, and Forest Products Group organizations should consider discussing how climate-related risks and opportunities—such as current and forecasted levels of GHG emissions, energy, and water—are integrated into their strategy formulation and decision making, and key planning assumptions around:

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Strategy (continued)

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

(continued) **Recommended Disclosure b)** Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	**Income Statement** – **Revenues —** Assumptions about the impact of GHG emissions and water on revenues and demand, including whether this is on an operational basis or on a lifecycle basis and their assessment of the potential impacts on the demand for their products. – **Expenditures —** The potential impacts of climate-related risks and opportunities on cost of supply and strategy for managing these impacts relative to market demand and competition. This may include discussions of research and development (R&D) expenditures, adoption of new technology, costs of key inputs (e.g., fuel, water), and losses from weather events (e.g., severe storms, floods). **Balance Sheet** – **Assets/Liabilities —** An indication of the emissions/energy/water intensity (both emissions and absorption of GHG) of long-lived assets (e.g., land) and reserves (e.g., forests), with a focus on existing and committed future activities, given that the value of assets and reserves may require restating, write-downs or impairment. Agriculture, Food, and Forest Products Group organizations should consider describing critical planning assumptions around legacy assets (e.g., strategies and timelines for land acquisition or divestment, anticipated land use changes including afforestation or deforestation). – **Capital —** How climate-related risks and opportunities, particularly in the areas of GHG emissions, energy usage, and water issues, are taken into account in capital planning and allocation. For example, this could include a discussion of major acquisitions and divestments, joint venture requirements, and investments in technology, innovation, and new business areas in light of changing climate-related risks and opportunities. Organizations should also consider providing an assessment of flexibility in positioning/repositioning capital to address emerging climate-related risks and opportunities.
Recommended Disclosure c) Describe the potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	**Guidance for All Sectors** Organizations should describe how their strategies are likely to perform under various forward-looking, climate-related scenarios (e.g., potential effects under different scenarios) and any resulting changes to their strategies and financial plans, risk management activities, or targets/metrics to mitigate risks and take advantage of opportunities. **Supplemental Guidance for the Agriculture, Food, and Forest Products Group** Agriculture, Food, and Forest Products Group organizations should describe: – The climate-related scenarios used, including the 2°C scenario, and the key assumptions and considerations underlying each climate-related scenario. – For the 2°C scenario used, any adjustments/differences from publicly available 2°C scenarios. – Whether climate-related scenarios with major disruptions (positive and negative) from business-as-usual (breakthroughs, breakdowns) were considered. – Quantitatively and qualitatively the critical input parameters, assumptions, and analytical choices for the climate-related scenarios used.

Strategy (continued)

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

(continued) **Recommended Disclosure c)** Describe the potential impact of different scenarios, including a 2°C scenario, on the organization's businesses, strategy, and financial planning.	– Time frames used for the climate-related scenarios, including near-, medium- and long-term milestones (e.g., how does the organization consider timing of potential future implications under the climate-related scenarios used). Agriculture, Food, and Forest Products Group organizations should consider describing qualitatively and quantitatively the conclusion of the organization's scenario analysis regarding the organization's likely strategic performance under the various scenarios considered, including implications for the organization's value chain, capital allocation decisions, R&D, and other financial implications.

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. 100-101), 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.

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Metrics and Targets

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

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. 100-101). Organizations should consider including metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable. Where relevant, organizations should provide their internal carbon prices as well as climate-related opportunity metrics such as revenue from products and services designed for a low-carbon economy. Metrics should be provided for historical periods to allow for trend analysis. In addition, where not apparent, organizations should provide a description of the methodologies used to calculate or estimate climate-related metrics. **Supplemental Guidance for the Agriculture, Food, and Forest Products Group** For all relevant metrics, Agriculture, Food, and Forest Products Group organizations should provide historical trends and forward-looking projections (by relevant country and/or jurisdiction and business line). Agriculture, Food, and Forest Products Group organizations should consider providing key metrics related to the implications of GHG emissions, energy, and water as well as impacts of climate change on the financial aspects related to shifting demand, cost of supply, capital allocation, and reserves. Such metrics could include the following: **Revenues** – Investments in low-emissions/water technology and products. **Expenditures** – Percent of freshwater withdrawn and consumed in regions with high or extremely high baseline water stress.[56] **Assets/Liabilities** – Where applicable, metrics used to measure new land converted to agricultural land. **Capital** – Relevant metrics to indicate flexibility of capital deployment, portfolio allocation and capital payback. This could include measures such as proportion of capital allocation to long-lived assets versus short-term assets and capital payback periods or return on capital deployed. – Investment in low carbon/water alternatives R&D, equipment, products or services.
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.[57] GHG emissions should be calculated in line with the GHG Protocol methodology to allow for aggregation and comparability across organizations and jurisdictions.[58] As appropriate, organizations should consider providing related, generally accepted industry-specific GHG efficiency ratios.[59] **Supplemental Guidance for the Agriculture, Food, and Forest Products Group** Agriculture, Food, and Forest Products Group organizations should consider providing sector-specific metrics. For illustrative examples, please see Table 8 (p. 91).

