

SUSTAINABILITY ACCOUNTING STANDARDS BOARD

# CLIMATE RISK

TECHNICAL BULLETIN

2021 EDITION



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## ABOUT SASB

The Sustainability Accounting Standards Board (SASB) connects businesses and investors on the financial impacts of sustainability. SASB Standards enable businesses around the world to identify, manage, and communicate financially material sustainability information to investors. SASB Standards are industry-specific and are designed to be decision-useful for investors and cost-effective for companies. They are developed using a process that is evidence based and market informed. To download any of the 77 industry-specific standards, or learn more about SASB, please visit [SASB.org](https://sasb.org).



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## FOREWORD

The technical bulletin you're about to read arrives in front of you following a long and winding road. We released an initial working draft in January 2016 at the Investor Summit on Climate Risk, the first major event on climate change for investors and financial institutions in the wake of the Paris Agreement. The 2016 working draft was intended to inform the deliberations of the then-newly formed Task Force on Climate-related Financial Disclosures (TCFD) and to solicit market feedback on the then-provisional SASB Standards. The response we heard was loud and clear: The market's appetite to better understand the disparate impacts of climate change across industries was enormous—and rapidly growing.



Of course, assessing, managing, and communicating about climate risk are evolving practices. And since that initial draft—and its revised, “official” release later that year—a lot has changed. Three key developments, in particular, compelled us to revisit this work. First, in June 2017, the TCFD issued its final recommendations, providing global markets with a framework for communicating how companies manage climate-related risks and opportunities. Second, in November 2018, SASB launched our Standards after six years in development, codifying key disclosure topics and associated metrics companies can use to measure and manage performance on business-critical sustainability risks—including climate risks—in 77 industries. Third, in 2020, a variety of efforts emerged to accelerate a coherent, comprehensive system of sustainability disclosure that can support global capital markets. Today's global demand for improved climate risk information, and the global cooperation to deliver that information, was unimaginable when we published the first working draft of this bulletin in 2016.

This revised and updated edition of SASB's *Climate Risk Technical Bulletin* reflects the developments of the past several years. It builds on collaborative work we've recently done with other leading standard-setters and framework providers to develop a shared vision for the future of sustainability disclosure—key elements of which we've incorporated here. It reflects the final TCFD recommendations and the codified SASB Standards. And it discusses how SASB's industry-specific climate risk metrics can be integrated into the prototype climate standard published with our colleagues in the December 2020 paper, *Reporting on Enterprise Value*.

We're pleased to offer this revised and updated edition of SASB's *Climate Risk Technical Bulletin* to help inform the global development of climate-related disclosure standards. Returning to that January 2016 event, a recurring theme was the urgent need for better information to ensure markets make a smooth, orderly transition to a low-carbon future. That message is no less true today as companies, investors, and other market participants continue to grapple with the complex risks inherent in climate change. The volume of climate-related financial disclosure has rapidly increased, and its quality and utility continue to evolve and improve. We believe the approach outlined in this bulletin can help accelerate progress toward decision-useful, comparable climate-related information that can inform investment decision making around the world.

Sincerely,

A handwritten signature in black ink that reads "Janine Guillot". The signature is fluid and cursive, with a large initial "J".

**Janine Guillot**

Chief Executive Officer  
Sustainability Accounting Standards Board

## INTRODUCTION

*The Sustainability Accounting Standards Board's (SASB's) Climate Risk Technical Bulletin is intended to help investors and other providers of financial capital better understand their exposure to climate risks and opportunities and also demonstrates for companies, regulators, and policymakers how those exposures can be more effectively disclosed for integration into investment decisions.*

### OVERVIEW

Today, it is widely recognized that the world's economic systems exist within—rather than apart from—its natural systems. For example, companies, investors, and other market participants now take it for granted that natural resources provide critical inputs to businesses, power their processes, and are impacted by their outputs as they seek to create value for customers, for shareholders, and for other stakeholders. However, this view was not always commonly held and, as a result, existing approaches to financial accounting and financial reporting were never designed to capture these linkages between financial capital and other critical sources of value.

In today's world, for example, concerns about climate change have heightened, with scientific consensus—and, increasingly, lived experience—indicating substantial long-term threats to the financial stability of markets, the resilience of investment portfolios, and the viability of some business enterprise. At the same time, detailed analysis suggests that bold action to address climate change could potentially yield a global economic gain of US\$26 trillion through 2030.<sup>1</sup> Investors, as providers of the financial capital that is the lifeblood of global markets, have increasingly recognized the importance of measuring and managing their exposure to climate-related financial risks and opportunities.

As this bulletin demonstrates, these risks and opportunities are now undeniably present in nearly every industry. (See Figure 1.) Because of this ubiquity, investors cannot diversify away from climate risk; instead, they must focus on managing it—and encouraging portfolio companies to manage it—in all its forms.

Among these risks are the physical effects of climate change, such as those due to the increasing frequency and severity of

weather-related events; liabilities related to a shifting regulatory landscape; and the challenge of navigating the transition to a resilient, low-carbon economy. Each of these risks can have a positive or negative impact on a company's financial condition, operating performance, or cost of capital—and therefore on an investment portfolio's risk-return profile.

*Figure 1. Ubiquity of Climate-Related Financial Risk*

Type of Risk	# of Industries	% by Market Cap*	Total Market Cap*
Physical Risk	36 of 77	55%	US\$28.2T
Transition Risk	57 of 77	85%	US\$43.4T
Regulatory Risk	40 of 77	29%	US\$14.7T
<b>Any Climate Risk</b>	<b>68 of 77</b>	<b>89%</b>	<b>US\$45.1T</b>

\* Represents market capitalization of S&P Global 1200 companies reasonably likely to be exposed to each risk type.

This bulletin is intended to assist investors and companies in their efforts to more effectively manage and communicate about climate risk. First, for investors, it presents a comprehensive view of where climate risk is likely to be present across a diversified portfolio and maps that risk to corresponding financial impacts to provide a greater understanding of exposures and value at risk. Second, for companies, the bulletin shares recommendations on how industry-specific climate risk can be more effectively measured, managed, and disclosed, ensuring markets have the information they need to price climate-related risks and opportunities.

<sup>1</sup> Global Commission on the Economy and Climate, *The New Climate Economy: Unlocking the Inclusive Growth Story of the 21st Century: Accelerating Climate Action in Urgent Times* (September 2018).

## BACKGROUND

### Growing Investor Demand

As climate-related uncertainty has increased, investors have not sat by idly. To lead the effort toward improved climate-related risk management and disclosure, they have formed a range of initiatives, including the Global Investor Coalition on Climate Change (GIC), the Investor Agenda, the Institutional Investors Group on Climate Change (IIGCC), Climate Action 100+, and the Transition Pathway Initiative, among others. Importantly, these initiatives are not small, niche groups, but rather represent broad swaths of the global investment community. For example, Climate Action 100+ is made up of 545 global investors across 33 markets with more than US\$52 trillion in assets under management.<sup>2</sup> These initiatives and others recognize that measuring and managing climate risks and opportunities, will require greater transparency for example, through corporate reporting in line with the recommendations of the Task Force for Climate-related Financial Disclosures (TCFD).

### Regulatory Response

In response to this growing demand from investors, securities regulators around the world have begun to consider the financial implications posed by climate change in the context of their primary objectives:<sup>3</sup>

- » Protecting investors;
- » Ensuring markets are fair, efficient, and transparent; and
- » Reducing systemic risk.

In many countries, regulators have concluded that one or more—and arguably all three—of these objectives compels them to address climate risk disclosure. Accordingly, regulators around the world have begun to encourage or require companies to disclose climate-related information to investors. For example, the European Union’s Non-Financial Reporting Directive requires large companies to disclose nonfinancial information including their policies, risks, and metrics in relation to environmental and climate-related matters, among other sustainability factors. The United Kingdom and New Zealand have become the first countries to announce plans to mandate TCFD-aligned disclosure. Japan’s Ministry of Economy, Trade, and Industry has declared its support for the TCFD recommendations and established guidance to promote their implementation. In the United States, the Securities and Exchange Commission has solicited public input and initiated a review of its approach to climate disclosure.<sup>4</sup>

Today, all but five G20 countries have mandatory corporate reporting schemes in place for climate-related risks.<sup>5</sup> However, it is important

to note that requirements vary widely in scope, application, and intended reporting channel. This has presented a key challenge for investors, who require some degree of standardized information to accurately assess risks and allocate capital across global portfolios. It also creates challenges for multinational companies that must comply with the existing assortment of mandatory requirements and voluntary initiatives. Although important progress is being made in this regard, analysis of the current state of companies’ climate-related disclosure has shown that while the volume of information has increased—particularly among larger, more well-resourced firms—the information lacks comparability, consistency, and a clear connection to financial implications.<sup>6</sup>

### The Push for a Global Solution

To address the challenge of fragmentation, the IFRS Foundation—which oversees the International Accounting Standards Board (IASB), whose financial accounting standards are generally accepted in more than 140 countries—has proposed the creation of an international Sustainability Standards Board (SSB). As the IFRS Foundation noted in announcing its proposal, “Delays to global coherence, most pressingly on climate-related disclosures, will increase the threat of fragmentation and consequently cause difficulties in engaging capital markets to smooth the transition to a low-carbon economy.”<sup>7</sup> Market responses to the IFRS Foundation’s proposal indicated strong demand to improve the global consistency and comparability of sustainability disclosure, as well as strong recognition that urgent steps need to be taken to address climate-related disclosure in particular.<sup>8</sup>

A coherent but flexible system of disclosure will be required to strike the delicate balance between providing the global consistency that markets need and the regional requirements that are essential to policymakers and regulators. Many observers have recommended that the push for a global solution follow a “building blocks” approach, which would be founded on a “consistent and comparable baseline of sustainability-related information that is material to enterprise value creation.”<sup>9</sup> Furthermore, the market has demonstrated strong support for building on existing efforts—including those of SASB—to develop this coherent but flexible system.

### The Role of SASB Standards

To establish a foundational layer of investor-focused disclosure, SASB Standards can serve as an input to a coherent, global system. Since its founding in 2011, SASB has conducted extensive analysis of the financial risks associated with climate change and other sustainability factors and has developed industry-specific disclosure recommendations based on its findings. Corporate preparers of climate-related financial disclosures have cited “the

2 Climate Action 100+, “Investor Signatories,” accessed February 28, 2021 at <https://www.climateaction100.org/whos-involved/investors/>.

3 International Organization of Securities Commissions (IOSCO), *Objectives and Principles of Securities Regulation* (May 2017).

4 Securities and Exchange Commission, public statement by Acting Chair Allison Herren Lee, “Statement on the Review of Climate-Related Disclosure” (February 24, 2021).

5 Climate Disclosure Standards Board (CDSB), *Corporate Climate Disclosure Schemes in G20 Countries After COP 21* (July 2017).

6 Task Force on Climate-related Financial Disclosures, *2020 Status Report* (October 29, 2020).

7 IFRS Foundation, *Consultation Paper on Sustainability Reporting* (September 2020).

8 IFRS Foundation, “IFRS Foundation Trustees announce next steps in response to broad demand for global sustainability standards” (February 2, 2021).

9 IOSCO, “IOSCO sees an urgent need for globally consistent, comparable, and reliable sustainability disclosure standards and announces its priorities and vision for a Sustainability Standards Board under the IFRS Foundation,” media release (February 24, 2021).

lack of standardized, industry metrics” as a primary challenge in implementing the TCFD recommendations.<sup>10</sup> SASB Standards help address this need.

Just over two years after their codification and release, SASB’s 77 industry-specific Standards are now used by hundreds of companies in dozens of countries around the world to disclose information to investors regarding sustainability-related risks and opportunities. More than 210 asset owners and asset managers, representing approximately US\$71 trillion in assets under management across Asia, Europe, the Middle East, North America, and South America, participate in the SASB Alliance, or have licensed SASB Standards for use in investment tools and processes. This includes the 57 members of SASB’s Investor Advisory Group (US\$48 trillion), who recognize the need for comparable, consistent, and reliable disclosure of financially material, decision-useful sustainability information to investors.

SASB Standards are widely recognized as a practical tool for companies to use when implementing the TCFD’s principles-based recommendations. In collaboration with the Climate Disclosure Standards Board (CDSB), SASB has developed best-practice guidance for companies with the *TCFD Implementation Guide*<sup>11</sup> and *TCFD Good Practice Handbook*.<sup>12</sup> In addition, SASB has worked with the world’s leading sustainability standard setters and framework providers—including CDP, CDSB, the Global Reporting Initiative (GRI), as well as the International Integrated Reporting Council (IIRC), which focuses on how organizations create value over time—to develop a prototype standard for climate-related financial disclosures.<sup>13</sup> (See Page 21.)

SASB’s research and standard-setting work has addressed a range of sustainability issues, from resource scarcity to product safety to human rights and beyond. However, this bulletin details SASB’s findings related to a single issue—climate risk—as it manifests itself in each of the 77 industries for which SASB sets standards. The bulletin summarizes recommended disclosures for companies to use in helping investors better understand, evaluate, and price that risk.

“Since the Task Force’s recommendations were developed to apply broadly across sectors and jurisdictions and to be flexible enough to accommodate evolving practices, implementing the Metrics and Targets recommendation requires companies to identify those metrics and targets most relevant to their specific products or services, operations, and climate-related risks and opportunities. Furthermore, for metrics and targets to be useful for investors and other users, they should be defined and calculated consistently within an industry to ensure comparability.”

» TCFD 2020 Status Report

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<sup>10</sup> Supra note 6.

<sup>11</sup> Sustainability Accounting Standards Board (SASB) and CDSB, *TCFD Implementation Guide* (May 1, 2019).

<sup>12</sup> SASB and CDSB, *TCFD Good Practice Handbook* (September 23, 2019).

<sup>13</sup> CDP, CDSB, Global Reporting Initiative (GRI), International Integrated Reporting Council (IIRC), and SASB, *Reporting on Enterprise Value* (December 2020).

## KEY FINDINGS

**Climate risk is ubiquitous.** SASB research demonstrates that 68 out of 77 industries in SASB’s Sustainable Industry Classification System (SICS™)<sup>14</sup> are significantly affected in some way by climate risk. This equates to US\$45.2 trillion, or 89 percent, of the market capitalization of the S&P Global 1200<sup>15</sup> and represents a systematic risk that cannot be diversified away. As a result, investors must employ other strategies to manage climate risk, such as balancing exposures through sector allocation, focusing exposures on best-in-class securities, and actively engaging with portfolio companies on key climate-related factors to encourage improved performance.

**Climate risk is diverse.** Although climate risk is virtually omnipresent, cutting across every sector, it manifests itself differently from one industry to the next. For example, agricultural concerns must manage water as an increasingly stressed resource, oil and gas companies need to properly value reserves and be prudent about capital expenditures in a carbon-constrained world, and commercial banks must understand risk related to the carbon embedded in their loan portfolios. Using SASB’s climate risk framework, summarized in this bulletin, these industry-specific impacts can be grouped into three primary types of risk likely to affect a company and its investors: physical risk, transition risk, and/or regulatory risk.

To understand their relevance to investors, climate-related risks and related opportunities must be viewed through the lens of financial materiality and decision-usefulness: in other words, how are these risks likely to affect a company’s financial condition (i.e., its balance sheet), operating performance (i.e., its income statement), or market valuation (i.e., its cost of capital)? SASB has conducted a detailed mapping of the types of climate risk likely to be financially material in each industry (see Table 1) so that investors can understand the nature of the risk they are exposed to depending on their holdings.

**Understanding climate risk requires industry-specific disclosures.** Investors need specific information that allows them to fully understand how well portfolio companies are positioned to manage the three types of climate risk as they manifest in each industry. For example, although many companies disclose their carbon footprint or data on greenhouse gas (GHG) emissions, available data indicates that seven industries account for 85 percent of reported Scope 1 GHG

“SASB’s work serves as a leading example of a set of standards that supplements the TCFD framework by providing detail and specificity.”

