SUSTAINABILITY ACCOUNTING STANDARD
RENEWABLE RESOURCES & ALTERNATIVE ENERGY SECTOR

BIOFUELS

Sustainability Accounting Standard

Sustainable Industry Classification System™ (SICS™) #RR0101

Prepared by the
Sustainability Accounting Standards Board®

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Provisional Standard

BIOFUELS

Sustainability Accounting Standard

About SASB

The Sustainability Accounting Standards Board (SASB) provides sustainability accounting standards for use by publicly-listed corporations in the U.S. in disclosing material sustainability information for the benefit of investors and the public. SASB standards are designed for disclosure in mandatory filings to the Securities and Exchange Commission (SEC), such as the Form 10-K and 20-F. SASB is an independent 501(c)3 non-profit organization. Through 2016, SASB is developing standards for 79 industries in 10 sectors.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

Table of Contents

INTRODUCTION

Purpose & Structure

This document contains the SASB Sustainability Accounting Standard (SASB Standard) for the Biofuels industry.

SASB Sustainability Accounting Standards are comprised of **(1) disclosure guidance and (2) accounting standards on sustainability topics** for use by U.S. and foreign public companies in their annual filings (Form 10-K or 20-F) with the U.S. Securities and Exchange Commission (SEC). To the extent relevant, SASB Standards may also be applicable to other periodic mandatory filings with the SEC, such as the Form 10-Q, Form S-1, and Form 8-K.

SASB Standards identify sustainability topics at an industry level, which may constitute material information—depending on a company's specific operating context—for a company within that industry. SASB Standards are intended to provide guidance to company management, which is ultimately responsible for determining which information is material and should therefore be included in its Form 10-K or 20-F and other periodic SEC filings.

SASB Standards provide companies with standardized sustainability metrics designed to communicate performance on industry level sustainability topics. When making disclosure on sustainability topics, companies can use SASB Standards to help ensure that disclosure is standardized and therefore decision-useful, relevant, comparable, and complete.

SASB Standards are intended to constitute "suitable criteria" as defined by AT 101.23—.32[1] and referenced in AT 701[2], as having the following attributes:

- *Objectivity*—Criteria should be free from bias.
- *Measurability*—Criteria should permit reasonably consistent measurements, qualitative or quantitative, of subject matter.
- *Completeness*—Criteria should be sufficiently complete so that those relevant factors that would alter a conclusion about subject matter are not omitted.
- *Relevance*—Criteria should be relevant to the subject matter.

Industry Description

The Biofuels industry consists of companies that produce biofuels, such as ethanol and biodiesel, and process the raw materials for production. Biofuels are made from plant- or animal-based organic materials and are used primarily as transportation fuels. Companies typically source feedstocks, which include food and oil crops, from agricultural product distributors. Ethanol and biodiesel are the most widely produced biofuels. Other types are biogas, biohydrogen, and synthetic biofuels. First-generation biofuels are those derived from a variety of edible or non-edible fuel crops and are made through common fermentation, distillation, and esterification technologies. Second-generation biofuels are made from non-edible crops or the non-edible parts of food crops or other plant material, called cellulosic feedstocks, and may require more sophisticated production methods. Third-generation

[1] http://pcaobus.org/Standards/Attestation/Pages/AT101.aspx#at_101_fn7
[2] http://pcaobus.org/Standards/Attestation/Pages/AT701.aspx

biofuels, a nascent market, are produced using algae and advanced technologies. Second- and third-generation biofuels are commonly referred to as advanced biofuels. Biofuels companies' customers are chiefly fuel-blending and fuel-supply companies, including major integrated oil companies. While biofuels are produced worldwide, the publicly listed companies in the Biofuels industry operate primarily in the U.S., though some have operations abroad, notably in India, Brazil, and South Korea.

Guidance for Disclosure of Sustainability Topics in SEC Filings

1. Industry-Level Sustainability Topics

For the Biofuels industry, SASB has identified the following sustainability disclosure topics:

- Air Quality
- Water Management in Manufacturing
- Product Formulation & Impacts on Food Markets
- Lifecycle Emissions Balance
- Management of the Legal & Regulatory Environment
- Operational Safety, Emergency Preparedness, and Response
- Sourcing & Environmental Impacts of Feedstock Production

2. Company-Level Determination and Disclosure of Material Sustainability Topics

Sustainability disclosures are governed by the same laws and regulations that govern disclosures by securities issuers generally. According to the U.S. Supreme Court, a fact is material if, in the event such fact is omitted from a particular disclosure, there is "a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of the information made available."[3,4]

SASB has attempted to identify those sustainability topics that are reasonably likely to have a material effect on the financial condition or operating performance of companies within each SICS industry. SASB recognizes, however, that each company is ultimately responsible for determining what information should be disclosed within the context of Regulation S-K and other guidance.

Regulation S-K, which sets forth certain disclosure requirements associated with Form 10-K and other SEC filings, requires companies, among other things, to describe in the Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) section of Form 10-K "any known trends or uncertainties that have had or that the registrant reasonably expects will have a material favorable or unfavorable impact on net sales or revenues or income from continuing operations. If the registrant knows of events that will cause a material change in the relationship between costs and revenues (such as known future increases in costs of labor or materials or price increases or inventory adjustments), the change in the relationship shall be disclosed."

[3] TSC Industries v. Northway, Inc., 426 U.S. 438 (1976).
[4] C.F.R. 229.303(Item 303)(a)(3)(ii).

Furthermore, Instructions to Item 303 state that the MD&A "shall focus specifically on material events and uncertainties known to management that would cause reported financial information not to be necessarily indicative of future operating results or of future financial condition."[2]

The SEC has provided guidance for companies to use in determining whether a trend or uncertainty should be disclosed. The two-part assessment prescribed by the SEC, based on probability and magnitude, can be applied to the topics included within this standard:

- First, a company is not required to make disclosure about a known trend or uncertainty if its management determines that such trend or uncertainty is not reasonably likely to occur.

- Second, if a company's management cannot make a reasonable determination of the likelihood of an event or uncertainty, then disclosure is required unless management determines that a material effect on the registrant's financial condition or results of operation is not reasonably likely to occur.

3. Sustainability Accounting Standard Disclosures in Form 10-K

a. Management's Discussion and Analysis

For purposes of comparability and usability, companies should consider making disclosure on sustainability topics in the MD&A, in a sub-section titled **"Sustainability Accounting Standards Disclosures."**[5]

b. Other Relevant Sections of Form 10-K

In addition to the MD&A section, it may be relevant for companies to disclose sustainability information in other sections of Form 10-K, including, but not limited to:

- **Description of business**—Item 101 of Regulation S-K requires a company to provide a description of its business and its subsidiaries. Item 101(c)(1)(xii) expressly requires disclosure regarding certain costs of complying with environmental laws:

Appropriate disclosure also shall be made as to the material effects that compliance with Federal, State and local provisions which have been enacted or adopted regulating the discharge of materials into the environment, or otherwise relating to the protection of the environment, may have upon the capital expenditures, earnings and competitive position of the registrant and its subsidiaries.

- **Legal proceedings**—Item 103 of Regulation S-K requires companies to describe briefly any material pending or contemplated legal proceedings. Instructions to Item 103 provide specific disclosure requirements for administrative or judicial proceedings arising from laws and

[5] SEC [Release Nos. 33-8056; 34-45321; FR-61] Commission Statement about Management's Discussion and Analysis of Financial Condition and Results of Operations: "We also want to remind registrants that disclosure must be both useful and understandable. That is, management should provide the most relevant information and provide it using language and formats that investors can be expected to understand. Registrants should be aware also that investors will often find information relating to a particular matter more meaningful if it is disclosed in a single location, rather than presented in a fragmented manner throughout the filing."

regulations that target discharge of materials into the environment or that are primarily for the purpose of protecting the environment.

- **Risk factors**—Item 503(c) of Regulation S-K requires filing companies to provide a discussion of the most significant factors that make an investment in the registrant speculative or risky, clearly stating the risk and specifying how a particular risk affects the particular filing company.

c. Rule 12b-20

Securities Act Rule 408 and Exchange Act Rule 12b-20 require a registrant to disclose, in addition to the information expressly required by law or regulation, "such further material information, if any, as may be necessary to make the required statements, in light of the circumstances under which they are made, not misleading."

More detailed guidance on disclosure of material sustainability topics can be found in the **SASB Conceptual Framework**, available for download via http://www.sasb.org/approach/conceptual-framework/.

Guidance on Accounting for Sustainability Topics

For each sustainability topic included in the Biofuels industry Sustainability Accounting Standard, SASB identifies accounting metrics.

SASB recommends that each company consider using these sustainability accounting metrics when preparing disclosures on the sustainability topics identified herein.

As appropriate—and consistent with Rule 12b-20[6]—when disclosing a sustainability topic identified by this Standard, companies should consider including a narrative description of any material factors necessary to ensure completeness, accuracy, and comparability of the data reported. Where not addressed by the specific accounting metrics, but relevant, the registrant should discuss the following, related to the topic:

- The registrant's **strategic approach** to managing performance on material sustainability issues;
- The registrant's **relative performance** with respect to its peers;
- The **degree of control** the registrant has;
- Any **measures the registrant has undertaken** or **plans to undertake** to improve performance; and
- Data for the registrant's **last three completed fiscal years** (when available).

SASB recommends that registrants use SASB Standards specific to their primary industry as identified in the Sustainable Industry Classification System (SICS™). If a registrant generates significant revenue from multiple

[6] SEC Rule 12b-20: "In addition to the information expressly required to be included in a statement or report, there shall be added such further material information, if any, as may be necessary to make the required statements, in the light of the circumstances under which they are made, not misleading."

industries, SASB recommends that it also consider sustainability topics that SASB has identified for those industries and disclose the associated SASB accounting metrics.

In disclosing to SASB Standards, it is expected that registrants disclose with the same level of rigor, accuracy, and responsibility as they apply to all other information contained in their SEC filings.

Users of the SASB Standards

The SASB Standards are intended to provide guidance for companies that engage in public offerings of securities registered under the Securities Act of 1933 (the Securities Act) and those that issue securities registered under the Securities Exchange Act of 1934 (the Exchange Act),[7] for use in SEC filings, including, without limitation, annual reports on Form 10-K (Form 20-F for foreign issuers), quarterly reports on Form 10-Q, current reports on Form 8-K, and registration statements on Forms S-1 and S-3. Disclosure with respect to the SASB Standards is not required or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Scope of Disclosure

Unless otherwise specified, SASB recommends:

- That a registrant disclose on sustainability issues and metrics for itself and for entities that are consolidated for financial reporting purposes as defined by accounting principles generally accepted in the United States for consistency with other accompanying information within SEC filings;[8]

- That for consolidated entities, disclosures be made, and accounting metrics calculated, for the whole entity, regardless of the size of the minority interest; and

- That information from unconsolidated entities not be included in the computation of SASB accounting metrics. A registrant should disclose, however, information about unconsolidated entities to the extent that the registrant considers the information necessary for investors to understand the effect of sustainability topics on the company's financial condition or operating performance (typically, this disclosure would be limited to risks and opportunities associated with these entities).

[7] Registration under the Securities Exchange Act of 1934 is required (1) for securities to be listed on a national securities exchange such as the New York Stock Exchange, the NYSE Amex, and the NASDAQ Stock Market or (2) if (A) the securities are equity securities and are held by more than 2,000 persons (or 500 persons who are not accredited investors) and (B) the company has more than $10 million in assets.

[8] See US GAAP consolidation rules (Section 810).

Reporting Format

Use of Financial Data

In instances where accounting metrics, activity metrics, and technical protocols in this standard incorporate financial data (e.g., revenues, cost of sales, expenses recorded and disclosed for fines, etc.), such financial data shall be prepared in accordance with the accounting principles generally accepted in the United States of America ("US GAAP") and be consistent with the corresponding financial data reported within the registrant's SEC filings. Should accounting metrics, activity metrics and technical protocols in this standard incorporate disclosure of financial data that is not prepared in accordance with US GAAP, the registrant shall disclose such information in accordance with the SEC Regulation G.

Activity Metrics and Normalization

SASB recognizes that normalizing accounting metrics is important for the analysis of SASB disclosures.

SASB recommends that a registrant disclose any basic business data that may assist in the accurate evaluation and comparability of disclosure, to the extent that they are not already disclosed in the Form 10-K (e.g., revenue, EBITDA, etc.).

Such data—termed "activity metrics"—may include high-level business data such as total number of employees, quantity of products produced or services provided, number of facilities, or number of customers. It may also include industry-specific data such as plant capacity utilization (e.g., for specialty chemical companies), number of transactions (e.g., for Internet media and services companies), hospital bed days (e.g., for health care delivery companies), or proven and probable reserves (e.g., for oil and gas exploration and production companies).

Activity metrics disclosed should:

- Convey contextual information that would not otherwise be apparent from SASB accounting metrics.
- Be deemed generally useful for an investor relying on SASB accounting metrics in performing their own calculations and creating their own ratios.
- Be explained and consistently disclosed from period to period to the extent they continue to be relevant. However, a decision to make a voluntary disclosure in one period does not obligate a continuation of that disclosure if it is no longer relevant or if a better metric becomes available.[9]

Where relevant, SASB recommends specific activity metrics that—at a minimum—should accompany SASB accounting metric disclosures.

[9] *Improving Business Reporting: Insights into Enhancing Voluntary Disclosures*, FASB Business Reporting Research Project, January 29, 2001.

ACTIVITY METRIC	CATEGORY	UNIT OF MEASURE	CODE
Biofuel production capacity	Quantitative	Millions of gallons (gal)	RR0101-A
Production of (1) Renewable fuel, (2) Advanced biofuel, (3) Biomass-based diesel, (4) Cellulosic biofuel [10]	Quantitative	Millions of gallons (gal)	RR0101-B
Amount of feedstock consumed in production[11]	Quantitative	Metric tons (t)	RR0101-C

Units of Measure

Unless specified, disclosures should be reported in International System of Units (SI units).

Uncertainty

SASB recognizes that there may be inherent uncertainty when disclosing certain sustainability data and information. This may be related to variables such as the reliance on data from third-party reporting systems and technologies, or the unpredictable nature of climate events. Where uncertainty around a particular disclosure exists, SASB recommends that the registrant should consider discussing its nature and likelihood.

Estimates

SASB recognizes that scientifically based estimates, such as the reliance on certain conversion factors or the exclusion of *de minimis* values, may occur for certain quantitative disclosures. Where appropriate, SASB does not discourage the use of such estimates. When using an estimate for a particular disclosure, SASB expects that the registrant discuss its nature and substantiate its basis.

Timing

Unless otherwise specified, disclosure shall be for the registrant's fiscal year.

Limitations

There is no guarantee that SASB Standards address all sustainability impacts or opportunities associated with a sector, industry, or company, and therefore, a company must determine for itself the topics—sustainability-related or otherwise—that warrant discussion in its SEC filings.

Disclosure under SASB Standards is voluntary. It is not intended to replace any legal or regulatory requirements that may be applicable to user operations. Where such laws or regulations address legal or regulatory topics, disclosure under SASB Standards is not meant to supersede those requirements. Disclosure according to SASB Standards shall not be construed as demonstration of compliance with any law, regulation, or other requirement.

[10] Note to **RR0101-B**—Biofuel categories are defined in CFR §80.14, Title 40—Regulation of Fuels and Fuel Additives, Subpart M—Renewable Fuel Standard.
[11] Note to **RR0101-C**—The amount of feedstock consumed in production is defined as feedstock purchases adjusted for changes in inventory throughout the fiscal year.

SASB Standards are intended to be aligned with the principles of materiality enforced by the SEC. However, SASB is not affiliated with or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Forward-Looking Statements

Disclosures on sustainability topics can involve discussion of future trends and uncertainties related to the registrant's operations and financial condition, including those influenced by external variables (e.g., environmental, social, regulatory, and political). Companies making such disclosures should familiarize themselves with the safe harbor provisions of Section 27A of the Securities Act and Section 21E of the Exchange Act, which preclude civil liability for material misstatements or omissions in such statements if the registrant takes certain steps, including, among other things, identifying the disclosure as "forward-looking" and accompanying such disclosure with "meaningful cautionary statements identifying important factors that could cause actual results to differ materially from those in the forward-looking statements."

The following sections contain the disclosure guidance associated with each accounting metric such as guidance on definitions, scope, accounting, compilation, and presentation.

The term "shall" is used throughout this document to indicate those elements that reflect requirements of the Standard. The terms "should" and "may" are used to indicate guidance, which, although not required, provides a recommended means of disclosure.

Table 1. Sustainability Disclosure Topics & Accounting Metrics

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Air Quality	Air emissions for the following pollutants: NO_x (excluding N_2O), SO_x, volatile organic compounds (VOCs), particulate matter (PM), and hazardous air pollutants (HAPs)	Quantitative	Metric tons (t)	RR0101-01
	Number of incidents of non-compliance with air quality permits, standards, and regulations	Quantitative	Number	RR0101-02
Water Management in Manufacturing	(1) Total water withdrawn and (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Cubic meters (m^3), Percentage (%)	RR0101-03
	Discussion of water management risks and description of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	RR0101-04
	Number of incidents of non-compliance with water quality permits, standards, and regulations	Quantitative	Number	RR0101-05
Product Formulation & Impacts on Food Markets	Top five feedstocks used for biofuels production, by weight[12]	Quantitative	Metric tons (t)	RR0101-06
	Percentage of feedstock grown in food-insecure countries	Quantitative	Percentage (%) by weight	RR0101-07
Lifecycle Emissions Balance	Lifecycle greenhouse gas (GHG) emissions, by biofuel type	Quantitative	Grams of CO_2-e per megajoule (MJ)	RR0101-08
Management of the Legal & Regulatory Environment	Amount of subsidies received through government programs	Quantitative	U.S. Dollars ($)	RR0101-09
	Discussion of positions on the regulatory and political environment related to environmental and social factors and description of efforts to manage risks and opportunities presented	Discussion and Analysis	n/a	RR0101-10

[12] Note to **RR0101-06**—The registrant shall discuss risks associated with the use of food crop feedstocks and feedstocks grown on arable lands.

Table 1. Sustainability Disclosure Topics & Accounting Metrics (cont.)

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Operational Safety, Emergency Preparedness, and Response	Process Safety Incidents Count (PSIC), Process Safety Total Incident Rate (PSTIR), and Process Safety Incident Severity Rate (PSISR)[13]	Quantitative	Number, Rate	RR0101-11
Sourcing & Environmental Impacts of Feedstock Production	Description of strategy to manage risks associated with environmental impacts of feedstock production	Discussion and Analysis	n/a	RR0101-12
	Percentage of biofuel production third-party certified to an environmental sustainability standard	Quantitative	Percentage (%) of gallons	RR0101-13

[13] Note to **RR0101-11**—The registrant shall describe incidents with a severity rating of 1 or 2, including their root cause, outcomes, and corrective actions implemented in response (e.g., technology improvements, operator training, etc.).

Air Quality

Description

Biofuels refineries generate air emissions—including hazardous air pollutants, criteria air pollutants, and volatile organic compounds—that can cause adverse human health and environmental impacts. Some primary substances of concern include particulate matter, nitrogen oxides, carbon monoxide, and sulfur dioxide. Emissions can come from grain-handling equipment, boilers, wastewater treatment, and units for cooling, drying, distillation, and fermentation. Companies that violate emissions standards can face regulatory compliance costs and penalties, as well as higher operating and capital expenditures for emissions-abatement technologies and process improvements. Companies could also face permit restrictions or delays from state and local agencies if their facilities do not meet emissions standards.

Accounting Metrics

RR0101-01. Air emissions for the following pollutants: NO_x (excluding N_2O), SO_x, volatile organic compounds (VOCs), particulate matter (PM), and hazardous air pollutants (HAPs)

.01 The registrant shall disclose its emissions of air pollutants (in metric tons) that are released to the atmosphere as a result of its activities:

- Direct air emissions from stationary or mobile sources that include, but are not limited to, production facilities, office buildings, marine vessels transporting products, and truck fleets.

.02 The registrant shall disclose emissions released to the atmosphere by emissions type. Substances include:

- Oxides of nitrogen (including NO and NO_2 and excluding N_2O), reported as NO_x.
- Oxides of sulfur (SO_2 and SO_3), reported as SO_x.
- Nonmethane volatile organic compounds (VOCs), defined as any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and methane, that participates in atmospheric photochemical reactions, except those designated by the U.S. Environmental Protection Agency (EPA) as having negligible photochemical reactivity.
    - Where regional and national definitions supersede EPA regulations, such as EC Directive 1999/13/EC and Schedule 1 of the Canadian Environmental Protection Act 1999, the registrant may refer to the relevant regulations on VOCs.
- Particulate matter (PM), reported as the sum of PM_{10} and $PM_{2.5}$, or all particulates less than 10 micrometers in diameter.
- Hazardous air pollutants (HAPs), defined by the EPA as those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects, which are listed here.

.03 This scope does not include CO_2, CH_4, and N_2O.

.04 Air emissions data shall be consolidated according to the approach with which the registrant consolidates its financial reporting data.

.05 The registrant should discuss the calculation methodology for its emissions disclosure, such as whether data are from continuous emissions monitoring systems (CEMS), engineering calculations, mass balance calculations, etc.

RR0101-02. Number of incidents of non-compliance with air quality permits, standards, and regulations

.06 The registrant shall disclose the total number of instances of non-compliance, including violations of a technology-based standard and exceedances of a quality-based standard.

.07 The scope of disclosure includes incidents governed by federal, state, and local statutory permits and regulations including, but not limited to, the Clean Air Act and other state or local air quality legislation.

.08 An incident of non-compliance shall be disclosed regardless of whether it resulted in an enforcement action (e.g., fine, warning letter, etc.).

.09 Violations, regardless of their measurement methodology or frequency, shall be disclosed. These include:

- For continuous emissions, limitations, standards, and prohibitions that are generally expressed as maximum daily, weekly, and monthly averages.
- For non-continuous emissions, limitations that are generally expressed in terms of frequency, total mass, maximum rate of discharge, and mass or concentrations of specified pollutants.
- False or inaccurate reporting.
- Failure to obtain permits.

Water Management in Manufacturing

Description

Biofuel refining is water-intensive. Biorefineries require water for feedstock processing and washing, fermentation, distillation, and cooling. Although water use at biorefineries is modest relative to the quantities consumed during feedstock crop production, it is concentrated and thus may have substantial impacts on local water resources. Facilities may also generate wastewater contaminated with salts, organic compounds, dissolved solids, phosphorus, and chlorine, all of which, if not properly treated, can affect water quality and aquatic life. Depending on their location, biofuel refineries may be exposed to the risk of reduced water availability and related cost increases or operational disruption, as water is becoming a scarce resource worldwide. Furthermore, companies that use a significant amount of water in manufacturing could also face permit restrictions and delays from state and local agencies. Extraction of water from sensitive areas for the purposes of refining, as well as contamination of water supplies due to refining operations, could also create tensions with local communities if these operations add stress to the local water supply. Water efficiency in operations and the proper treatment of effluents are therefore important factors for the financial performance of biofuels companies.

Accounting Metrics

RR0101-03. (1) Total water withdrawn and (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress

.10 The registrant shall disclose the amount of water (in thousands of cubic meters) that was withdrawn from all sources, where:

- Water sources include surface water (including water from wetlands, rivers, lakes, and oceans), groundwater, rainwater collected directly and stored by the organization, wastewater obtained from other entities, municipal water supplies, or other water utilities.
- Disclosure corresponds to CDP Water Questionnaire W1.2a.

.11 The registrant may choose to disclose the portion of its supply by source if, for example, significant portions of withdrawals are from non-freshwater sources, where:

- Fresh water may be defined according to the local statutes and regulations where the registrant operates. Where there is no regulatory definition, fresh water shall be considered to be water that has a solids (TDS) concentration of less than 1000 mg/l per the Water Quality Association definition.
- Water obtained from a water utility in compliance with U.S. National Primary Drinking Water Regulations can be assumed to meet the definition of fresh water.

.12 The registrant shall disclose the amount of water (in thousands of cubic meters) that was consumed in its operations, where water consumption is defined as:

- Water that evaporates during withdrawal, usage, and discharge;
- Water that is directly or indirectly incorporated into the product or service; and
- Water that does not otherwise return to the same catchment area from which it was withdrawn, such as water returned to another catchment area or the sea.
- Disclosure corresponds to CDP Water Questionnaire W1.2c.

.13 The registrant shall analyze all of its operations for water risks and identify activities that withdraw and consume water in locations with High (40–80%) or Extremely High (>80%) Baseline Water Stress as classified by the World Resources Institute's (WRI) Water Risk Atlas tool, Aqueduct (publicly available online here).

.14 The registrant shall disclose its water withdrawn in locations with High or Extremely High Baseline Water Stress as a percentage of the total water withdrawn.

.15 The registrant shall disclose its water consumed in locations with High or Extremely High Baseline Water Stress as a percentage of the total water consumed.

RR0101-04. Discussion of water management risks and description of strategies and practices to mitigate those risks

.16 The registrant shall discuss its risks associated with water withdrawals, water consumption, and discharge of water to the environment and describe how it manages these risks.

- Disclosure corresponds to CDP Water Questionnaire W3.1 and W3.2c.