[56] Information on assessment tools can be found in the Corporate Water Disclosure Guidelines available at http://ceowatermandate.org/disclosure/.

[57] 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.

[58] While challenges remain, the GHG Protocol methodology is the most widely recognized and used international standard for calculating GHG emissions.

[59] 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 (continued)

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

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 low-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. **Supplemental Guidance for the Agriculture, Food, and Forest Products Group** For all relevant metrics identified by Agriculture, Food, and Forest Products Group organizations under recommended disclosures a) and b) above, organizations should also report relevant targets.

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Table 8

Agriculture, Food, And Forest Products — Illustrative Examples

The specific examples of metrics provided below 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 sector-specific guidance. 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.

In determining the most relevant and useful metrics, organizations are encouraged to engage with their key stakeholders, including investors, and review publicly available frameworks.[60] Again, the examples below 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.

Beverages

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues Capital	Low-Carbon Alternatives	Investment in low-carbon/water alternatives (e.g., R&D, equipment, products, or services)	Local currency	N/A	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 impacted.
Expenditures	Water	Total water withdrawn and total water consumed	Cubic meters (m^3)	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/ Liabilities	Reserves/ Assets Water	Amount of assets committed in regions with high or extremely high baseline water stress	Number of assets, value, percentage of total assets	N/A	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.

[60] 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.

Table 8

Agriculture, Food, And Forest Products — Illustrative Examples *(continued)*

Agriculture					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Revenues Capital	Low-Carbon Alternatives	Investment in low-carbon/water alternatives R&D, equipment, products or services	Local currency	N/A	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 impacted.
Expenditures	Water	Total water withdrawn and total water consumed	Cubic meters (m^3)	SASB: CN0101-06 CN0102-04	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 CN0102-04	
Expenditures	GHG Emissions	Mechanical (Scope 1): Emissions from equipment or machinery operated on farms	Metric ton (MT) of carbon dioxide emissions (CO_2e)	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	MT of CO_2e	CDP: FBT 1.3b	
Assets/ Liabilities	GHG Emissions	Non-mechanical (Scope 1): Emissions from biological processes shaped by climatic and soil conditions or the burning of crop residues	MT of CO_2e	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 occur 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.
Assets/ Liabilities	GHG Emissions Land Use	Land use change (Scope 1): Emissions from land use change that results in a reduction in the size of carbon stocks (e.g., from the conversion of native habitats into farmlands)	MT of CO_2e	CDP: FBT 1.3c	
Assets/ Liabilities	Reserves/ Assets Water	Amount of assets committed in regions with high or extremely high baseline water stress	Number of assets, value, percentage of total assets	N/A	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.

Table 8

Agriculture, Food, And Forest Products — Illustrative Examples *(continued)*

Packaged Food and Meats

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues Capital	Low-Carbon Alternatives	Investment in low-carbon/water alternatives (e.g., R&D, equipment, products, or services)	Local currency	N/A	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 impacted.
Expenditures	Water	Total water withdrawn and total water consumed	Cubic meters (m^3)	SASB: CN0103-03	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: CN0103-03	
Assets/ Liabilities	Reserves/Assets Water	Amount of assets committed in regions with high or extremely high baseline water stress	Number of assets, value, percentage of total assets	N/A	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.