» NYU School of Law Institute for Policy Integrity, “Mandating Disclosure of Climate-Related Financial Risk” (February 2021)

emissions.<sup>16</sup> (See Figure 2.) Thus, investors often require additional, industry-tailored information to assess and manage exposures to climate-related risks and opportunities. In health care, investors need to understand extreme weather events that can affect both business continuity and demand for services. In real estate, they need information on the energy efficiency of buildings and the vulnerability of building stock due to geographic location. In the automotive industry, investors need to be able to track progress on the development of zero-emission or hybrid vehicles that curb use-phase emissions and capitalize on changing consumer preferences.

An industry-specific approach to broader environmental and social issues is essential, because macroeconomic risks can only be understood and managed in terms of their microeconomic implications.<sup>17</sup> SASB Standards therefore focus on the direct levers available to a company—and measure how the company is using them—to provide actionable data to management and decision-useful information to investors. To that end, this bulletin provides industry-by-industry guidance for issuers to measure, manage, and report performance on dimensions of climate risk that are most relevant for their industry. (See Table 3.)

**Climate risk is inadequately disclosed.** Despite the growing volume of climate-related information being reported by companies, disclosure on climate risk can be improved. (See Figure 5.) For example, a review of disclosures made by 1,630 companies related to physical climate risk revealed that 82 percent had experienced physical risk within the previous 12 months, 67 percent of those risks were described as “more likely than not” or “virtually certain,”

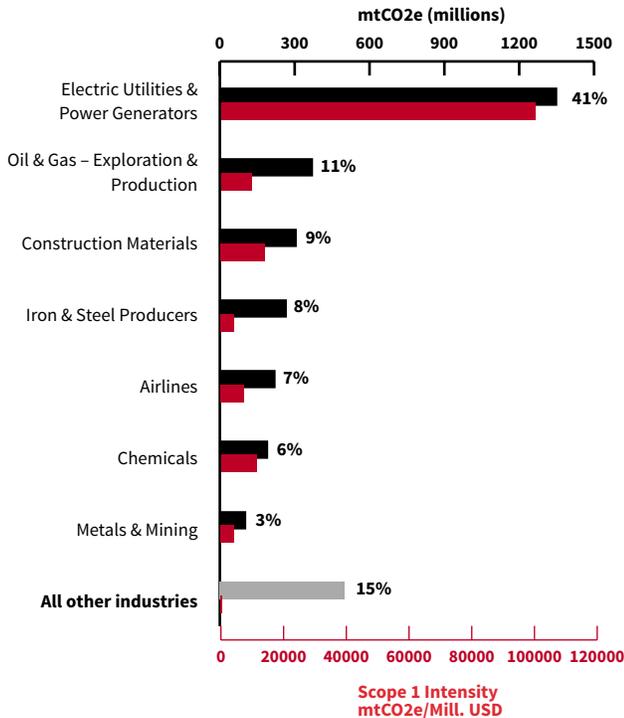
14 SASB groups companies into industries and sectors based on their resource intensity and shared sustainability risks and opportunities. The nine industries for which SASB Standards include no climate-related topics are: Advertising & Marketing, Biotechnology & Pharmaceuticals, Consumer Finance, Education, Media & Entertainment, Professional & Commercial Services, Security & Commodity Exchanges, Tobacco, and Toys & Sporting Goods. For more information on SICS, see <http://www.sasb.org/sics/>.

15 Market cap data as of August 1, 2020.

16 Based on SASB analysis using latest available data pulled from the Bloomberg Professional Service in August, 2020, and organized by SICS industry. High-impact industries include Airlines, Chemicals, Construction Materials, Iron & Steel Producers, Metals & Mining, Oil & Gas – Exploration & Production, and Electric Utilities. Note that not all companies in every industry report data on GHG emissions.

17 Rosenberg, B. and V. Marathe, 1976, “Common Factors in Security Returns: Microeconomic Determinants and Macroeconomic Correlates,” working paper, No. 44 Research Program in Finance, Institute of Business and Economic Research, Berkeley, University of California.

Figure 2. Scope 1 GHG Emissions by Industry



For more information on SASB’s approach to GHG emissions and related topics, see Appendix B.

but only 21 percent of companies reported quantitative information about the anticipated magnitude and costs of the risk.<sup>18</sup> Similarly, other analyses have found that “climate-related disclosures in some companies’ filings use boilerplate language, which is not specific to

18 Allie Goldstein, Will R. Turner, Jillian Gladstone, and David G. Hole, “The private sector’s climate change risk and adaptation blind spots,” *Nature Climate Change* (December 10, 2018).

the company, and information is unquantified,” thereby limiting the utility of the information to investors.<sup>19</sup>

**Climate risk has financial implications that are tangible and identifiable.** SASB’s evidence-based standard-setting process is designed to identify the sustainability issues reasonably likely to result in material financial impact to the typical company in an industry. In doing so, SASB maps each of its industry-specific disclosure topics, including those related to climate risk, to one or more channels of financial impact commonly evaluated by financial analysts—namely those that would affect a company’s revenues and operating costs, the value of its assets and liabilities, and its financing costs. (See example in Figure 3.) For instance, an energy-intensive firm might be exposed to volatile energy prices, and/or incur future costs from internalization of carbon prices, while investments in energy efficiency and renewable energy sources may require research and development (R&D) and capital expenditures. This bulletin identifies the financial impact channels associated with each type of climate risk in each industry (see Table 2).

### SASB STANDARDS AND CLIMATE RISK

The remainder of this bulletin follows the structure outlined above, exploring the ubiquitous but differentiated nature of climate risk, assessing the current state of climate-related financial disclosure, and demonstrating how standardized, industry-specific topics and metrics can improve that disclosure. Using the information contained in this bulletin, investors can gain a deeper understanding of the types of climate risk to which they are exposed, where those exposures lie, where they are likely to be uncompensated, and what types of financial impacts they are likely to have. Using the disclosure recommendations, companies can more effectively describe how they are managing climate-related risks, the related impacts on their financial position, and the relevant implications for their long-term financial performance and enterprise value.

19 U.S. Government Accountability Office (GAO), *Climate-related Risks: SEC Has Taken Steps to Clarify Disclosure Requirements* (February 2018).

Figure 3. Example of SASB’s Financial Impact Channels

Income Statement							Balance Sheet				Risk Profile	
Revenue			Operating Expenses		Non-Operating Expenses		Assets		Liabilities		Financing Costs	
Market share	New markets	Pricing power	Cost of revenue	R&D	CapEx	Extra-ordinary expenses	Tangible assets	Intangible assets	Contingent liabilities & provisions	Pension & other liabilities	Cost of Capital	Industry divestment risk
●	●	●		●								

SECTOR: **Resource Transformation**  
 INDUSTRY: **Chemicals**  
 DISCLOSURE TOPIC: **Product design for use-phase efficiency**

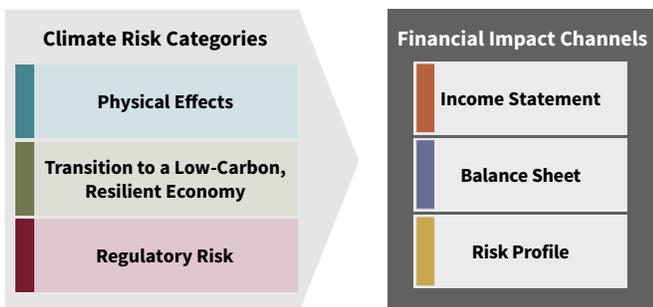


## SASB CLIMATE RISK FRAMEWORK

Climate risk can affect investment risks and returns over the near, medium, and long term. Traditionally, many investors have evaluated the impacts of climate risk by assessing and reducing the “carbon footprint” of their portfolios (i.e., the Scope 1, Scope 2, and/or Scope 3 GHG emissions associated with each investment) or have considered divestment from fossil fuel companies or certain high-carbon industries, such as coal and tar sands. However, the ubiquity of climate risk and the wide range of differentiated impacts it has across a myriad of business operations suggest a wider range of information is needed to address climate risk exposure.

SASB’s approach links climate risk categories to corporate financial performance, and ultimately provides industry-specific disclosure topics and metrics that enable analysis of how these risks are being managed. SASB’s climate risk framework, visualized in the following figure, addresses three distinct types of climate risk and three channels of financial impact through which climate risk can ultimately impact investment returns.

Figure 4. SASB’s Climate Risk Framework



SASB’s climate risk framework enables:

- » Recognition that climate-related risks manifest in industry-specific ways.

- » Identification of key climate risks and opportunities and the specific financial impact channel through which they are likely to affect the value of the typical company in an industry over time.
- » Preparation of disclosures by companies that provide decision-useful information to investors in a cost-effective way.

### SASB CLIMATE RISK CATEGORIES

Below are detailed definitions of climate risk categories used by SASB. These categories are not mutually exclusive.

#### Physical Effects

Climate change has a range of current and projected acute (punctuated, unpredictable) and chronic (progressive, predictable) effects on the physical environment. The probability, magnitude, and timing of these impacts are uncertain and will be influenced by geographic location, industry, and capacity for adaptation. Disclosures can help both companies and investors understand their exposure to the physical risks of climate change.

#### Acute (event-related)

Acute physical risks are associated with the impacts of more frequent and more severe catastrophic weather events (e.g., droughts, flooding, extensive wildfires, greater precipitation, higher wind speeds, etc.). Examples of such impacts may include physical damage to assets, supply chain disruptions, and/or electricity grid disruptions.

#### Chronic (progressive)

Chronic physical risks could be associated with sustained greenhouse gas emissions into the atmosphere, leading to the progressive impacts of increasing temperatures, changing precipitation patterns, and rising sea levels. Impacts may affect agricultural yields, shift growing seasons and species distribution, cause human disease migration, affect the availability and

quality of water resources, and impact coastal residential and commercial real estate and infrastructure.

**Some examples of potential negative financial impacts from acute and/or chronic physical effects include:**

- » **Asset impairment** – long-lived physical asset and natural asset damage and impairment such as premature deterioration or devaluation of agricultural land, coastal real estate, infrastructure located in hurricane zones
- » **Cost increase** – short- and medium-term disruptions of operations, disruptions to transportation, supply chains, and distribution chains, increases in insurance premia, as well as long-term adaptation costs
- » **Loss of revenue** – work interruptions association with loss of grid power, flooding, or supply chain disruption, as well as productivity loss due to chronic temperature rise

The physical impacts of climate change may present opportunities to some companies. For example, some agricultural companies may experience increased agricultural yields in certain geographic regions, resulting in revenue growth.

*INDUSTRY EXAMPLES: PHYSICAL EFFECTS*

- » **Real Estate entities' physical assets located on floodplains or in coastal regions may face increased risk of premature impairment or devaluation due to the progressive effects of climate change. For example, in 2017, Hurricane Harvey caused more than US\$125 billion in damage to both residential and commercial properties in Louisiana and Texas, and such storms are projected to intensify as oceans continue to warm.<sup>20</sup> Over the medium to long term, changes in the frequency and intensity of extreme weather events may shift human settlements away from coastal zones, devaluing residential and commercial real estate there. Today, although demand for single-family homes in coastal communities remains high, data shows that 18 US states have lost a total of US\$15.9 billion in relative property values in coastal areas because of sea-level-rise flooding since 2005—including US\$5.4 billion in Florida alone.<sup>21</sup>**
- » **Certain Agricultural Products entities may face risks or opportunities due to the current and projected physical effects of climate change on ecological systems, as well as the changing frequency and magnitude of extreme weather events. Impacts may manifest, for example, in the form of lower crop yields due to higher temperatures, resulting in downward pressure on revenues. Research indicates that anthropogenic climate change has reduced agricultural productivity by 21 percent since 1961.<sup>22</sup> Looking ahead, by**

20 US National Hurricane Center, "Tropical Cyclone Report: Hurricane Harvey" (May 9, 2018).

21 First Street Foundation, "State by State Analysis: Property Value Loss from Sea Level Rise," press release (August 8, 2019).

22 Ariel Ortiz-Bobea, Toby R. Ault, Carlos M. Carrillo, et al., "Anthropogenic climate change has slowed global agricultural productivity growth," *Nature Climate Change* (April 2021).

**one estimate, for each 1 ° C rise in temperature, global crop yields will decrease by between 3.1 and 7.4 percent.<sup>23</sup> At the same time, as global population surpasses 9 billion by 2050, food demand is expected to increase anywhere from 59 percent to 98 percent.<sup>24</sup> Alternately, entities in certain commodity-reliant industries may benefit from reduced materials costs as agricultural productivity increases due to lengthened growing seasons and higher atmospheric concentration of CO2 (assuming nutrient levels, soil moisture, water availability, and other variables align).**

**Transition to a Low-Carbon, Resilient Economy**

Transition risk refers to climate risk that manifests itself through shifts in market forces, - including new products and services that support mitigation or adaptation to climate change, as well as direct changes in consumer preferences. Such changes may be connected to GHG emissions intensity of operations and products (e.g., energy intensity of product manufacturing, fuel efficiency of vehicles, energy efficiency of home appliances, end-of-life emissions of products) or water consumption of operations or products (e.g., water intensity of food or beverage production, as well as for manufacturing and power generation, lifecycle water consumption of home appliances, end-of-life contamination of freshwater sources).

The mitigation and adaptation to climate-related impacts may be influenced by the regulatory environment and the geographic location of a company, depending on what physical risks of climate change are present. Therefore, transition risk is often connected to either physical or regulatory risk—or to both. Such connections may exist in a company's direct operations or arise from downstream or upstream relationships in the value chain—e.g., regulatory pressures may prompt automakers to pursue a range of fuel-economy strategies, which can shift demand among auto parts manufacturers toward inputs that can enhance fuel efficiency, as well as among mining and chemicals companies for lithium to produce electric vehicle batteries.

Mitigation responses are those technologies and services that reduce a company's potential contributions to climate change, such as through increased energy efficiency, water efficiency, renewable energy uptake, and the capture or sequestration of carbon dioxide. Adaptation responses include, but are not limited to, infrastructure resiliency efforts and business model shifts (e.g., the introduction of new products and services, and aligning business models with new environmental conditions).

**Potential financial impacts from the transition to a low carbon economy include:**

- » **Revenue loss (due to demand contraction)** – reduced demand for fossil fuels as well as for products and services associated with the fossil fuel value chain

23 Chuang Zhao, et al., "Temperature increase reduces global yields of major crops in four independent estimates," *Proceedings of the National Academy of Sciences of the United States of America* (August 15, 2017).

24 Hugo Valin, Ronald D. Sands, Dominique van der Mensbrugge, et al., "The future of food demand: understanding differences in global economic models," *Agricultural Economics* (January 2014).

- » **Stranded assets** – devaluation or impairment of fossil fuel reserves
- » **Revenue growth** – growth in renewable energy, emergence of new industries and products, including carbon capture and sequestration, smart grid technologies, energy-efficient products, infrastructure adaptations, and green chemistry solutions
- » **Long-term cost reductions** – operating cost reduction from investments in updated infrastructure and technologies

Shifting consumer demand may put competitive pressure on companies. Thus, the failure to adapt and invest in R&D with the goal of reducing lifecycle impacts of products or services may hinder a company's long-term financial performance. At the same time, companies that can innovate and offer sustainable products and services could see increased revenue and build brand loyalty which could strengthen their pricing power.