.17 The registrant shall discuss, where applicable, risks to the availability of adequate, clean water resources.

- Relevant information to provide includes, but is not limited to:
  - Environmental constraints, such as operating in water-stressed regions, drought, interannual or seasonal variability, and risks due to the impact of climate change.
  - External constraints, such as volatility in water costs, stakeholder perceptions and concerns related to water withdrawals (e.g., those from local communities, non-governmental organizations, and regulatory agencies), direct competition with and impact from the actions of other users (commercial and municipal), restrictions to withdrawals due to regulations, and constraints on the registrant's ability to obtain and retain water rights or permits.
  - How risks may vary by withdrawal source, including wetlands, rivers, lakes, oceans, groundwater, rainwater, municipal water supplies, or supply from other water utilities.

.18 The registrant shall discuss, where applicable, risks associated with its discharge of wastewater.

- Relevant information to provide includes, but is not limited to:
  - Environmental constraints, such as the ability to maintain compliance with regulations focused on the quality of effluent discharged to the environment, the ability to eliminate existing and emerging pollutants of concern, and the ability to maintain control over runoff and storm water discharges.
  - External constraints, such as increased liability and/or reputational risks, restrictions to discharges and/or increased operating costs due to regulation, stakeholder perceptions and concerns related to water discharges (e.g., those from local communities, non-governmental organizations, and regulatory agencies), and the ability to obtain discharge rights or permits.
  - How risks may vary by discharges to different destinations, including wetlands, rivers, lakes, oceans, groundwater, rainwater, municipal water supplies, or other water utilities.

.19 The registrant should include a discussion of the potential impacts that these risks may have on its operations and the timeline over which such risks are expected to manifest.

- Impacts may include, but are not limited to, those associated with costs, revenues, liabilities, continuity of operations, and reputation.

.20 The registrant shall provide a description of its short-term and long-term strategy or plan to manage these risks, including the following, where relevant:

- Any water management targets it has set, and an analysis of performance against those targets.
  - Water management targets can include water management goals that the registrant prioritizes to manage its risks and opportunities associated with water withdrawal, consumption, or discharge.
  - Targets can include, but are not limited to, those associated with reducing water withdrawals, reducing water consumption, reducing water discharges, and improving the quality of wastewater discharges.
- The scope of its strategy, plans, or targets, such as whether they pertain differently to different business units, geographies, or water-consuming operational processes.
- The activities and investments required to achieve the plans and targets, and any risks or limiting factors that might affect achievement of the plans and/or targets.
- Disclosure corresponds to CDP Water Questionnaire W8.1, W8.1a, and W8.1b.

.21 For water management targets, the registrant shall additionally disclose:

- The percentage reduction or improvements from the base year, where:
  - The base year is the first year against which water management targets are evaluated toward the achievement of the target.
- Whether the target is absolute or intensity based, and the metric denominator if it is an intensity-based target.
- The timelines for the water management plans, including the start year, the target year, and the base year.
- The mechanism(s) for achieving the target, including:
  - Efficiency efforts, such as the use of water recycling and/or closed-loop systems
  - Product innovations such as redesigning products or services to require less water
  - Process and equipment innovations, such as those that enable the use of less water in manufacturing or operations
  - The use of tools and technologies (e.g., the World Wildlife Fund Water Risk Filter, WRI/WBCSD Global Water Tool, and Water Footprint Network Footprint Assessment Tool) to analyze water use, risk, and opportunities
  - Collaborations or programs in place with the community or other organizations

.22 Disclosure of strategies, plans, and targets shall be limited to activities that were ongoing (active) or reached completion during the fiscal year.

.23 The registrant shall discuss whether its water management practices result in any additional lifecycle impacts or tradeoffs in its organization, including tradeoffs in land use, energy consumption, and greenhouse gas (GHG) emissions, and why the registrant chose these practices despite lifecycle tradeoffs.

RR0101-05. Number of incidents of non-compliance with water quality permits, standards, and regulations

.24 The registrant shall disclose the total number of instances of non-compliance, including violations of a technology-based standard and exceedances of a quality-based standard.

.25 The scope of disclosure includes incidents governed by federal, state, and local statutory permits and regulations including, but not limited to, the discharge of a hazardous substance, failure to monitor wastewater effluent, and effluent limit exceedances (e.g., waste load allocation or whole effluent toxicity).

.26 An incident of non-compliance shall be disclosed regardless of whether it resulted in an enforcement action (e.g., fine, warning letter, etc.).

.27 An incident of non-compliance shall be disclosed regardless of its measurement methodology or frequency. These include violations:

- For continuous discharges, limitations, standards, and prohibitions that are generally expressed as maximum daily, weekly, and monthly averages.
- For non-continuous discharges, limitations that are generally expressed in terms of frequency, total mass, maximum rate of discharge, frequency, and mass or concentration of specified pollutants.

Product Formulation & Impacts on Food Markets

Description

A rising share of food crops such as corn and soy is diverted toward biofuels production worldwide. In addition, the cultivation of inedible crop-based feedstocks could indirectly affect food production by displacing food crops on arable lands. The potential impact on global food prices, availability, and security has engendered government and public concern over the rapid growth of biofuel production. This concept is popularly termed the "food versus fuel" debate. By and large, renewable fuel policies reflect these concerns by progressively increasing the volume of biofuels from non-food crop sources blended with transport fuels. Some governments have even moved to cap the production volume of crop-based ethanol. Given the industry's reliance on food-crop feedstocks, these policy shifts introduce risks and opportunities. The ability to use alternative feedstocks may become a key competitive driver in the industry, while traditional biofuel production may face limited or reduced policy support, affecting demand or production costs.

Accounting Metrics

RR0101-06. Top five feedstocks used for biofuels production, by weight

.28 The registrant shall disclose the five feedstocks it consumed in the greatest quantities for biofuel production during the fiscal year and the amount of each feedstock that was used in the production of biofuels, in air-dried metric tons.

.29 The scope of feedstocks includes those that meet the definition of renewable biomass according to CFR §80.1401, Title 40—Regulation of Fuels and Fuel Additives, Subpart M—Renewable Fuel Standard—Definitions including, but not limited to, the following types as they are defined in the CFR:

- Planted crops, such as corn, soybeans, sugarcane, and rapeseed
- Algae
- Tree residue and trimmings
- Animal waste material and animal byproducts
- Yard waste
- Food waste, such as recycled cooking and trap grease

.30 Feedstock consumption shall be calculated as purchases of feedstock plus beginning inventory less ending inventory, in air-dried metric tons.

- The amount may include any incidental *de minimis* contaminants that are impractical to remove and are related to customary feedstock production and transport.

Note to **RR0101-06**

.31 The registrant shall discuss risks associated with the use of food crop feedstocks and feedstocks grown on arable lands, and describe how it manages those risks. Risks can include, but are not limited to:

- Market risks, such as competition for feedstocks also used in food (or animal feed) or competition over land that could be used for food (or animal feed) production.
- Regulatory risks, such as production limits on the volume of biofuel from food-crop feedstocks or repeal of federal mandates on production volumes.
- Reputational risks, such as external pressure from governments or other community organizations to use feedstocks that do not affect food resources and negative public perception about biofuel produced from food-crop feedstocks.

.32 The registrant shall discuss its approach to managing risks associated with the use of food crop feedstocks or feedstocks grown on arable lands.

- Relevant strategies to discuss include research and development into alternative feedstocks, feedstock diversification and increased production of biofuels from non-food-crop sources, supplier diversification, partnerships with industry groups or nongovernmental development organizations, and selection criteria to identify different feedstocks.

RR0101-07. Percentage of feedstock grown in food-insecure countries

.33 The registrant shall disclose the percentage of the feedstock that it purchased by weight (in air-dried metric tons) that was grown in food-insecure countries, where:

- Food insecurity is defined by the U.S. Department of Agriculture (USDA) as consistent access to adequate food being limited by a lack of money and other resources at times during the year.
- The registrant shall use the International Food Policy Research Institute Global Hunger Index Interactive Map to identify countries of food insecurity. Food-insecure countries are those countries with a "Serious," "Alarming," or "Extremely alarming" ranking on the GHI index.

.34 The percentage shall be calculated as the amount of feedstock, in air-dried metric tons, that was grown in food-insecure countries divided by the total amount of feedstock purchased, in air-dried metric tons.

.35 Where applicable, the registrant may include a discussion of how feedstock it sources that is grown in food-insecure countries is or is not in direct competition with other edible crops in the region(s) or land that can be used to grow food crops.

.36 The registrant may choose to describe how it is demonstrating a positive contribution toward local food security conditions in food-insecure regions where it operates, in relation to the four pillars of food security developed by the UN Food and Agriculture Organization (food availability, food access, food utilization, and food stability).

- Disclosure corresponds to Roundtable of Sustainable Biomaterials Criterion 6b.

Additional References

Congressional Research Service, Renewable Fuel Standard (RFS): Overview and Issues, March 14, 2013.

Roundtable on Sustainable Biomaterials Food Security Guidelines RSB-GUI-01-006-01 (version 2.2)

Information on the International Food Policy Research Institute Global Hunger Index

Lifecycle Emissions Balance

Description

The rapid growth in global biofuels production is due in large part to government energy policies, which seek to reduce net greenhouse gas (GHG) emissions from transportation fuels. Most major renewable-fuel policies worldwide require that biofuels achieve lifecycle GHG emissions reductions relative to a petroleum-fuel baseline to qualify for renewable-fuel-mandate thresholds. The biofuel lifecycle emission calculation can include indirect and direct emissions from feedstock crop production and land use, fuel refining, fuel and feedstock transport, and vehicle exhaust emissions. Biofuel producers can directly influence net emissions during the refining process through energy management (fuel use) and process innovation. Furthermore, companies may reduce lifecycle emissions by using feedstocks with lower emissions profiles. Fuel products that achieve a reduction in net emissions can qualify as advanced biofuels, which, based on existing biofuels mandates, are expected to constitute an increasing share of production. Companies may also be able to garner financial incentives from the sale of advanced fuels. Thus, biofuel companies that cost-effectively reduce the net carbon emissions of their products may gain a competitive advantage, leading to revenue growth and increased market share.

Accounting Metrics

RR0101-08. Lifecycle greenhouse gas (GHG) emissions, by biofuel type

.37 The registrant shall disclose its lifecycle GHG emissions (in grams of CO_2-e per megajoule) for each biofuel category it produces, calculated according to the EPA Renewable Fuel Standard 2 (RFS2) requirements, where:

- Lifecycle GHG emissions are defined in the U.S. Clean Air Act Section 211(o)(1) as the aggregate quantity of GHG emissions (including direct emissions and significant indirect emissions, such as significant emissions from land-use changes) related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery of the finished fuel to the ultimate consumer and use of the fuel, where the mass values for all GHGs are adjusted to account for their relative global warming potential.

- The registrant shall disclose its lifecycle GHG emissions for each biofuel type that it produces, where biofuel types include the following, which are disclosed in RR0101-B and based on the U.S. EPA's Renewable Fuel Standard categories: (1) renewable fuel, (2) advanced biofuel, (3) biomass-based diesel, and (4) cellulosic biofuel.

.38 The registrant should disclose all applicable lifecycle GHG emissions results, including those calculated for the California Air Resources Board Low Carbon Fuel Standard Program, the European Union Renewable Energy Directive, and the Roundtable on Sustainable Biomaterials (RSB) certification, if results from any of these calculations are materially different than the results from the EPA RFS2 calculation.

Management of the Legal & Regulatory Environment

Description

The Biofuels industry is heavily dependent on government policies, which create market demand and incentivize supply with tax breaks and other support for feedstock production. The Biofuels industry therefore engages in strategic political and regulatory lobbying related to renewable fuel policy, production tax credits, and feedstock production. While successful lobbying can result in positive short-term gains by supporting the biofuels market, the potential long-term adverse environmental and social impacts from feedstock and biofuels production may result in a reversal of these benefits to reflect the balance of corporate and public interest in those issues, leading to a more burdensome or uncertain regulatory environment. More specifically, traditional biofuels are linked to potential negative environmental and social impacts, resulting in attempts to reduce or remove the support for such fuels and to increase the support for advanced biofuels. However, advanced biofuels, while potentially creating fewer negative externalities, are yet to be produced on a commercial scale in many cases. It is likely in traditional biofuels producers' long-term interests, therefore, to support regulations that account for externalities while working to reduce the externalities of their own feedstock and production. For advanced biofuels, long-term policy support might depend on taking into account the viability of supply and any negative externalities that such fuels themselves may create. Consequently, biofuels companies could benefit from developing a clear strategy for engaging policymakers and regulators that is aligned with long-term sustainable business outcomes and that accounts for societal and environmental externalities.

Accounting Metrics

RR0101-09. Amount of subsidies received through government programs

.39 The registrant shall disclose the amount of subsidies (in U.S. dollars) it received through government programs during the reporting year, where subsidies include tax credits such as blending and production tax credits, funding for projects such as research and development, import tariffs, direct payments, capital grants, loans and loan guarantees, and any other monetary support received from government departments or programs.

.40 Government programs include those in the U.S. and internationally at national, regional, and local levels.

.41 The registrant should disclose the type of biofuel subsidies received and the amount of each, in U.S. dollars, where types of biofuel subsidies can include, but are not limited to, blending and production tax credits, capital grants, direct payments, loans and loan guarantees, surcharges or tariffs on competing products, and funding for projects such as research and development.

.42 The registrant shall disclose the amount of subsidies as an aggregate amount that was recognized during the reporting year, regardless of the accounting method (e.g., deferral method, flow-through method, or non-US GAAP methods for investment tax credits, etc.).

RR0101-10. Discussion of positions on the regulatory and political environment related to environmental and social factors and description of efforts to manage risks and opportunities presented

.43 The registrant shall identify risks and opportunities it faces related to legislation, regulation, rule making, actions of individual politicians, and the overall political environment (hereafter referred to collectively as "regulatory and political environment") related to environmental and social factors.

- The scope shall include existing, emerging, and known future risks and opportunities.
- The scope shall include risks and opportunities that may exist within the U.S. at the local, state, and federal levels.
- The registrant may discuss risks and opportunities in international markets.
- The regulatory and political environment related to environmental and social factors includes topics that address the type of feedstocks used in biofuel production, how feedstocks are cultivated, the environmental impacts associated with producing traditional versus advanced biofuels, biodiversity, emissions and effluents, toxic substances, climate change, immigration, food safety, wages, intellectual property, and financial regulations.

.44 Relevant risks include, but are not limited to, risk of increased compliance costs, risk of policy reversal (e.g., trade protections), risk of loss of financial incentives (e.g., reduction or elimination of subsidies, tax incentives, grants, etc.), risk to reputation due to the registrant's stance and actions related to the regulatory and political environment, risk that the regulatory and political environment may not be aligned with long-term strategy, and risk of misalignment with customers', investors', and other stakeholders' expectations.

.45 Relevant opportunities include, but are not limited to, improved financial conditions (e.g., through trade protections, financial subsidies, tax benefits, etc.), preferential market status (including federal contracts) due to environmental and social practices that are aligned with the regulatory and political environment, improved access to human capital, enhanced brand reputation due to the registrant's stance and actions related to the regulatory and political environment, and other benefits due to alignment of the regulatory and political environment with long-term strategy.

.46 For each risk and opportunity associated with the regulatory and political environment the registrant has identified, it shall disclose the following:

- For specific pieces of legislation, regulation, or candidates, the registrant shall indicate whether its position is of support or opposition and specify any qualifying statements about the legislation that may affect the registrant's stance.
- For general environmental and social topics such as climate change, immigration, and other topics associated with the general lobbying issue codes defined by The Lobbying Disclosure Act of 1995, the registrant shall provide a description of the type of regulation or legislation that it supports or opposes.

.47 The registrant shall discuss its efforts to manage risks and opportunities associated with each aspect of the regulatory and political environment it has identified in RR0101-10, where relevant efforts to discuss include the use of each of the following:

- Direct lobbying, as defined by the Internal Revenue Service as "the attempt to influence a legislative body through communication with a member or employee of a legislative body, or with a government official who participates in formulating legislation."
- Grassroots lobbying, as defined by the Internal Revenue Service as "the attempt to influence legislation by attempting to affect the opinion of the public with respect to the legislation and encouraging the audience to take action with respect to the legislation."
- Direct or indirect contributions or expenditures in support of, or opposition to, a candidate for public office or a ballot measure.
- Any payments made to trade associations or tax-exempt entities that may be used (where permitted) for lobbying, to make campaign contributions, or to otherwise exert influence on a political campaign or ballot measure.
    - The scope includes political organizations that seek to influence the "selection, nomination, election, or appointment of any individual to Federal, State, or local public office or office in a political organization, or the election of Presidential electors," as classified under Section 527 of the Internal Revenue Code.
    - The scope includes advocacy organizations, commonly classified as social welfare organizations under Section 501(c)(4) of the Internal Revenue Code.
- Other interactions with regulators and regulatory agencies, such as through legislative testimony, employment of former members of Congress, regulatory agencies, and other public servants.
- Any direct or indirect political expenditure (one-time or recurring) that must be reported to the Federal Election Commission (FEC), the Internal Revenue Service (IRS), or a state disclosure agency.

.48 In addition to its efforts to influence the regulatory and political environment, the registrant shall discuss its overall strategy to manage risks and opportunities associated with each aspect of the regulatory and political environment it has identified, such as the following actions or activities:

- Any changes it has made or plans to make to its business structure or model;
- The development of new technologies or services; and
- Any changes it has made or plans to make to its operational process, control, or organizational structures.

.49 With respect to the emerging or potential future regulatory and political environment, the registrant shall discuss its view of:

- Which outcome is most likely to come to fruition;
- Whether the outcome would impact the registrant and/or the industry as a whole;
- The likelihood the outcome will occur (i.e., a qualitative assessment of certainty or uncertainty);
- The time horizon over which it expects the outcome to occur; and
- The expected magnitude of the impact (e.g., a one-time, acute impact on costs, an ongoing moderate impact on ability to retain employees, etc.).

.50 The registrant should describe whether its stance may align with or differ from its peers, other companies, and the official stance of its trade organization(s) and discuss any relevant reasons for alignment or divergence.

.51 The registrant may choose to disclose its total amount of political spending and a list of the recipients, which includes:

- Any direct or indirect contributions or expenditures in support of, or opposition to, a candidate for public office or a ballot measure.
- Any payments made to trade associations or tax-exempt entities that are used to influence a political campaign (including advocacy organizations, commonly classified as social welfare organizations under Section 501(c)(4) of the Internal Revenue Code, or business leagues, chambers of commerce, boards of trade, and similar organizations classified under Section 501(c)(6) of the Internal Revenue Code).
- Any direct or indirect political expenditure (one-time or recurring) that must be reported to the Federal Election Commission, the Internal Revenue Service, or a state disclosure agency.
- Any direct or indirect contributions to registered lobbyists or lobbying organizations, including contributions made to trade organizations that contribute to political lobbying efforts.

Operational Safety, Emergency Preparedness, and Response

Description

Biofuel production presents operational safety hazards because of the use of flammable and explosive substances, high temperatures, and pressurized equipment. While biodiesel itself is a relatively safe product that is non-flammable and biodegradable, the chemicals used in production can present significant risks if they are not handled safely. Process safety incidents can significantly damage facilities, injure workers, and affect ecosystems and local communities. While the frequency of occurrence of accidents in the industry is relatively low, when they do take place, the outcomes tend to be acute, with severe impacts on financial performance. Damaged facilities can be inoperable for extended periods, resulting in lost revenues and large capital expenditures for repairs. Companies perceived to be at a greater risk for process safety incidents may have a higher cost of capital. Workforce injuries could result in regulatory penalties and litigation. Therefore, companies with a strong safety culture and operational safety oversight can more effectively detect and respond to such incidents, mitigating potential financial risks and improving operational efficiency

Accounting Metrics

RR0101-11. Process Safety Incidents Count (PSIC), Process Safety Total Incident Rate (PSTIR), and Process Safety Incident Severity Rate (PSISR)

.52 The registrant shall disclose its process safety performance using the following indicators, consistent with the process safety reporting element of the American Chemistry Council's (ACC) Responsible Care program, further defined in the Center for Chemical Process Safety's "Process Safety Leading and Lagging Metrics":

- PSIC, defined as the total (annual) count of all incidents that meet the definition of a Tier-1 process safety incident (PSI) per ANSI/API RP 754.
- PSTIR, defined as the cumulative (annual) count of incidents normalized by man-hours and calculated as the PSIC multiplied by 200,000 and divided by the total annual hours worked by employees, contractors, and subcontractors.
- PSISR, defined as the cumulative (annual) severity-weighted rate of PSIs and calculated as the Total Severity Score for all PSIs multiplied by 200,000 and divided by the total annual hours worked by employees, contractors, and subcontractors.

.53 The scope of disclosure includes PSIs occurring at company-owned or -operated facilities.

.54 The registrant may choose to separately disclose the same incident rates for Tier-2 process safety events as defined by ANSI/API RP 754 and Center for Chemical Process Safety's "Process Safety Leading and Lagging Metrics."

Note to **RR0101-11**

.55 The registrant shall describe incidents with a severity rating of 1 or 2, including the root cause, outcomes, and corrective actions implemented in response (e.g., technology improvements, operator training, etc.).

Sourcing & Environmental Impacts of Feedstock Production

Description

The Biofuels industry utilizes a variety of plant-based feedstocks as raw materials for production. Most companies producing first- or second-generation biofuels purchase feedstocks from agricultural producers and distributors. A growing proportion of the world's arable land is now occupied by biofuel crops; some of this land is being converted from forestland or rangeland. Unsustainable cultivation practices can have negative environmental externalities, including deforestation and biodiversity loss, soil degradation, and water pollution (the implications of biofuel feedstock cultivation on global food markets is discussed in the Product Formulation & Impacts on Food Markets disclosure topic). These factors could adversely affect feedstock crop yields, both acutely in the near term, because of events such as crop failure, and gradually over the long term. This, in turn, could influence the price and availability of feedstocks for biofuels producers. The increasing frequency of extreme weather conditions and other impacts of climate change could compound the effects of environmental externalities from crop cultivation. Furthermore, the public awareness and changing perception of the lifecycle impacts of biofuels production beyond GHG emissions can affect the broader reputation of and support for the industry, pushing the regulatory environment toward stricter compliance criteria. Biofuel manufacturers that, to the extent possible, increase the transparency of their supply chain and reduce their exposure to feedstock cultivation on lands classified as having high biodiversity value may be able to maintain or gain access to a growing European renewable energy market, where regulations include broader land-use restrictions for feedstock cultivation than those of the RFS. Consequently, vetting supply-chain sustainability and engaging with suppliers to the greatest extent possible to ensure that they are engaged in sustainable operations are important considerations for biofuels producers.

Accounting Metrics

RR0101-12. Description of strategy to manage risks associated with environmental impacts of feedstock production

.56 The registrant shall discuss its strategy to manage the environmental impacts and regulatory risks associated with feedstock production, where risks may include, but are not limited to:

- Risks to feedstock supply and pricing created by climate change impacts such as increased likelihood of extreme weather events, decreased availability of clean water resources, increased competition for arable land, and decreased crop yields due to temperature increases.
- Long-term risks to feedstock supply associated with suppliers' impacts on environmental health including those on biodiversity and soil health that may be due to monoculture practices and/or fertilizer and pesticide use.
- Constraints created by regulation such as compliance with sustainability criteria in renewable fuel mandates (including RFS2 in the U.S. and the Renewable Energy Directive in the E.U.); potential regulatory limits on the types of land where feedstock can be grown; potential limits on what qualifies as renewable biomass; potential for reduction or loss of public or political support for

biofuel mandates due to environmental impacts of feedstock production; and resistance to the use of genetically modified organisms (GMOs).

.57 The scope of this disclosure excludes risks associated with the impact of feedstock on food markets and lifecycle GHG emissions, which are addressed in RR0101-06, RR0101-07, and RR0101-08, respectively.

.58 If the registrant identifies availability of clean water resources as a risk to feedstock supply and/or pricing, it shall discuss its vulnerability to feedstock-growing regions with water stress and how it manages the risk of price variability due to sourcing feedstock from these regions.

- The registrant should identify its known sources of feedstock from growing regions with High (40–80%) or Extremely High (>80%) Baseline Water Stress using the World Resources Institute's (WRI) Water Risk Atlas tool, Aqueduct (publicly available online here).

.59 The registrant shall discuss its approach to managing risks and/or opportunities associated with feedstock production, including constraints created by regulation, and limits on availability and price.

- Relevant strategies to discuss include sourcing from feedstock producers that are third-party certified to environmental sustainability standards, diversification of suppliers, using feedstock procurement criteria to choose suppliers for varied feedstocks with fewer environmental impacts or greater adaptability to the effects of environmental externalities (e.g., drought-tolerant or disease-resistant feedstocks), supplier audits, sourcing from regions where the registrant has greater control over feedstock sources, and expenditures on research and development (R&D) for alternative and substitute feedstocks that are less susceptible to environmental externalities.

- The registrant should disclose the sustainability criteria it uses to assess its feedstock suppliers.

RR0101-13. Percentage of biofuel production third-party certified to an environmental sustainability standard

.60 The registrant shall calculate the percentage as the amount of biofuel produced (in gallons) that is third-party certified to an environmental sustainability standard divided by the total amount of biofuel produced (in gallons).