Paper and Forest Products

Financial Category	Climate-Related Category	Example Metric	Unit of Measure	Alignment	Rationale for Inclusion
Revenues Capital	Low-Carbon Alternatives	Investment in low-carbon/water alternatives (e.g., R&D, equipment, products, or services)	Local currency	N/A	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 impacted.
Expenditures	Water	Total water withdrawn and total water consumed	Cubic meters (m^3)	SASB: RR0202-05	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: RR0202-05	
Expenditures	GHG Emissions	Mechanical (Scope 1): Emissions from equipment or machinery operated on farms	MT of CO_2e	SASB: RR0202-01 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	MT of CO_2e	CDP: FBT 1.3b	

Table 8

Agriculture, Food, And Forest Products — Illustrative Examples *(continued)*

Paper and Forest Products *Continued*					
Financial Category	**Climate-Related Category**	**Example Metric**	**Unit of Measure**	**Alignment**	**Rationale for Inclusion**
Expenditures	GHG Emissions	Non-mechanical (Scope 1): Emissions from biological processes shaped by climatic and soil conditions or the burning of crop residues	MT of CO_2e	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 occur 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.
Assets/ Liabilities	GHG Emissions/ Land Use	Land use change (Scope 1): Emissions from land-use change that results in a reduction in the size of carbon stocks, e.g., from the conversion of native habitats into farmlands	MT of CO_2e	CDP: FBT 1.3c	
Assets/ Liabilities	Reserves/ Assets Water	Amount of assets committed in regions with high or extremely high baseline water stress	Number of assets, value, percentage of total assets	N/A	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.

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.[61] As understanding of, and approaches to, climate-related issues evolve over time, so too will climate-related financial reporting. These principles can help achieve high-quality and decision-useful disclosures that enable users to understand the impact of climate change on organizations. The Task Force encourages organizations adopting its recommendations to consider these principles as they develop climate-related financial disclosures.

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

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Principle 1: Disclosures should present relevant information

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

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

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

Principle 2: Disclosures should be specific and complete

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

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

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

Principle 4: Disclosures should be consistent over time

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

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

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

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

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

Principle 7: Disclosures should be provided on a timely basis

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

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

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Appendix 1: Climate-Related Risks and Opportunities

Table A1

Examples of Climate-Related Risks and Potential Financial Impacts

Type	Climate-Related Risks	Potential Financial Impact
Transition Risks	**Policy and Legal**	
	– Increased pricing of GHG emissions – Enhanced emissions-reporting obligations – Mandates on and regulation of existing products and services – Exposure to litigation	– Increased operating costs (e.g., compliance costs) – Write-offs and early retirement of existing assets due to policy change – Impaired assets – Increased insurance premiums – Fines and judgments
	Technology	
	– Substitution of existing products and services with lower emissions options – Unsuccessful investment in new technologies – Upfront costs to transition to lower emissions technology	– Write-offs and early retirement of existing assets – Reduced demand for products and services – Upfront research and development (R&D) expenditures in new and alternative technologies – Upfront capital investments in technology development – Upfront costs to adopt/deploy new practices and processes[1]
	Markets	
	– Changing customer behavior – Uncertainty in market signals – Increased cost of raw materials	– Reduced demand for goods and services due to shift in consumer preferences – Increased production costs due to changing input prices (e.g., energy, water) and output requirements (e.g., waste treatment) – Abrupt and unexpected shifts in energy costs – Changing revenue mix and sources – Re-pricing of assets and speed of re-pricing (e.g., fossil fuel reserves, land valuations, securities valuations)
	Reputation	
	– Shift in consumer preferences – Stigmatization of sector – Increased stakeholder concern or negative stakeholder feedback	– Reduced demand for goods/services – Reduction or disruption in production capacity (e.g., shutdowns, delayed planning approvals, interruptions to supply chain) – Impacts on workforce management and planning (e.g., employee attraction and retention) – Reduction in capital availability
Physical Risks	**Acute**	– Reduction or disruption in production capacity (e.g., shutdowns,transport difficulties, supply chain interruptions) – Impacts to workforce management and planning (e.g., health,safety, absenteeism) – Write-offs and early retirement of existing assets (e.g., damage to property and assets in "high-risk" locations) – Increased operating costs (e.g., inadequate water supply for hydroelectric plants or to cool nuclear and fossil fuel plants) – Increased capital costs (e.g., damage to facilities) – Reduced revenues from lower sales/output – Increased insurance premiums and potential for reduced availability of insurance on assets in "high-risk" locations
	– Increased severity of extreme weather events such as cyclones and floods	
	Chronic	
	– Changes in precipitation patterns and extreme variability in weather patterns – Rising mean temperatures – Rising sea levels	