#### *INDUSTRY EXAMPLES: TRANSITION TO A LOW-CARBON, RESILIENT ECONOMY*

- » **As the market price of carbon rises and demand shifts to increasingly cost-competitive renewable energy sources, Extractives & Minerals Processing entities with oil and gas and thermal coal reserves are likely to see a decline in the amount of their reserves that is viable for extraction and production—including those proved, undeveloped reserves that are capitalized. In this low-emissions scenario, analysts have estimated that equity valuations of fossil fuel companies could be reduced by 40 to 60 percent.<sup>25</sup> This devaluation or “asset stranding” is likely to be driven primarily by economic conditions, although specific regulations may impact carbon prices and/or otherwise restrict the ability to exploit reserves.**
- » **As the economy decarbonizes and the market favors industries that contribute to adaptation and mitigation, companies that offer related technologies and services are likely to see revenue growth opportunities. Automobile companies that invest in R&D to transition to more fuel-efficient technologies such as hybrid and electric vehicles will likely be better positioned to capture large shares of these rapidly expanding markets. Although electric vehicles represent less than five percent of the market today, they are projected to make up 32 percent of sales by 2030.<sup>26</sup> In recent months, a rapidly growing number of automakers have responded by committing to invest significant sums in electric and autonomous vehicles, including Volkswagen (US\$41 billion)<sup>27</sup>, Ford**

(US\$29 billion)<sup>28</sup>, General Motors (US\$27 billion)<sup>29</sup>, and many more. Auto companies that struggle to make this transition are likely to see a decrease in market share—for example, by 2030, sales of diesel-based cars within the European market are expected to plummet to 9 percent from 52 percent.<sup>30</sup>

#### **Regulatory Risk**

Regulatory risks may result from a range of legal and regulatory issues associated with climate change. This encompasses all international, national, and subnational targets, mandates, legislation, and regulations to address climate change. It also includes those that establish a price for carbon emissions and compliance with policy-driven responses to climate change such as those that mandate energy, water, and fuel efficiency, regulate greenhouse gas emissions, restrict or mandate specific electricity sources, and/or those that directly incentivize and subsidize certain services and technologies.

This category also encompasses a range of potential impacts that may occur due to legal actions against companies related to climate change. These include action against those deemed liable for the physical effects of climate change, including but not limited to deforestation and water withdrawal (also referred to as “liability risks”), allegations of breach of fiduciary duty by directors and officers, and disputes over the implementation of climate-related regulation.

Regulatory risk directly impacts companies that are subject to legal or regulatory actions, while indirectly it could impact regulatory and compliance costs across a company's value chain. **Potential financial impacts from climate regulation include:**

- » **Operating costs** – explicit carbon pricing in certain markets and related increase of cost of grid electricity, compliance costs, and/or fines related to climate regulation
- » **Revenue growth impacts** – fossil fuel providers or large greenhouse gas emitters may be denied permits for new projects due to climate considerations. Meanwhile, climate-related incentives such as subsidies and tax credits might afford potential revenue growth for companies that qualify, such as wind and biofuel power producers in certain geographies
- » **Legal expenses or liabilities** – If an entity is alleged to be liable for damages, adaptation, or other costs associated with the physical effects of climate change, failure to adequately disclose climate-related risks, or disputes over compliance with climate-related regulation.

A significant majority of countries around the world have enacted laws and policies to address climate change.<sup>31</sup> These include but are not restricted to limits on carbon emissions from power generators,

25 HSBC Global Research, “Oil & carbon revisited: Value at risk from ‘unburnable’ reserves (January 25, 2013).

26 Deloitte, “Electric Vehicles: Setting a Course for 2030” (July 28, 2020).

27 Volkswagen, “How Volkswagen is becoming a climate-neutral company,” (March 19, 2021).

28 Ford, “Ford Raises Planned Investment in EV, AV Leadership to \$29 Billion,” press release (February 4, 2021).

29 General Motors, “General Motors, the Largest U.S. Automaker, Plans to be Carbon Neutral by 2040,” press release (January 28, 2021).

30 Lawrence Frost and Gilles Guillaume, “Exclusive: Renault sees diesel disappearing from most of its European cars,” Reuters (September 6, 2016).

31 Grantham Research Institute on Climate Change and the Environment, “Policy brief: National laws and policies on climate change adaptation: a global review” (December 2019).

funding for wind and solar generation, fuel-efficiency standards for vehicle manufacturers, and pricing programs for direct carbon emissions. These policies are all designed to ultimately reduce the amount of greenhouse gases entering the atmosphere by targeting parts of the energy value chain, resulting in a range of financial impacts and regulatory risks across industries.

### *INDUSTRY EXAMPLES: REGULATORY RISK*

- » **When a cost is associated with carbon emissions through some regulatory mechanism (e.g., tax or cap-and-trade allowance), such as those in place in Australia, Britain, Canada, Europe, South Korea, and nine northeastern states in the US, there will be cost implications for Electric Utilities, which represent the global economy’s largest source of GHG emissions. Electric utility companies may face significant operating and capital expenditures for mitigating GHG emissions. While some of these costs can be passed on to a utility’s customers, power generators in deregulated (competitive) markets may not be able to recoup these costs. In either case, however, companies that have taken a long-term view toward proactively managing their facilities and energy mix will be better positioned to absorb these impacts.**
- » **Climate regulations and policy mechanisms such as subsidies, incentives, credits, and renewable portfolio standards will create revenue growth opportunities for a range of industries, including Solar Technology & Project Developers. Although 70 percent of global energy subsidies go to fossil fuels, the solar industry receives significant governmental assistance—particularly in Europe and Japan—generally with the understanding that solar technologies will lower GHG emissions.<sup>32</sup> For example, solar energy providers benefit from tax credits, rebates, or exemptions, subsidized loans, government purchasing requirements, and other subsidies, depending on the market. In 2017, the solar industry is estimated to have received US\$60.8 billion globally in government support.<sup>33</sup> However, the industry also has the potential to create negative social and environmental externalities. For example, if solar energy companies do not adequately manage the waste generated during the manufacturing or the sourcing of their inputs to minimize negative environmental and social impacts, public sentiment could turn against the industry, threatening vital subsidies or creating difficulties when trying to obtain permits and win new customers.**

<sup>32</sup> International Renewable Energy Agency, *Energy Subsidies: Evolution in the Global Energy Transformation to 2050* (April 2020).

<sup>33</sup> Ibid.

## SASB CLIMATE RISK MAP

Table 1 indicates the presence of these three primary types of climate risk (physical, transition, and regulatory risk) in each of SASB’s 77 SICs industries, as shown by the shaded boxes. Table 1 draws on relevant disclosure topics from the SASB Standards to present a holistic view of the climate-related risks and opportunities embedded in a typical diversified portfolio.

Table 1. SASB Climate Risk Map

SECTOR	INDUSTRIES	CLIMATE RISK CATEGORY		
		PHYSICAL	TRANSITION	REGULATORY
	<b>CONSUMER GOODS</b>			
	Apparel, Accessories & Footwear	Shaded	Shaded	Shaded
	Appliance Manufacturing	Shaded	Shaded	Shaded
	Household & Personal Products	Shaded	Shaded	Shaded
	Building Products & Furnishings	Shaded	Shaded	Shaded
	E-Commerce	Shaded	Shaded	Shaded
	Multiline and Specialty Retailers & Distributors	Shaded	Shaded	Shaded
	Toys & Sporting Goods	Shaded	Shaded	Shaded
	<b>EXTRACTIVES &amp; MINERALS PROCESSING</b>			
	Coal Operations	Shaded	Shaded	Shaded
	Construction Materials	Shaded	Shaded	Shaded
	Iron & Steel Producers	Shaded	Shaded	Shaded
	Metals & Mining	Shaded	Shaded	Shaded
	Oil & Gas – Exploration & Production	Shaded	Shaded	Shaded
	Oil & Gas – Midstream	Shaded	Shaded	Shaded
	Oil & Gas – Refining & Marketing	Shaded	Shaded	Shaded
	Oil & Gas – Services	Shaded	Shaded	Shaded
	<b>FINANCIALS</b>			
	Asset Management & Custody Activities	Shaded	Shaded	Shaded
	Commercial Banks	Shaded	Shaded	Shaded
	Consumer Finance	Shaded	Shaded	Shaded
	Insurance	Shaded	Shaded	Shaded
	Investment Banking & Brokerage	Shaded	Shaded	Shaded
	Mortgage Finance	Shaded	Shaded	Shaded
	Security & Commodity Exchanges	Shaded	Shaded	Shaded
	<b>FOOD &amp; BEVERAGE</b>			
	Agricultural Products	Shaded	Shaded	Shaded
	Alcoholic Beverages	Shaded	Shaded	Shaded
	Meat, Poultry & Dairy	Shaded	Shaded	Shaded
	Non-Alcoholic Beverages	Shaded	Shaded	Shaded
	Processed Foods	Shaded	Shaded	Shaded
	Food Retailers & Distributors	Shaded	Shaded	Shaded
	Restaurants	Shaded	Shaded	Shaded
	Tobacco	Shaded	Shaded	Shaded
	<b>HEALTH CARE</b>			
	Biotechnology & Pharmaceuticals	Shaded	Shaded	Shaded
	Health Care Delivery	Shaded	Shaded	Shaded
	Health Care Distributors	Shaded	Shaded	Shaded
	Managed Care	Shaded	Shaded	Shaded
	Medical Equipment & Supplies	Shaded	Shaded	Shaded
	Drug Retailers	Shaded	Shaded	Shaded
	<b>INFRASTRUCTURE</b>			
	Electric Utilities & Power Generators	Shaded	Shaded	Shaded
	Engineering & Construction Services	Shaded	Shaded	Shaded
	Gas Utilities & Distributors	Shaded	Shaded	Shaded
	Home Builders	Shaded	Shaded	Shaded
	Real Estate	Shaded	Shaded	Shaded
	Real Estate Services	Shaded	Shaded	Shaded
	Water Utilities & Services	Shaded	Shaded	Shaded
		Waste Management	Shaded	Shaded

Table 1. SASB Climate Risk Map (cont.)

		CLIMATE RISK CATEGORY		
SECTOR	INDUSTRIES	PHYSICAL	TRANSITION	REGULATION
	<b>RENEWABLE RESOURCES &amp; ALTERNATIVE ENERGY</b>			
	Biofuels	■	■	■
	Forestry Management	■	■	■
	Fuel Cells & Industrial Batteries	■	■	■
	Pulp & Paper Products	■	■	■
	Solar Technology & Project Developers	■	■	■
Wind Technology & Project Developers	■	■	■	
	<b>RESOURCE TRANSFORMATION</b>			
	Aerospace & Defense	■	■	■
	Chemicals	■	■	■
	Containers & Packaging	■	■	■
	Electrical & Electronic Equipment	■	■	■
Industrial Machinery & Goods	■	■	■	
	<b>SERVICES</b>			
	Advertising & Marketing	■	■	■
	Casinos & Gaming	■	■	■
	Education	■	■	■
	Hotels & Lodging	■	■	■
	Leisure Facilities	■	■	■
	Media & Entertainment	■	■	■
Professional & Commercial Services	■	■	■	
	<b>TECHNOLOGY &amp; COMMUNICATIONS</b>			
	Electronic Manufacturing Services & Original Design Manufacturing	■	■	■
	Internet Media & Services	■	■	■
	Semiconductors	■	■	■
	Software & IT Services	■	■	■
	Telecommunication Services	■	■	■
	<b>TRANSPORTATION</b>			
	Airlines	■	■	■
	Air Freight & Logistics	■	■	■
	Automobiles	■	■	■
	Auto Parts	■	■	■
	Car Rental & Leasing	■	■	■
	Cruise Lines	■	■	■
	Marine Transportation	■	■	■
	Rail Transportation	■	■	■
	Road Transportation	■	■	■
<b>No. of industries impacted by Climate Risk Category</b>		<b>36</b>	<b>57</b>	<b>40</b>

## FINANCIAL IMPACT CHANNELS

Although the three types of climate risk identified in Table 1 are helpful in terms of thinking about how climate change affects different industries, business models, or specific companies, financial analysts also require an understanding of how those climate risks could impact companies in a financial sense, including current and future effects on a company's financial condition, operating performance, and its risk profile. The financial implications of climate risk can be grouped into three general categories: income statement impacts, balance sheet impacts, and risk profile impacts. As this publication uses the terms income statement and balance sheet to describe the financial impacts of climate change, it means both current and future impacts on the income statement, balance sheet, and cash flows—not only those that are currently recognized in the financial statements.

### Income Statement

#### *Revenue Impacts*

This category includes the impact on revenues and/or future cash inflows from climate-related effects on the company. These may be due to, for example, operational disruptions, changes in demand for products or services, changes in market share or product yield, reputational impacts, legal and regulatory factors, and/or loss of social license to operate. Revenue may be affected positively or negatively depending on the company or industry.

#### *Operating Cost Impacts*

This category includes the impact on capital expenditures, operating expenses, and/or other cash outflows from climate-related risks. These may be due to changes in the costs of supplies, labor, investments needed to maintain or improve resource efficiency or adjust an entity's energy source mix, investments needed to comply with new regulations, legal expenses, and R&D expenses necessary to respond to competitive and market pressures. It may also include investments needed to repair facilities, improve infrastructure resiliency from exposure to increased storm events, and/or the cost of insurance from such exposure. Costs can be affected either positively (e.g., through increased resource efficiency) or negatively (e.g., CAPEX required to reduce emissions, increased cost of materials, higher insurance premiums, etc.).

### Balance Sheet Impacts

This category comprises effects on the value of assets due to regulatory actions such as carbon pricing, changes in asset value due to the physical effects of climate change, and/or other devaluation of assets due to the transition to a low-carbon, resilient economy. Current assets (e.g., inventory, crops, and livestock) and long-lived physical assets (e.g., coastal properties, infrastructure, and forestland) may be at risk for impairment or devaluation due to increased extreme weather events. Additionally, the amount of capitalized hydrocarbon reserves that are viable for extraction and production may be reduced due to carbon pricing in certain markets and shift in demand to renewable energy sources.

### Risk Profile Impacts

Climate change will have a range of effects on the viability of businesses, depending on their ability to effectively manage climate-related risks and opportunities. These scenarios will impact entities' ability to gain access to debt and equity capital, along with the cost of that capital. Entities that have greater exposure to the physical effects of climate change, fail to manage their transition risks, and insufficiently prepare for or adapt to climate regulations, will likely face debt and equity risk premia. Creditworthiness will erode and interest rates will rise as ratings agencies, investors, insurers, and lenders increasingly consider such climate risks. Certain industries may face "divestment" risks due to investor concerns over their contribution to GHG emissions, as well as due to reputational concerns. Entities better able to manage—and communicate their management of—climate risks and/or those that position themselves to benefit from a low-carbon economy could see higher credit ratings, lower debt financing costs, and lower cost of equity capital.

## SASB FINANCIAL IMPACT CHANNEL MAP

Table 2 illustrates the exposure of each of SASB’s 77 SICs industries to climate-related impacts through each financial impact channel (i.e., balance sheet, income statement, and risk profile). The potential financial impacts of specific climate-related topics are described at a more granular level in the SASB Standards, which can be found at [sasb.org/standards/download](https://sasb.org/standards/download).