.61 Examples of environmental sustainability standards include the Roundtable on Sustainable Biomaterials (RSB), Roundtable on Responsible Soy (RTRS), Council on Sustainable Biomass Production (CSBP), Roundtable on Sustainable Palm Oil (RSPO), Bonsucro, and International Sustainability & Carbon Certification, as well as other standards with equivalent criteria.

- At a minimum, standards should include the following environmental sustainability topics:

  - GHG and other air emissions, water consumption and quality, soil health, fertilizer and pesticide use, land-use change, biodiversity, and waste management.

.62 The registrant should disclose the certification schemes to which its biofuel is certified and the percentage of production certified to each scheme.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD®

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

SUSTAINABILITY ACCOUNTING STANDARD
RENEWABLE RESOURCES & ALTERNATIVE ENERGY SECTOR

SOLAR ENERGY

Sustainability Accounting Standard

Sustainable Industry Classification System™ (SICS™) #RR0102

Prepared by the
Sustainability Accounting Standards Board®

December 2015
Provisional Standard

SOLAR ENERGY

Sustainability Accounting Standard

About SASB

The Sustainability Accounting Standards Board (SASB) provides sustainability accounting standards for use by publicly-listed corporations in the U.S. in disclosing material sustainability information for the benefit of investors and the public. SASB standards are designed for disclosure in mandatory filings to the Securities and Exchange Commission (SEC), such as the Form 10-K and 20-F. SASB is an independent 501(c)3 non-profit organization. Through 2016, SASB is developing standards for 79 industries in 10 sectors.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

Table of Contents

INTRODUCTION

Purpose & Structure

This document contains the SASB Sustainability Accounting Standard (SASB Standard) for the Solar Energy industry.

SASB Sustainability Accounting Standards are comprised of **(1) disclosure guidance and (2) accounting standards on sustainability topics** for use by U.S. and foreign public companies in their annual filings (Form 10-K or 20-F) with the U.S. Securities and Exchange Commission (SEC). To the extent relevant, SASB Standards may also be applicable to other periodic mandatory filings with the SEC, such as the Form 10-Q, Form S-1, and Form 8-K.

SASB Standards identify sustainability topics at an industry level, which may constitute material information—depending on a company's specific operating context—for a company within that industry. SASB Standards are intended to provide guidance to company management, which is ultimately responsible for determining which information is material and should therefore be included in its Form 10-K or 20-F and other periodic SEC filings.

SASB Standards provide companies with standardized sustainability metrics designed to communicate performance on industry level sustainability topics. When making disclosure on sustainability topics, companies can use SASB Standards to help ensure that disclosure is standardized and therefore decision-useful, relevant, comparable, and complete.

SASB Standards are intended to constitute "suitable criteria" as defined by AT 101.23–.32[1] and referenced in AT 701[2], as having the following attributes:

- *Objectivity*—Criteria should be free from bias.
- *Measurability*—Criteria should permit reasonably consistent measurements, qualitative or quantitative, of subject matter.
- *Completeness*—Criteria should be sufficiently complete so that those relevant factors that would alter a conclusion about subject matter are not omitted.
- *Relevance*—Criteria should be relevant to the subject matter.

Industry Description

The Solar Energy industry comprises companies that manufacture solar energy equipment, including solar photovoltaic (PV) modules, polysilicon feedstock, solar thermal electricity-generation systems, solar inverters, and other related components. Companies may also develop, build, and manage solar energy projects and offer financing or maintenance services to customers. Two primary technologies are utilized in the industry: PV, which accounts for the majority of the projects and thus is the focus of the SASB standard; and concentrated solar (CSP).

[1] http://pcaobus.org/Standards/Attestation/Pages/AT101.aspx#at_101_fn7
[2] http://pcaobus.org/Standards/Attestation/Pages/AT701.aspx

Within solar PV there are two main technologies: crystalline silicon-based solar and thin-film solar, which includes panels made from copper indium gallium selenide and cadmium telluride. The primary markets for solar panels are residential, non-residential (commercial and industrial), and utility-scale projects. Companies in the industry operate globally.

Guidance for Disclosure of Sustainability Topics in SEC Filings

1. Industry-Level Sustainability Topics

For the Solar Energy industry, SASB has identified the following sustainability disclosure topics:

- Energy Management in Manufacturing
- Water Management in Manufacturing
- Hazardous Materials Management
- Community & Ecological Impacts of Project Development
- Management of Energy Infrastructure Integration & Related Regulations
- Product Lifecycle Environmental Impacts
- Materials Sourcing

2. Company-Level Determination and Disclosure of Material Sustainability Topics

Sustainability disclosures are governed by the same laws and regulations that govern disclosures by securities issuers generally. According to the U.S. Supreme Court, a fact is material if, in the event such fact is omitted from a particular disclosure, there is "a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of the information made available."[3,4]

SASB has attempted to identify those sustainability topics that are reasonably likely to have a material effect on the financial condition or operating performance of companies within each SICS industry. SASB recognizes, however, that each company is ultimately responsible for determining what information should be disclosed within the context of Regulation S-K and other guidance.

Regulation S-K, which sets forth certain disclosure requirements associated with Form 10-K and other SEC filings, requires companies, among other things, to describe in the Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) section of Form 10-K "any known trends or uncertainties that have had or that the registrant reasonably expects will have a material favorable or unfavorable impact on net sales or revenues or income from continuing operations. If the registrant knows of events that will cause a material change in the relationship between costs and revenues (such as known future increases in costs of labor or materials or price increases or inventory adjustments), the change in the relationship shall be disclosed."

[3] TSC Industries v. Northway, Inc., 426 U.S. 438 (1976).
[4] C.F.R. 229.303(Item 303)(a)(3)(ii).

Furthermore, Instructions to Item 303 state that the MD&A "shall focus specifically on material events and uncertainties known to management that would cause reported financial information not to be necessarily indicative of future operating results or of future financial condition."[2]

The SEC has provided guidance for companies to use in determining whether a trend or uncertainty should be disclosed. The two-part assessment prescribed by the SEC, based on probability and magnitude, can be applied to the topics included within this standard:

- First, a company is not required to make disclosure about a known trend or uncertainty if its management determines that such trend or uncertainty is not reasonably likely to occur.

- Second, if a company's management cannot make a reasonable determination of the likelihood of an event or uncertainty, then disclosure is required unless management determines that a material effect on the registrant's financial condition or results of operation is not reasonably likely to occur.

3. Sustainability Accounting Standard Disclosures in Form 10-K

a. Management's Discussion and Analysis

For purposes of comparability and usability, companies should consider making disclosure on sustainability topics in the MD&A, in a sub-section titled **"Sustainability Accounting Standards Disclosures."**[5]

b. Other Relevant Sections of Form 10-K

In addition to the MD&A section, it may be relevant for companies to disclose sustainability information in other sections of Form 10-K, including, but not limited to:

- **Description of business**—Item 101 of Regulation S-K requires a company to provide a description of its business and its subsidiaries. Item 101(c)(1)(xii) expressly requires disclosure regarding certain costs of complying with environmental laws:

Appropriate disclosure also shall be made as to the material effects that compliance with Federal, State and local provisions which have been enacted or adopted regulating the discharge of materials into the environment, or otherwise relating to the protection of the environment, may have upon the capital expenditures, earnings and competitive position of the registrant and its subsidiaries.

- **Legal proceedings**—Item 103 of Regulation S-K requires companies to describe briefly any material pending or contemplated legal proceedings. Instructions to Item 103 provide specific disclosure requirements for administrative or judicial proceedings arising from laws and regulations that target discharge of materials into the environment or that are primarily for the purpose of protecting the environment.

[5] SEC [Release Nos. 33-8056; 34-45321; FR-61] Commission Statement about Management's Discussion and Analysis of Financial Condition and Results of Operations: "We also want to remind registrants that disclosure must be both useful and understandable. That is, management should provide the most relevant information and provide it using language and formats that investors can be expected to understand. Registrants should be aware also that investors will often find information relating to a particular matter more meaningful if it is disclosed in a single location, rather than presented in a fragmented manner throughout the filing."

- **Risk factors**—Item 503(c) of Regulation S-K requires filing companies to provide a discussion of the most significant factors that make an investment in the registrant speculative or risky, clearly stating the risk and specifying how a particular risk affects the particular filing company.

c. Rule 12b-20

Securities Act Rule 408 and Exchange Act Rule 12b-20 require a registrant to disclose, in addition to the information expressly required by law or regulation, "such further material information, if any, as may be necessary to make the required statements, in light of the circumstances under which they are made, not misleading."

More detailed guidance on disclosure of material sustainability topics can be found in the **SASB Conceptual Framework**, available for download via http://www.sasb.org/approach/conceptual-framework/.

Guidance on Accounting for Sustainability Topics

For each sustainability topic included in the Solar Energy industry Sustainability Accounting Standard, SASB identifies accounting metrics.

SASB recommends that each company consider using these sustainability accounting metrics when preparing disclosures on the sustainability topics identified herein.

As appropriate—and consistent with Rule 12b-20[6]—when disclosing a sustainability topic identified by this Standard, companies should consider including a narrative description of any material factors necessary to ensure completeness, accuracy, and comparability of the data reported. Where not addressed by the specific accounting metrics, but relevant, the registrant should discuss the following, related to the topic:

- The registrant's **strategic approach** to managing performance on material sustainability issues;
- The registrant's **relative performance** with respect to its peers;
- The **degree of control** the registrant has;
- Any measures the registrant has undertaken or plans to undertake to improve performance; and
- Data for the registrant's **last three completed fiscal years** (when available).

SASB recommends that registrants use SASB Standards specific to their primary industry as identified in the Sustainable Industry Classification System (SICS™). If a registrant generates significant revenue from multiple industries, SASB recommends that it also consider sustainability topics that SASB has identified for those industries and disclose the associated SASB accounting metrics.

[6] SEC Rule 12b-20: "In addition to the information expressly required to be included in a statement or report, there shall be added such further material information, if any, as may be necessary to make the required statements, in the light of the circumstances under which they are made, not misleading."

In disclosing to SASB Standards, it is expected that registrants disclose with the same level of rigor, accuracy, and responsibility as they apply to all other information contained in their SEC filings.

Users of the SASB Standards

The SASB Standards are intended to provide guidance for companies that engage in public offerings of securities registered under the Securities Act of 1933 (the Securities Act) and those that issue securities registered under the Securities Exchange Act of 1934 (the Exchange Act),[7] for use in SEC filings, including, without limitation, annual reports on Form 10-K (Form 20-F for foreign issuers), quarterly reports on Form 10-Q, current reports on Form 8-K, and registration statements on Forms S-1 and S-3. Disclosure with respect to the SASB Standards is not required or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Scope of Disclosure

Unless otherwise specified, SASB recommends:

- That a registrant disclose on sustainability issues and metrics for itself and for entities that are consolidated for financial reporting purposes as defined by accounting principles generally accepted in the United States for consistency with other accompanying information within SEC filings;[8]
- That for consolidated entities, disclosures be made, and accounting metrics calculated, for the whole entity, regardless of the size of the minority interest; and
- That information from unconsolidated entities not be included in the computation of SASB accounting metrics. A registrant should disclose, however, information about unconsolidated entities to the extent that the registrant considers the information necessary for investors to understand the effect of sustainability topics on the company's financial condition or operating performance (typically, this disclosure would be limited to risks and opportunities associated with these entities).

Reporting Format

Use of Financial Data

In instances where accounting metrics, activity metrics, and technical protocols in this standard incorporate financial data (e.g., revenues, cost of sales, expenses recorded and disclosed for fines, etc.), such financial data shall be prepared in accordance with the accounting principles generally accepted in the United States of America ("US GAAP") and be consistent with the corresponding financial data reported within the registrant's SEC filings. Should accounting metrics, activity metrics and technical protocols in this standard incorporate disclosure of financial data

[7] Registration under the Securities Exchange Act of 1934 is required (1) for securities to be listed on a national securities exchange such as the New York Stock Exchange, the NYSE Amex, and the NASDAQ Stock Market or (2) if (A) the securities are equity securities and are held by more than 2,000 persons (or 500 persons who are not accredited investors) and (B) the company has more than $10 million in assets.

[8] See US GAAP consolidation rules (Section 810).

that is not prepared in accordance with US GAAP, the registrant shall disclose such information in accordance with the SEC Regulation G.

Activity Metrics and Normalization

SASB recognizes that normalizing accounting metrics is important for the analysis of SASB disclosures.

SASB recommends that a registrant disclose any basic business data that may assist in the accurate evaluation and comparability of disclosure, to the extent that they are not already disclosed in the Form 10-K (e.g., revenue, EBITDA, etc.).

Such data—termed "activity metrics"—may include high-level business data such as total number of employees, quantity of products produced or services provided, number of facilities, or number of customers. It may also include industry-specific data such as plant capacity utilization (e.g., for specialty chemical companies), number of transactions (e.g., for Internet media and services companies), hospital bed days (e.g., for health care delivery companies), or proven and probable reserves (e.g., for oil and gas exploration and production companies).

Activity metrics disclosed should:

- Convey contextual information that would not otherwise be apparent from SASB accounting metrics.
- Be deemed generally useful for an investor relying on SASB accounting metrics in performing their own calculations and creating their own ratios.
- Be explained and consistently disclosed from period to period to the extent they continue to be relevant. However, a decision to make a voluntary disclosure in one period does not obligate a continuation of that disclosure if it is no longer relevant or if a better metric becomes available.[9]

Where relevant, SASB recommends specific activity metrics that—at a minimum—should accompany SASB accounting metric disclosures.

ACTIVITY METRIC	CATEGORY	UNIT OF MEASURE	CODE
Total capacity of photovoltaic (PV) solar modules sold[10]	Quantitative	Megawatts (MW)	RR0102-A
Total capacity of photovoltaic (PV) solar modules produced[11]	Quantitative	Megawatts (MW)	RR0102-B
Total capacity of completed solar energy systems[12]	Quantitative	Megawatts (MW)	RR0102-C
Total project development assets[13]	Quantitative	U.S. Dollars ($)	RR0102-D

[9] *Improving Business Reporting: Insights into Enhancing Voluntary Disclosures*, FASB Business Reporting Research Project, January 29, 2001.
[10] Note to **RR0102-A**—PV solar modules are defined in accordance with the U.S. Department of Energy (DOE) Solar Energy Glossary: photovoltaic (PV) module.
[11] Note to **RR0102-B**—PV solar modules are defined in accordance with the U.S. DOE Solar Energy Glossary: photovoltaic (PV) module.
[12] Note to **RR0102-C**—Solar energy systems are defined as any system that converts sunlight into electrical energy, in accordance with the U.S. DOE Solar Energy Glossary, including, but not limited to, "photovoltaic (PV) system" and "solar thermal electric systems." Completed systems are defined by the registrant, consistent with its existing public disclosure of completed systems.
[13] Note to **RR0102-D**—Project development assets are defined by the registrant, consistent with its existing public disclosure of project development assets, regardless of terminology used by the registrant (e.g., "Project assets," "Project assets—plants and land," "Solar

Units of Measure

Unless specified, disclosures should be reported in International System of Units (SI units).

Uncertainty

SASB recognizes that there may be inherent uncertainty when disclosing certain sustainability data and information. This may be related to variables such as the reliance on data from third-party reporting systems and technologies, or the unpredictable nature of climate events. Where uncertainty around a particular disclosure exists, SASB recommends that the registrant should consider discussing its nature and likelihood.

Estimates

SASB recognizes that scientifically based estimates, such as the reliance on certain conversion factors or the exclusion of *de minimis* values, may occur for certain quantitative disclosures. Where appropriate, SASB does not discourage the use of such estimates. When using an estimate for a particular disclosure, SASB expects that the registrant discuss its nature and substantiate its basis.

Timing

Unless otherwise specified, disclosure shall be for the registrant's fiscal year.

Limitations

There is no guarantee that SASB Standards address all sustainability impacts or opportunities associated with a sector, industry, or company, and therefore, a company must determine for itself the topics—sustainability-related or otherwise—that warrant discussion in its SEC filings.

Disclosure under SASB Standards is voluntary. It is not intended to replace any legal or regulatory requirements that may be applicable to user operations. Where such laws or regulations address legal or regulatory topics, disclosure under SASB Standards is not meant to supersede those requirements. Disclosure according to SASB Standards shall not be construed as demonstration of compliance with any law, regulation, or other requirement.

SASB Standards are intended to be aligned with the principles of materiality enforced by the SEC. However, SASB is not affiliated with or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Forward-Looking Statements

Disclosures on sustainability topics can involve discussion of future trends and uncertainties related to the registrant's operations and financial condition, including those influenced by external variables (e.g., environmental,

Energy Systems Held for Development and Sale," etc.). At a minimum, project development assets include assets that are associated with solar energy systems that are under development or fully developed, owned by the registrant, and held for sale or intended to be sold to a third party prior to the execution of a definitive sales agreement, and assets that consist primarily of capitalized costs incurred in connection with the development of solar energy systems.

social, regulatory, and political). Companies making such disclosures should familiarize themselves with the safe harbor provisions of Section 27A of the Securities Act and Section 21E of the Exchange Act, which preclude civil liability for material misstatements or omissions in such statements if the registrant takes certain steps, including, among other things, identifying the disclosure as "forward-looking" and accompanying such disclosure with "meaningful cautionary statements identifying important factors that could cause actual results to differ materially from those in the forward-looking statements."

The following sections contain the disclosure guidance associated with each accounting metric such as guidance on definitions, scope, accounting, compilation, and presentation.

The term "shall" is used throughout this document to indicate those elements that reflect requirements of the Standard. The terms "should" and "may" are used to indicate guidance, which, although not required, provides a recommended means of disclosure.

Table 1. Sustainability Disclosure Topics & Accounting Metrics

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Energy Management in Manufacturing	Total energy consumed, percentage grid electricity, percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	RR0102-01
Water Management in Manufacturing	(1) Total water withdrawn and (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Cubic meters (m^3), Percentage (%)	RR0102-02
	Discussion of water management risks and description of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	RR0102-03
Hazardous Materials Management	Amount of hazardous waste, percentage recycled	Quantitative	Metric tons (t), Percentage (%)	RR0102-04
	Number and aggregate quantity of reportable spills, quantity recovered[14]	Quantitative	Number, Kilograms (kg)	RR0102-05
Community & Ecological Impacts of Project Development	Project development asset impairments associated with community or ecological impacts	Quantitative	U.S. Dollars ($)	RR0102-06
	Description of efforts in solar energy system project development to address community and ecological impacts	Discussion and Analysis	n/a	RR0102-07
Management of Energy Infrastructure Integration & Related Regulations	Average price of solar energy (1) photovoltaic (PV) modules and (2) completed utility-scale systems	Quantitative	U.S. Dollars per watt ($/W)	RR0102-08
	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	RR0102-09
	Discussion 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	RR0102-10

[14] Note to **RR0102-05**—The registrant shall discuss its long-term activities to remediate spills that occurred in years prior to the reporting period but for which remediation activities are ongoing.

Table 1. Sustainability Disclosure Topics & Accounting Metrics (cont.)

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Product Lifecycle Environmental Impacts	Percentage of products sold that are recyclable or reusable	Quantitative	Percentage (%)	RR0102-11
	Weight of end-of-life material recovered, percentage of recovered materials that are recycled	Quantitative	Metric tons (t), Percentage (%)	RR0102-12
	Discussion of approach to manage use, reclamation, and disposal of hazardous materials	Discussion and Analysis	n/a	RR0102-13
Materials Sourcing	Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free	Quantitative	Percentage (%)	RR0102-14
	Discussion of the management of risks associated with the use of conflict minerals	Discussion and Analysis	n/a	RR0102-15
	Discussion of the management of environmental risks associated with the polysilicon supply chain	Discussion and Analysis	n/a	RR0102-16

Energy Management in Manufacturing

Description

Solar panel manufacturing requires significant use of electricity. It is typically purchased from the grid and can account for a considerable share of the total cost of materials. Climate change regulations and growing energy demand are contributing to rising prices for conventional electricity sources. It is therefore increasingly important for companies in energy-intensive industries to manage their overall energy efficiency. Additionally, companies that diversify their energy sources will be better able to manage the associated risks and maintain a reliable energy supply, which could be particularly relevant in emerging markets. Thin-film solar does not involve the silicon-purifying process, which is energy-intensive, meaning that it has lower energy requirements and generally a relatively lower price. Companies that minimize their energy costs through effective energy management can gain a competitive advantage through operational efficiency and competitive pricing of products. This is particularly important given the low margins and intense price competition of solar energy companies. Companies may obtain the additional reputational benefit of lowering energy payback time, which is the amount of time needed for a panel to produce the energy it took to manufacture it.

Accounting Metrics

RR0102-01. Total energy consumed, percentage grid electricity, percentage renewable

.01 The registrant shall disclose total energy consumption from all sources as an aggregate figure in gigajoules or their multiples.

- The scope includes energy purchased from sources external to the organization or produced by the organization itself (self-generated).
- The scope includes only energy consumed by entities owned or controlled by the organization.
- The scope includes energy from all sources including direct fuel usage, purchased electricity, and heating, cooling, and steam energy.

.02 In calculating energy consumption from fuels and biofuels, the registrant shall use higher heating values (HHV), also known as gross calorific values (GCV), which are directly measured or taken from the Intergovernmental Panel on Climate Change (IPCC), the U.S. Department of Energy (DOE), or the U.S. Energy Information Administration (EIA).

.03 The registrant shall disclose purchased grid electricity consumption as a percentage of its total energy consumption.

.04 The registrant shall disclose renewable energy consumption as a percentage of its total energy consumption.

.05 The scope of renewable energy includes renewable fuel the registrant consumes and renewable energy the registrant directly produces, purchases through a renewable power purchase agreement (PPA) that explicitly includes renewable energy certificates (RECs), or for which Green-e Energy Certified RECs are paired with grid electricity.

- For any renewable electricity generated on-site, any RECs must be retained (i.e., not sold) and retired on behalf of the registrant in order for the registrant to claim them as renewable energy.
- For renewable PPAs, the agreement must explicitly include and convey that RECs be retained and retired on behalf of the registrant in order for the registrant to claim them as renewable energy.
- The renewable portion of the electricity grid mix that is outside of the control or influence of the registrant is excluded from disclosure.[15]
- Renewable energy is defined as energy from sources that are replenished at a rate greater than or equal to their rate of depletion, consistent with the U.S. Environmental Protection Agency's (EPA) definitions, such as geothermal, wind, solar, hydro, and biomass.

.06 For the purposes of this disclosure, the scope of renewable energy from hydro sources is limited to those that are certified by the Low Impact Hydropower Institute or are eligible for a state Renewable Portfolio Standard.

.07 For the purposes of this disclosure, the scope of renewable energy from biomass sources is limited to the following:

- Energy from biomass sources that meets at least one of the following criteria:
  - Certification to a third-party standard (e.g., Forest Stewardship Council, Sustainable Forest Initiative, Programme for the Endorsement of Forest Certification, or American Tree Farm System);
  - Classification as an "eligible renewable" according to the Green-e Energy National Standard Version 2.5 (2014); or
  - Eligibility for a state Renewable Portfolio Standard.

.08 The registrant shall apply conversion factors consistently for all data reported under this disclosure, such as the use of HHVs for fuel usage (including biofuels) and conversion of kWh to gigajoules (for energy data including electricity from solar or wind energy).

.09 The registrant may choose to disclose the amount of energy that it generates in excess of what it consumes and is net metered through an electric utility.

[15] SASB recognizes that RECs reflect the environmental attributes of renewable energy that have been introduced to the grid.

Water Management in Manufacturing

Description

Solar PV panel manufacturing can be water-intensive, and ultra-pure water can be a critical input in some processes. The manufacturing process can also generate high volumes of contaminated wastewater, which must be treated before disposal or reuse. Wastewater treatment and disposal can result in high operating costs and additional capital expenditures. The contamination of local water resources is a risk that can generate tension with local water users, potentially disrupting manufacturing operations, and can adversely impact brand value. Depending on their location, solar manufacturing facilities may be exposed to the risk of reduced water availability and related cost increases or operational disruption, as water is becoming a scarce resource around the world. To address water supply and treatment issues, companies can adopt various strategies such as recycling process water, improving production techniques to lower water intensity, and installing water treatment systems to preempt more-stringent water-effluent regulations.

Accounting Metrics

RR0102-02. (1) Total water withdrawn and (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress

.10 The registrant shall disclose the amount of water (in thousands of cubic meters) that was withdrawn from all sources, where:

- Water sources include surface water (including water from wetlands, rivers, lakes, and oceans), groundwater, rainwater collected directly and stored by the registrant, wastewater obtained from other entities, municipal water supplies, or other water utilities.
- Disclosure corresponds to CDP Water Questionnaire W1.2a.

.11 The registrant may choose to disclose the portion of its supply by source if, for example, significant portions of withdrawals are from non-freshwater sources, where:

- Fresh water may be defined according to the local statutes and regulations where the registrant operates. Where there is no regulatory definition, fresh water shall be considered to be water that has a solids (TDS) concentration of less than 1000 mg/l per the Water Quality Association definition.
- Water obtained from a water utility in compliance with U.S. National Primary Drinking Water Regulations can be assumed to meet the definition of fresh water.