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Table A2

Examples of Climate-Related Opportunities and Potential Financial Impacts

Type	Climate-Related Risks	Potential Financial Impact
Resource Efficiency	– Use of more efficient modes of transport – More efficient production and distribution processes – Use of recycling – More efficient buildings – Reduced water usage and consumption	– Reduced operational costs (e.g., through efficiency gains and cost reductions) – Increased production capacity – 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) – Better prepared for changes in or additions to government policies and regulations
Energy Source	– Lower-emission sources of energy – Supportive policy incentives – Emergence of new technologies – Participating in carbon market – Energy security and shift toward decentralization	– Reduced operational costs (e.g., through use of lowest cost abatement) – Reduced exposure to future energy price increases – Reduced exposure to GHG emissions and therefore less sensitivity to changes in cost of carbon – Generate return on investment in low-emission technology – Increase in capital availability (e.g., as more investors favor lower-emissions producers) – Reputational benefits and increased demand for goods/services
Products and Services	– Develop and/or expand low emission goods and services – Climate adaptation and insurance risk solutions – R&D and innovation – Diversify business activities – Shifting consumer preferences	– Increased revenue through demand for lower emissions products and services – Increased revenue through new solutions to adaptation needs (e.g., insurance risk transfer products and services) – Increased resilience to changes in government policies and regulations – Better competitive position to reflect shifting consumer preferences
Markets	– New markets – Public-sector incentives – Community needs and initiatives – Development banks	– Increased access to new and emerging markets (e.g., partnerships with governments, development banks) – Increased diversification (e.g., green bonds and infrastructure) – Increased resilience in existing supply chain relationships – Increased demand for goods/services in new markets
Resilience	– Participate in renewable energy programs and adopt energy-efficiency measures – Resource substitutes/diversification – New assets and locations needing insurance coverage	– 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

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."[62]

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 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."[63] "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."[64]

[62] OECD, G20/OECD Principles of Corporate Governance, OECD Publishing, Paris, 2015. http://dx.doi.org/10.1787/9789264236882-en.
[63] A. Cadbury, Report of the Committee on the Financial Aspects of Corporate Governance. London, 1992. http://www.ecgi.org/codes/documents/cadbury.pdf.
[64] OECD, G20/OECD Principles of Corporate Governance, OECD Publishing, Paris, 2015. http://dx.doi.org/10.1787/9789264236882-en.

GREENHOUSE GAS (GHG) EMISSIONS SCOPE LEVELS[65]

- **Scope 1** refers to all direct GHG emissions.
- **Scope 2** refers to indirect GHG emissions from consumption of purchased electricity, heat, or steam.
- **Scope 3** refers to other indirect emissions not covered in Scope 2 that occur in the value chain of the reporting company, including both upstream and downstream emissions. Scope 3 emissions could include: the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g., transmission and distribution losses), outsourced activities, and waste disposal.[66]

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.

[65] 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/standards/corporate-standard.

[66] *IPCC, Climate Change 2014 Mitigation of Climate Change*, Cambridge University Press, 2014. https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_full.pdf.

Abbreviations

AODP
Asset Owners Disclosure Project

CDSB
Climate Disclosure Standards Board

CNG
Compressed natural gas

CO_2
Carbon dioxide

CO_2e
Carbon dioxide equivalent

EDTF
Enhanced Disclosure Task Force

EEDI
Energy Efficiency Design Index

FSB
Financial Stability Board

G20
Group of 20

GHG
Greenhouse gas

GICS
Global Industry Classification Standard

GJ
Gigajoules

GMO
Genetically modified organism

GRI
Global Reporting Initiative

IEA
International Energy Agency

IIRC
International Integrated Reporting Council

IPCC
Panel on Climate Change

Kg
Kilogram

Km
Kilometer

L
Liters

LPG
Liquefied petroleum gas

M^3
Cubic meters

MPG
Miles per gallon

MT
Metric ton

MW
Megawatt

OECD
Organization for Economic Co-operation and Development

PRI
Principles for Responsible Investment

R&D
Research and development

ROI
Return on investment

SASB
Sustainability Accounting Standards Board

TCFD
Task Force on Climate-related Financial Disclosures

UNEP FI
United Nations Environment Programme Finance Initiative

WBCSD
World Business Council for Sustainable Development

WRI
World Resources Institute

Appendix 3: References

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