Table 2. Financial Impacts of Climate Risk



SECTOR	INDUSTRY	INCOME STATEMENT	BALANCE SHEET	RISK PROFILE
<b>CONSUMER GOODS</b>	Apparel, Accessories & Footwear			
	Appliance Manufacturing			
	Household & Personal Products			
	Building Products & Furnishings			
	E-Commerce			
	Multiline and Specialty Retailers & Distributors			
<b>EXTRACTIVES &amp; MINERALS PROCESSING</b>	Coal Operations			
	Construction Materials			
	Iron & Steel Producers			
	Metals & Mining			
	Oil & Gas – Exploration & Production			
	Oil & Gas – Midstream			
	Oil & Gas – Refining & Marketing			
Oil & Gas – Services				
<b>FINANCIALS</b>	Asset Management & Custody Activities			
	Commercial Banks			
	Insurance			
	Investment Banking & Brokerage			
	Mortgage Finance			
<b>FOOD &amp; BEVERAGE</b>	Agricultural Products			
	Alcoholic Beverages			
	Meat, Poultry & Dairy			
	Non-Alcoholic Beverages			
	Processed Foods			
	Food Retailers & Distributors			
	Restaurants			
<b>HEALTH CARE</b>	Health Care Delivery			
	Health Care Distributors			
	Managed Care			
	Medical Equipment & Supplies			
	Drug Retailers			
<b>INFRASTRUCTURE</b>	Electric Utilities & Power Generators			
	Engineering & Construction Services			
	Gas Utilities & Distributors			
	Home Builders			
	Real Estate			
	Real Estate Services			
	Water Utilities & Services			
	Waste Management			

Table 2. Financial Impacts of Climate Risk (CONT.)

SECTOR	INDUSTRY	INCOME STATEMENT	BALANCE SHEET	RISK PROFILE
 <b>RENEWABLE RESOURCES &amp; ALTERNATIVE ENERGY</b>	Biofuels			
	Forestry Management			
	Fuel Cells & Industrial Batteries			
	Pulp & Paper Products			
	Solar Technology & Project Developers			
	Wind Technology & Project Developers			
 <b>RESOURCE TRANSFORMATION</b>	Aerospace & Defense			
	Chemicals			
	Containers & Packaging			
	Electrical & Electronic Equipment			
	Industrial Machinery & Goods			
 <b>SERVICES</b>	Casinos & Gaming			
	Hotels & Lodging			
	Leisure Facilities			
 <b>TECHNOLOGY &amp; COMMUNICATIONS</b>	Electronic Manufacturing Services & Original Design Manufacturing			
	Internet Media & Services			
	Semiconductors			
	Software & IT Services			
	Telecommunication Services			
	Hardware			
 <b>TRANSPORTATION</b>	Airlines			
	Air Freight & Logistics			
	Automobiles			
	Auto Parts			
	Car Rental & Leasing			
	Cruise Lines			
	Marine Transportation			
	Rail Transportation			
Road Transportation				

## CURRENT STATE OF CLIMATE RISK DISCLOSURE

It is generally accepted that when climate change poses material risks to a company’s financial condition, operating performance, or market valuation, its disclosure to investors should address those risks.<sup>34</sup> And, increasingly, companies around the world include climate-related risks and opportunities in their public disclosures. However, companies, investors, and regulators are challenged by the current state of climate risk disclosure guidance.

Analyses of company disclosure in both the US and EU have revealed that while the overwhelming majority of companies (94 percent) address climate risk in their mainstream financial reports, only a few provide quantitative metrics beyond GHG emissions.<sup>35,36</sup> For example, as previously noted, while approximately four out of five companies say they face physical risks related to climate change, only about one out of five have attempted to quantify the impact or financial implications.<sup>37</sup> In another analysis, 91 percent of European companies addressed climate change in their disclosure, but only 23 percent identified and described specific risks and only 36 percent communicated specific climate-related performance targets.<sup>38</sup> (See Figure 5.)

34 International Organization of Securities Commissions, “Statement on Disclosure of ESG Matters by Issuers” (January 18, 2019).

35 US Government Accountability Office, *Disclosure of Environmental, Social, and Governance Factors and Options to Enhance Them* (July 2020).

36 CDSB, *The State of EU Environmental Disclosure in 2020* (December 2020).

37 Supra note 18.

38 Alliance for Corporate Transparency, *2019 Research Report* (February 2019).

### SASB IN ACTION

**Companies around the world and across every sector are using SASB Standards to communicate financially material information to investors. To see the SASB Standards in action—including for the purposes of communicating climate-related financial information—please refer to SASB’s website: [sasb.org/company-use/sasb-reporters/](https://sasb.org/company-use/sasb-reporters/)**

To navigate this uncertainty, investors and companies are asking for more specific guidance. In 2019, 631 investors managing more than US\$37 trillion in assets signed the Global Investor Statement to Governments on Climate Change, which called on world governments to improve climate-related financial reporting.<sup>39</sup> In recent years, a growing number of government regulators and policymakers have begun to heed this call and mandate TCFD disclosure; however, the disclosure landscape is still characterized by wide variation in scope, application, and intended reporting channel. As a result, companies have thus far been challenged to effectively respond, citing “a lack of standardized metrics for our industry” as a primary barrier to implementation of the TCFD Recommendations.<sup>40</sup> Indeed,

39 Investor Agenda Founding Partners (IAFP), *Global Investor Statement to Governments on Climate Change* (December 2019).

40 Supra note 6.

Figure 5. Climate-related Disclosure Among 1,000 EU Companies

#### Company disclosures that ...



Source: Alliance for Corporate Transparency

an analysis of TCFD reporting found that “metrics and targets” disclosures “are particularly poor for all sectors besides energy and utilities.”<sup>41</sup>

Traditional financial disclosure was long ago standardized to solve for many of these same challenges. Accounting standards help ensure that the decisions facing companies, investors, regulators, and other users of financial information can be made in an informed, rigorous way. They not only establish clear expectations for disclosure, but also promote market efficiency by reducing information asymmetry between market participants. However, sustainability disclosure standards have only begun to emerge in recent years, and today there is tremendous global momentum to accelerate their development and adoption.

This momentum includes important efforts by the IFRS Foundation to establish a Sustainability Standards Board (SSB) alongside the International Accounting Standards Board (IASB);<sup>42</sup> work underway in the European Union to standardize disclosure under its Non-Financial Reporting Directive (NFRD);<sup>43</sup> and collaboration among leading standard-setters and framework providers—including SASB—to consolidate their complementary tools into a coherent, comprehensive system for corporate reporting.<sup>44</sup>

"The top-cited issue by preparers on implementing the Metrics and Targets recommendation was the lack of standardized, industry metrics."

» TCFD 2020 Status Report

41 Julia Anna Bingle, Mathias Kraus, Markus Leippold, “Cheap Talk and Cherry-Picking: What ClimateBert has to say on Corporate Climate Risk Disclosures” (March 2, 2021).

42 IFRS Foundation, “IFRS Foundation Trustees announce strategic direction and further steps based on feedback to sustainability reporting consultation” (March 8, 2021).

43 European Financial Reporting Advisory Group, *Final Report: Proposals for a Relevant and Dynamic EU Sustainability Reporting Standard-Setting* (February 2021).

44 CDP, CDSB, GRI, IIRC, and SASB, *Statement of intent to work together towards comprehensive corporate reporting* (September 2020).

## IMPROVING CLIMATE-RELATED DISCLOSURE EFFECTIVENESS

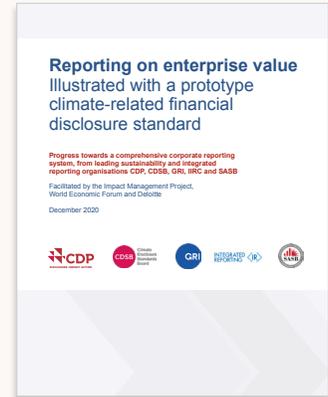
A globally accepted standard for climate-related financial disclosure would enable consistent, comparable, reliable disclosure of how climate change can erode or enhance enterprise value. To bring this concept to life, five leading international framework providers and standard setters—CDP, CDSB, GRI, IIRC, and SASB—jointly developed a publication titled *Reporting on enterprise value: Illustrated with a prototype climate-related financial disclosure standard* (the “Prototype Climate Standard”).<sup>45</sup> This paper, released in December 2020, was intended to illustrate how the relevant components of the authors’ frameworks and standards, along with the recommendations set out by the TCFD, could form the basis for development of a climate-related financial disclosure standard. The Prototype Climate Standard could therefore serve as useful input for the Trustees of the IFRS Foundation, who are currently evaluating the role that a sustainability standards board, under the governance of the IFRS Foundation, could play in establishing sustainability disclosure standards, with an initial focus on climate risk.

The structure of the Prototype Climate Standard is based on the structure of the TCFD recommendations (see Figure 6). Like the TCFD recommendations, the Prototype Climate Standard acknowledges the importance of both cross-industry and industry-specific disclosures.

<sup>45</sup> Supra note 13.

### PROTOTYPE CLIMATE-RELATED FINANCIAL DISCLOSURE STANDARD

In December 2020, SASB and four other leading organizations in sustainability and integrated reporting published *Reporting on Enterprise Value*. The paper sets out a shared vision for a coherent, comprehensive corporate reporting system and brings the concept to life with a prototype climate-related financial disclosure standard. The Prototype Climate Standard, which consolidates guidance from multiple organizations into one document, is [available in its entirety online](#).



- » **Cross-industry** disclosures are disclosures that are relevant to all entities, regardless of their industry and business model.
- » **Industry-specific** topics and metrics provide insight into performance on the unique drivers of climate risk and opportunity in specific industries.

Further, both the TCFD recommendations and Prototype Climate Standard recognize that effective climate-related financial disclosure contains both qualitative disclosures and quantitative metrics.

Figure 6. Prototype Climate-related Financial Disclosure Standard Structure

Foundation		
Objective		
Scope		
Climate-related Financial Disclosures		
Governance		<ul style="list-style-type: none"> <li>• Disclosure objective</li> <li>• Content</li> </ul>
Strategy	Strategy	
	Business Model	
Risk Management		<ul style="list-style-type: none"> <li>• Disclosure objective</li> <li>• Content (including cross-industry and industry-specific climate-related financial disclosures).</li> </ul>
Metrics & Targets	Operational	
	Risk	
Application Guidance		
Cross-industry and industry-specific application guidance (metrics and targets)		

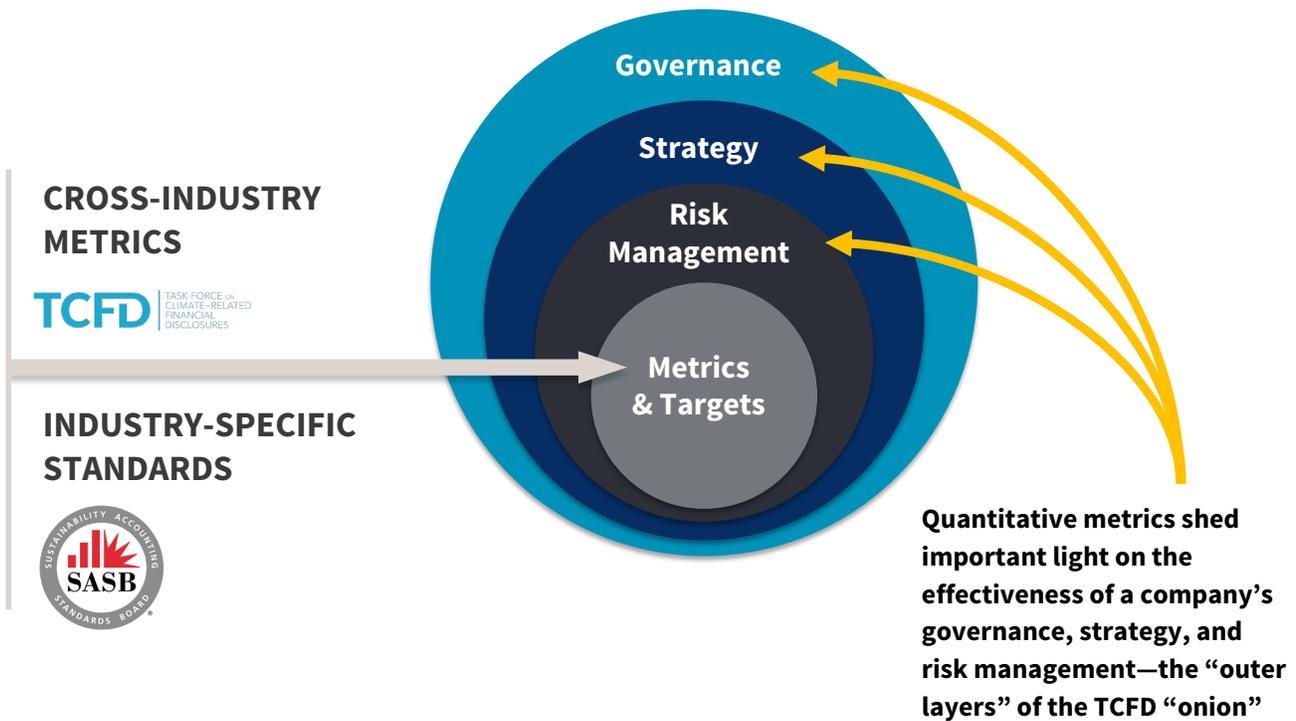
- » **Qualitative information** provides essential context to investors, helping them more fully understand the company’s current position, future prospects, and the relevant circumstances under which performance has been achieved.
- » **Quantitative metrics** introduce essential elements of accountability and comparability to climate-related financial disclosure. They shed important light on the effectiveness of a company’s governance practices, its strategy, its approach to risk management, and its progress toward key performance targets. Quantitative metrics also facilitate comparison to peers or industry benchmarks.

In addition to recommended qualitative disclosures, the Prototype Climate Standard includes suggested cross-industry metrics and a link to the industry-specific disclosure topics and metrics in the SASB Standards. In Table 3, we present a complete selection of SASB’s industry-specific, climate-related topics and metrics, along with their associated climate-related risk categories. In preparing disclosures in accordance with these and other SASB metrics, companies should consult the full industry standards, as well as the SASB Standards Application Guidance, both available at <https://www.sasb.org/standards/download/>.

The Prototype Climate Standard represents an important step toward a globally accepted standard for climate-related financial disclosure, and it has been taken up as a starting point for ongoing efforts by the IFRS Foundation<sup>46</sup> and IOSCO.<sup>47</sup> As the former has noted, such a standard “would provide a global sustainability reporting baseline that would allow for greater comparability and consistency . . . while also providing flexibility for coordination on additional jurisdictional and multi-stakeholder reporting requirements (a “building blocks” approach).”<sup>48</sup> Both the IFRS Foundation and IOSCO have announced the formation of technical groups to advise on convergence of global sustainability reporting standards focused on enterprise value, including the evolution of the Prototype Climate Standard. SASB is pleased to serve on the IFRS Foundation’s working group.

46 IFRS Foundation, “IFRS Foundation Trustees announce working group to accelerate convergence in global sustainability reporting standards focused on enterprise value” (March 22, 2021).  
 47 IOSCO, “IOSCO Technical Expert Group to undertake an assessment of the technical recommendations to be developed as part of the IFRS Foundation’s sustainability project,” media release (March 30, 2021).  
 48 Supra note 46.