.12 The registrant shall disclose the amount of water (in thousands of cubic meters) that was consumed in its operations, where water consumption is defined as:

- Water that evaporates during withdrawal, usage, and discharge;
- Water that is directly or indirectly incorporated into the registrant's product or service; and

- Water that does not otherwise return to the same catchment area from which it was withdrawn, such as water returned to another catchment area or the sea.

- Disclosure corresponds to CDP Water Questionnaire W1.2c.

.13 The registrant shall analyze all of its operations for water risks and identify activities that withdraw and consume water in locations with High (40–80%) or Extremely High (>80%) Baseline Water Stress as classified by the World Resources Institute's (WRI) Water Risk Atlas tool, Aqueduct (publicly accessible online here).

.14 The registrant shall disclose its water withdrawn in locations with High or Extremely High Baseline Water Stress as a percentage of the total water withdrawn.

.15 The registrant shall disclose its water consumed in locations with High or Extremely High Baseline Water Stress as a percentage of the total water consumed.

RR0102-03. Discussion of water management risks and description of strategies and practices to mitigate those risks

.16 The registrant shall discuss its risks associated with water withdrawals, water consumption, and discharge of water to the environment and describe how it manages these risks.

- Disclosure corresponds to CDP Water Questionnaire W3.1 and W3.2c.

.17 The registrant shall discuss, where applicable, risks to the availability of adequate, clean water resources.

- Relevant information to provide includes, but is not limited to:

  - Environmental constraints, such as operating in water-stressed regions, drought, interannual or seasonal variability, and risks due to the impact of climate change.

  - External constraints, such as volatility in water costs, stakeholder perceptions and concerns related to water withdrawals (e.g., those from local communities, non-governmental organizations, and regulatory agencies), direct competition with and impact from the actions of other users (commercial and municipal), restrictions to withdrawals due to regulations, and constraints on the registrant's ability to obtain and retain water rights or permits.

  - How risks may vary by withdrawal source, including wetlands, rivers, lakes, oceans, groundwater, rainwater, municipal water supplies, or supply from other water utilities.

.18 The registrant shall discuss, where applicable, risks associated with its discharge of wastewater.

- Relevant information to provide includes, but is not limited to:

  - Environmental constraints, such as the ability to maintain compliance with regulations focused on the quality of effluent discharged to the environment, the ability to eliminate existing and

emerging pollutants of concern, and the ability to maintain control over runoff and storm water discharges.

- External constraints, such as increased liability and/or reputational risks, restrictions to discharges and/or increased operating costs due to regulation, stakeholder perceptions and concerns related to water discharges (e.g., those from local communities, non-governmental organizations, and regulatory agencies), and the ability to obtain discharge rights or permits.

- How risks may vary by discharges to different sources, including wetlands, rivers, lakes, oceans, groundwater, rainwater, municipal water supplies, or other water utilities.

.19 The registrant should include a discussion of the potential impacts that these risks may have on its operations and the timeline over which such risks are expected to manifest.

- Impacts may include, but are not limited to, those associated with costs, revenues, liabilities, continuity of operations, and reputation.

.20 The registrant shall provide a description of its short-term and long-term strategy or plan to manage these risks, including the following, where relevant:

- Any water management targets it has set, and an analysis of performance against those targets.

  - Water management targets can include water management goals that the registrant prioritizes to manage its risks and opportunities associated with water withdrawal, consumption, or discharge.

  - Targets can include, but are not limited to, those associated with reducing water withdrawals, reducing water consumption, reducing water discharges, and improving the quality of wastewater discharges.

- The scope of its strategy, plans, or targets, such as whether they pertain differently to different business units, geographies, or water-consuming operational processes.

- The activities and investments required to achieve the plans and targets, and any risks or limiting factors that might affect achievement of the plans and/or targets.

- Disclosure corresponds to CDP Water Questionnaire W8.1, W8.1a, and W8.1b.

.21 For water management targets, the registrant shall additionally disclose:

- The percentage reduction or improvements from the base year, where:

  - The base year is the first year against which water management targets are evaluated toward the achievement of the target.

- Whether the target is absolute or intensity based, and the metric denominator if it is an intensity-based target.
- The timelines for the water management plans, including the start year, the target year, and the base year.
- The mechanism(s) for achieving the target, including:
  - Efficiency efforts, such as the use of water recycling and/or closed-loop systems
  - Product innovations such as redesigning products or services to require less water
  - Process and equipment innovations, such as those that enable the use of less water in manufacturing or operations
  - The use of tools and technologies (e.g., the World Wildlife Fund Water Risk Filter, WRI/WBCSD Global Water Tool, and Water Footprint Network Footprint Assessment Tool) to analyze water use, risk, and opportunities
  - Collaborations or programs in place with the community or other organizations

.22 Disclosure of strategies, plans, and targets shall be limited to activities that were ongoing (active) or reached completion during the fiscal year.

.23 The registrant shall discuss if its water management practices result in any additional lifecycle impacts or tradeoffs in its organization, including tradeoffs in land use, energy consumption, and greenhouse gas (GHG) emissions, and why the registrant chose these practices despite lifecycle tradeoffs.

Hazardous Materials Management

Description

Solar panel manufacturing involves the use of hazardous chemicals that can cause human health and environmental harm if they are not properly managed. Common thin-film technologies can utilize hazardous substances such as cadmium, gallium arsenide, and copper indium gallium diselenide, which require careful handling during the manufacturing process. The cleaning of the semiconductor surface in silicon PV manufacturing can involve the use of chemicals such as hydrochloric acid, sulfuric acid, and hydrogen fluoride. Hazardous materials management is an important factor in preserving the Solar Energy industry's reputation as an environmentally sustainable energy source. Hazardous waste handling and disposal generate ongoing pollution-abatement costs and capital expenditures. In addition, improper treatment or disposal of hazardous process materials could result in contamination of local water or land, potentially harming brand value or resulting in regulatory penalties. Effective management of hazardous materials, including through reduction, reuse, recycling, and safe storage and disposal, can lower operating costs and mitigate potential regulatory penalties or reputational damage.

Accounting Metrics

RR0102-04. Amount of hazardous waste, percentage recycled

.24 The amount of hazardous waste shall be calculated in metric tons, where:

- Hazardous waste includes both hazardous secondary materials, per 40 CFR 260.10, and waste that meets the definition of hazardous waste under Subtitle C of the U.S. EPA's Resource Conservation and Recovery Act (RCRA), per 40 CFR 261.3.
- Hazardous wastes include those that display the following characteristics: ignitability, corrosivity, reactivity, or toxicity.

.25 The percentage recycled shall be calculated as the weight of hazardous waste material that was reused or reclaimed, plus the weight recycled or remanufactured (through treatment or processing) by the registrant, plus the amount sent externally for further recycling, divided by the total weight of hazardous waste material, where:

- Reclaimed materials are defined as materials processed to recover or regenerate a usable product, consistent with RCRA hazardous waste regulation. Common hazardous waste reclamation activities involve recovery of spent solvents (e.g., recovery of acetone) or metals (e.g., recovery of lead).
- Reused materials are defined as those recovered products or components of products that are used for the same purpose for which they were conceived.
- Recycled and remanufactured materials are defined as waste materials that have been reprocessed or treated by means of production or manufacturing processes and made into a final product or a component for incorporation into a product.

- Materials sent for further recycling include those materials that are transferred to a third party for the express purpose of reuse, recycling, or refurbishment.

- The scope of recycled and remanufactured products includes primary recycled materials, co-products (outputs of equal value to primary recycled materials), and by-products (outputs of lesser value than primary recycled materials).

- Portions of products and materials that are disposed of in landfills are not considered recycled. Only the portions of products that are directly incorporated into new products, co-products, or by-products shall be included in the percentage recycled.

- Materials incinerated, including for energy recovery, are not considered reused or recycled. Energy recovery is defined as the use of combustible waste as a means to generate energy through direct incineration, with or without other waste, but with recovery of the heat.

.26 Electronic waste material (e-waste) shall be considered recycled only if the registrant can demonstrate that this material was transferred to entities with third-party certification to a standard for e-waste recycling, such as Basel Action Network's e-Steward® standard or the U.S. EPA's Responsible Recycling Practices (R2) standard.

- The registrant shall disclose the standard(s) with which the entities it has transferred e-waste to are compliant.

RR0102-05. Number and aggregate quantity of reportable spills, quantity recovered

.27 The registrant shall disclose the total number and quantity (in kilograms) of reportable spills, where:

- Reportable spills are defined as any release of a hazardous substance in an amount equal to or greater than the reportable quantity as listed in Table 302.4 in 40 CFR Part 302.4 of the U.S. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), including consideration of reportable quantities of mixtures and solutions as defined under 40 CFR Part 302.6 (b)(1).

- The number of reportable spills shall include any leaks, emissions, discharges, injections, disposals, and abandonment releases over time, counted once at the time identified, consistent with the CERCLA definition of release (42 USC 9601(22)) and guidelines for reporting requirements (40 CFR Part 302).

- The aggregate quantity reported shall represent the total quantity of material released to the environment and shall not be reduced by the amount of such hazardous substances that are subsequently recovered, evaporated, or otherwise lost.

- The scope of disclosure includes all spills, even those in jurisdictions that are not subject to regulation under CERCLA.

.28 The registrant shall calculate the quantity of spills recovered as the quantity of spilled hazardous substances (in kilograms) removed from the environment through short-term release response activities, excluding:

- Amounts that were recovered during longer-term remediation at spill sites.
- Amounts that evaporated, burned, or were dispersed.

.29 The registrant may choose to disclose releases to soil and water separately. A release that qualifies as a release to both soil and water should be reported as a single release to water, with the volume properly apportioned to soil and water.

.30 The registrant may choose to separately indicate spills that occurred in the past, such as those that resulted from abandoned, legacy, or decommissioned operations but that were identified and disclosed during the fiscal year.

Note to **RR0102-05**

.31 Where applicable, the registrant shall discuss its activities to remediate spills that occurred in years prior to the disclosure period but for which remediation activities are ongoing and long term.

.32 Relevant activities include, but are not limited to, land-use controls, site monitoring, site maintenance, and continued cleanup.

Additional References

For guidance on the "legitimate recycling" of hazardous waste, see 40 CFR 260.43.

Community & Ecological Impacts of Project Development

Description

Many large, publicly listed solar energy companies are involved in project development, including the evaluation and acquisition of land rights, site permitting, and engagement with stakeholders. Successful development is contingent on securing the approval of environmental permits and permission from local governments and communities. Siting of medium or large solar installations in ecologically sensitive areas, including endangered species habitats, can render environmental permitting more difficult and costly. Project development may also be affected by local land-use laws and community opposition to projects due to their environmental and community impacts, such as noise and threatened property values. CSP projects may face opposition because of their significant land footprint and concerns over impacts on local water resources. These factors can slow or disrupt the development process, possibly resulting in higher costs, lost revenues, or impaired project assets. Companies with robust strategies for environmental impact assessment and mitigation and community engagement can reduce the risk of project delays, increasing the likelihood of successful project completion.

Accounting Metrics

RR0102-06. Project development asset impairments associated with community or ecological impacts

.33 The registrant shall disclose the amount of project development asset write-offs, in U.S. dollars, that resulted from asset impairments during the fiscal year for reasons related to, or associated with, in whole or in part, community or ecological impacts of the project, where:

- Project development assets are defined by the registrant, consistent with its existing public disclosure of project development assets, regardless of terminology used by the registrant (e.g., "Project assets," "Project assets—plants and land," "Solar Energy Systems Held for Development and Sale," etc.). At a minimum, project development assets meet the following criteria:
    - Assets that are associated with solar energy systems that are under development or fully developed, owned by the registrant, and held for sale or intended to be sold to a third party prior to the execution of a definitive sales agreement; and
    - Assets that consist primarily of capitalized costs incurred in connection with the development of solar energy systems.
- Write-offs (or write-downs) that resulted from asset impairments are defined by the registrant, consistent with its existing public disclosure of write-offs and asset impairments.
- Project development asset impairments for reasons related to, or associated with, community and/or ecological impacts are defined as those impairments that can reasonably be determined to relate to the following:

- Community opposition to solar energy system project development or operations, including, but not limited to, opposition related to land use, purported property valuation impacts, visual aesthetics, and safety of human health or property; and

- Ecological impact or risks of ecological impact of solar energy system project development or operations, including, but not limited to, risks to wildlife or habitat loss.

- Project development asset impairments for reasons related to, or associated with, community and/or ecological impacts include impairments resulting from voluntary or involuntary actions taken relating, in whole or in part, to community and/or ecological impact, including the following:

  - Inability to obtain necessary permits, approvals, financing, or other requirements; and

  - Voluntary decisions to abandon, delay, alter, or scale back projects.

- If a project development asset impairment occurs for multiple reasons including one or more that is related to, or associated with, community and/or ecological impacts, the impairment shall be included in the scope of disclosure in its entirety.

.34 The scope of disclosure shall include all project development assets regardless of the level of development activity occurring and the stage of development of the associated solar energy system, including delayed projects, pre-construction development activities, construction, and systems in the operational stage.

.35 The registrant may choose to additionally disclose project asset impairments by solar energy system capacity.

.36 The registrant may choose to discuss specific project asset impairments, including root causes and corrective actions to reduce the risk of future project asset impairments due to community or ecological impacts.

RR0102-07. Description of efforts in solar energy system project development to address community and ecological impacts

.37 The registrant shall describe its efforts to address the community and ecological impacts of solar energy system project development and operation, where:

- Community impacts may include, but are not limited to, land use, concerns around property valuation impacts, visual aesthetics, safety of human health or property, and noise and congestion resulting from construction activities.

- Ecological impacts may include, but are not limited to, land use, risk of habitat disruption, water consumption, wildlife fatalities, and ecological impacts of construction.

.38 The scope of disclosure shall include all solar energy system projects under development, or under consideration for development, regardless of actual or intended ownership.

.39 The scope of disclosure shall include efforts, activities, and strategies related to project siting, project design, engagement of the community and other stakeholders, and engagement with regulatory authorities or other permitting authorities.

.40 The registrant shall describe its efforts to eliminate or mitigate community risks and address community concerns and/or efforts to communicate project benefits and expected impacts, including, but not limited to:

- The use of social impact assessments (SIA) that evaluate, manage, and mitigate risks.
- Efforts to engage with stakeholders, build consensus, and collaborate with communities.
- Efforts to create benefits for communities through projects.
- New and emerging technologies that the registrant expects to incorporate into projects that may improve impacts.

Management of Energy Infrastructure Integration & Related Regulations

Description

The Solar Energy industry continues to benefit from accommodative government renewable energy policies worldwide (e.g., the EPA's Clean Power Plan), fostered in large part by many countries desire to transition to a low-carbon energy economy. However, if the industry wants to ensure continued policy support and greater adoption of solar for greenhouse gas (GHG) mitigation and energy security, it must work to prevent systemic disruptions to the existing energy infrastructure and access to essential energy services.

Companies are innovating to overcome the technical challenges of increasing solar energy on the grid. They are also engaging with regulatory agencies and policymakers to reduce regulatory barriers to the adoption of solar energy, many of which are emerging due to the concern around increasing overall grid electricity costs and grid disruptions. Also, despite recent cost reductions, solar energy remains a relatively expensive means of energy production and GHG reduction, and as a result, it is still a small portion of global electricity generation. Solar companies are investing in innovations to reduce hardware and installation costs, and working toward business-model innovation to reduce the cost of capital and facilitate the purchase of solar energy systems. Solar energy companies must be able to deploy one or more of these strategies successfully to ensure business survival and business scale-up over the long term.

Accounting Metrics

RR0102-08. Average price of solar energy (1) photovoltaic (PV) modules and (2) completed utility-scale systems

.41 The registrant shall calculate and disclose its average sales price of (1) solar energy photovoltaic (PV) modules and (2) completed utility-scale solar energy systems during the fiscal year.

- Solar energy PV module sales shall be calculated as the total revenue from solar energy PV module sales, in U.S. dollars, divided by the total rated capacity of solar energy PV module sales, in watts ($/W).
    - Solar energy PV modules are defined in accordance with the U.S. DOE Solar Energy Glossary: photovoltaic (PV) module.[16]
    - The scope of solar energy module sales shall only include revenue from the PV module hardware and shall exclude revenue resulting from non-hardware sales and services, such as software, service agreements, etc.

[16] For additional reference, see IEC/TS 61836 Ed. 3.0, "Solar photovoltaic energy systems—Terms, definitions and symbols."

- The average sales price of completed utility-scale solar energy systems shall be calculated as the total revenue from completed utility-scale solar energy systems, in U.S. dollars, divided by the total rated capacity of completed utility-scale solar energy systems, in watts ($/W).
    - Solar energy systems are defined as any system that converts sunlight into electrical energy, in accordance with the U.S. DOE Solar Energy Glossary, including, but not limited to, "photovoltaic (PV) system" and "solar thermal electric systems."[17]
    - Utility-scale scale systems are defined in accordance with the Lawrence Berkeley National Laboratory as any ground-mounted solar project that is larger than 5 MW_{AC}.
    - Completed systems are defined by the registrant, consistent with its existing public disclosure of completed systems.
    - The scope of revenue from completed solar energy systems shall only include revenue directly from the solar energy systems and shall exclude revenue resulting from service agreements and other associated services.
- Rated capacity is defined as the maximum output (generation) of solar energy systems, in watts (W), also referred to as nameplate capacity, measured in accordance with an applicable standard, including, but not limited to, IEC 61215, IEC 61646, or IEC 62108.

.42 Where the registrant utilizes leases to customers, it shall use an appropriate methodology for calculating the implied sales price and shall disclose the methodology used.

.43 The scope of disclosure shall include (1) solar energy PV module sales and (2) completed solar energy systems that occurred during the fiscal year.

.44 The registrant shall not double-count any (1) solar energy PV module sale or (2) completed solar energy system in either (1) or (2) above.

.45 The scope of disclosure shall exclude intercompany transactions and completed solar energy systems retained by the registrant.

.46 The registrant may disclose prices by category of customer, where:

- Categories of customers may include utilities, independent power developers and producers, distributors, contractors and installers, commercial and industrial companies, and residential customers.

[17] Ibid.

RR0102-09. Description of risks associated with integration of solar energy into existing energy infrastructure and discussion of efforts to manage those risks

.47 The registrant shall describe risks, challenges, and barriers surrounding the integration of solar energy into the existing energy infrastructure in terms of its products and services.

- Relevant information to provide may include, but is not limited to:
  - Technological barriers to increased integration of solar energy, such as limited transmission network connectivity, lack of access to high-capacity transmission networks, variability in interconnection standards, and inverter interconnection requirements;
  - Operational barriers to increased integration of solar energy, such as curtailment and challenges associated with the variable nature of solar energy; and
  - Customer motivations for seeking increased integration of solar energy, such as economic advantages, regulatory compliance, risk mitigation, public perception or reputational risk, etc.

.48 The registrant shall discuss its strategy and approach to design, development, and sales in order to integrate solar energy into the existing energy infrastructure.

- Relevant strategies and approaches may include, but are not limited to:
  - Technical product design;
  - Development of new products or product components (e.g., smart inverters);
  - Technical innovation designed to reduce the cost of solar energy modules and/or systems;
  - Third-party partnerships and product integrations;
  - Project design (e.g., project siting in regions with reduced curtailment risk);
  - Project risk transfer (e.g., power purchase agreements (PPAs) with curtailment caps);
  - Marketing and sales (e.g., focus on regions or customer segments with less grid integration risk);
  - The incorporation of energy storage technology, or "smart grid" technology, into solar energy systems, whether through proprietary technological development or collaboration with third parties;
  - Products designed to operate "off-grid" or as part of "micro-grids;"
  - Innovation designed to decrease solar energy's levelized cost of energy (LCOE) through the reduction in "soft costs," including financing, leasing, customer acquisition, and development costs; and
  - Innovation designed to increase the total addressable solar energy market.

- Relevant information to provide includes, but is not limited to:
    - Whether the registrant pursues multiple approaches;
    - Whether the registrant's approach differs by market;
    - The intensity of R&D requirements for the registrant's approach and strategy;
    - The level of competition relative to the registrant's approach and strategy; and
    - How the registrant evaluates the success of its approach.

.49 The scope of disclosure shall include all of the registrant's solar energy-related products, product components, projects, project development efforts, and services, as well as the associated marketing and sales strategies, in the markets in which the registrant operates.

.50 The registrant should describe how energy infrastructure influences the establishment of sales targets, strategies for specific product categories, technologies or marketing practices in specific regions, research and development (R&D) objectives, partnerships, etc.

RR0102-10. Discussion of risks and opportunities associated with energy policy and its impact on the integration of solar energy into existing energy infrastructure

.51 The registrant shall discuss its risks and opportunities associated with energy policy and the impact energy policy has on the integration of solar energy into existing energy infrastructure, where:

- Relevant risks and opportunities may include, but are not limited to:
    - Direct or indirect government subsidization of solar energy;
    - International trade policy disputes and agreements;
    - Public policies that establish minimum requirements for renewable energy generation (e.g., renewable portfolio standards);
    - Public policies that affect the monetization of solar energy generation, including, but not limited to, net metering, time-of-use rates, feed-in tariffs, utility fixed fees, and renewable energy priority dispatch;
    - Public policies that affect the financing and tax structure of solar energy, including, but not limited to, investment tax credits, property-assessed clean energy, loan guarantees, and depreciation schedules;
    - Public policies pertaining to any external social costs created by distributed solar energy generation;

- Policies pertaining to electricity transmission, including, but not limited to, regional transmission planning, interconnected transmission networks, interconnection standards, and high-capacity transmission networks; and

- Replacements to ageing energy-generation and transmission infrastructure.

.52 The registrant shall identify risks and opportunities it faces related to legislation, regulation, rule-making, actions of individual politicians, and the overall political environment (hereafter referred to collectively as "regulatory and political environment") related to energy policy and the integration of solar energy into energy infrastructure.

- The scope shall include existing, emerging, and known future risks and opportunities.

- The scope shall include risks and opportunities that may exist within the U.S. at the local, state, and federal levels as well as foreign governments, international governmental organizations, and regulatory organizations.

    - The scope shall include the relevant policies of utilities, rule-makers, and regulators or their delegates.

.53 Relevant information to provide includes, but is not limited to, the impact on demand for the registrant's solar energy products and services and the impact on business viability related to risks and opportunities associated with energy policy and the impact energy policy has on the integration of solar energy into the existing energy infrastructure.

.54 The registrant shall provide a description of its short-term and long-term strategy or plan to manage these risks and opportunities, including the following, where relevant:

- Efforts to influence the regulatory and political environment, including, but not limited to:

    - Direct lobbying, as defined by the Internal Revenue Service (IRS) as "the attempt to influence a legislative body through communication with a member or employee of a legislative body, or with a government official who participates in formulating legislation."

    - Grassroots lobbying, as defined by the IRS as "the attempt to influence legislation by attempting to affect the opinion of the public with respect to the legislation and encouraging the audience to take action with respect to the legislation."

    - Direct or indirect contributions or expenditures in support of, or opposition to, a candidate for public office or a ballot measure.

    - Any payments made to trade associations or tax-exempt entities that may be used (where permitted) for lobbying, campaign contributions, or in ways that otherwise exert influence on a political campaign or ballot measure.

- Other interactions with regulatory agencies, rule-makers, or their delegates, including public utilities commissions, the Federal Energy Regulatory Commission (FERC), regional transmission organizations, and independent system operators.

- Any direct or indirect political expenditure (one-time or recurring) that must be reported to the Federal Election Commission (FEC), the IRS, or a state disclosure agency.

Product Lifecycle Environmental Impacts

Description

Solar panels contain hazardous substances as well as reusable materials of high economic value. Materials recovery and recycling are important in lowering the environmental impacts from the extraction of virgin materials and from waste streams. Given the rapid expansion of solar energy in recent years, increasing volumes of solar panels are expected to reach the end of their useful life in the medium term. In some regions, manufacturers are required by law to take financial responsibility for their products at the end-of-life stage, including collection and recycling. Any revenue contraction from additional end-user costs for hazardous waste disposal could have a significant effect on profits. The issue could also cause the industry reputational damage in the medium to long-term. Management of these risks could improving the recyclability of panels and components. Furthermore, as more modules reach the end of their life and this issue likely receives more legislative attention, being able to offer take-back and recycling services in a cost-effective manner could become an important differentiator between companies. This could increase the revenue of companies that have a robust system in place to handle end-of-life recycling. Companies could also benefit from lower costs by reusing recovered materials in their manufacturing processes.

Accounting Metrics

RR0102-11. Percentage of products sold that are recyclable or reusable

.55 The registrant shall disclose the percentage of products, by weight (in metric tons), that are reusable or recyclable, where:

- "Reusable" is defined as a product or packaging that has been conceived and designed to accomplish, within its lifecycle, a certain number of trips, rotations, or uses for the same purpose for which it was conceived, consistent with definitions in ISO 14021:1999, *Environmental labels and declarations—Self-declared environmental claims (Type II environmental labelling)*.

- "Recyclable" is defined a product or packaging that can be diverted from the waste stream through available processes and programs and can be collected, processed, and returned to use in the form of raw materials or products, consistent with definitions in ISO 14021:1999, *Environmental labels and declarations—Self-declared environmental claims (Type II environmental labelling)*.