Figure 7. The Mutually Reinforcing Roles of Quantitative and Qualitative Disclosure



SASB metrics are among the most frequently referenced tools cited by TCFD for implementing its recommendations

Figure 8. The Recommendations of the Task Force on Climate-related Financial Disclosures

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

# SASB CLIMATE METRICS TABLE

■ Physical Effects   ■ Transition to a Low-Carbon, Resilient Economy   ■ Regulatory Risk

Table 3. SASB Climate-related Disclosure Topics and Metrics by Industry

INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE	
<b>CONSUMER GOODS</b>					
<b>Apparel, Accessories &amp; Footwear</b>	Raw Materials Sourcing	Description of environmental and social risks associated with sourcing priority raw materials	Discussion and Analysis	n/a	■ ■
		Percentage of raw materials third-party certified to an environmental and/or social sustainability standard, by standard	Quantitative	Percentage (%) by weight	■ ■
<b>Appliance Manufacturing</b>	Product Lifecycle Environmental Impacts	Percentage of eligible products by revenue certified to the ENERGY STAR® program	Quantitative	Percentage (%) by revenue	■
		Percentage of eligible products certified to an Association of Home Appliance Manufacturers (AHAM) sustainability standard	Quantitative	Percentage (%) by revenue	■
		Description of efforts to manage products' end-of-life impacts	Discussion and Analysis	n/a	■
<b>Household &amp; Personal Products</b>	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■ ■
	Environmental & Social Impacts of Palm Oil Supply Chain	Amount of palm oil sourced, percentage certified through the Roundtable on Sustainable Palm Oil (RSPO) supply chains as (a) Identity Preserved, (b) Segregated, (c) Mass Balance, or (d) Book & Claim	Quantitative	Metric tons (t), Percentage (%)	■ ■
<b>Building Products &amp; Furnishings</b>	Energy Management in Manufacturing	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
	Product Lifecycle Environmental Impacts	Description of efforts to manage product lifecycle impacts and meet demand for sustainable products	Discussion and Analysis	n/a	■
		(1) Weight of end-of-life material recovered, (2) percentage of recovered materials recycled	Quantitative	Metric tons (t), Percentage (%) by weight	■
	Wood Supply Chain Management	(1) Total weight of wood fiber materials purchased, (2) percentage from third-party certified forestlands, (3) percentage by standard, and (4) percentage certified to other wood fiber standards, (5) percentage by standard	Quantitative	Metric tons (t), Percentage (%) by weight	■ ■
<b>E-Commerce</b>	Hardware Infrastructure Energy & Water Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
		(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Discussion of the integration of environmental considerations into strategic planning for data center needs	Discussion and Analysis	n/a	■ ■
	Product Packaging & Distribution	Total greenhouse gas (GHG) footprint of product shipments	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of strategies to reduce the environmental impact of product delivery	Discussion and Analysis	n/a	■
<b>Multiline and Specialty Retailers &amp; Distributors</b>	Energy Management in Retail & Distribution	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■

■ Physical Effects ■ Transition to a Low-Carbon, Resilient Economy ■ Regulatory Risk

INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE	
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## EXTRACTIVES & MINERALS PROCESSING

<b>Coal Operations</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Water Management	(1) Total fresh water withdrawn, (2) percentage recycled, (3) percentage in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Number of incidents of non-compliance associated with water quality permits, standards, and regulations	Quantitative	Number	■
	Reserves Valuation & Capital Expenditures	Sensitivity of coal reserve levels to future price projection scenarios that account for a price on carbon emissions	Quantitative	Million metric tons (Mt)	■ ■
		Estimated carbon dioxide emissions embedded in proven coal reserves	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■ ■
		Discussion of how price and demand for coal and/or climate regulation influence the capital expenditure strategy for exploration, acquisition, and development of assets	Discussion and Analysis	n/a	■ ■
<b>Construction Materials</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Air Quality	Air emissions of the following pollutants: (1) NOx (excluding N <sub>2</sub> O), (2) SOx, (3) particulate matter (PM10), (4) dioxins/furans, (5) volatile organic compounds (VOCs), (6) polycyclic aromatic hydrocarbons (PAHs), and (7) heavy metals	Quantitative	Metric tons (t)	■
	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage alternative, (4) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
	Water Management	(1) Total fresh water withdrawn, (2) percentage recycled, (3) percentage in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
	Waste Management	Amount of waste generated, percentage hazardous, percentage recycled	Quantitative	Metric tons (t), Percentage (%)	■
		Product Innovation	Percentage of products that qualify for credits in sustainable building design and construction certifications	Quantitative	Percentage (%) by annual sales revenue
		Total addressable market and share of market for products that reduce energy, water, and/or material impacts during usage and/or production	Quantitative	Reporting currency, Percentage (%)	■
<b>Iron &amp; Steel Producers</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
		(1) Total fuel consumed, (2) percentage coal, (3) percentage natural gas, (4) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
	Water Management	(1) Total fresh water withdrawn, (2) percentage recycled, (3) percentage in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
Supply Chain Management	Discussion of the process for managing iron ore and/or coking coal sourcing risks arising from environmental and social issues	Discussion and Analysis	n/a	■	
<b>Metals &amp; Mining</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
	Water Management	(1) Total fresh water withdrawn, (2) total fresh water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Number of incidents of non-compliance associated with water quality permits, standards, and regulations	Quantitative	Number	■

■ Physical Effects ■ Transition to a Low-Carbon, Resilient Economy ■ Regulatory Risk

INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE	
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## EXTRACTIVES & MINERALS PROCESSING

<b>Oil &amp; Gas – Exploration &amp; Production</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage methane, percentage covered under emissions-limiting regulations	Quantitative	Metric tons CO <sub>2</sub> -e (t), Percentage (%)	■
		Amount of gross global Scope 1 emissions from: (1) flared hydrocarbons, (2) other combustion, (3) process emissions, (4) other vented emissions, and (5) fugitive emissions	Quantitative	Metric tons CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Water Management	(1) Total fresh water withdrawn, (2) total fresh water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Volume of produced water and flowback generated; percentage (1) discharged, (2) injected, (3) recycled; hydrocarbon content in discharged water	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%), Metric tons (t)	■
		Percentage of hydraulically fractured wells for which there is public disclosure of all fracturing fluid chemicals used	Quantitative	Percentage (%)	■
		Percentage of hydraulic fracturing sites where ground or surface water quality deteriorated compared to a baseline	Quantitative	Percentage (%)	■
	Reserves Valuation & Capital Expenditures	Sensitivity of hydrocarbon reserve levels to future price projection scenarios that account for a price on carbon emissions	Quantitative	Million barrels (MMbbls), Million standard cubic feet (MMscf)	■ ■
		Estimated carbon dioxide emissions embedded in proved hydrocarbon reserves	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■ ■
		Amount invested in renewable energy, revenue generated by renewable energy sales	Quantitative	Reporting currency	■ ■
Discussion of how price and demand for hydrocarbons and/or climate regulation influence the capital expenditure strategy for exploration, acquisition, and development of assets		Discussion and Analysis	n/a	■ ■	
<b>Oil &amp; Gas – Midstream</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage methane, percentage covered under emissions-limiting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
<b>Oil &amp; Gas – Refining &amp; Marketing</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Water Management	(1) Total fresh water withdrawn, (2) percentage recycled, (3) percentage in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
	Product Specifications & Clean Fuel Blends	Percentage of Renewable Volume Obligation (RVO) met through: (1) production of renewable fuels, (2) purchase of “separated” renewable identification numbers (RIN)	Quantitative	Percentage (%)	■ ■
		Total addressable market and share of market for advanced biofuels and associated infrastructure	Quantitative	Reporting currency, Percentage (%)	■ ■
<b>Oil &amp; Gas – Services</b>	Emissions Reduction Services & Fuels Management	Total fuel consumed, percentage renewable, percentage used in: (1) on-road equipment and vehicles and (2) off-road equipment	Quantitative	Gigajoules (GJ), Percentage (%)	■
		Discussion of strategy or plans to address air emissions-related risks, opportunities, and impacts	Discussion and Analysis	n/a	■
		Percentage of engines in service that meet Tier 4 compliance for non-road diesel engine emissions	Quantitative	Percentage (%)	■
	Water Management Services	(1) Total volume of fresh water handled in operations, (2) percentage recycled	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■ ■
		Discussion of strategy or plans to address water consumption and disposal-related risks, opportunities, and impacts	Discussion and Analysis	n/a	■ ■

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INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE	
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## FOOD & BEVERAGE

<b>Agricultural Products</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
		Fleet fuel consumed, percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Energy Management	(1) Operational energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
		Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)
	Description of water management risks and discussion of strategies and practices to mitigate those risks		Discussion and Analysis	n/a	■
	Number of incidents of non-compliance associated with water quantity and/or quality permits, standards, and regulations		Quantitative	Number	■
	Ingredient Sourcing	Identification of principal crops and description of risks and opportunities presented by climate change	Discussion and Analysis	n/a	■
Percentage of agricultural products sourced from regions with High or Extremely High Baseline Water Stress		Quantitative	Percentage (%) by cost	■	
<b>Alcoholic Beverages</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■
	Environmental & Social Impacts of Ingredient Supply Chain	Suppliers' social and environmental responsibility audit (1) non-conformance rate and (2) associated corrective action rate for (a) major and (b) minor non-conformances	Quantitative	Rate	■
	Ingredient Sourcing	Percentage of beverage ingredients sourced from regions with High or Extremely High Baseline Water Stress	Quantitative	Percentage (%) by cost	■
		List of priority beverage ingredients and description of sourcing risks due to environmental and social considerations	Discussion and Analysis	n/a	■
<b>Meat, Poultry &amp; Dairy</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■
		Number of incidents of non-compliance with water quality permits, standards, and regulations	Quantitative	Number	■
	Land Use & Ecological Impacts	Amount of animal litter and manure generated, percentage managed according to a nutrient management plan	Quantitative	Metric tons (t), Percentage (%)	■
		Percentage of pasture and grazing land managed to Natural Resources Conservation Service (NRCS) conservation plan criteria	Quantitative	Percentage (%) by hectares	■
		Animal protein production from concentrated animal feeding operations (CAFOs)	Quantitative	Metric tons (t)	■
	Animal & Feed Sourcing	Percentage of animal feed sourced from regions with High or Extremely High Baseline Water Stress	Quantitative	Percentage (%) by weight	■
		Percentage of contracts with producers located in regions with High or Extremely High Baseline Water Stress	Quantitative	Percentage (%) by contract value	■
		Discussion of strategy to manage opportunities and risks to feed sourcing and livestock supply presented by climate change	Discussion and Analysis	n/a	■

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INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE	
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## FOOD & BEVERAGE

<b>Non-Alcoholic Beverages</b>	Fleet Fuel Management	Fleet fuel consumed, percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Energy Management	(1) Operational energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■
	Environmental & Social Impacts of Ingredient Supply Chain	Suppliers' social and environmental responsibility audit (1) non-conformance rate and (2) associated corrective action rate for (a) major and (b) minor non-conformances	Quantitative	Rate	■
	Ingredient Sourcing	Percentage of beverage ingredients sourced from regions with High or Extremely High Baseline Water Stress	Quantitative	Percentage (%) by cost	■
		List of priority beverage ingredients and description of sourcing risks due to environmental and social considerations	Discussion and Analysis	n/a	■
<b>Processed Foods</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Number of incidents of non-compliance associated with water quantity and/or quality permits, standards, and regulations	Quantitative	Number	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■
	Environmental & Social Impacts of Ingredient Supply Chain	Percentage of food ingredients sourced that are certified to third-party environmental and/or social standards, and percentages by standard	Quantitative	Percentage (%) by cost	■
		Suppliers' social and environmental responsibility audit (1) non-conformance rate and (2) associated corrective action rate for (a) major and (b) minor non-conformances	Quantitative	Rate	■
	Ingredient Sourcing	Percentage of food ingredients sourced from regions with High or Extremely High Baseline Water Stress	Quantitative	Percentage (%) by cost	■ ■
List of priority food ingredients and discussion of sourcing risks due to environmental and social considerations		Discussion and Analysis	n/a	■ ■	
<b>Food Retailers &amp; Distributors</b>	Fleet Fuel Management	Fleet fuel consumed, percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Air Emissions from Refrigeration	Gross global Scope 1 emissions from refrigerants	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Percentage of refrigerants consumed with zero ozone-depleting potential	Quantitative	Percentage (%) by weight	■
		Average refrigerant emissions rate	Quantitative	Percentage (%)	■
	Energy Management	(1) Operational energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
	Management of Environmental & Social Impacts in the Supply Chain	Revenue from products third-party certified to environmental or social sustainability sourcing standards	Quantitative	Reporting currency	■
		Percentage of revenue from (1) eggs that originated from a cage-free environment and (2) pork produced without the use of gestation crates	Quantitative	Percentage (%) by revenue	■
Discussion of strategy to manage environmental and social risks within the supply chain, including animal welfare		Discussion and Analysis	n/a	■	
Discussion of strategies to reduce the environmental impact of packaging		Discussion and Analysis	n/a	■	

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INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE
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## FOOD & BEVERAGE

INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE	Physical Effects	Transition to a Low-Carbon, Resilient Economy	Regulatory Risk
<b>Restaurants</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■	■	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■	■	■
	Supply Chain Management & Food Sourcing	Percentage of food purchased that (1) meets environmental and social sourcing standards and (2) is certified to third-party environmental and/or social standards	Quantitative	Percentage (%) by cost	■	■	■
		Percentage of (1) eggs that originated from a cage-free environment and (2) pork that was produced without the use of gestation crates	Quantitative	Percentage (%) by number, Percentage (%) by weight	■	■	■
		Discussion of strategy to manage environmental and social risks within the supply chain, including animal welfare	Discussion and Analysis	n/a	■	■	■

■ Physical Effects   ■ Transition to a Low-Carbon, Resilient Economy   ■ Regulatory Risk

INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE	
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## FINANCIALS

<b>Asset Management &amp; Custody Activities</b>	Incorporation of Environmental, Social, and Governance Factors in Investment Management & Advisory	Amount of assets under management, by asset class, that employ (1) integration of environmental, social, and governance (ESG) issues, (2) sustainability themed investing, and (3) screening	Quantitative	Reporting currency	■
		Description of approach to incorporation of environmental, social, and governance (ESG) factors in investment and/or wealth management processes and strategies	Discussion and Analysis	n/a	■
		Description of proxy voting and investee engagement policies and procedures	Discussion and Analysis	n/a	■
<b>Commercial Banks</b>	Incorporation of Environmental, Social, and Governance Factors in Credit Analysis	Commercial and industrial credit exposure, by industry	Quantitative	Reporting currency	■
		Description of approach to incorporation of environmental, social, and governance (ESG) factors in credit analysis	Discussion and Analysis	n/a	■
<b>Insurance</b>	Incorporation of Environmental, Social, and Governance Factors in Investment Management	Total invested assets, by industry and asset class	Quantitative	Reporting currency	■
		Description of approach to incorporation of environmental, social, and governance (ESG) factors in investment management processes and strategies	Discussion and Analysis	n/a	■
	Policies Designed to Incentivize Responsible Behavior	Net premiums written related to energy efficiency and low carbon technology	Quantitative	Reporting currency	■
		Discussion of products and/or product features that incentivize health, safety, and/or environmentally responsible actions and/or behaviors	Discussion and Analysis	n/a	■
	Environmental Risk Exposure	Probable Maximum Loss (PML) of insured products from weather-related natural catastrophes	Quantitative	Reporting currency	■
		Total amount of monetary losses attributable to insurance payouts from (1) modeled natural catastrophes and (2) non-modeled natural catastrophes, by type of event and geographic segment (net and gross of reinsurance)	Quantitative	Reporting currency	■
Description of approach to incorporation of environmental risks into (1) the underwriting process for individual contracts and (2) the management of firm-level risks and capital adequacy		Discussion and Analysis	n/a	■	
<b>Investment Banking &amp; Brokerage</b>	Incorporation of Environmental, Social, and Governance Factors in Investment Banking & Brokerage Activities	Revenue from (1) underwriting, (2) advisory, and (3) securitization transactions incorporating integration of environmental, social, and governance (ESG) factors, by industry	Quantitative	Reporting currency	■
		(1) Number and (2) total value of investments and loans incorporating integration of environmental, social, and governance (ESG) factors, by industry	Quantitative	Number, Reporting currency	■
		Description of approach to incorporation of environmental, social, and governance (ESG) factors in investment banking and brokerage activities	Discussion and Analysis	n/a	■
<b>Mortgage Finance</b>	Environmental Risk to Mortgaged Properties	(1) Number and (2) value of mortgage loans in 100-year flood zones	Quantitative	Number, Reporting currency	■
		(1) Total expected loss and (2) Loss Given Default (LGD) attributable to mortgage loan default and delinquency due to weather-related natural catastrophes, by geographic region	Quantitative	Reporting currency, Percentage (%)	■
		Description of how climate change and other environmental risks are incorporated into mortgage origination and underwriting	Discussion and Analysis	n/a	■

■ Physical Effects   ■ Transition to a Low-Carbon, Resilient Economy   ■ Regulatory Risk

INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE	
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## HEALTH CARE

<b>Health Care Delivery</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Waste Management	Total amount of medical waste, percentage (a) incinerated, (b) recycled or treated, and (c) landfilled	Quantitative	Metric tons (t)	■
		Total amount of: (1) hazardous and (2) non-hazardous pharmaceutical waste, percentage (a) incinerated, (b) recycled or treated, and (c) landfilled	Quantitative	Metric tons (t), Percentage (%)	■
	Climate Change Impacts on Human Health & Infrastructure	Description of policies and practices to address: (1) the physical risks due to an increased frequency and intensity of extreme weather events and (2) changes in the morbidity and mortality rates of illnesses and diseases, associated with climate change	Discussion and Analysis	n/a	■
		Percentage of health care facilities that comply with the Centers for Medicare and Medicaid Services (CMS) Emergency Preparedness Rule	Quantitative	Percentage (%)	■
<b>Health Care Distributors</b>	Fleet Fuel Management	Payload fuel economy	Quantitative	Gallons, Tons (U.S.), Miles	■
		Description of efforts to reduce the environmental impact of logistics	Discussion and Analysis	n/a	■
<b>Managed Care</b>	Climate Change Impacts on Human Health	Discussion of the strategy to address the effects of climate change on business operations and how specific risks presented by changes in the geographic incidence, morbidity, and mortality of illnesses and diseases are incorporated into risk models	Discussion and Analysis	n/a	■
<b>Medical Equipment &amp; Supplies</b>	Product Design & Lifecycle Management	Discussion of process to assess and manage environmental and human health considerations associated with chemicals in products, and meet demand for sustainable products	Discussion and Analysis	n/a	■
		Total amount of products accepted for take-back and reused, recycled, or donated, broken down by: (1) devices and equipment and (2) supplies	Quantitative	Metric tons (t)	■
<b>Drug Retailers</b>	Energy Management in Retail	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■

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INDUSTRY	DISCLOSURE TOPIC	ACCOUNTING METRIC	ACCOUNTING METRIC CATEGORY	ACCOUNTING METRIC UNIT OF MEASURE
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## INFRASTRUCTURE

<b>Electric Utilities &amp; Power Generators</b>	Greenhouse Gas Emissions & Energy Resource Planning	(1) Gross global Scope 1 emissions, percentage covered under (2) emissions-limiting regulations, and (3) emissions-reporting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)	■
		Greenhouse gas (GHG) emissions associated with power deliveries	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
		(1) Number of customers served in markets subject to renewable portfolio standards (RPS) and (2) percentage fulfillment of RPS target by market	Quantitative	Number, Percentage (%)	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■ ■
		Number of incidents of non-compliance associated with water quantity and/or quality permits, standards, and regulations	Quantitative	Number	■ ■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■ ■
	End-Use Efficiency & Demand	Percentage of electric utility revenues from rate structures that (1) are decoupled and (2) contain a lost revenue adjustment mechanism (LRAM)	Quantitative	Percentage (%)	■ ■
		Percentage of electric load served by smart grid technology	Quantitative	Percentage (%) by megawatt hours (MWh)	■ ■
		Customer electricity savings from efficiency measures, by market	Quantitative	Megawatt hours (MWh)	■ ■
	Nuclear Safety & Emergency Management	Total number of nuclear power units, broken down by U.S. Nuclear Regulatory Commission (NRC) Action Matrix Column	Quantitative	Number	■
		Description of efforts to manage nuclear safety and emergency preparedness	Discussion and Analysis	n/a	■
	Grid Resiliency	Number of incidents of non-compliance with physical and/or cybersecurity standards or regulations	Quantitative	Number	■
(1) System Average Interruption Duration Index (SAIDI), (2) System Average Interruption Frequency Index (SAIFI), and (3) Customer Average Interruption Duration Index (CAIDI), inclusive of major event days		Quantitative	Minutes, Number	■	
<b>Engineering &amp; Construction Services</b>	Environmental Impacts of Project Development	Number of incidents of non-compliance with environmental permits, standards, and regulations	Quantitative	Number	■
		Discussion of processes to assess and manage environmental risks associated with project design, siting, and construction	Discussion and Analysis	n/a	■
	Structural Integrity & Safety	Amount of defect- and safety-related rework costs	Quantitative	Reporting currency	■ ■
		Total amount of monetary losses as a result of legal proceedings associated with defect- and safety-related incidents	Quantitative	Reporting currency	■ ■
	Lifecycle Impacts of Buildings & Infrastructure	Number of (1) commissioned projects certified to a third-party multi-attribute sustainability standard and (2) active projects seeking such certification	Quantitative	Number	■
		Discussion of process to incorporate operational-phase energy and water efficiency considerations into project planning and design	Discussion and Analysis	n/a	■
	Climate Impacts of Business Mix	Amount of backlog for (1) hydrocarbon-related projects and (2) renewable energy projects	Quantitative	Reporting currency	■
		Amount of backlog cancellations associated with hydrocarbon-related projects	Quantitative	Reporting currency	■
Amount of backlog for non-energy projects associated with climate change mitigation		Quantitative	Reporting currency	■	

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## INFRASTRUCTURE

<b>Gas Utilities &amp; Distributors</b>	End-Use Efficiency	Percentage of gas utility revenues from rate structures that (1) are decoupled or (2) contain a lost revenue adjustment mechanism (LRAM)	Quantitative	Percentage (%)	■ ■
		Customer gas savings from efficiency measures by market	Quantitative	Million British Thermal Units (MMBtu)	■ ■
	Integrity of Gas Delivery Infrastructure	Number of (1) reportable pipeline incidents, (2) Corrective Action Orders (CAO), and (3) Notices of Probable Violation (NOPV)	Quantitative	Number	■
		Percentage of distribution pipeline that is (1) cast and/or wrought iron and (2) unprotected steel	Quantitative	Percentage (%) by length	■
		Percentage of gas (1) transmission and (2) distribution pipelines inspected	Quantitative	Percentage (%) by length	■
		Description of efforts to manage the integrity of gas delivery infrastructure, including risks related to safety and emissions	Discussion and Analysis	n/a	■
<b>Home Builders</b>	Land Use & Ecological Impacts	Number of (1) lots and (2) homes delivered on redevelopment sites	Quantitative	Number	■
		Number of (1) lots and (2) homes delivered in regions with High or Extremely High Baseline Water Stress	Quantitative	Number	■
		Total amount of monetary losses as a result of legal proceedings associated with environmental regulations	Quantitative	Reporting currency	■
		Description of process to integrate environmental considerations into site selection, site design, and site development and construction	Discussion and Analysis	n/a	■
	Design for Resource Efficiency	(1) Number of homes that obtained a certified HERS® Index Score and (2) average score	Quantitative	Number, Index score	■
		Percentage of installed water fixtures certified to WaterSense® specifications	Quantitative	Percentage (%)	■
		Number of homes delivered certified to a third-party multi-attribute green building standard	Quantitative	Number	■
		Description of risks and opportunities related to incorporating resource efficiency into home design, and how benefits are communicated to customers	Discussion and Analysis	n/a	■
	Climate Change Adaptation	Number of lots located in 100-year flood zones	Quantitative	Number	■ ■
		Description of climate change risk exposure analysis, degree of systematic portfolio exposure, and strategies for mitigating risks	Discussion and Analysis	n/a	■ ■
<b>Real Estate</b>	Energy Management	Energy consumption data coverage as a percentage of total floor area, by property subsector	Quantitative	Percentage (%) by floor area	■ ■
		(1) Total energy consumed by portfolio area with data coverage, (2) percentage grid electricity, and (3) percentage renewable, by property subsector	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
		Like-for-like percentage change in energy consumption for the portfolio area with data coverage, by property subsector	Quantitative	Percentage (%)	■ ■
		Percentage of eligible portfolio that (1) has an energy rating and (2) is certified to ENERGY STAR, by property subsector	Quantitative	Percentage (%) by floor area	■ ■
		Description of how building energy management considerations are integrated into property investment analysis and operational strategy	Discussion and Analysis	n/a	■ ■
	Water Management	Water withdrawal data coverage as a percentage of (1) total floor area and (2) floor area in regions with High or Extremely High Baseline Water Stress, by property subsector	Quantitative	Percentage (%) by floor area	■ ■
		(1) Total water withdrawn by portfolio area with data coverage and (2) percentage in regions with High or Extremely High Baseline Water Stress, by property subsector	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■ ■
		Like-for-like percentage change in water withdrawn for portfolio area with data coverage, by property subsector	Quantitative	Percentage (%)	■ ■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■ ■

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## INFRASTRUCTURE

<b>Real Estate (cont.)</b>	Management of Tenant Sustainability Impacts	(1) Percentage of new leases that contain a cost recovery clause for resource efficiency-related capital improvements and (2) associated leased floor area, by property subsector	Quantitative	Percentage (%) by floor area, Square feet (ft <sup>2</sup> )	■
		Percentage of tenants that are separately metered or submetered for (1) grid electricity consumption and (2) water withdrawals, by property subsector	Quantitative	Percentage (%) by floor area	■
		Discussion of approach to measuring, incentivizing, and improving sustainability impacts of tenants	Discussion and Analysis	n/a	■
	Climate Change Adaptation	Area of properties located in 100-year flood zones, by property subsector	Quantitative	Square feet (ft <sup>2</sup> )	■
		Description of climate change risk exposure analysis, degree of systematic portfolio exposure, and strategies for mitigating risks	Discussion and Analysis	n/a	■
<b>Real Estate Services</b>	Sustainability Services	Revenue from energy and sustainability services	Quantitative	Reporting currency	■
		(1) Floor area and (2) number of buildings under management provided with energy and sustainability services	Quantitative	Square feet (ft <sup>2</sup> ), Number	■
		(1) Floor area and (2) number of buildings under management that obtained an energy rating	Quantitative	Square feet (ft <sup>2</sup> ), Number	■
<b>Water Utilities &amp; Services</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Distribution Network Efficiency	Water main replacement rate	Quantitative	Rate	■
		Volume of non-revenue real water losses	Quantitative	Thousand cubic meters (m <sup>3</sup> )	■
	End-Use Efficiency	Percentage of water utility revenues from rate structures that are designed to promote conservation and revenue resilience	Quantitative	Percentage (%)	■ ■
		Customer water savings from efficiency measures, by market	Quantitative	Cubic meters (m <sup>3</sup> )	■ ■
	Water Supply Resilience	Total water sourced from regions with High or Extremely High Baseline Water Stress, percentage purchased from a third party	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Volume of recycled water delivered to customers	Quantitative	Thousand cubic meters (m <sup>3</sup> )	■
		Discussion of strategies to manage risks associated with the quality and availability of water resources	Discussion and Analysis	n/a	■
	Network Resiliency & Impacts of Climate Change	Wastewater treatment capacity located in 100-year flood zones	Quantitative	Cubic meters (m <sup>3</sup> ) per day	■
		(1) Number and (2) volume of sanitary sewer overflows (SSO), (3) percentage of volume recovered	Quantitative	Number, Cubic meters (m <sup>3</sup> ), Percentage (%)	■
		(1) Number of unplanned service disruptions, and (2) customers affected, each by duration category	Quantitative	Number	■
		Description of efforts to identify and manage risks and opportunities related to the impact of climate change on distribution and wastewater infrastructure	Discussion and Analysis	n/a	■
	<b>Waste Management</b>	Greenhouse Gas Emissions	(1) Gross global Scope 1 emissions, percentage covered under (2) emissions-limiting regulations, and (3) emissions-reporting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)
(1) Total landfill gas generated, (2) percentage flared, (3) percentage used for energy			Quantitative	Million British Thermal Units (MMBtu), Percentage (%)	■
Discussion of long-term and short-term strategy or plan to manage Scope 1 and lifecycle emissions, emissions reduction targets, and an analysis of performance against those targets			Discussion and Analysis	n/a	■
Fleet Fuel Management		(1) Fleet fuel consumed, (2) percentage natural gas, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
		Percentage of alternative fuel vehicles in fleet	Quantitative	Percentage (%)	■

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## RENEWABLE RESOURCES & ALTERNATIVE ENERGY

<b>Biofuels</b>	Water Management in Manufacturing	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■
		Number of incidents of non-compliance associated with water quality permits, standards, and regulations	Quantitative	Number	■
	Lifecycle Emissions Balance	Lifecycle greenhouse gas (GHG) emissions, by biofuel type	Quantitative	Grams of CO <sub>2</sub> -e per megajoule (MJ)	■ ■
	Sourcing & Environmental Impacts of Feedstock Production	Discussion of strategy to manage risks associated with environmental impacts of feedstock production	Discussion and Analysis	n/a	■ ■
		Percentage of biofuel production third-party certified to an environmental sustainability standard	Quantitative	Percentage (%) of gallons	■ ■
	Management of the Legal & Regulatory Environment	Amount of subsidies received through government programs	Quantitative	Reporting currency	■
		Discussion of corporate positions related to government regulations and/or policy proposals that address environmental and social factors affecting the industry	Discussion and Analysis	n/a	■
<b>Forestry Management</b>	Ecosystem Services & Impacts	Area of forestland certified to a third-party forest management standard, percentage certified to each standard	Quantitative	Acres (ac), Percentage (%)	■
		Area of forestland with protected conservation status	Quantitative	Acres (ac)	■
		Area of forestland in endangered species habitat	Quantitative	Acres (ac)	■
		Description of approach to optimizing opportunities from ecosystem services provided by forestlands	Discussion and Analysis	n/a	■
	Climate Change Adaptation	Description of strategy to manage opportunities for and risks to forest management and timber production presented by climate change	Discussion and Analysis	n/a	■
<b>Fuel Cells &amp; Industrial Batteries</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Product Efficiency	Average storage capacity of batteries, by product application and technology type	Quantitative	Specific energy (Wh/kg)	■
		Average energy efficiency of fuel cells as (1) electrical efficiency and (2) thermal efficiency, by product application and technology type	Quantitative	Percentage (%)	■
		Average battery efficiency as coulombic efficiency, by product application and technology type	Quantitative	Percentage (%)	■
		Average operating lifetime of fuel cells, by product application and technology type	Quantitative	Hours (h)	■
		Average operating lifetime of batteries, by product application and technology type	Quantitative	Number of cycles	■
<b>Pulp &amp; Paper Products</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage from biomass, (4) percentage from other renewable energy, (5) total self-generated energy	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■
	Supply Chain Management	Percentage of wood fiber sourced from (1) third-party certified forestlands and percentage to each standard and (2) meeting other fiber sourcing standards and percentage to each standard	Quantitative	Percentage (%) by weight	■ ■
		Amount of recycled and recovered fiber procured	Quantitative	Metric tons (t)	■ ■

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## RENEWABLE RESOURCES & ALTERNATIVE ENERGY

<b>Solar Technology &amp; Project Developers</b>	Energy Management in Manufacturing	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Water Management in Manufacturing	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■
	Management of Energy Infrastructure Integration & Related Regulations	Description of risks associated with integration of solar energy into existing energy infrastructure and discussion of efforts to manage those risks	Discussion and Analysis	n/a	■ ■
		Description of risks and opportunities associated with energy policy and its impact on the integration of solar energy into existing energy infrastructure	Discussion and Analysis	n/a	■ ■
<b>Wind Technology &amp; Project Developers</b>	Materials Efficiency	Top five materials consumed, by weight	Quantitative	Metric tons (t)	■
		Average top head mass per turbine capacity, by wind turbine class	Quantitative	Metric tons per megawatts (t/MW)	■
		Description of approach to optimize materials efficiency of wind turbine design	Discussion and Analysis	n/a	■