.56 For products or product materials that are partially made of recyclable or reusable materials, the registrant shall classify the portion of the material that is recyclable or reusable based on a calculation (or estimate, where appropriate) of the weight of each portion.

.57 A product or its components shall be considered recyclable or reusable if this claim is aligned with 16 CFR Part 260, Guides for the Use of Environmental Marketing Claims; Final Rule, (also known as the "FTC Green Guides"), including the following elements:

- A product or package shall not be marketed as recyclable unless it can be collected, separated, or otherwise recovered from the waste stream through an established recycling program for reuse or use in manufacturing or assembling another item.

- When recycling facilities are available to a substantial majority (i.e., 60 percent) of consumers or communities where the item is sold, the registrant may consider the product (or product component) recyclable without a qualification.

- When recycling facilities are available to less than a substantial majority of customers or communities where the product is sold, the registrant shall only consider the product (or product components) recyclable if it makes the appropriate qualification to its customers.

- For items that are partially made of recyclable components, the registrant shall only consider those components recyclable if (a) it clearly and prominently qualifies the recyclable claim to avoid deception about which portions are recyclable, and (b) no components significantly limit the ability to disassemble and recycle the product or components of the product (e.g., the size, shape, or assembly method).

RR0102-12. Weight of end-of-life material recovered, percentage of recovered materials that are recycled

.58 The registrant shall disclose the weight, in metric tons, of materials recovered, including those recovered through recycling services, product take-back programs, and refurbishment services, where:

- The scope of disclosure shall include products, materials, and parts at the end of their useful life that would have otherwise been disposed of as waste or used for energy recovery, but have instead been collected.

- The scope of disclosure shall include both materials physically handled by the registrant and materials of which the registrant does not take physical possession, but for which it has contracted with a third party the task of collection for the express purpose of reuse, recycling, or refurbishment.

- The scope of disclosure excludes products and parts that are in warranty and have been collected for repairs.

.59 The percentage recycled shall be calculated as the weight of incoming material that was reused or reclaimed, plus the weight of material recycled or remanufactured (through treatment or processing) by the registrant, plus the weight of material sent externally for further recycling, divided by the total weight of incoming recovered material, where:

- A material is recycled if it is used, reused, or reclaimed.

- Reclaimed materials are defined as those processed to recover or regenerate a usable product.

- Reused materials are defined as those recovered products or components of products that are used for the same purpose for which they were conceived.

- Recycled and remanufactured materials are defined as waste materials that have been reprocessed or treated by means of production or manufacturing processes and made into a final product or a component for incorporation into a product.

- Materials sent for further recycling include those materials that are transferred to a third party for the express purpose of reuse, recycling, or refurbishment.

- The scope of recycled and remanufactured products includes primary recycled materials, co-products (outputs of equal value to primary recycled materials), and by-products (outputs of lesser value than primary recycled materials).

- Portions of products and materials that are disposed of in landfills are not considered recycled. Only the portions of products that are directly incorporated into new products, co-products, or by-products shall be included in the percentage recycled.

- Materials incinerated, including for energy recovery, are not considered reused, recycled, or reclaimed. Energy recovery is defined as the use of combustible waste as a means to generate energy through direct incineration, with or without other waste, but with recovery of the heat.

.60 Electronic waste material (e-waste) shall be considered recycled only if the registrant can demonstrate that the material was transferred to entities with third-party certification to a standard for e-waste recycling such as Basel Action Network's e-Steward® standard or the U.S. EPA's Responsible Recycling Practices (R2) standard.

- The registrant shall disclose the standard(s) to which the entities it has transferred e-waste to are compliant.

RR0102-13. Discussion of approach to manage use, reclamation, and disposal of hazardous materials

.61 The registrant shall discuss its strategies to manage the use of hazardous materials, where:

- Hazardous materials include both hazardous secondary materials, per 40 CFR 260.10, and waste that meets the definition of hazardous waste under Subtitle C of the U.S. EPA's RCRA, per 40 CFR 261.3.

- Hazardous materials include those that display the following characteristics: ignitability, corrosivity, reactivity, or toxicity.

.62 The registrant shall discuss its approach to design for reducing use of hazardous materials or substituting them with non-hazardous materials and its strategies to mitigate risks associated with the use of hazardous materials.

.63 The registrant should identify which hazardous materials are used in its products.

.64 The registrant shall discuss its approach to design and strategies to increase the disposal or reclamation of hazardous materials in the product end-of-life stage, including take-back programs and direct contracts with third-party hazardous waste reclamation services.

.65 The registrant shall describe the root cause and its corrective actions for any incidences when its use, reclamation, and/or disposal of hazardous materials deviated from its expected outcomes, such as those resulting in a release to the environment (i.e., those disclosed in RR0102-05), regulatory non-compliance, and/or human health and safety impacts.

Materials Sourcing

Description

Solar panel materials such as tin and polysilicon can have negative environmental and social impacts in the supply chain. The process of purifying polysilicon, the main input in a majority of solar panels, creates a harmful wastewater by-product called silicon tetrachloride. Equipment to recycle this wastewater to extract silicon is available but expensive, and not all polysilicon refiners utilize it. The improper disposal of such waste in the supply chain has been associated with killing fish and wildlife, destroying farmland, and causing higher cancer rates in affected areas. These supply-chain impacts could affect the reputation of listed solar energy companies, potentially hurting their revenue-growth prospects. In addition, suppliers may be required to curtail production if they violate environmental regulations, which could, in turn, disrupt production at solar manufacturing plants. U.S. solar companies are required to comply with federal regulations and face other pressures to track and eliminate the use of minerals responsible for conflict in the Democratic Republic of the Congo. Some solar panels contain all four of the "conflict" minerals (tin, tantalum, tungsten, and gold), although many contain only tin. In addition to facing reputational and regulatory risks from sourcing tin from conflict-torn areas, solar energy companies face competition from increasing global demand for tin from other sectors. Along with supply constraints, this can result in significant price increases and supply chain risks. Companies can minimize negative externalities of sourcing sensitive materials like polysilicon and conflict minerals and protect themselves from related risks by having transparent supply chains, working actively to source materials from reliable suppliers or regions that have minimal environmental or social risks, and supporting research for alternative inputs.

Accounting Metrics

RR0102-14. Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free

.66 The registrant shall calculate the percentage as the number of tungsten, tin, tantalum, and gold smelters and/or refineries within its supply chain that are verified to be conflict-free divided by the total number of tungsten, tin, tantalum, and gold smelters and/or refineries within its supply chain.

.67 A smelter or refiner is considered to be conflict-free if it can demonstrate compliance with:

- The Electronic Industry Citizenship Coalition (EICC) and Global e-Sustainability Initiatives (GeSI) Conflict-Free Smelter Program (CFSP) assessment protocols.
- The Responsible Jewellery Council's (RJC) Chain-of-Custody (CoC) Standard.

.68 A smelter or refinery is considered to be within the registrant's supply chain if it supplies, or is approved to supply, tungsten, tin, tantalum, or gold that is contained in any product the registrant manufactures or contracts to be manufactured.

- The scope includes smelters or refineries that supply material directly to the registrant as well as those that supply material to any of its suppliers of raw materials, components, or subassemblies.

RR0102-15. Discussion of the management of risks associated with the use of conflict minerals

.69 The registrant shall discuss its strategic approach to managing its risks associated with the use of conflict minerals in its products, including physical limits on availability and access, price, and reputational risks, where:

- Conflict minerals are defined as tungsten, tin, tantalum, and gold.

.70 The registrant should identify which minerals present a risk to its operations, which type of risk they represent, and the strategies the registrant uses to mitigate the risk.

.71 Relevant strategies to discuss include due diligence practices, supply chain auditing, supply chain engagement, and partnerships with industry groups or nongovernmental development organizations.

RR0102-16. Discussion of the management of environmental risks associated with the polysilicon supply chain

.72 The registrant shall discuss its approach to managing the environmental risks associated with the polysilicon supply chain, including, but not limited to, risks of suppliers' noncompliance with environmental regulations and risks associated with suppliers' disposal and handling of manufacturing wastes (including tetrachloride).

.73 Relevant strategies to discuss include due diligence practices, supply chain auditing, supply chain engagement, codes of conduct, and partnerships with industry groups or nongovernmental development organizations.

.74 The registrant shall describe its process for implementing corrective actions in the event of noncompliance with environmental regulations in the supply chain, including the use of alternative suppliers.

.75 The registrant should identify which materials within the polysilicon supply chain present an environmental risk to its operations, which type of risk they represent (e.g., regulatory compliance, reputational risk, or physical limits on availability and access), and the strategies the registrant uses to mitigate the risk.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD®

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

SUSTAINABILITY ACCOUNTING STANDARD
RENEWABLE RESOURCES & ALTERNATIVE ENERGY SECTOR

WIND ENERGY

Sustainability Accounting Standard

Sustainable Industry Classification System™ (SICS™) #RR0103

Prepared by the
Sustainability Accounting Standards Board®

December 2015
Provisional Standard

WIND ENERGY

Sustainability Accounting Standard

About SASB

The Sustainability Accounting Standards Board (SASB) provides sustainability accounting standards for use by publicly-listed corporations in the U.S. in disclosing material sustainability information for the benefit of investors and the public. SASB standards are designed for disclosure in mandatory filings to the Securities and Exchange Commission (SEC), such as the Form 10-K and 20-F. SASB is an independent 501(c)3 non-profit organization. Through 2016, SASB is developing standards for 79 industries in 10 sectors.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

Table of Contents

INTRODUCTION

Purpose & Structure

This document contains the SASB Sustainability Accounting Standard (SASB Standard) for the Wind Energy industry.

SASB Sustainability Accounting Standards are comprised of **(1) disclosure guidance and (2) accounting standards on sustainability topics** for use by U.S. and foreign public companies in their annual filings (Form 10-K or 20-F) with the U.S. Securities and Exchange Commission (SEC). To the extent relevant, SASB Standards may also be applicable to other periodic mandatory filings with the SEC, such as the Form 10-Q, Form S-1, and Form 8-K.

SASB Standards identify sustainability topics at an industry level, which may constitute material information—depending on a company's specific operating context—for a company within that industry. SASB Standards are intended to provide guidance to company management, which is ultimately responsible for determining which information is material and should therefore be included in its Form 10-K or 20-F and other periodic SEC filings.

SASB Standards provide companies with standardized sustainability metrics designed to communicate performance on industry level sustainability topics. When making disclosure on sustainability topics, companies can use SASB Standards to help ensure that disclosure is standardized and therefore decision-useful, relevant, comparable, and complete.

SASB Standards are intended to constitute "suitable criteria" as defined by AT 101.23–.32[1] and referenced in AT 701[2], as having the following attributes:

- *Objectivity*—Criteria should be free from bias.
- *Measurability*—Criteria should permit reasonably consistent measurements, qualitative or quantitative, of subject matter.
- *Completeness*—Criteria should be sufficiently complete so that those relevant factors that would alter a conclusion about subject matter are not omitted.
- *Relevance*—Criteria should be relevant to the subject matter.

Industry Description

The Wind Energy industry comprises companies that manufacture wind turbines, blades, towers, and other components of wind power systems. Companies that develop, build, and manage wind energy projects are also included within the scope of this industry, but few companies publicly listed in the U.S. operate primarily in this segment. SASB standards for the Wind Energy industry therefore focus on the manufacturing segment. Manufacturers also offer post-sale maintenance and support services. Turbines can be installed onshore or

[1] http://pcaobus.org/Standards/Attestation/Pages/AT101.aspx#at_101_fn7
[2] http://pcaobus.org/Standards/Attestation/Pages/AT701.aspx

offshore, which can cause differences in wind-generating capacity and challenges in project development for each type of installation. Wind energy companies operate globally.

Guidance for Disclosure of Sustainability Topics in SEC Filings

1. Industry-Level Sustainability Topics

For the Wind Energy industry, SASB has identified the following sustainability disclosure topics:

- Safety of Wind Farm Operations
- Design to Mitigate Community & Ecological Impacts
- Materials Efficiency
- Materials Sourcing

2. Company-Level Determination and Disclosure of Material Sustainability Topics

Sustainability disclosures are governed by the same laws and regulations that govern disclosures by securities issuers generally. According to the U.S. Supreme Court, a fact is material if, in the event such fact is omitted from a particular disclosure, there is "a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of the information made available."[3,4]

SASB has attempted to identify those sustainability topics that are reasonably likely to have a material effect on the financial condition or operating performance of companies within each SICS industry. SASB recognizes, however, that each company is ultimately responsible for determining what information should be disclosed within the context of Regulation S-K and other guidance.

Regulation S-K, which sets forth certain disclosure requirements associated with Form 10-K and other SEC filings, requires companies, among other things, to describe in the Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) section of Form 10-K "any known trends or uncertainties that have had or that the registrant reasonably expects will have a material favorable or unfavorable impact on net sales or revenues or income from continuing operations. If the registrant knows of events that will cause a material change in the relationship between costs and revenues (such as known future increases in costs of labor or materials or price increases or inventory adjustments), the change in the relationship shall be disclosed."

Furthermore, Instructions to Item 303 state that the MD&A "shall focus specifically on material events and uncertainties known to management that would cause reported financial information not to be necessarily indicative of future operating results or of future financial condition."[2]

[3] TSC Industries v. Northway, Inc., 426 U.S. 438 (1976).
[4] C.F.R. 229.303(Item 303)(a)(3)(ii).

The SEC has provided guidance for companies to use in determining whether a trend or uncertainty should be disclosed. The two-part assessment prescribed by the SEC, based on probability and magnitude, can be applied to the topics included within this standard:

- First, a company is not required to make disclosure about a known trend or uncertainty if its management determines that such trend or uncertainty is not reasonably likely to occur.

- Second, if a company's management cannot make a reasonable determination of the likelihood of an event or uncertainty, then disclosure is required unless management determines that a material effect on the registrant's financial condition or results of operation is not reasonably likely to occur.

3. Sustainability Accounting Standard Disclosures in Form 10-K

a. Management's Discussion and Analysis

For purposes of comparability and usability, companies should consider making disclosure on sustainability topics in the MD&A, in a sub-section titled **"Sustainability Accounting Standards Disclosures**."[5]

b. Other Relevant Sections of Form 10-K

In addition to the MD&A section, it may be relevant for companies to disclose sustainability information in other sections of Form 10-K, including, but not limited to:

- **Description of business**—Item 101 of Regulation S-K requires a company to provide a description of its business and its subsidiaries. Item 101(c)(1)(xii) expressly requires disclosure regarding certain costs of complying with environmental laws:

Appropriate disclosure also shall be made as to the material effects that compliance with Federal, State and local provisions which have been enacted or adopted regulating the discharge of materials into the environment, or otherwise relating to the protection of the environment, may have upon the capital expenditures, earnings and competitive position of the registrant and its subsidiaries.

- **Legal proceedings**—Item 103 of Regulation S-K requires companies to describe briefly any material pending or contemplated legal proceedings. Instructions to Item 103 provide specific disclosure requirements for administrative or judicial proceedings arising from laws and regulations that target discharge of materials into the environment or that are primarily for the purpose of protecting the environment.

[5] SEC [Release Nos. 33-8056; 34-45321; FR-61] Commission Statement about Management's Discussion and Analysis of Financial Condition and Results of Operations: "We also want to remind registrants that disclosure must be both useful and understandable. That is, management should provide the most relevant information and provide it using language and formats that investors can be expected to understand. Registrants should be aware also that investors will often find information relating to a particular matter more meaningful if it is disclosed in a single location, rather than presented in a fragmented manner throughout the filing."

- **Risk factors**—Item 503(c) of Regulation S-K requires filing companies to provide a discussion of the most significant factors that make an investment in the registrant speculative or risky, clearly stating the risk and specifying how a particular risk affects the particular filing company.

c. Rule 12b-20

Securities Act Rule 408 and Exchange Act Rule 12b-20 require a registrant to disclose, in addition to the information expressly required by law or regulation, "such further material information, if any, as may be necessary to make the required statements, in light of the circumstances under which they are made, not misleading."

More detailed guidance on disclosure of material sustainability topics can be found in the **SASB Conceptual Framework**, available for download via http://www.sasb.org/approach/conceptual-framework/.

Guidance on Accounting for Sustainability Topics

For each sustainability topic included in the Wind Energy industry Sustainability Accounting Standard, SASB identifies accounting metrics.

SASB recommends that each company consider using these sustainability accounting metrics when preparing disclosures on the sustainability topics identified herein.

As appropriate—and consistent with Rule 12b-20[6]—when disclosing a sustainability topic identified by this Standard, companies should consider including a narrative description of any material factors necessary to ensure completeness, accuracy, and comparability of the data reported. Where not addressed by the specific accounting metrics, but relevant, the registrant should discuss the following, related to the topic:

- The registrant's **strategic approach** to managing performance on material sustainability issues;
- The registrant's **relative performance** with respect to its peers;
- The **degree of control** the registrant has;
- Any **measures the registrant has undertaken** or **plans to undertake** to improve performance; and
- Data for the registrant's **last three completed fiscal years** (when available).

SASB recommends that registrants use SASB Standards specific to their primary industry as identified in the Sustainable Industry Classification System (SICS™). If a registrant generates significant revenue from multiple industries, SASB recommends that it also consider sustainability topics that SASB has identified for those industries and disclose the associated SASB accounting metrics.

[6] SEC Rule 12b-20: "In addition to the information expressly required to be included in a statement or report, there shall be added such further material information, if any, as may be necessary to make the required statements, in the light of the circumstances under which they are made, not misleading."

In disclosing to SASB Standards, it is expected that registrants disclose with the same level of rigor, accuracy, and responsibility as they apply to all other information contained in their SEC filings.

Users of the SASB Standards

The SASB Standards are intended to provide guidance for companies that engage in public offerings of securities registered under the Securities Act of 1933 (the Securities Act) and those that issue securities registered under the Securities Exchange Act of 1934 (the Exchange Act),[7] for use in SEC filings, including, without limitation, annual reports on Form 10-K (Form 20-F for foreign issuers), quarterly reports on Form 10-Q, current reports on Form 8-K, and registration statements on Forms S-1 and S-3. Disclosure with respect to the SASB Standards is not required or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Scope of Disclosure

Unless otherwise specified, SASB recommends:

- That a registrant disclose on sustainability issues and metrics for itself and for entities that are consolidated for financial reporting purposes as defined by accounting principles generally accepted in the United States for consistency with other accompanying information within SEC filings;[8]
- That for consolidated entities, disclosures be made, and accounting metrics calculated, for the whole entity, regardless of the size of the minority interest; and
- That information from unconsolidated entities not be included in the computation of SASB accounting metrics. A registrant should disclose, however, information about unconsolidated entities to the extent that the registrant considers the information necessary for investors to understand the effect of sustainability topics on the company's financial condition or operating performance (typically, this disclosure would be limited to risks and opportunities associated with these entities).

Reporting Format

Use of Financial Data

In instances where accounting metrics, activity metrics, and technical protocols in this standard incorporate financial data (e.g., revenues, cost of sales, expenses recorded and disclosed for fines, etc.), such financial data shall be prepared in accordance with the accounting principles generally accepted in the United States of America ("US GAAP") and be consistent with the corresponding financial data reported within the registrant's SEC filings. Should

[7] Registration under the Securities Exchange Act of 1934 is required (1) for securities to be listed on a national securities exchange such as the New York Stock Exchange, the NYSE Amex, and the NASDAQ Stock Market or (2) if (A) the securities are equity securities and are held by more than 2,000 persons (or 500 persons who are not accredited investors) and (B) the company has more than $10 million in assets.
[8] See US GAAP consolidation rules (Section 810).

accounting metrics, activity metrics and technical protocols in this standard incorporate disclosure of financial data that is not prepared in accordance with US GAAP, the registrant shall disclose such information in accordance with the SEC Regulation G.

Activity Metrics and Normalization

SASB recognizes that normalizing accounting metrics is important for the analysis of SASB disclosures.

SASB recommends that a registrant disclose any basic business data that may assist in the accurate evaluation and comparability of disclosure, to the extent that they are not already disclosed in the Form 10-K (e.g., revenue, EBITDA, etc.).

Such data—termed "activity metrics"—may include high-level business data such as total number of employees, quantity of products produced or services provided, number of facilities, or number of customers. It may also include industry-specific data such as plant capacity utilization (e.g., for specialty chemical companies), number of transactions (e.g., for Internet media and services companies), hospital bed days (e.g., for health care delivery companies), or proven and probable reserves (e.g., for oil and gas exploration and production companies).

Activity metrics disclosed should:

- Convey contextual information that would not otherwise be apparent from SASB accounting metrics.
- Be deemed generally useful for an investor relying on SASB accounting metrics in performing their own calculations and creating their own ratios.
- Be explained and consistently disclosed from period to period to the extent they continue to be relevant. However, a decision to make a voluntary disclosure in one period does not obligate a continuation of that disclosure if it is no longer relevant or if a better metric becomes available.[9]

Where relevant, SASB recommends specific activity metrics that—at a minimum—should accompany SASB accounting metric disclosures.

[9] *Improving Business Reporting: Insights into Enhancing Voluntary Disclosures*, FASB Business Reporting Research Project, January 29, 2001.

ACTIVITY METRIC	CATEGORY	UNIT OF MEASURE	CODE
Number of delivered wind turbines, by wind turbine class[10]	Quantitative	Number	RR0103-A
Aggregate capacity of delivered wind turbines, by wind turbine class[11]	Quantitative	Megawatts (MW)	RR0103-B
Amount of turbine backlog[12]	Quantitative	U.S. Dollars ($)	RR0103-C
Aggregate capacity of turbine backlog[13]	Quantitative	Megawatts (MW)	RR0103-D

Units of Measure

Unless specified, disclosures should be reported in International System of Units (SI units).

Uncertainty

SASB recognizes that there may be inherent uncertainty when disclosing certain sustainability data and information. This may be related to variables such as the reliance on data from third-party reporting systems and technologies, or the unpredictable nature of climate events. Where uncertainty around a particular disclosure exists, SASB recommends that the registrant should consider discussing its nature and likelihood.

Estimates

SASB recognizes that scientifically based estimates, such as the reliance on certain conversion factors or the exclusion of *de minimis* values, may occur for certain quantitative disclosures. Where appropriate, SASB does not discourage the use of such estimates. When using an estimate for a particular disclosure, SASB expects that the registrant discuss its nature and substantiate its basis.

Timing

Unless otherwise specified, disclosure shall be for the registrant's fiscal year.

Limitations

There is no guarantee that SASB Standards address all sustainability impacts or opportunities associated with a sector, industry, or company, and therefore, a company must determine for itself the topics—sustainability-related or otherwise—that warrant discussion in its SEC filings.

[10] Note to **RR0103-A**—Wind turbine class is defined by the International Electrotechnical Commission's IEC 61400-1, Edition 3.0—Design requirements. Wind turbine class shall be determined by the rating of the turbine.
[11] Note to **RR0103-B**—Ibid.
[12] Note to **RR0103-C**—Turbine backlog is defined by the registrant, consistent with its existing public disclosure of order backlog. Turbine backlog excludes any backlog amounts resulting from operating and maintenance agreements or other service agreements.
[13] Note to **RR0103-D**—Ibid.

Disclosure under SASB Standards is voluntary. It is not intended to replace any legal or regulatory requirements that may be applicable to user operations. Where such laws or regulations address legal or regulatory topics, disclosure under SASB Standards is not meant to supersede those requirements. Disclosure according to SASB Standards shall not be construed as demonstration of compliance with any law, regulation, or other requirement.

SASB Standards are intended to be aligned with the principles of materiality enforced by the SEC. However, SASB is not affiliated with or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Forward-Looking Statements

Disclosures on sustainability topics can involve discussion of future trends and uncertainties related to the registrant's operations and financial condition, including those influenced by external variables (e.g., environmental, social, regulatory, and political). Companies making such disclosures should familiarize themselves with the safe harbor provisions of Section 27A of the Securities Act and Section 21E of the Exchange Act, which preclude civil liability for material misstatements or omissions in such statements if the registrant takes certain steps, including, among other things, identifying the disclosure as "forward-looking" and accompanying such disclosure with "meaningful cautionary statements identifying important factors that could cause actual results to differ materially from those in the forward-looking statements."

The following sections contain the disclosure guidance associated with each accounting metric such as guidance on definitions, scope, accounting, compilation, and presentation.

The term "shall" is used throughout this document to indicate those elements that reflect requirements of the Standard. The terms "should" and "may" are used to indicate guidance, which, although not required, provides a recommended means of disclosure.