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## RESOURCE TRANSFORMATION

<b>Aerospace &amp; Defense</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Fuel Economy & Emissions in Use-phase	Revenue from alternative energy-related products	Quantitative	Reporting currency	■
		Description of approach and discussion of strategy to address fuel economy and greenhouse gas (GHG) emissions of products	Discussion and Analysis	n/a	■ ■
<b>Chemicals</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable, (4) total self-generated energy	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Number of incidents of non-compliance associated with water quality permits, standards, and regulations	Quantitative	Number	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	■
	Product Design for Use-phase Efficiency	Revenue from products designed for use-phase resource efficiency	Quantitative	Reporting currency	■
<b>Containers &amp; Packaging</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations	Quantitative	Metric tons (t) CO <sub>2</sub> -e, Percentage (%)	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable, (4) total self-generated energy	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Description of water management risks and discussion of strategies and practices to mitigate those risks	Quantitative	Number	■
		Number of incidents of non-compliance associated with water quality permits, standards, and regulations	Quantitative	Number	■
	Waste Management	Amount of hazardous waste generated, percentage recycled	Quantitative	Metric tons (t), Percentage (%)	■
	Supply Chain Management	Total wood fiber procured, percentage from certified sources	Quantitative	Metric tons (t), Percentage (%)	■
		Total aluminum purchased, percentage from certified sources	Quantitative	Metric tons (t), Percentage (%)	■
	<b>Electrical &amp; Electronic Equipment</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)
Product Lifecycle Management		Percentage of products by revenue that contain IEC 62474 declarable substances	Quantitative	Percentage (%) by revenue	■
		Percentage of eligible products, by revenue, that meet ENERGY STAR® criteria	Quantitative	Percentage (%) by revenue	■
		Revenue from renewable energy-related and energy efficiency-related products	Quantitative	Reporting currency	■
<b>Industrial Machinery &amp; Goods</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Fuel Economy & Emissions in Use-phase	Sales-weighted fleet fuel efficiency for medium- and heavy-duty vehicles	Quantitative	Gallons per 1,000 ton-miles	■ ■
		Sales-weighted fuel efficiency for non-road equipment	Quantitative	Gallons per hour	■ ■
		Sales-weighted fuel efficiency for stationary generators	Quantitative	Watts per gallon	■ ■
		Sales-weighted emissions of: (1) nitrogen oxides (NOx) and (2) particulate matter (PM) for: (a) marine diesel engines, (b) locomotive diesel engines, (c) on-road medium- and heavy-duty engines, and (d) other non-road diesel engines	Quantitative	Grams per kilowatt-hour	■ ■

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## SERVICES

<b>Casinos &amp; Gaming</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
	Hotels & Lodging	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
<b>Hotels &amp; Lodging</b>	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■ ■
	Climate Change Adaptation	Number of lodging facilities located in 100-year flood zones	Quantitative	Number	■ ■
<b>Leisure Facilities</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■

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## TECHNOLOGY & COMMUNICATIONS

<b>Electronic Manufacturing Services &amp; Original Design Manufacturing</b>	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
	Product Lifecycle Management	Weight of end-of-life products and e-waste recovered, percentage recycled	Quantitative	Metric tons (t), Percentage (%)	■
<b>Internet Media &amp; Services</b>	Environmental Footprint of Hardware Infrastructure	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
		(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
	Discussion of the integration of environmental considerations into strategic planning for data center needs	Discussion and Analysis	n/a	■ ■	
<b>Semiconductors</b>	Greenhouse Gas Emissions	(1) Gross global Scope 1 emissions and (2) amount of total emissions from perfluorinated compounds	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
	Energy Management in Manufacturing	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
	Product Lifecycle Management	Percentage of products by revenue that contain IEC 62474 declarable substances	Quantitative	Percentage (%)	■
Processor energy efficiency at a system-level for: (1) servers, (2) desktops, and (3) laptops		Quantitative	Various, by product category	■	
<b>Software &amp; IT Services</b>	Environmental Footprint of Hardware Infrastructure	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
		(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	■
		Discussion of the integration of environmental considerations into strategic planning for data center needs	Discussion and Analysis	n/a	■ ■
	Managing Systemic Risks from Technology Disruptions	Number of (1) performance issues and (2) service disruptions; (3) total customer downtime	Quantitative	Number, Days	■
		Description of business continuity risks related to disruptions of operations	Discussion and Analysis	n/a	■
<b>Telecommunication Services</b>	Environmental Footprint of Operations	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Managing Systemic Risks from Technology Disruptions	(1) System average interruption frequency and (2) customer average interruption duration	Quantitative	Disruptions per customer, Hours per customer	■
		Discussion of systems to provide unimpeded service during service interruptions	Discussion and Analysis	n/a	■
<b>Hardware</b>	Product Lifecycle Management	Percentage of products by revenue that contain IEC 62474 declarable substances	Quantitative	Percentage (%)	■
		Percentage of eligible products, by revenue, meeting the requirements for EPEAT registration or equivalent	Quantitative	Percentage (%)	■
		Percentage of eligible products, by revenue, meeting ENERGY STAR® criteria	Quantitative	Percentage (%)	■
		Weight of end-of-life products and e-waste recovered, percentage recycled	Quantitative	Metric tons (t), Percentage (%)	■

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## TRANSPORTATION

<b>Airlines</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
		(1) Total fuel consumed, (2) percentage alternative, (3) percentage sustainable	Quantitative	Gigajoules (GJ), Percentage (%)	■
<b>Air Freight &amp; Logistics</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■ ■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■ ■
		Fuel consumed by (1) road transport, percentage (a) natural gas and (b) renewable, and (2) air transport, percentage (a) alternative and (b) sustainable	Quantitative	Gigajoules (GJ), Percentage (%)	■ ■
	Supply Chain Management	Percentage of carriers with BASIC percentiles above the FMCSA intervention threshold	Quantitative	Percentage (%)	■
		Total greenhouse gas (GHG) footprint across transport modes	Quantitative	Metric tons (t) CO <sub>2</sub> -e per ton-kilometer	■
<b>Automobiles</b>	Fuel Economy & Use-phase Emissions	Sales-weighted average passenger fleet fuel economy, by region	Quantitative	Mpg, L/km, gCO <sub>2</sub> /km, km/L	■ ■
		Number of (1) zero emission vehicles (ZEV), (2) hybrid vehicles, and (3) plug-in hybrid vehicles sold	Quantitative	Number	■ ■
		Discussion of strategy for managing fleet fuel economy and emissions risks and opportunities	Discussion and Analysis	n/a	■ ■
<b>Auto Parts</b>	Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
	Design for Fuel Efficiency	Revenue from products designed to increase fuel efficiency and/or reduce emissions	Quantitative	Reporting currency	■ ■
<b>Car Rental &amp; Leasing</b>	Fleet Fuel Economy & Utilization	Rental day-weighted average rental fleet fuel economy, by region	Quantitative	Mpg, L/km, gCO <sub>2</sub> /km, km/L	■
		Fleet utilization rate	Quantitative	Rate	■
<b>Cruise Lines</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
		(1) Total energy consumed, (2) percentage heavy fuel oil, (3) percentage onshore power supply (OPS), (4) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
		Average Energy Efficiency Design Index (EEDI) for new ships	Quantitative	Grams of CO <sub>2</sub> per ton-nautical mile	■
<b>Marine Transportation</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
		(1) Total energy consumed, (2) percentage heavy fuel oil, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
		Average Energy Efficiency Design Index (EEDI) for new ships	Quantitative	Grams of CO <sub>2</sub> per ton-nautical mile	■
<b>Rail Transportation</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
		Total fuel consumed, percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■
<b>Road Transportation</b>	Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO <sub>2</sub> -e	■
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	■
		(1) Total fuel consumed, (2) percentage natural gas, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	■

## CONCLUSION

The movement to better understand and more effectively manage climate risk in investment portfolios continues to gain momentum among a broad swath of the global investment community. In fact, 631 investors with US\$37 trillion in assets under management, have publicly called on international governments to raise their climate ambitions, suggesting that the impacts they anticipate under the current trajectory are “of great concern for investors, as global warming at that scale would have large and detrimental impacts on global economies, society, and investment portfolios, now and into the future.”<sup>49</sup> Putting a finer point on the need for actionable information, the CEO of the world’s largest asset manager—responsible for US\$7 trillion—has said climate change is causing “a fundamental reshaping of finance” and called for portfolio companies to use the TCFD recommendations and SASB Standards to guide their disclosure.<sup>50</sup>

Although climate risk is hardly new, global capital markets are still developing a practical toolkit for addressing it. Many organizations have made important contributions to this effort, and still more important work remains to be done. SASB hopes this bulletin will contribute to progress on that front.

SASB Standards are designed to help improve the effectiveness of sustainability-related financial disclosures by companies to investors in a way that is highly complementary with the TCFD recommendations. As the TCFD has noted, “for metrics and targets to be useful for investors and other users, they should be defined and calculated consistently within an industry to ensure comparability.”<sup>51</sup>

As the market’s understanding of climate risk continues to evolve, companies, investors, regulators, and policymakers will adapt, taking new approaches to understand and mitigate risks and capitalize

on opportunities. While these developments unfold, the SASB Standards will evolve alongside them. SASB engages in ongoing research and consultation with both companies and investors to ensure the SASB Standards remain decision-useful and cost-effective. This bottom-up, market-based approach is key to ensuring that SASB Standards continue to support market needs.

At the same time, SASB is committed to supporting the ongoing evolution of the broader sustainability disclosure field. This will include continued efforts to simplify the private-sector disclosure landscape, such as through our soon-to-be-formalized merger with the IIRC to form the Value Reporting Foundation. It will also involve continued collaboration with other initiatives, including our colleagues at GRI, with whom we aim to develop increasing cohesion among our frameworks and standards. And we will eagerly participate in the IFRS Foundation’s working group to accelerate progress on internationally consistent, investor-focused sustainability disclosure standards alongside TCFD, CDSB, and the World Economic Forum.

With the increasingly sophisticated tools and information that have begun to emerge, addressing climate risk in capital markets can no longer be viewed as a zero-sum game. A healthy climate and a healthy global economy can and should be mutually supportive—not an exercise in maximizing today’s financial returns at the expense of tomorrow’s. By pushing for more effective and efficient pricing of climate risks across the financial system, investors have the opportunity to create sustainable, long-term value for themselves and their portfolio companies, while building a more resilient economy for the world at large.

49 Asia Investor Group on Climate Change (AIGCC), CDP, Ceres, the Investor Group on Climate Change, the Institutional Investor Group on Climate Change (IIGCC), Principles for Responsible Investment (PRI), and UN Environment Programme Finance Initiative (UNEPFI), “Briefing Paper on the 2018 Global Investor Statement to Governments on Climate Change” (December 2018).

50 Larry Fink, BlackRock, “A Fundamental Reshaping of Finance,” open letter to CEOs (January 14, 2020).

51 Supra note 6.

## ADDITIONAL RESOURCES

Sustainability Accounting Standards Board (SASB) and Climate Disclosure Standards Board (CDSB), [TCFD Implementation Guide](#)

SASB and CDSB, [TCFD Good Practice Handbook](#)

SASB, [Implementation Supplement – Greenhouse Gas Emissions and SASB Standards](#)

SASB, [Climate Week Webinar: Accelerating Change via ESG Disclosure](#)

CDP, CDSB, Global Reporting Initiative (GRI), International Integrated Reporting Council (IIRC), SASB, [Statement of intent to work together towards comprehensive corporate reporting](#)

CDP, CDSB, GRI, IIRC, SASB, [Reporting on enterprise value: Illustrated with a prototype climate-related financial disclosure standard](#)

## APPENDIX A: MAPPING OF SASB CLIMATE FRAMEWORK TO TCFD FRAMEWORK

The following table shows how the impacts (risks and opportunities) identified by the SASB Climate Risk Framework are mapped to those of the TCFD’s corresponding framework.

TCFD Risks and Opportunities			SASB Climate Risk Bulletin		
			Physical Effects	Transition to Low-Carbon, Resilient Economy	Regulatory Risk
Risks	Transition Risk	Policy and Legal Risk			
		Technology Risk			
		Market Risk			
		Reputation Risk			
	Physical Risks	Acute Risk			
		Chronic Risk			
Opportunities		Resource Efficiency			
		Energy Source			
		Products and Services			
		Markets			
		Resilience			

# APPENDIX B: GREENHOUSE GAS EMISSIONS AND SASB STANDARDS

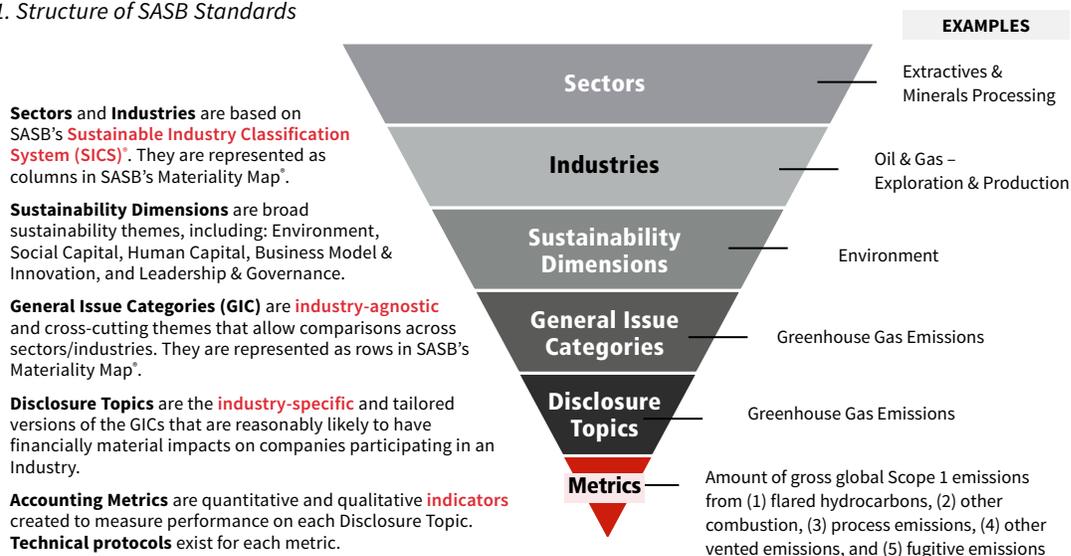
- » This appendix provides an overview of SASB’s approach to greenhouse gas (GHG) emissions and related topics in the SASB Standards.
- » Reporting entities that wish to disclose Scope 1, 2, or 3 emissions, regardless of their industry, are not precluded from doing so when using SASB Standards. Disclosure of this information may be made alongside relevant SASB disclosures. This is consistent with the guidance provided in the “Use of the Standards” section of SASB Standards, available for download at <https://www.sasb.org/standards/download/>.

## INTRODUCTION

SASB aims to facilitate more effective communication between companies and investors on the environmental, social, and governance (ESG) topics most relevant to long-term enterprise value creation. SASB’s industry-specific disclosure standards are fundamental to achieving that goal. SASB Standards identify the subset of ESG issues reasonably likely to materially impact the financial performance of the typical company in an industry. The Standards are developed using a transparent due process that is evidence-based and market-informed.

This appendix provides a practical overview of how risks and opportunities related to greenhouse gas (GHG) emissions (Scope 1, Scope 2, and Scope 3) are captured in SASB Standards, including summarizing which industry standards include topics related to Scope 1, 2, and/or 3 GHG emissions. The Methodology and Background section of this appendix provides an explanation of SASB’s standard-setting process and presents the rationale for the treatment of GHG emissions in the Standards.