Table 1. Sustainability Disclosure Topics & Accounting Metrics

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Safety of Wind Farm Operations	(1) Total recordable injury rate (TRIR) and (2) fatality rate for (a) direct employees and (b) contract employees	Quantitative	Rate	RR0103-01
Design to Mitigate Community & Ecological Impacts	Average A-weighted sound power level of wind turbines, by wind turbine class	Quantitative	dB(A)	RR0103-02
	Backlog cancellations associated with community or ecological impacts	Quantitative	U.S. Dollars ($)	RR0103-03
	Description of efforts to address ecological and community impacts of wind energy production through turbine design	Discussion and Analysis	n/a	RR0103-04
Materials Efficiency	Top five materials consumed, by weight	Quantitative	Metric tons (t)	RR0103-05
	Average top head mass per turbine capacity, by wind turbine class	Quantitative	Metric tons per megawatts (t/MW)	RR0103-06
	Discussion of approach to optimize materials efficiency of wind turbine design	Discussion and Analysis	n/a	RR0103-07
Materials Sourcing	Percentage of materials costs for items containing critical materials	Quantitative	Percentage (%)	RR0103-08
	Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free	Quantitative	Percentage (%)	RR0103-09
	Discussion of the management of risks associated with the use of critical materials and conflict minerals	Discussion and Analysis	n/a	RR0103-10

Safety of Wind Farm Operations

Description

Many wind turbine manufacturers offer higher-margin operations and maintenance (O&M) services for wind farm owners or operators together with the sales of their products. These activities may include installation, maintenance, monitoring, and repairing turbine installations. The wind farm O&M segment is held to a high safety standard because the work is inherently dangerous. Physical dangers include falls from height, electrical hazards, and moving mechanical parts. The quality of O&M services is therefore critical for the safety of wind farm operations, with the potential to affect company reputations and demand for products and services. Operational downtime and impacts on wind farm insurance costs as a result of frequent or high-magnitude accidents have the potential to add to the total costs of operating wind farms. Wind farm owners or developers may therefore consider the safety record of turbine and service providers in their requests for tender. Companies that can improve turbine and O&M safety can potentially reduce operating and extraordinary expenses and increase their market share.

Accounting Metrics

RR0103-01. (1) Total recordable injury rate (TRIR) and (2) fatality rate for (a) direct employees and (b) contract employees

.01 Registrants whose workforce is entirely U.S.-based shall disclose its total recordable injury rate (TRIR) and fatality rate as calculated and reported in Occupational Safety and Health Administration (OSHA) Form 300.

- OSHA guidelines provide details for the determination of whether an event is a recordable occupational incident as well as definitions for exemptions for incidents that occur in the work environment, but are not occupational.

.02 Registrants whose workforce includes non-U.S.-based employees shall calculate their TRIR according to the U.S. Bureau of Labor Statistics guidance and/or using the U.S. Bureau of Labor Statistics calculator.

.03 The registrant shall disclose its TRIR separately for its direct employees and for contract employees, where:

- Direct employees are all those employees on the registrant's payroll, whether they are labor, executive, hourly, salary, part-time, seasonal, or migrant workers.

- Contract employees are those who are not on the registrant's payroll, but who are supervised by the registrant on a day-to-day basis, including independent contractors and those employed by third parties (e.g., temp agencies, labor brokers, etc.).

.04 The scope includes all employees, domestic and foreign.

.05 Rates shall be calculated as (statistic count / total hours worked) * 200,000.

Design to Mitigate Community & Ecological Impacts

Description

Wind farm development involves siting and land acquisition, permitting, and engagement with local stakeholders to address concerns about potential environmental and community impacts. Neighboring communities may have concerns regarding the noise from turbines and the impacts on quality of life. Offshore developments could affect the marine ecosystem, and both on and offshore wind farms can affect birds, sometimes including endangered species. Obtaining environmental and construction permits for projects can be slowed or prevented if regulators or community members have concerns about the ecological or community impacts of the development. Wind project approval and construction success directly affect equipment manufacturers through demand for turbines. While manufacturers do not typically control the project approval process, they can design their products to minimize ecological and community impacts, including designing quieter turbines or turbines that have less impact on wildlife. These measures could facilitate project approvals and give wind energy manufacturers a competitive advantage, potentially increasing their market share over time.

Accounting Metrics

RR0103-02. Average A-weighted sound power level of wind turbines, by wind turbine class

.06 The registrant shall disclose, by wind turbine class, the average A-weighted sound power level of turbines delivered during the fiscal year, weighted by the total number of turbine deliveries per wind turbine class.

.07 A-weighted sound power level shall be calculated according to the International Electrotechnical Commission's IEC 61400-11, Edition 3.0—Acoustic noise measurement techniques.

.08 The registrant shall disclose weighted-average sound power level by the following wind turbine classes as they are defined by the International Electrotechnical Commission's IEC 61400-1, Edition 3.0—Design requirements:

- IEC Wind Turbine Class I
- IEC Wind Turbine Class II
- IEC Wind Turbine Class III
- IEC Wind Turbine Class IV
- IEC Wind Turbine Class S

.09 Wind turbine class shall be determined by the rating of the turbine.

.10 The registrant may choose to disclose weighted-average sound power level in additional wind turbine classes, including the following:

- Turbulence characteristics
- Mixed class (e.g., IEC Wind Turbine Class I / II)
- Onshore
- Offshore

RR0103-03. Backlog cancellations associated with community or ecological impacts

.11 The registrant shall disclose the amount of its turbine order backlog, in U.S. dollars, that was subject to cancellation during the fiscal year for reasons related to or associated with community or ecological impacts, where:

- Turbine order backlog is defined by the registrant, consistent with its existing public disclosure of order backlog.
- Turbine order backlog excludes any backlog amounts resulting from operating and maintenance agreements or other service agreements.
- Order backlog cancellations are defined as the amount of the order backlog canceled, reduced, terminated, deferred such that it no longer meets the registrant's definition of order backlog, or removed from the order backlog for any reason other than conversion to revenue or foreign exchange rate fluctuations.
- Order backlog cancellations include those that occur for reasons including, but not limited to, a customer's failure to obtain necessary project permitting, a customer's voluntary project cancellation, and reduction in project scope due to financial constraints.
- Order backlog cancellations for reasons related to or associated with community or ecological impacts are defined as those cancellations that can reasonably be determined to relate, in whole or in part, to:
  - Community opposition to a customer's wind turbine project development or operations, including, but not limited to, opposition related to noise emissions, land use, visual aesthetics, and safety of human health or property; or
  - Ecological impact or risks of ecological impact of a customer's wind turbine project development or operations, including, but not limited to, risks to wildlife or habitat loss.

.12 The registrant shall exclude from its calculation any amount of an order backlog cancellation that re-enters order backlog during the same fiscal year as a result of a project developer's successful re-ordering of turbines.

.13 The registrant may choose to additionally disclose order backlog cancellations as the aggregate amount of turbine capacity that was subject to cancellation.

.14 The registrant may choose to discuss specific order backlog cancellations, including root causes and corrective actions to prevent future order backlog cancellations.

RR0103-04. Description of efforts to address ecological and community impacts of wind energy production through turbine design

.15 The registrant shall describe efforts to address the ecological and community impacts of wind energy production through turbine design, where:

- Ecological impacts may include, but are not limited to, risk of bird and bat deaths, land-use requirements, and ecological impact of construction.
- Community impacts may include, but are not limited to, noise emissions, visual aesthetics, land-use requirements, and safety of human health and property.

.16 If the registrant has identified separate ecological and/or community impacts for onshore and offshore wind energy production, it shall describe its efforts to address such impacts through the design of onshore and offshore turbines separately.

.17 The scope of disclosure shall include physical technologies and modifications to wind turbine design as well as operational control software (e.g., SCADA systems) that may mitigate ecological and community impacts.

- Physical technologies include, but are not limited to, blade heating elements, wildlife detection technologies (e.g., radar), and wildlife deterrent technologies (e.g., ultrasonic transmitters).
- Modifications to wind turbine design include, but are not limited to, sudden curtailment capabilities, resilience for sudden curtailments, integration of wildlife risk mitigation into cut-in speed management, and aesthetic design to mitigate wildlife risk and community opposition.

.18 The registrant may choose to discuss its role in wind project siting, if applicable. Elements to discuss include the extent of the registrant's role in siting analysis and/or selection and the incorporation of ecological and community impacts into siting analysis and/or selection.

Materials Efficiency

Description

The Wind Energy industry's long-term success depends on its ability to produce energy at a comparatively lower cost than other energy sources. Steel and other materials purchases are one of the largest cost components of turbines; and inputs such as steel have exhibited price volatility in the past. In recent years, wind turbines have grown rapidly in size, in terms of both the tower height and the swept area of the rotor, to improve energy output and increase the potential for wind energy production in more areas. To achieve this expansion cost-effectively, however, companies can find innovative methods to increase turbine tower height and swept areas while more efficiently using steel and other expensive materials. This could influence companies' competitiveness and market share, costs of production, and operational risks related to the supply and price volatility of raw materials, as well as the ability of the Wind Energy industry to scale up.

Accounting Metrics

RR0103-05. Top five materials consumed, by weight

.19 For each of the following wind turbine classes, the registrant shall disclose the weight, in metric tons, of the five materials consumed in the greatest amounts (by weight) in delivered wind turbines during the fiscal year.

.20 The scope of disclosure includes materials weights in the final delivered turbine, including the nacelle, blades, and tower, and excludes the weight of materials consumed in production (e.g., waste), freight, storage, and installation (e.g., foundation).

.21 Materials may include, but are not limited to, steel, iron, copper, aluminum, fiberglass, or carbon fiber.

.22 The registrant may choose to disclose the weight of the five materials consumed in the greatest amounts by wind turbine class.

- Wind turbine classes are defined by the International Electrotechnical Commission's IEC 61400-1, Edition 3.0—Design requirements:
  - IEC Wind Turbine Class I
  - IEC Wind Turbine Class II
  - IEC Wind Turbine Class III
  - IEC Wind Turbine Class IV
  - IEC Wind Turbine Class S
  - Turbulence characteristics
  - Mixed class (e.g., IEC Wind Turbine Class I / II)
  - Onshore
  - Offshore

.23 The registrant may choose to disclose additional materials weights that may represent significant materials costs, supply chain risks, or exposure to pricing volatility.

RR0103-06. Average top head mass per turbine capacity, by wind turbine class

.24 For each of the following wind turbine classes, the registrant shall disclose the average top head mass per turbine capacity of turbines delivered during the fiscal year, weighted by turbine deliveries per wind turbine class.

- Wind turbine classes are defined by the International Electrotechnical Commission's IEC 61400-1, Edition 3.0—Design requirements:
  - IEC Wind Turbine Class I
  - IEC Wind Turbine Class II
  - IEC Wind Turbine Class III
  - IEC Wind Turbine Class IV
  - IEC Wind Turbine Class S

.25 Wind turbine class shall be determined by the rating of the turbine.

.26 Average top head mass per turbine capacity shall be calculated as the mass of the top head in metric tons divided by turbine capacity in megawatts (MW).

- The top head shall include the turbine nacelle and the turbine rotor.
- The top head shall exclude the blades.
- Turbine capacity is the rated turbine capacity, defined as the maximum output (generation) of a wind turbine, in megawatts (MW), also referred to as "nameplate capacity."

.27 The registrant may choose to disclose performance in additional wind turbine classes, including the following:

- Turbulence characteristics
- Mixed class (e.g., IEC Wind Turbine Class I / II)
- Onshore
- Offshore

RR0103-07. Discussion of approach to optimize materials efficiency of wind turbine design

.28 The registrant shall discuss its approach to improving the materials efficiency of wind turbines, including design considerations and materials selection to optimize:

- Amount of materials consumed;
- Capacity and capacity factor by materials consumed; and
- Lifespan.

.29 The scope of disclosure shall include materials selection and modifications to wind turbine design as well as operational control software (e.g., SCADA systems) that may increase the materials efficiency of wind turbines.

- Materials selection includes, but is not limited to, priorities in materials selection, emphasis on materials innovation and development, materials risk assessments, and objectives around materials consumption.
- Modifications to wind turbine design include, but are not limited to, innovation in design to reduce materials consumption through reduced turbine weights or tower weights, innovation in design to increase turbine capacity or capacity factor relative to materials consumption, strategies to reduce waste created in turbine manufacturing, and design to reduce materials consumed in installation of wind turbines (e.g., foundation).

Materials Sourcing

Description

Wind energy companies source sensitive raw materials from global supply chains for use in turbines, including critical rare earth minerals, such as neodymium and dysprosium, and sensitive conflict minerals, such as tin, tantalum, tungsten, and gold. Direct drive turbines, which are being increasingly used for their reliability, can require significantly more rare earth minerals than more traditional drive trains do. The extraction and production of sensitive and critical materials can have negative environmental and social impacts, including the effects on human health of hazardous waste by-products and contribution to conflict in and near the Democratic Republic of the Congo. Governmental support of this industry is a key demand driver, placing wind energy firms at a particularly high reputational risk if they are connected to the sourcing of minerals associated with violence, illness, or environmental degradation. Wind energy firms are also exposed to the risk of supply chain disruptions and input price increases or volatility from the use of such materials. These risks arise from a low substitution ratio, the concentration of deposits in a few countries, geopolitical considerations, and competition from other industries. U.S. wind energy companies are required to comply with federal/government regulations and external pressure to track and eliminate conflict materials in supply chains. Companies can minimize negative externalities and protect themselves from related operational and reputational risks by creating transparent supply chains, working actively to source materials from reliable suppliers or regions that have minimal environmental or social risks associated with them, supporting research for alternative inputs, and reducing their reliance on these materials.

Accounting Metrics

RR0103-08. Percentage of materials costs for items containing critical materials

.30 The registrant shall calculate the percentage as the materials costs of goods sold, in U.S. dollars, of items that contain critical materials divided by total materials cost of goods sold.

- The scope of disclosure includes materials costs for parts, components, commodities, associated freight, and storage, and excludes those for overhead, labor, recalls, warranties, or other costs of goods sold.

.31 A critical material is defined, consistent with the National Research Council's "Minerals, Critical Minerals, and the U.S. Economy," as one that is both essential in use and subject to the risk of supply restriction.

.32 At a minimum, the scope of critical materials includes the following minerals and metals:

- Antimony, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, tantalum, and tungsten;
- Platinum group metals (platinum, palladium, iridium, rhodium, ruthenium, and osmium); and
- Rare earth elements, which include yttrium, scandium, lanthanum, and the lanthanides (cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium).

RR0103-09. Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free

.33 The registrant shall calculate the percentage as the number of tungsten, tin, tantalum, and gold smelters and/or refineries within its supply chain that are verified to be conflict-free divided by the total number of tungsten, tin, tantalum, and gold smelters and/or refineries within its supply chain.

.34 A smelter or refiner is considered to be conflict-free if it can demonstrate compliance with:

- The Electronic Industry Citizenship Coalition (EICC) and Global e-Sustainability Initiatives (GeSI) Conflict-Free Smelter Program (CFSP) assessment protocols.
- The Responsible Jewellery Council's (RJC) Chain-of-Custody (CoC) Standard.

.35 A smelter or refinery is considered to be within the registrant's supply chain if it supplies, or is approved to supply, tungsten, tin, tantalum, or gold that is contained in any product the registrant manufactures or contracts to be manufactured.

- The scope includes smelters or refineries that supply material directly to the registrant as well as those that supply material to any of its suppliers of raw materials, components, or subassemblies.

RR0103-10. Discussion of the management of risks associated with the use of critical materials and conflict minerals

.36 The registrant shall discuss its strategic approach to managing its risks associated with use of critical materials and conflict minerals in its products, including physical limits on availability, access, price, and reputational risks, where:

- A critical material is defined, consistent with the National Research Council's "Minerals, Critical Minerals, and the U.S. Economy," as one that is both essential in use and subject to the risk of supply restriction. At a minimum, the scope of critical materials includes the following minerals and metals:
  - Antimony, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, tantalum, and tungsten;
  - Platinum group metals (platinum, palladium, iridium, rhodium, ruthenium, and osmium); and
  - Rare earth elements, which include yttrium, scandium, lanthanum, and the lanthanides (cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium).
- Conflict minerals are defined as tungsten, tin, tantalum, and gold.

.37 The registrant should identify which materials and minerals present a risk to its operations, which type of risk they represent, and the strategies the registrant uses to mitigate the risk.

.38 For critical materials, relevant strategies to discuss include diversification of suppliers, stockpiling of materials, expenditures in research and development (R&D) for alternative and substitute materials, and investments in recycling technology for critical materials.

.39 For conflict minerals, relevant strategies to discuss include due diligence practices, supply chain auditing, supply chain engagement, and partnerships with industry groups or nongovernmental development organizations.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD®

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

SUSTAINABILITY ACCOUNTING STANDARD
RENEWABLE RESOURCES & ALTERNATIVE ENERGY SECTOR

FUEL CELLS & INDUSTRIAL BATTERIES

Sustainability Accounting Standard

Sustainable Industry Classification System™ (SICS™) #RR0104

Prepared by the
Sustainability Accounting Standards Board®

December 2015
Provisional Standard

FUEL CELLS & INDUSTRIAL BATTERIES

Sustainability Accounting Standard

About SASB

The Sustainability Accounting Standards Board (SASB) provides sustainability accounting standards for use by publicly-listed corporations in the U.S. in disclosing material sustainability information for the benefit of investors and the public. SASB standards are designed for disclosure in mandatory filings to the Securities and Exchange Commission (SEC), such as the Form 10-K and 20-F. SASB is an independent 501(c)3 non-profit organization. Through 2016, SASB is developing standards for 79 industries in 10 sectors.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

Table of Contents

INTRODUCTION

Purpose & Structure

This document contains the SASB Sustainability Accounting Standard (SASB Standard) for the Fuel Cells & Industrial Batteries industry.

SASB Sustainability Accounting Standards are comprised of **(1) disclosure guidance and (2) accounting standards on sustainability topics** for use by U.S. and foreign public companies in their annual filings (Form 10-K or 20-F) with the U.S. Securities and Exchange Commission (SEC). To the extent relevant, SASB Standards may also be applicable to other periodic mandatory filings with the SEC, such as the Form 10-Q, Form S-1, and Form 8-K.

SASB Standards identify sustainability topics at an industry level, which may constitute material information—depending on a company's specific operating context—for a company within that industry. SASB Standards are intended to provide guidance to company management, which is ultimately responsible for determining which information is material and should therefore be included in its Form 10-K or 20-F and other periodic SEC filings.

SASB Standards provide companies with standardized sustainability metrics designed to communicate performance on industry level sustainability topics. When making disclosure on sustainability topics, companies can use SASB Standards to help ensure that disclosure is standardized and therefore decision-useful, relevant, comparable, and complete.

SASB Standards are intended to constitute "suitable criteria" as defined by AT 101.23-.32[1] and referenced in AT 701[2], as having the following attributes:

- *Objectivity*—Criteria should be free from bias.
- *Measurability*—Criteria should permit reasonably consistent measurements, qualitative or quantitative, of subject matter.
- *Completeness*—Criteria should be sufficiently complete so that those relevant factors that would alter a conclusion about subject matter are not omitted.
- *Relevance*—Criteria should be relevant to the subject matter.

Industry Description

The Fuel Cells & Industrial Batteries industry consists of companies that manufacture fuel cells for energy production and energy storage equipment, such as batteries for primarily industrial or utility-scale purposes. Manufacturers in this industry mainly sell business-to-business products to companies for varied energy generation and storage applications and intensities, from commercial business applications to large-scale energy projects for

[1] http://pcaobus.org/Standards/Attestation/Pages/AT101.aspx#at_101_fn7
[2] http://pcaobus.org/Standards/Attestation/Pages/AT701.aspx

utilities. Companies listed on U.S. exchanges or traded over the counter are primarily headquartered in the U.S. (though some are domiciled in France and China) but have global operations and sell products to a global marketplace.

Note: For the purposes of SASB standards, this industry does not include fuel cells or batteries used in light automotive vehicle applications. See SASB Standards for the Auto Parts industry (TR0102) for details on reporting this business segment. This industry also does not include non-industrial batteries for personal consumer use, which are classified under the Household & Personal Products industry (CN0602).

Guidance for Disclosure of Sustainability Topics in SEC Filings

1. Industry-Level Sustainability Topics

For the Fuel Cells & Industrial Batteries industry, SASB has identified the following sustainability disclosure topics:

- Energy Management
- Workforce Health & Safety
- Product Efficiency
- Product End-of-life Management
- Materials Sourcing

2. Company-Level Determination and Disclosure of Material Sustainability Topics

Sustainability disclosures are governed by the same laws and regulations that govern disclosures by securities issuers generally. According to the U.S. Supreme Court, a fact is material if, in the event such fact is omitted from a particular disclosure, there is "a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of the information made available."[3,4]

SASB has attempted to identify those sustainability topics that are reasonably likely to have a material effect on the financial condition or operating performance of companies within each SICS industry. SASB recognizes, however, that each company is ultimately responsible for determining what information should be disclosed within the context of Regulation S-K and other guidance.

Regulation S-K, which sets forth certain disclosure requirements associated with Form 10-K and other SEC filings, requires companies, among other things, to describe in the Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) section of Form 10-K "any known trends or uncertainties that have had or that the registrant reasonably expects will have a material favorable or unfavorable impact on net sales or revenues or income from continuing operations. If the registrant knows of events that will cause a material change in the relationship between costs and revenues (such as known future increases in costs of labor or materials or price increases or inventory adjustments), the change in the relationship shall be disclosed."

[3] TSC Industries v. Northway, Inc., 426 U.S. 438 (1976).
[4] C.F.R. 229.303(Item 303)(a)(3)(ii).

Furthermore, Instructions to Item 303 state that the MD&A "shall focus specifically on material events and uncertainties known to management that would cause reported financial information not to be necessarily indicative of future operating results or of future financial condition."[2]

The SEC has provided guidance for companies to use in determining whether a trend or uncertainty should be disclosed. The two-part assessment prescribed by the SEC, based on probability and magnitude, can be applied to the topics included within this standard:

- First, a company is not required to make disclosure about a known trend or uncertainty if its management determines that such trend or uncertainty is not reasonably likely to occur.

- Second, if a company's management cannot make a reasonable determination of the likelihood of an event or uncertainty, then disclosure is required unless management determines that a material effect on the registrant's financial condition or results of operation is not reasonably likely to occur.

3. Sustainability Accounting Standard Disclosures in Form 10-K

a. Management's Discussion and Analysis

For purposes of comparability and usability, companies should consider making disclosure on sustainability topics in the MD&A, in a sub-section titled **"Sustainability Accounting Standards Disclosures."**[5]

b. Other Relevant Sections of Form 10-K

In addition to the MD&A section, it may be relevant for companies to disclose sustainability information in other sections of Form 10-K, including, but not limited to:

- **Description of business**—Item 101 of Regulation S-K requires a company to provide a description of its business and its subsidiaries. Item 101(c)(1)(xii) expressly requires disclosure regarding certain costs of complying with environmental laws:

Appropriate disclosure also shall be made as to the material effects that compliance with Federal, State and local provisions which have been enacted or adopted regulating the discharge of materials into the environment, or otherwise relating to the protection of the environment, may have upon the capital expenditures, earnings and competitive position of the registrant and its subsidiaries.

- **Legal proceedings**—Item 103 of Regulation S-K requires companies to describe briefly any material pending or contemplated legal proceedings. Instructions to Item 103 provide specific disclosure requirements for administrative or judicial proceedings arising from laws and regulations that target discharge of materials into the environment or that are primarily for the purpose of protecting the environment.

[5] SEC [Release Nos. 33-8056; 34-45321; FR-61] Commission Statement about Management's Discussion and Analysis of Financial Condition and Results of Operations: "We also want to remind registrants that disclosure must be both useful and understandable. That is, management should provide the most relevant information and provide it using language and formats that investors can be expected to understand. Registrants should be aware also that investors will often find information relating to a particular matter more meaningful if it is disclosed in a single location, rather than presented in a fragmented manner throughout the filing."

- **Risk factors**—Item 503(c) of Regulation S-K requires filing companies to provide a discussion of the most significant factors that make an investment in the registrant speculative or risky, clearly stating the risk and specifying how a particular risk affects the particular filing company.

c. Rule 12b-20

Securities Act Rule 408 and Exchange Act Rule 12b-20 require a registrant to disclose, in addition to the information expressly required by law or regulation, "such further material information, if any, as may be necessary to make the required statements, in light of the circumstances under which they are made, not misleading."

More detailed guidance on disclosure of material sustainability topics can be found in the **SASB Conceptual Framework**, available for download via http://www.sasb.org/approach/conceptual-framework/.

Guidance on Accounting for Sustainability Topics

For each sustainability topic included in the Fuel Cells & Industrial Batteries industry Sustainability Accounting Standard, SASB identifies accounting metrics.

SASB recommends that each company consider using these sustainability accounting metrics when preparing disclosures on the sustainability topics identified herein.

As appropriate—and consistent with Rule 12b-20[6]—when disclosing a sustainability topic identified by this Standard, companies should consider including a narrative description of any material factors necessary to ensure completeness, accuracy, and comparability of the data reported. Where not addressed by the specific accounting metrics, but relevant, the registrant should discuss the following, related to the topic:

- The registrant's **strategic approach** to managing performance on material sustainability issues;
- The registrant's **relative performance** with respect to its peers;
- The **degree of control** the registrant has;
- Any measures the registrant has undertaken or plans to undertake to improve performance; and
- Data for the registrant's **last three completed fiscal years** (when available).

SASB recommends that registrants use SASB Standards specific to their primary industry as identified in the Sustainable Industry Classification System (SICS™). If a registrant generates significant revenue from multiple industries, SASB recommends that it also consider sustainability topics that SASB has identified for those industries and disclose the associated SASB accounting metrics.

[6] SEC Rule 12b-20: "In addition to the information expressly required to be included in a statement or report, there shall be added such further material information, if any, as may be necessary to make the required statements, in the light of the circumstances under which they are made, not misleading."

In disclosing to SASB Standards, it is expected that registrants disclose with the same level of rigor, accuracy, and responsibility as they apply to all other information contained in their SEC filings.

Users of the SASB Standards

The SASB Standards are intended to provide guidance for companies that engage in public offerings of securities registered under the Securities Act of 1933 (the Securities Act) and those that issue securities registered under the Securities Exchange Act of 1934 (the Exchange Act),[7] for use in SEC filings, including, without limitation, annual reports on Form 10-K (Form 20-F for foreign issuers), quarterly reports on Form 10-Q, current reports on Form 8-K, and registration statements on Forms S-1 and S-3. Disclosure with respect to the SASB Standards is not required or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Scope of Disclosure

Unless otherwise specified, SASB recommends:

- That a registrant disclose on sustainability issues and metrics for itself and for entities that are consolidated for financial reporting purposes as defined by accounting principles generally accepted in the United States for consistency with other accompanying information within SEC filings;[8]
- That for consolidated entities, disclosures be made, and accounting metrics calculated, for the whole entity, regardless of the size of the minority interest; and
- That information from unconsolidated entities not be included in the computation of SASB accounting metrics. A registrant should disclose, however, information about unconsolidated entities to the extent that the registrant considers the information necessary for investors to understand the effect of sustainability topics on the company's financial condition or operating performance (typically, this disclosure would be limited to risks and opportunities associated with these entities).

Reporting Format

Use of Financial Data

In instances where accounting metrics, activity metrics, and technical protocols in this standard incorporate financial data (e.g., revenues, cost of sales, expenses recorded and disclosed for fines, etc.), such financial data shall be prepared in accordance with the accounting principles generally accepted in the United States of America ("US GAAP") and be consistent with the corresponding financial data reported within the registrant's SEC filings. Should accounting metrics, activity metrics and technical protocols in this standard incorporate disclosure of financial data

[7] Registration under the Securities Exchange Act of 1934 is required (1) for securities to be listed on a national securities exchange such as the New York Stock Exchange, the NYSE Amex, and the NASDAQ Stock Market or (2) if (A) the securities are equity securities and are held by more than 2,000 persons (or 500 persons who are not accredited investors) and (B) the company has more than $10 million in assets.
[8] See US GAAP consolidation rules (Section 810).

that is not prepared in accordance with US GAAP, the registrant shall disclose such information in accordance with the SEC Regulation G.

Activity Metrics and Normalization

SASB recognizes that normalizing accounting metrics is important for the analysis of SASB disclosures.

SASB recommends that a registrant disclose any basic business data that may assist in the accurate evaluation and comparability of disclosure, to the extent that they are not already disclosed in the Form 10-K (e.g., revenue, EBITDA, etc.).

Such data—termed "activity metrics"—may include high-level business data such as total number of employees, quantity of products produced or services provided, number of facilities, or number of customers. It may also include industry-specific data such as plant capacity utilization (e.g., for specialty chemical companies), number of transactions (e.g., for Internet media and services companies), hospital bed days (e.g., for health care delivery companies), or proven and probable reserves (e.g., for oil and gas exploration and production companies).

Activity metrics disclosed should:

- Convey contextual information that would not otherwise be apparent from SASB accounting metrics.
- Be deemed generally useful for an investor relying on SASB accounting metrics in performing their own calculations and creating their own ratios.
- Be explained and consistently disclosed from period to period to the extent they continue to be relevant. However, a decision to make a voluntary disclosure in one period does not obligate a continuation of that disclosure if it is no longer relevant or if a better metric becomes available.[9]

Where relevant, SASB recommends specific activity metrics that—at a minimum—should accompany SASB accounting metric disclosures.

ACTIVITY METRIC	CATEGORY	UNIT OF MEASURE	CODE
Number of units sold	Quantitative	Number	RR0104-A
Total storage capacity of batteries sold	Quantitative	Megawatts (MW)	RR0104-B
Total energy production capacity of fuel cells sold	Quantitative	Megawatts (MW)	RR0104-C

Units of Measure

Unless specified, disclosures should be reported in International System of Units (SI units).

[9] *Improving Business Reporting: Insights into Enhancing Voluntary Disclosures*, FASB Business Reporting Research Project, January 29, 2001.

Uncertainty

SASB recognizes that there may be inherent uncertainty when disclosing certain sustainability data and information. This may be related to variables such as the reliance on data from third-party reporting systems and technologies, or the unpredictable nature of climate events. Where uncertainty around a particular disclosure exists, SASB recommends that the registrant should consider discussing its nature and likelihood.

Estimates

SASB recognizes that scientifically based estimates, such as the reliance on certain conversion factors or the exclusion of *de minimis* values, may occur for certain quantitative disclosures. Where appropriate, SASB does not discourage the use of such estimates. When using an estimate for a particular disclosure, SASB expects that the registrant discuss its nature and substantiate its basis.

Timing

Unless otherwise specified, disclosure shall be for the registrant's fiscal year.

Limitations

There is no guarantee that SASB Standards address all sustainability impacts or opportunities associated with a sector, industry, or company, and therefore, a company must determine for itself the topics—sustainability-related or otherwise—that warrant discussion in its SEC filings.

Disclosure under SASB Standards is voluntary. It is not intended to replace any legal or regulatory requirements that may be applicable to user operations. Where such laws or regulations address legal or regulatory topics, disclosure under SASB Standards is not meant to supersede those requirements. Disclosure according to SASB Standards shall not be construed as demonstration of compliance with any law, regulation, or other requirement.

SASB Standards are intended to be aligned with the principles of materiality enforced by the SEC. However, SASB is not affiliated with or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Forward-Looking Statements

Disclosures on sustainability topics can involve discussion of future trends and uncertainties related to the registrant's operations and financial condition, including those influenced by external variables (e.g., environmental, social, regulatory, and political). Companies making such disclosures should familiarize themselves with the safe harbor provisions of Section 27A of the Securities Act and Section 21E of the Exchange Act, which preclude civil liability for material misstatements or omissions in such statements if the registrant takes certain steps, including, among other things, identifying the disclosure as "forward-looking" and accompanying such disclosure with "meaningful cautionary statements identifying important factors that could cause actual results to differ materially from those in the forward-looking statements."

The following sections contain the disclosure guidance associated with each accounting metric such as guidance on definitions, scope, accounting, compilation, and presentation.

The term "shall" is used throughout this document to indicate those elements that reflect requirements of the Standard. The terms "should" and "may" are used to indicate guidance, which, although not required, provides a recommended means of disclosure.

Table 1. Sustainability Disclosure Topics & Accounting Metrics

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Energy Management	Total energy consumed, percentage grid electricity, percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	RR0104-01
Workforce Health & Safety	(1) Total recordable injury rate (TRIR) and (2) fatality rate	Quantitative	Rate	RR0104-02
	Discussion of efforts to assess, monitor, and reduce exposure of workforce to human health hazards	Discussion and Analysis	n/a	RR0104-03
Product Efficiency	Average storage capacity of batteries, by product application and technology type	Quantitative	Specific energy (Wh/kg)	RR0104-04
	Average energy efficiency of fuel cells as (1) electrical efficiency and (2) thermal efficiency, by product application and technology type	Quantitative	Percentage (%)	RR0104-05
	Average battery efficiency as coulombic efficiency, by product application and technology type	Quantitative	Percentage (%)	RR0104-06
	Average operating lifetime of fuel cells, by product application and technology type	Quantitative	Hours (h)	RR0104-07
	Average operating lifetime of batteries, by product application and technology type	Quantitative	Number of cycles	RR0104-08
Product End-of-life Management	Percentage of products sold that are recyclable or reusable	Quantitative	Percentage (%) by weight	RR0104-09
	Weight of end-of-life material recovered, percentage of recovered materials that are recycled	Quantitative	Metric tons (t), Percentage (%)	RR0104-10
	Discussion of approach to manage use, reclamation, and disposal of hazardous materials	Discussion and Analysis	n/a	RR0104-11
Materials Sourcing	Percentage of materials costs for items containing critical materials	Quantitative	Percentage (%)	RR0104-12
	Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free	Quantitative	Percentage (%)	RR0104-13
	Discussion of the management of risks associated with the use of critical materials and conflict minerals	Discussion and Analysis	n/a	RR0104-14

Energy Management

Description

Manufacturing and research and development (R&D) in the Fuel Cells & Industrial Batteries industry requires significant energy consumption to power cooling, ventilation, lighting, and product-testing systems. Purchased electricity can represent a major share of the energy sources used in the industry and can account for a notable proportion of the total cost of materials and value added. Various sustainability factors are contributing to an increase in the cost of conventional electricity while making alternative sources cost-competitive. These factors include greenhouse gas (GHG) emissions pricing, incentives for energy efficiency and renewable energy, and risks associated with nuclear energy and its increasingly limited license to operate. Energy efficiency efforts can have a significant positive impact on operational efficiency and profitability, especially given the fact that many companies operate on relatively low or negative margins. By improving the efficiency of the manufacturing process and exploring alternative energy sources, including using their own products to power their facilities, fuel cell and industrial battery companies can reduce both their indirect environmental impacts and their operating expenses. These reductions can improve profit margins and, in turn, can help improve the commercial viability of this industry's products.

Accounting Metrics

RR0104-01. Total energy consumed, percentage grid electricity, percentage renewable

.01 The registrant shall disclose total energy consumption from all sources as an aggregate figure in gigajoules or their multiples.

- The scope includes energy purchased from sources external to the organization or produced by the organization itself (self-generated).
- The scope includes only energy consumed by entities owned or controlled by the organization.
- The scope includes energy from all sources including direct fuel usage, purchased electricity, and heating, cooling, and steam energy.

.02 In calculating energy consumption from fuels and biofuels, the registrant shall use higher heating values (HHV), also known as gross calorific values (GCV), which are directly measured or taken from the Intergovernmental Panel on Climate Change (IPCC), the U.S. Department of Energy (DOE), or the U.S. Energy Information Administration (EIA).

.03 The registrant shall disclose purchased grid electricity consumption as a percentage of its total energy consumption.

.04 The registrant shall disclose renewable energy consumption as a percentage of its total energy consumption.

.05 The scope of renewable energy includes renewable fuel the registrant consumes and renewable energy the registrant directly produces, purchases through a renewable power purchase agreement (PPA) that explicitly

includes renewable energy certificates (RECs), or for which Green-e Energy Certified RECs are paired with grid electricity.

- For any renewable electricity generated on-site, any RECs must be retained (i.e., not sold) and retired on behalf of the registrant in order for the registrant to claim them as renewable energy.
- For renewable PPAs, the agreement must explicitly include and convey that RECs be retained and retired on behalf of the registrant in order for the registrant to claim them as renewable energy.
- The renewable portion of the electricity grid mix that is outside of the control or influence of the registrant is excluded from disclosure.[10]
- Renewable energy is defined as energy from sources that are replenished at a rate greater than or equal to their rate of depletion, consistent with the U.S. Environmental Protection Agency's (EPA) definitions, such as geothermal, wind, solar, hydro, and biomass.

.06 For the purposes of this disclosure, the scope of renewable energy from hydro sources is limited to those that are certified by the Low Impact Hydropower Institute or are eligible for a state Renewable Portfolio Standard.

.07 For the purposes of this disclosure, the scope of renewable energy from biomass sources is limited to the following:

- Energy from biomass sources that meets at least one of the following criteria:
  - Certification to a third-party standard (e.g., Forest Stewardship Council, Sustainable Forest Initiative, Programme for the Endorsement of Forest Certification, or American Tree Farm System);
  - Classification as an "eligible renewable" according to the Green-e Energy National Standard Version 2.5 (2014); or
  - Eligibility for a state Renewable Portfolio Standard.

.08 The registrant shall apply conversion factors consistently for all data reported under this disclosure, such as the use of HHVs for fuel usage (including biofuels) and conversion of kWh to gigajoules (for energy data including electricity from solar or wind energy).

.09 The registrant may choose to disclose the amount of energy that it generates in excess of what it consumes and is net metered through an electric utility.

[10] SASB recognizes that RECs reflect the environmental attributes of renewable energy that have been introduced to the grid.

Workforce Health & Safety

Description

Fuel cell and industrial battery manufacturing workers may be exposed to hazardous substances or workplace accidents that can have chronic or acute health impacts. Chronic health impacts can develop as a result of repeated or prolonged exposure to hazardous substances. Since lead is a key component in many traditional batteries and is absorbed into the body by ingestion or inhalation, battery plant workers can be subject to lead toxicity, which can have a variety of physical and mental health impacts. While injury rates are generally low in the industry, relative to others, companies have faced regulatory action from violations of health and safety standards, some of which have been repeat violations. Companies could also face litigation as a result of fatalities or chronic health impacts from working in fuel cell and battery manufacturing or recycling facilities. Companies that develop a strong safety culture, including through providing health and safety training, protective gear, improved ventilation, and regular health monitoring, can improve workforce health and safety performance and mitigate regulatory and litigation risks.

Accounting Metrics

RR0104-02. (1) Total recordable injury rate (TRIR) and (2) fatality rate

.10 Registrants whose workforce is entirely U.S.-based shall disclose its total recordable injury rate (TRIR) and fatality rate as calculated and reported in the Occupational Safety and Health Administration's (OSHA) Form 300.

- OSHA guidelines provide details on determining whether an event is a recordable occupational incident and definitions for exemptions for incidents that occur in the work environment but are not occupational.

.11 Registrants whose workforce includes non-U.S.-based employees shall calculate their TRIR and fatality rate according to the U.S. Bureau of Labor Statistics guidance and/or using the U.S. Bureau of Labor Statistics calculator.

.12 The registrant shall disclose its TRIR and fatality rate for all employees, including direct full-time employees, contract employees, and seasonal and migrant employees.

.13 The scope includes all employees, domestic and foreign.

.14 Rates shall be calculated as: (statistic count / total hours worked)*200,000.

RR0104-03. Discussion of efforts to assess, monitor, and reduce exposure of workforce to human health hazards

.15 The registrant shall discuss efforts to assess, monitor, and reduce the exposure of employees to human health hazards including, but not limited to, solvents, corrosives, lead (and its compounds), arsenic (and its compounds), cadmium, and sulfuric acid, as well as known or suspected carcinogens, teratogens, and mutagens, and efforts to reduce the occurrence of events including, but not limited to, fires, explosions, freeze burns, and electrocution.

.16 The registrant shall describe its management approach in the context of short-term (i.e., acute) risks and long-term (i.e., chronic) risks.

.17 Relevant efforts to discuss include, but are not limited to, risk assessments, risk monitoring, participation in long-term health studies, implementation of technology to control worker exposure, worker use of personal protective equipment (PPE), automation of processes, and phasing out, substituting, or using alternative materials.

.18 The registrant shall include a description of risk-monitoring policies as they apply to workforce lead exposure, including the monitoring of workforce blood lead levels (BLL) where lead exposure may exist.

.19 The scope of the workforce shall focus on employees and contract employees in manufacturing or recycling plants but should discuss other members of the workforce as relevant.

.20 The registrant should discuss company policies regarding maximum workforce BLL thresholds and testing frequencies, including, but not limited to, the following aspects:

- How the registrant ensures compliance with maximum workforce BLL thresholds and testing frequencies as established by regulatory agencies and governmental or nongovernmental organizations, such as OSHA and the American Conference of Governmental Industrial Hygenists (ACGIH);
- Whether any elements of company policies are more stringent than regulatory requirements;
- Whether policies differ across locations with varying regulatory requirements; and
- How policies are responsive to evolving regulatory requirements.

.21 The registrant should discuss its performance in adhering to maximum workforce BLL thresholds and testing frequencies as established by company policies and/or applicable regulations, including any legal or regulatory fines or settlements and instances of non-compliance.

Product Efficiency

Description

While fuel cells and batteries may be inherently cleaner and more efficient than traditional sources of energy, firms may still improve characteristics of their products through design decisions and win a competitive advantage in capturing a larger share of this growing market. Both customer demand and regulatory requirements are increasing for energy-efficient products with lower environmental impacts and lower total cost of ownership. The widespread adoption of fuel cell technologies, in particular, may be limited because of their high costs relative to competing energy sources. Therefore, design decisions in the Fuel Cells & Industrial Batteries industry that drive energy and thermal efficiency and enhance storage capacities can lower barriers to adoption. As the rate of adoption of fuel cells and industrial batteries increases, it will become even more important to ensure that product design is maximized for efficient energy production or storage. In particular, advances in battery technology to increase storage capabilities and improve charging efficiencies, while lowering costs, are critical for the integration of renewable energy technologies into the grid. Fuel cell and industrial battery manufacturers that are able to improve efficiency in the use phase will be able to satisfy growing demand, pressured by stricter environmental regulations, high energy costs, and customer preferences.

Accounting Metrics

RR0104-04. Average storage capacity of batteries, by product application and technology type

.22 The registrant shall disclose the average storage capacity of batteries by product application and technology type, weighted by unit sales volume per product application and technology type.

- Storage capacity shall be measured as the specific energy, or gravimetric energy density, of batteries, and is calculated as the ratio of nominal energy in watt-hours to the mass of the product in kilograms: watt-hours / kilograms (Wh/kg).

.23 The registrant shall measure and disclose performance in accordance with the applicable product application and/or technology type standard(s), and shall disclose the standard(s) utilized for performance measurement.

- Applicable standard(s) may include SAE J240—Automotive storage batteries and SAE J2185—Heavy-duty storage batteries.

.24 The registrant shall disclose performance by the following application types, where applicable: portable, motive, stationary, and "all other," each further categorized by the following technology types, where applicable: lead-based, nickel-based, lithium-based, sodium-based, and "all other."

- The registrant may include additional categories of application types and/or technology types where appropriate, including categories for new products with low sales volumes but strategic importance in terms of product efficiency or other attributes.

RR0104-05. Average energy efficiency of fuel cells as (1) electrical efficiency and (2) thermal efficiency, by product application and technology type

.25 The registrant shall disclose the average energy efficiency of fuel cells as (1) electrical efficiency and (2) thermal efficiency, weighted by unit sales volume per product application and technology type.

- Electrical efficiency is calculated as net electricity produced divided by total fuel energy input.
- Thermal efficiency is calculated as net useful power output divided by total fuel energy input.
- The registrant shall use lower heating values (LHV) in the calculation of electrical efficiency and thermal efficiency, and shall disclose the heating values used.

.26 The registrant shall measure and disclose electrical and thermal efficiency in accordance with standard(s) applicable to the product application and/or technology type.

- Applicable standard(s) may include IEC 62282-3-200—Stationary fuel cell power systems and SAE J2615—Testing Performance of Fuel Cell Systems for Automotive Applications.
- The registrant shall disclose the standard(s) utilized for energy efficiency measurements.

.27 The registrant shall disclose electrical and thermal efficiency by the following application types, where applicable: portable, motive, stationary, and "all other," each further categorized by the following technology types, where applicable: direct methanol (DMFC), polymer electrolyte (PEM), alkaline (AFC), phosphoric acid (PAFC), molten carbonate (MCFC), solid oxide fuel cell (SOFC), and "all other."

- The registrant may include additional categories of application types and/or technology types where appropriate, including categories for new products with low sales volumes but strategic importance in terms of product efficiency or other attributes.

.28 The registrant should disclose any other fuel cell outputs that have economic value (e.g., hydrogen), including an appropriate measurement of sales-weighted average value, by product application and technology type.

RR0104-06. Average battery efficiency as coulombic efficiency, by product application and technology type

.29 The registrant shall disclose the average energy efficiency of batteries as coulombic efficiency, weighted by unit sales volume per product application and technology type.

- Coulombic efficiency is calculated as energy removed from a battery during discharge divided by the energy used during charging to restore the original capacity.

.30 The registrant shall measure and disclose coulombic efficiency in accordance with standard(s) applicable to the product application and/or technology type.

- Applicable standard(s) may include SAE J240—Automotive storage batteries and SAE J2185—Heavy-duty storage batteries.

.31 The registrant shall disclose coulombic efficiency by the following application types, where applicable: portable, motive, stationary, and "all other," each further categorized by the following technology types, where applicable: lead-based, nickel-based, lithium-based, sodium-based, and "all other."

- The registrant may include additional categories of application types and/or technology types where appropriate, including categories for new products with low sales volumes but strategic importance in terms of product efficiency or other attributes.

RR0104-07. Average operating lifetime of fuel cells, by product application and technology type

.32 The registrant shall disclose the average operating lifetime of fuel cells, weighted by unit sales volume per product application and technology type.

- Operating lifetime of fuel cells is calculated as operating hours until 20% net power degradation occurs.

.33 The registrant shall measure and disclose operating lifetime in accordance with standard(s) applicable to the product application and/or technology type.

- Applicable standard(s) may include IEC 62282-3-200—Stationary fuel cell power systems and SAE J2615—Testing Performance of Fuel Cell Systems for Automotive Applications.

.34 The registrant shall disclose operating lifetime by the following application types, where applicable: portable, motive, stationary, and "all other," each further categorized by the following technology types, where applicable: direct methanol (DMFC), polymer electrolyte (PEM), alkaline (AFC), phosphoric acid (PAFC), molten carbonate (MCFC), solid oxide fuel cell (SOFC), and "all other."

- The registrant may include additional categories of application types and/or technology types, where appropriate, including categories for new products with low sales volumes but strategic importance in terms of product efficiency or other attributes.

RR0104-08. Average operating lifetime of batteries, by product application and technology type

.35 The registrant shall disclose the average operating lifetime of batteries, weighted by unit sales volume per product application and technology type.

- The operating lifetime of batteries is calculated as the number of times the battery can be fully charged and discharged, or "cycles," until 20% capacity degradation occurs.

.36 The registrant shall measure and disclose operating lifetime in accordance with standard(s) applicable to the product application and/or technology type.

- Applicable standard(s) may include SAE J240—Automotive storage batteries and SAE J2185—Heavy-duty storage batteries.

.37 The registrant shall disclose performance by the following application types, where applicable: portable, motive, stationary, and "all other," each further categorized by the following technology types, where applicable: lead-based, nickel-based, lithium-based, sodium-based, and "all other."

- The registrant may include additional categories of application types and/or technology types where appropriate, including categories for new products with low sales volumes but strategic importance in terms of product efficiency or other attributes.

Product End-of-life Management

Description

As the rate of adoption for fuel cells and industrial batteries increases and more products reach their end of life, it will become increasingly important to ensure that product design is maximized for end-of-life management and materials efficiency. Fuel cells and batteries contain hazardous materials, which can leach into the environment if these products are improperly disposed of. This can pose significant human health and environmental risks, with possible regulatory impacts for companies in some regions. The emergence of several laws regarding the end-of-life phase of batteries has recently heightened the importance of the issue, creating potential added costs of managing risks as well as opportunities through regulatory incentives. Effective design for disassembly and reuse or recycling will be a key element for ramping up these recovery rates in order to reduce the lifecycle impacts of fuel cells and batteries and mitigate the strain of new production on natural resources. Furthermore, given the input price volatility and resource constraints of materials such as platinum, fuel cell and industrial battery companies that are able to develop take-back and recycling systems and reuse some of the recovered materials in manufacturing are likely to increase their long-term operational efficiency and improve their risk profile.

Accounting Metrics

RR0104-09. Percentage of products sold that are recyclable or reusable

.38 The registrant shall disclose the percentage of products, by weight (in metric tons), that are reusable or recyclable, where:

- "Reusable" is defined as a product or packaging that has been conceived and designed to accomplish, within its lifecycle, a certain number of trips, rotations, or uses for the same purpose for which it was conceived, consistent with definitions in ISO 14021:1999, *Environmental labels and declarations—Self-declared environmental claims (Type II environmental labelling)*.

- "Recyclable" is defined a product or packaging that can be diverted from the waste stream through available processes and programs and can be collected, processed, and returned to use in the form of raw materials or products, consistent with definitions in ISO 14021:1999, *Environmental labels and declarations—Self-declared environmental claims (Type II environmental labelling)*.

.39 For products or product materials that are partially made of recyclable or reusable materials, the registrant shall classify the portion of the material that is recyclable or reusable based on a calculation (or estimate, where appropriate) of the weight of each portion.

.40 A product or its components shall be considered recyclable or reusable if this claim is aligned with 16 CFR Part 260, Guides for the Use of Environmental Marketing Claims; Final Rule (also known as the "FTC Green Guides"), including the following elements:

- A product or package shall not be marketed as recyclable unless it can be collected, separated, or otherwise recovered from the waste stream through an established recycling program for reuse or use in manufacturing or assembling another item.

- When recycling facilities are available to a substantial majority (i.e., 60 percent) of consumers, communities where the item is sold, or commercial and industrial customers through established collection infrastructure (public or private), the registrant may consider the product (or product component) recyclable without a qualification.

- When recycling facilities are available to less than a substantial majority of customers or communities where the product is sold, the registrant shall only consider the product (or product components) recyclable if it makes the appropriate qualification to its customers.

- For items that are partially made of recyclable components, the registrant shall only consider those components recyclable if (a) it clearly and prominently qualifies the recyclable claim to avoid deception about which portions are recyclable, and (b) no components significantly limit the ability to disassemble and recycle the product or components of the product (e.g., the size, shape, or assembly method).