Figure B1. Structure of SASB Standards



Regardless of the specific disclosures recommended by SASB Standards, SASB recognizes that certain regulatory jurisdictions require disclosure of Scope 1, 2, and 3 GHG emissions across all industries. **Use of SASB Standards does not preclude disclosure of Scope 1, 2, and 3 GHG emissions by a company in any industry, either to meet regulatory requirements or to prepare disclosures in accordance with a framework such as the Task Force on Climate-related Financial Disclosures (TCFD) recommendations.** (See “TCFD Considerations” below.)

## METHODOLOGY AND BACKGROUND: GREENHOUSE GAS EMISSIONS AND SASB STANDARDS

### The Structure and Development of SASB Standards

SASB organizes the universe of sustainability risks and opportunities that companies can face into five broad sustainability dimensions:

- » Environment,
- » Social Capital,
- » Human Capital,
- » Business Model & Innovation, and
- » Leadership & Governance.

The five sustainability dimensions, along with the 26 more granular general issue categories they contain, serve as a high-level organizing structure for the industry-specific disclosure topics included in SASB Standards. In addition to surfacing the industry-specific disclosure topics that are reasonably likely to materially impact financial performance of the typical company in an industry, SASB’s standard-setting process also identifies metrics to measure performance on each disclosure topic. The structure of SASB Standards is illustrated in Figure B1.

## TCFD CONSIDERATIONS

**In its recommendations related to Metrics & Targets, the Task Force on Climate-Related Financial Disclosures (TCFD) states that reporting entities should “disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.” Consistent with this financial materiality-based approach, SASB Standards provide a useful tool for companies wishing to disclose performance metrics, along with performance targets, on industry-specific climate-related risks and opportunities to investors as part of their TCFD-aligned reporting.**

**Specifically, SASB Standards include disclosure topics and metrics related to Scope 1 emissions in 22 of 77 industry Standards, for energy management (as a surrogate for Scope 2 emissions) in 35 of 77 industry Standards, and for drivers of other indirect emissions (commonly referred to as Scope 3 emissions) in many other industry Standards.**

**The TCFD recommends that companies in any industry disclose, where material, direct emissions in the form of Scope 1, and indirect emissions in the form of Scope 2 and Scope 3. For companies in any industry wishing to report Scope 1, 2, and 3 emissions, use of SASB Standards does not preclude disclosing this data alongside their SASB-aligned disclosures.**

**In cases in which a company determines that Scope 1, Scope 2, and/or Scope 3 emissions are not likely to be material, the company may still choose to disclose this information, as both societal and regulatory expectations around disclosure of this information are increasing. For example, asset owners and asset managers are likely to request this information from portfolio companies due to the TCFD’s recommendation that asset owners and managers report the weighted carbon intensity for each of their funds or investment strategies. Thus, many companies will be asked by their investors to report**

**Scope 1, 2, and 3 GHG emissions regardless of a materiality determination. Use of SASB Standards does not preclude disclosing this data alongside SASB-aligned disclosures.**

SASB Standards also include a technical protocol for each accounting metric, which helps companies communicate performance on each disclosure topic in a consistent, comparable, and reliable way. When the topic being measured is GHG emissions, SASB Standards specify that the metric shall be calculated according to the globally accepted methodology contained in The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (“the GHG Protocol”).<sup>52</sup>

Although direct, Scope 1 GHG emissions are included in the Environment dimension of SASB Standards, **it is important to note that certain disclosure topics related to the management and measurement of climate risk—including those related to indirect emissions—may fall under dimensions other than Environment.** For example, many climate risk-related topics are included in the Business Model & Innovation dimension of SASB Standards. SASB’s Climate Risk Technical Bulletin summarizes the climate-related disclosure topics across all 77 industry Standards.

The due process that SASB uses to determine whether a specific topic, such as GHG emissions, is reasonably likely to have financially material impacts on the typical company in an industry is described in SASB’s Conceptual Framework and Rules of Procedure. A disclosure topic is included in SASB Standards when this process reveals **evidence of financial impact** and **evidence of investor interest** through research and market consultation with both companies and investors. SASB’s initial standards development process resulted in the following outcomes (see Tables B1, B2, and B3):

- » Direct Scope 1 GHG emissions are included as a disclosure topic in 22 of 77 industry Standards;
- » Topics related to indirect, Scope 2 GHG emissions are included in 35 of 77 industry Standards; and
- » Topics related to indirect, Scope 3 GHG emissions are included in many other industry Standards.

<sup>52</sup> *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*. The World Business Council for Sustainable Development and The World Resources Institute. Accessed September 15, 2020. <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>

*Table B1. Direct Scope 1 Emissions (22 industries)*

- » Agricultural Products
- » Airlines
- » Air Freight & Logistics
- » Chemicals
- » Coal Operations
- » Construction Materials
- » Containers & Packaging
- » Cruise Lines
- » Electric Utilities & Power Generators
- » Food Retailers & Distributors
- » Iron & Steel Producers
- » Marine Transportation
- » Meat, Poultry & Dairy
- » Metals & Mining
- » Oil & Gas – Exploration & Production
- » Oil & Gas – Midstream
- » Oil & Gas – Refining & Marketing
- » Pulp & Paper Products
- » Rail Transportation
- » Road Transportation
- » Semiconductors
- » Waste Management

*Table B2. Energy Management as a Surrogate for Indirect Scope 2 Emissions (35 industries)*

- » Aerospace & Defense
- » Agricultural Products
- » Alcoholic Beverages
- » Auto Parts
- » Building Products & Furnishings
- » Casinos & Gaming
- » Chemicals
- » Construction Materials
- » Containers & Packaging
- » Cruise Lines
- » Drug Retailers
- » E-Commerce
- » Electrical & Electronic Equipment
- » Food Retailers & Distributors
- » Fuel Cells & Industrial Batteries
- » Health Care Delivery
- » Hotels & Lodging
- » Industrial Machinery & Goods
- » Internet Media & Services
- » Iron & Steel Producers
- » Leisure Facilities
- » Marine Transportation
- » Meat, Poultry & Dairy
- » Metals & Mining
- » Multiline and Specialty Retailers & Distributors
- » Non-Alcoholic Beverages
- » Processed Foods
- » Pulp & Paper Products
- » Real Estate
- » Restaurants Semiconductors
- » Software & IT Services
- » Solar Technology & Project Developers
- » Telecommunication Services
- » Water Utilities & Services

*Table B3. Disclosure Topics Related to Indirect Scope 3 Emissions*

Industry	Topic
Aerospace & Defense	Fuel Economy & Emissions in Use-phase
Air Freight & Logistics	Supply Chain Management
Alcoholic Beverages	Packaging Lifecycle Management
Appliance Manufacturing	Product Lifecycle Environmental Impacts
Automobiles	Fuel Economy & Use-phase Emissions
Auto Parts	Design for Fuel Efficiency
Biofuels	Lifecycle Emissions Balance
Building Products & Furnishings	Product Lifecycle Environmental Impacts
Car Rental & Leasing	Fleet Fuel Economy & Utilization
Chemicals	Product Design for Use-phase Efficiency
Construction Materials	Product Innovation
Containers & Packaging	Product Lifecycle Management
E-Commerce	Product Packaging & Distribution
Electrical & Electronic Equipment	Product Lifecycle Management
Engineering & Construction Services	Lifecycle Impacts of Buildings & Infrastructure
Food Retailers & Distributors	Management of Environmental & Social Impacts in the Supply Chain
Fuel Cells & Industrial Batteries	Product Efficiency

Industry	Topic
Hardware	Product Lifecycle Management
Health Care Distributors	Product Lifecycle Management
Household & Personal Products	Packaging Lifecycle Management
Industrial Machinery & Goods	Fuel Economy & Emissions in Use-phase
Medical Equipment & Supplies	Product Design & Lifecycle Management
Multiline and Specialty Retailers & Distributors	Product Sourcing, Packaging & Marketing
Non-Alcoholic Beverages	Packaging Lifecycle Management
Oil & Gas – Refining & Marketing	Product Specifications & Clean Fuel Blends
Processed Foods	Packaging Lifecycle Management
Pulp & Paper Products	Supply Chain Management
Real Estate	Management of Tenant Sustainability Impacts
Real Estate Services	Sustainability Services
Semiconductors	Product Lifecycle Management

### Direct Emissions in SASB Standards

Direct GHG emissions are those emitted from sources owned or controlled by the disclosing entity. SASB Standards reference the GHG Protocol to define direct emissions, which are referred to in the protocol as Scope 1 emissions.

The 22 industry Standards that include a GHG emissions disclosure topic (see Table B1) also include an accounting metric for the reporting entity’s gross global Scope 1 emissions. In certain Standards, SASB also recommends the disclosure of additional industry-specific performance data or analysis associated with these emissions, where such disclosure enhances the representativeness of the entity’s performance on the topic as well as the decision-usefulness of the information. Such additional recommended disclosures include, for example:

- » the disclosure of the percentage of Scope 1 emissions emitted in areas that are subject to emissions-limiting or emissions-reporting regulation;
- » the percentage of Scope 1 emissions associated with the emission of methane in certain Oil & Gas industries; and
- » the percentage of Scope 1 emissions associated with perfluorinated compounds in the Semiconductors industry.

Such additional industry-specific measures were included in the Standards where evidence and market feedback suggested this information would enhance investor understanding and assessment of how effectively a company is managing the risks and financial impacts associated with direct GHG emissions.

### Indirect Emissions in SASB Standards

Indirect GHG emissions are those emitted from sources not owned or controlled by the disclosing entity, but that are emitted as a consequence of the activities of the reporting entity. These may include energy directly purchased by the reporting entity (classified as Scope 2 emissions in the GHG Protocol)—for example in the form of electricity or heat—as well as other indirect emissions associated

with production activities, transportation, and/or the use of products and services provided by the reporting entity (categorized as Scope 3 emissions in the GHG Protocol).

One of the principles that guides SASB’s selection of disclosure topics is the idea that the topic must be “actionable” by companies—in other words, it must fall under the direct control or influence of the entity.<sup>53</sup> To this end, SASB Standards aim to identify disclosure topics that link directly to operational or strategic decisions made by a company.

**Thus, for the purposes of disclosure, SASB accounts for indirect emissions by capturing operational and/or strategic factors that give rise to such emissions. These factors are the actionable “levers” that company management is likely to pull to reduce Scope 2 and 3 emissions. Reporting on these “levers” enables investors to evaluate whether a company is adapting its business operations and strategy to mitigate climate-related risks, realize climate-related opportunities, and enable achievement of society’s GHG emission targets.**

The primary SASB general issue categories associated with management of Scope 2 and 3 GHG emissions are as follows:

#### *SASB General Issue Categories Related to Scope 2 Emissions*

- » *Energy Management* – addresses environmental impacts associated with energy consumption

#### *SASB General Issue Categories Related to Scope 3 Emissions*

- » *Product Design & Lifecycle Management* – addresses incorporation of environmental, social, and governance (ESG) considerations in characteristics of products and services provided or sold by the reporting entity

<sup>53</sup> SASB, *Conceptual Framework* (February 2017); note that SASB is updating its *Conceptual Framework* at the time of this publication, however the concept of “actionability” has not been substantively altered in the exposure draft that is currently open for public comment.

- » *Supply Chain Management* – addresses management of ESG risks within a reporting entity’s supply chain
- » *Materials Sourcing & Efficiency* – addresses issues related to the resilience of materials supply chains to impacts of climate change and other external environmental and social factors

### Energy Management as a Surrogate for Scope 2 Emissions

SASB Standards refer to one or more metrics to capture information about the energy consumed by the reporting entity as a surrogate for Scope 2 emissions in 35 of 77 industries. (See Table B2.)

The decision to use energy management as a surrogate for Scope 2 emissions was based on research and market input during SASB’s initial standards development process. Specifically, companies in certain energy-intensive industries do not typically face direct financial risks associated with their Scope 2 emissions. However, companies in energy-intensive industries do face direct financial risks related to their energy consumption and the energy mix thereof. As a result, energy management-related metrics provide companies and investors with information to support decision making that both (a) helps manage the direct financial risks they face and (b) influences upstream emissions.

With respect to energy consumption, emissions-limiting regulations impacting **energy producers** (direct greenhouse gas emitters) may result in financial impacts for **energy users** if such costs are passed through to **energy users**. For example, the direct risk of emissions-limiting regulation for **energy producers** is captured in the SASB Standard for Electrical Utilities & Power Generators, which includes a metric for direct, Scope 1 emissions. This risk may be passed through to **energy users** in the form of additional expenses when purchasing energy from **energy producers**. As such, in energy-intensive industries, SASB includes a disclosure topic for energy management and associated metrics describing a company’s energy usage.

Energy usage, and potential increases in the cost of energy due to regulation of energy producers, therefore represents an important financial risk for companies that are significant users of energy. In these industries, SASB recommends that companies disclose their total energy usage, the percentage of such energy that is purchased (representing Scope 2 emissions), and finally a breakdown of energy usage by source. Such information provides investors with a comprehensive view of a company’s management of the financial risks posed by indirect emissions, along with demonstrating a company’s contribution toward mitigating indirect emissions by managing its energy use and mix.

### Other Indirect (Scope 3) Emissions

Similarly, rather than calling for Scope 3 emissions disclosure—which relates to issues beyond the control of reporting entities—SASB calls for the disclosure of industry-specific metrics related to the direct risks and opportunities companies face which drive Scope 3 emissions both up and down the value chain. Such disclosures are intended to help investors identify companies that are well-positioned to meet evolving and increasingly stringent energy efficiency standards, to capture growing demand for energy-efficient products,

and/or to enable or incentivize upstream emissions reduction. Such disclosures help investors evaluate whether a company is adapting its business strategy to manage climate-related risk, realize climate-related opportunities, and influence Scope 3 emissions across the value chain.

For example, by measuring and managing the fuel economy of their fleet and their progress in bringing zero- or low-emission vehicles to market, automakers can simultaneously comply with evolving regulation, capture share of a growing market, and influence Scope 3 emissions both upstream in their supply chain and downstream in the use phase. Alternatively, e-commerce companies can employ strategies to reduce the environmental impacts of packaging and optimize deliveries to reduce the GHG emission footprint of product shipments. As these examples demonstrate, SASB Standards are designed to capture key business decisions made by companies that have a significant impact on upstream or downstream emissions.

A more in-depth discussion of the industry-specific ways in which SASB Standards account for indirect emissions is available in earlier sections of this *Climate Risk Technical Bulletin*.

### Future SASB Research

SASB’s initial Standards were developed through extensive research and market consultation, and the Standards were released for use in November 2018. Just as financial accounting standards continue to evolve to serve the needs of capital market participants, SASB Standards must similarly adapt in response to emerging evidence supporting the financial materiality of sustainability issues and the risks and opportunities they may create within each industry. In order to evolve SASB Standards over time, SASB has adopted a project-based model to pursue revisions to its standards, as described in SASB’s *Rules of Procedure*.<sup>54</sup>

Climate research continues to develop, including a growing body of quantitative research regarding the economic impacts of climate change and the implications for specific industries and regions. At the same time, corporate disclosure on climate-related issues is rapidly evolving in response to increasing interest from investors and regulators and the evolution of standards and frameworks designed to facilitate decision-useful disclosure—including those of TCFD, SASB, and CDSB. Accordingly, accounting for climate-related risks and opportunities across SASB Standards will necessarily continue to adapt as well. SASB welcomes feedback from companies and investors on their experience implementing and using SASB Standards to disclose and inform decision making regarding climate-related risks and opportunities. Visit <https://www.sasb.org/standards/feedback/>.

<sup>54</sup> SASB, *Rules of Procedure* (February 2017); note that SASB is updating its *Rules of Procedure* at the time of this publication; use of a project-based model for standards updates is described in both the current version as well as the exposure draft that is currently open for public comment.



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