RR0104-10. Weight of end-of-life material recovered, percentage of recovered materials that are recycled

.41 The registrant shall disclose the weight, in metric tons, of materials recovered, including those recovered through recycling services, product take-back programs, and refurbishment services, where:

- The scope of disclosure shall include products, materials, and parts at the end of their useful life that would have otherwise been disposed of as waste or used for energy recovery, but have instead been collected.

- The scope of disclosure shall include both materials physically handled by the registrant and materials of which the registrant does not take physical possession, but for which it has contracted with a third party the task of collection for the express purpose of reuse, recycling, or refurbishment.

- The scope of disclosure excludes products and parts that are in warranty and have been collected for repairs.

.42 The percentage recycled shall be calculated as the weight of incoming material that was reused or reclaimed, plus the weight of material recycled or remanufactured (through treatment or processing) by the registrant, plus the weight of material sent externally for further recycling, divided by the total weight of incoming recovered material, where:

- A material is recycled if it is used, reused, or reclaimed.

- Reclaimed materials are defined as materials processed to recover or regenerate a usable product.

- Reused materials are defined as recovered products or components of products that are used for the same purpose for which they were conceived.

- Recycled and remanufactured materials are defined as waste materials that have been reprocessed or treated by means of production or manufacturing processes and made into a final product or a component for incorporation into a product.

- Materials sent for further recycling include those materials that are transferred to a third party for the express purpose of reuse, recycling, or refurbishment.

- The scope of recycled and remanufactured products includes primary recycled materials, co-products (outputs of equal value to primary recycled materials), and by-products (outputs of lesser value than primary recycled materials).

- Portions of products and materials that are disposed of in landfills are not considered recycled. Only the portions of products that are directly incorporated into new products, co-products, or by-products shall be included in the percentage recycled.

- Materials incinerated, including for energy recovery, are not considered reused, recycled, or reclaimed. Energy recovery is defined as the use of combustible waste as a means to generate energy through direct incineration, with or without other waste, but with recovery of the heat.

.43 Electronic waste material (e-waste) shall be considered recycled only if the registrant can demonstrate that this material was transferred to entities with third-party certification to a standard for e-waste recycling such as Basel Action Network's e-Steward® standard or the U.S. EPA's Responsible Recycling Practices (R2) standard.

- The registrant shall disclose the standard(s) with which the entities it has transferred e-waste to are compliant.

RR0104-11. Discussion of approach to manage use, reclamation, and disposal of hazardous materials

.44 The registrant shall discuss its strategies to manage the use of hazardous materials, where:

- Hazardous materials include both hazardous secondary materials, per 40 CFR 260.10, and waste that meets the definition of hazardous waste under Subtitle C of the U.S. EPA's Resource Conservation and Recovery Act (RCRA), per 40 CFR 261.3.

- Hazardous materials include those that display the following characteristics: ignitability, corrosivity, reactivity, or toxicity.

.45 The registrant should identify which hazardous materials are used, its strategies to mitigate risks associated with the use of hazardous materials, and its approach to design for reducing use or substituting with non-hazardous materials.

.46 The registrant shall discuss its approach to design and its process to ensure proper and safe disposal and/or reclamation and recycling of hazardous materials at the product end-of-life stage, including take-back programs and direct contracts with third-party hazardous waste reclamation services.

.47 The registrant shall describe the root cause and its corrective actions for any incidences when its use, reclamation, and/or disposal of hazardous materials deviated from its expected outcomes, such as those resulting in a release to the environment, regulatory non-compliance, and/or human health and safety impacts.

Materials Sourcing

Description

Manufacturing certain types of industrial batteries and fuel cells requires an available supply of materials such as lithium, cobalt, nickel, and platinum. In some applications, gold, tantalum, and tin may be necessary to their functionality or production. Access to these materials is critical for the continuous development and scaling of clean energy technologies like fuel cells and industrial batteries. Limited global resources of these materials, as well as their concentration in particular countries that may have poor governance structures or are the subject of geopolitical tensions, expose fuel cell and industrial battery companies to the risk of supply-chain disruptions and input-price increases or volatility. Moreover, a company's reputation can be damaged if it uses gold, tantalum, tin, or other minerals originating from conflict zones. Companies face pressure from legislators, nongovernmental organizations, and peers to track and eliminate the use of tin, tantalum, tungsten, and gold responsible for conflict in the Democratic Republic of the Congo. The limited availability of suppliers that can provide certified conflict-free minerals presents supply-constraint risks to companies in the industry, as well as puts upward pressure on material prices. At the same time, competition from other industries that utilize the same critical materials and/or employ fuel cell and battery technologies is likely to exacerbate supply risks. Fuel cell and industrial battery companies with strong supply-chain standards and the ability to adapt to increasing resource scarcity will be better positioned to protect shareholder value. Innovations at the design phase to reduce dependence on some of these materials will help lower this risk. Companies that are able to limit the use of critical and conflict materials, as well as secure their supply of the materials they do use, will not only minimize environmental and social externalities related to extraction but also protect themselves from supply disruptions, volatile input prices, and reputational and regulatory risks.

Accounting Metrics

RR0104-12. Percentage of materials costs for items containing critical materials

.48 The registrant shall calculate the percentage as the materials costs of goods sold, in U.S. dollars, of items that contain critical materials divided by total materials cost of goods sold.

- The scope of disclosure includes materials costs for parts, components, commodities, and associated freight and storage, and excludes those for overhead, labor, recalls, warrantees, or other costs of goods sold.

.49 A critical material is defined, consistent with the National Research Council's "Minerals, Critical Minerals, and the U.S. Economy," as a material that is both essential in use and subject to the risk of supply restriction.

.50 At a minimum, the scope of critical materials includes the following minerals and metals:

- Antimony, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, tantalum, and tungsten;

- Platinum group metals (platinum, palladium, iridium, rhodium, ruthenium, and osmium); and

- Rare earth elements, which include yttrium, scandium, lanthanum, and the lanthanides (cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium).

RR0104-13. Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free

.51 The registrant shall calculate the percentage as the number of tungsten, tin, tantalum, and gold smelters and/or refineries within its supply chain that are verified to be conflict-free divided by the total number of tungsten, tin, tantalum, and gold smelters and/or refineries within its supply chain.

.52 A smelter or refiner is considered to be conflict-free if it can demonstrate compliance with:

- The Electronic Industry Citizenship Coalition (EICC) and Global e-Sustainability Initiatives (GeSI) Conflict-Free Smelter Program (CFSP) assessment protocols.
- The Responsible Jewellery Council's (RJC) Chain-of-Custody (CoC) Standard.
- Due diligence certifications, audits, or programs that are endorsed by the Automotive Industry Action Group (AIAG), including, but not limited to, the iPoint Conflict Minerals Platform.

.53 A smelter or refinery is considered to be within the registrant's supply chain if it supplies, or is approved to supply, tungsten, tin, tantalum, or gold that is contained in any product the registrant manufactures or contracts to be manufactured.

- The scope includes smelters or refineries that supply material directly to the registrant as well as those that supply material to any of its suppliers of raw materials, components, or subassemblies.

RR0104-14. Discussion of the management of risks associated with the use of critical materials and conflict minerals

.54 The registrant shall discuss its strategic approach to managing its risks associated with the use of critical materials and conflict minerals in its products, including physical limits on availability and access, price, and reputational risks, where:

- A critical material is defined, consistent with the National Research Council's "Minerals, Critical Minerals, and the U.S. Economy," as a material that is both essential in use and subject to the risk of supply restriction. At a minimum, the scope of critical materials includes the following minerals and metals defined by the National Research Council:
  - Antimony, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, tantalum, and tungsten;
  - Platinum group metals (platinum, palladium, iridium, rhodium, ruthenium, and osmium); and

    - Rare earth elements, which include yttrium, scandium, lanthanum, and the lanthanides (cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium).

- Conflict minerals are defined as tungsten, tin, tantalum, and gold.

.55 The registrant should identify which materials and minerals present a risk to its operations, which type of risk they represent, and the strategies the registrant uses to mitigate the risk.

.56 For critical materials, relevant strategies to discuss include diversification of suppliers, stockpiling of materials, expenditures in (R&D) for alternative and substitute materials, and investments in recycling technology for critical materials.

.57 For conflict minerals, relevant strategies to discuss include due diligence practices, supply chain auditing, supply chain engagement, and partnerships with industry groups or nongovernmental development organizations.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD®

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

SUSTAINABILITY ACCOUNTING STANDARD
RENEWABLE RESOURCES & ALTERNATIVE ENERGY SECTOR

FORESTRY & LOGGING

Sustainability Accounting Standard

Sustainable Industry Classification System™ (SICS™) #RR0201

Prepared by the
Sustainability Accounting Standards Board®

December 2015
Provisional Standard

FORESTRY & LOGGING

Sustainability Accounting Standard

About SASB

The Sustainability Accounting Standards Board (SASB) provides sustainability accounting standards for use by publicly-listed corporations in the U.S. in disclosing material sustainability information for the benefit of investors and the public. SASB standards are designed for disclosure in mandatory filings to the Securities and Exchange Commission (SEC), such as the Form 10-K and 20-F. SASB is an independent 501(c)3 non-profit organization. Through 2016, SASB is developing standards for 79 industries in 10 sectors.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

Table of Contents

INTRODUCTION

Purpose & Structure

This document contains the SASB Sustainability Accounting Standard (SASB Standard) for the Forestry & Logging industry.

SASB Sustainability Accounting Standards are comprised of **(1) disclosure guidance and (2) accounting standards on sustainability topics** for use by U.S. and foreign public companies in their annual filings (Form 10-K or 20-F) with the U.S. Securities and Exchange Commission (SEC). To the extent relevant, SASB Standards may also be applicable to other periodic mandatory filings with the SEC, such as the Form 10-Q, Form S-1, and Form 8-K.

SASB Standards identify sustainability topics at an industry level, which may constitute material information—depending on a company's specific operating context—for a company within that industry. SASB Standards are intended to provide guidance to company management, which is ultimately responsible for determining which information is material and should therefore be included in its Form 10-K or 20-F and other periodic SEC filings.

SASB Standards provide companies with standardized sustainability metrics designed to communicate performance on industry level sustainability topics. When making disclosure on sustainability topics, companies can use SASB Standards to help ensure that disclosure is standardized and therefore decision-useful, relevant, comparable, and complete.

SASB Standards are intended to constitute "suitable criteria" as defined by AT 101.23–.32[1] and referenced in AT 701[2], as having the following attributes:

- *Objectivity*—Criteria should be free from bias.
- *Measurability*—Criteria should permit reasonably consistent measurements, qualitative or quantitative, of subject matter.
- *Completeness*—Criteria should be sufficiently complete so that those relevant factors that would alter a conclusion about subject matter are not omitted.
- *Relevance*—Criteria should be relevant to the subject matter.

Industry Description

The Forestry & Logging industry consists of companies that own and/or manage natural and planted forestry lands and timber tracts, operate non-retail tree nurseries and rubber plantations, or conduct logging and harvesting operations that produce timber. The industry operates in naturally regenerated and planted forests, which can be company-owned or leased from public or private landowners. Companies typically sell timber to wood products manufacturers, pulp and paper producers, energy producers, and a variety of other customers. The industry's largest U.S.-listed companies primarily operate in and are domiciled in the U.S. and Canada. Some have

[1] http://pcaobus.org/Standards/Attestation/Pages/AT101.aspx#at_101_fn7
[2] http://pcaobus.org/Standards/Attestation/Pages/AT701.aspx

international operations including in Brazil. While some integrated companies may also operate sawmills, wood products facilities, and pulp and paper facilities, sustainability issues arising from these activities are addressed in SASB's Building Products & Furnishings (CN0603) and Pulp & Paper Products (RR0202) industry standards.

Guidance for Disclosure of Sustainability Topics in SEC Filings

1. Industry-Level Sustainability Topics

For the Forestry & Logging industry, SASB has identified the following sustainability disclosure topics:

- Ecosystem Services & Impacts
- Climate Change Adaptation
- Rights of Indigenous Peoples

2. Company-Level Determination and Disclosure of Material Sustainability Topics

Sustainability disclosures are governed by the same laws and regulations that govern disclosures by securities issuers generally. According to the U.S. Supreme Court, a fact is material if, in the event such fact is omitted from a particular disclosure, there is "a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of the information made available."[3,4]

SASB has attempted to identify those sustainability topics that are reasonably likely to have a material effect on the financial condition or operating performance of companies within each SICS industry. SASB recognizes, however, that each company is ultimately responsible for determining what information should be disclosed within the context of Regulation S-K and other guidance.

Regulation S-K, which sets forth certain disclosure requirements associated with Form 10-K and other SEC filings, requires companies, among other things, to describe in the Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) section of Form 10-K "any known trends or uncertainties that have had or that the registrant reasonably expects will have a material favorable or unfavorable impact on net sales or revenues or income from continuing operations. If the registrant knows of events that will cause a material change in the relationship between costs and revenues (such as known future increases in costs of labor or materials or price increases or inventory adjustments), the change in the relationship shall be disclosed."

Furthermore, Instructions to Item 303 state that the MD&A "shall focus specifically on material events and uncertainties known to management that would cause reported financial information not to be necessarily indicative of future operating results or of future financial condition."[2]

The SEC has provided guidance for companies to use in determining whether a trend or uncertainty should be disclosed. The two-part assessment –prescribed by the SEC, based on probability and magnitude, can be applied to the topics included within this standard:

[3] TSC Industries v. Northway, Inc., 426 U.S. 438 (1976).
[4] C.F.R. 229.303(Item 303)(a)(3)(ii).

- First, a company is not required to make disclosure about a known trend or uncertainty if its management determines that such trend or uncertainty is not reasonably likely to occur.
- Second, if a company's management cannot make a reasonable determination of the likelihood of an event or uncertainty, then disclosure is required unless management determines that a material effect on the registrant's financial condition or results of operation is not reasonably likely to occur.

3. Sustainability Accounting Standard Disclosures in Form 10-K

a. Management's Discussion and Analysis

For purposes of comparability and usability, companies should consider making disclosure on sustainability topics in the MD&A, in a sub-section titled **"Sustainability Accounting Standards Disclosures."**[5]

b. Other Relevant Sections of Form 10-K

In addition to the MD&A section, it may be relevant for companies to disclose sustainability information in other sections of Form 10-K, including, but not limited to:

- **Description of business**—Item 101 of Regulation S-K requires a company to provide a description of its business and its subsidiaries. Item 101(c)(1)(xii) expressly requires disclosure regarding certain costs of complying with environmental laws:

Appropriate disclosure also shall be made as to the material effects that compliance with Federal, State and local provisions which have been enacted or adopted regulating the discharge of materials into the environment, or otherwise relating to the protection of the environment, may have upon the capital expenditures, earnings and competitive position of the registrant and its subsidiaries.

- **Legal proceedings**—Item 103 of Regulation S-K requires companies to describe briefly any material pending or contemplated legal proceedings. Instructions to Item 103 provide specific disclosure requirements for administrative or judicial proceedings arising from laws and regulations that target discharge of materials into the environment or that are primarily for the purpose of protecting the environment.
- **Risk factors**—Item 503(c) of Regulation S-K requires filing companies to provide a discussion of the most significant factors that make an investment in the registrant speculative or risky, clearly stating the risk and specifying how a particular risk affects the particular filing company.

c. Rule 12b-20

Securities Act Rule 408 and Exchange Act Rule 12b-20 require a registrant to disclose, in addition to the information expressly required by law or regulation, "such further material information, if any, as may be

[5] SEC [Release Nos. 33-8056; 34-45321; FR-61] Commission Statement about Management's Discussion and Analysis of Financial Condition and Results of Operations: "We also want to remind registrants that disclosure must be both useful and understandable. That is, management should provide the most relevant information and provide it using language and formats that investors can be expected to understand. Registrants should be aware also that investors will often find information relating to a particular matter more meaningful if it is disclosed in a single location, rather than presented in a fragmented manner throughout the filing."

necessary to make the required statements, in light of the circumstances under which they are made, not misleading."

More detailed guidance on disclosure of material sustainability topics can be found in the **SASB Conceptual Framework**, available for download via http://www.sasb.org/approach/conceptual-framework/.

Guidance on Accounting for Sustainability Topics

For each sustainability topic included in the Forestry & Logging industry Sustainability Accounting Standard, SASB identifies accounting metrics.

SASB recommends that each company consider using these sustainability accounting metrics when preparing disclosures on the sustainability topics identified herein.

As appropriate—and consistent with Rule 12b-20[6]—when disclosing a sustainability topic identified by this Standard, companies should consider including a narrative description of any material factors necessary to ensure completeness, accuracy, and comparability of the data reported. Where not addressed by the specific accounting metrics, but relevant, the registrant should discuss the following, related to the topic:

- The registrant's **strategic approach** to managing performance on material sustainability issues;
- The registrant's **relative performance** with respect to its peers;
- The **degree of control** the registrant has;
- Any measures the registrant has undertaken or plans to undertake to improve performance; and
- Data for the registrant's **last three completed fiscal years** (when available).

SASB recommends that registrants use SASB Standards specific to their primary industry as identified in the Sustainable Industry Classification System (SICS™). If a registrant generates significant revenue from multiple industries, SASB recommends that it also consider sustainability topics that SASB has identified for those industries and disclose the associated SASB accounting metrics.

In disclosing to SASB Standards, it is expected that registrants disclose with the same level of rigor, accuracy, and responsibility as they apply to all other information contained in their SEC filings.

Users of the SASB Standards

The SASB Standards are intended to provide guidance for companies that engage in public offerings of securities registered under the Securities Act of 1933 (the Securities Act) and those that issue securities registered under the Securities Exchange Act of 1934 (the Exchange Act),[7] for use in SEC filings, including, without limitation, annual

[6] SEC Rule 12b-20: "In addition to the information expressly required to be included in a statement or report, there shall be added such further material information, if any, as may be necessary to make the required statements, in the light of the circumstances under which they are made, not misleading."

[7] Registration under the Securities Exchange Act of 1934 is required (1) for securities to be listed on a national securities exchange such as the New York Stock Exchange, the NYSE Amex, and the NASDAQ Stock Market or (2) if (A) the securities are equity securities and are held by more than 2,000 persons (or 500 persons who are not accredited investors) and (B) the company has

reports on Form10-K (Form 20-F for foreign issuers), quarterly reports on Form 10-Q, current reports on Form 8-K, and registration statements on Forms S-1 and S-3. Disclosure with respect to the SASB Standards is not required or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Scope of Disclosure

Unless otherwise specified, SASB recommends:

- That a registrant disclose on sustainability issues and metrics for itself and for entities that are consolidated for financial reporting purposes as defined by accounting principles generally accepted in the United States for consistency with other accompanying information within SEC filings;[8]
- That for consolidated entities, disclosures be made, and accounting metrics calculated, for the whole entity, regardless of the size of the minority interest; and
- That information from unconsolidated entities not be included in the computation of SASB accounting metrics. A registrant should disclose, however, information about unconsolidated entities to the extent that the registrant considers the information necessary for investors to understand the effect of sustainability topics on the company's financial condition or operating performance (typically, this disclosure would be limited to risks and opportunities associated with these entities).

Reporting Format

Use of Financial Data

In instances where accounting metrics, activity metrics, and technical protocols in this standard incorporate financial data (e.g., revenues, cost of sales, expenses recorded and disclosed for fines, etc.), such financial data shall be prepared in accordance with the accounting principles generally accepted in the United States of America ("US GAAP") and be consistent with the corresponding financial data reported within the registrant's SEC filings. Should accounting metrics, activity metrics and technical protocols in this standard incorporate disclosure of financial data that is not prepared in accordance with US GAAP, the registrant shall disclose such information in accordance with the SEC Regulation G.

Activity Metrics and Normalization

SASB recognizes that normalizing accounting metrics is important for the analysis of SASB disclosures.

SASB recommends that a registrant disclose any basic business data that may assist in the accurate evaluation and comparability of disclosure, to the extent that they are not already disclosed in the Form 10-K (e.g., revenue, EBITDA, etc.).

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more than $10 million in assets.

[8] See US GAAP consolidation rules (Section 810).

Such data—termed "activity metrics"—may include high-level business data such as total number of employees, quantity of products produced or services provided, number of facilities, or number of customers. It may also include industry-specific data such as plant capacity utilization (e.g., for specialty chemical companies), number of transactions (e.g., for Internet media and services companies), hospital bed days (e.g., for health care delivery companies), or proven and probable reserves (e.g., for oil and gas exploration and production companies).

Activity metrics disclosed should:

- Convey contextual information that would not otherwise be apparent from SASB accounting metrics.
- Be deemed generally useful for an investor relying on SASB accounting metrics in performing their own calculations and creating their own ratios.
- Be explained and consistently disclosed from period to period to the extent they continue to be relevant. However, a decision to make a voluntary disclosure in one period does not obligate a continuation of that disclosure if it is no longer relevant or if a better metric becomes available.[9]

Where relevant, SASB recommends specific activity metrics that—at a minimum—should accompany SASB accounting metric disclosures.

ACTIVITY METRIC	CATEGORY	UNIT OF MEASURE	CODE
Area of forestland owned, leased, and/or managed by the registrant	Quantitative	Acres	RR0201-A
Aggregate standing timber inventory[10]	Quantitative	Cubic meters (m^3)	RR0201-B
Timber harvest volume[11]	Quantitative	Cubic meters (m^3)	RR0201-C

Units of Measure

Unless specified, disclosures should be reported in International System of Units (SI units).

Uncertainty

SASB recognizes that there may be inherent uncertainty when disclosing certain sustainability data and information. This may be related to variables such as the reliance on data from third-party reporting systems and technologies,

[9] *Improving Business Reporting: Insights into Enhancing Voluntary Disclosures*, FASB Business Reporting Research Project, January 29, 2001.

[10] Note to **RR0201-B**—The registrant may additionally note if it uses other units of measure to define its standing timber inventory, and it shall disclose any conversion factors used.

[11] Note to **RR0201-C**—The registrant may additionally note if it uses other units of measure to define its timber harvest volume, and it shall disclose any conversion factors used.

or the unpredictable nature of climate events. Where uncertainty around a particular disclosure exists, SASB recommends that the registrant should consider discussing its nature and likelihood.

Estimates

SASB recognizes that scientifically based estimates, such as the reliance on certain conversion factors or the exclusion of *de minimis* values, may occur for certain quantitative disclosures. Where appropriate, SASB does not discourage the use of such estimates. When using an estimate for a particular disclosure, SASB expects that the registrant discuss its nature and substantiate its basis.

Timing

Unless otherwise specified, disclosure shall be for the registrant's fiscal year.

Limitations

There is no guarantee that SASB Standards address all sustainability impacts or opportunities associated with a sector, industry, or company, and therefore, a company must determine for itself the topics—sustainability-related or otherwise—that warrant discussion in its SEC filings.

Disclosure under SASB Standards is voluntary. It is not intended to replace any legal or regulatory requirements that may be applicable to user operations. Where such laws or regulations address legal or regulatory topics, disclosure under SASB Standards is not meant to supersede those requirements. Disclosure according to SASB Standards shall not be construed as demonstration of compliance with any law, regulation, or other requirement.

SASB Standards are intended to be aligned with the principles of materiality enforced by the SEC. However, SASB is not affiliated with or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Forward-Looking Statements

Disclosures on sustainability topics can involve discussion of future trends and uncertainties related to the registrant's operations and financial condition, including those influenced by external variables (e.g., environmental, social, regulatory, and political). Companies making such disclosures should familiarize themselves with the safe harbor provisions of Section 27A of the Securities Act and Section 21E of the Exchange Act, which preclude civil liability for material misstatements or omissions in such statements if the registrant takes certain steps, including, among other things, identifying the disclosure as "forward-looking" and accompanying such disclosure with "meaningful cautionary statements identifying important factors that could cause actual results to differ materially from those in the forward-looking statements."

The following sections contain the disclosure guidance associated with each accounting metric such as guidance on definitions, scope, accounting, compilation, and presentation.

The term "shall" is used throughout this document to indicate those elements that reflect requirements of the Standard. The terms "should" and "may" are used to indicate guidance, which, although not required, provides a recommended means of disclosure.

Table 1. Sustainability Disclosure Topics & Accounting Metrics

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Ecosystem Services & Impacts	Area of forestland certified to a third-party forest management standard, percentage certified to each standard[12, 13]	Quantitative	Acres, Percentage (%)	RR0201-01
	Area of forestland with protected conservation status	Quantitative	Acres	RR0201-02
	Area of forestland in endangered species habitat	Quantitative	Acres	RR0201-03
	Discussion of approach to optimizing opportunities from ecosystem services provided by forestlands	Discussion and Analysis	n/a	RR0201-04
Rights of Indigenous Peoples	Area of forestland in indigenous land	Quantitative	Acres	RR0201-05
	Discussion of engagement processes and due diligence practices with respect to human rights, indigenous rights, and the local community	Discussion and Analysis	n/a	RR0201-06
Climate Change Adaptation	Discussion of strategy to manage opportunities for and risks to forest management and timber production presented by climate change	Discussion and Analysis	n/a	RR0201-07

[12] Note to **RR0201-01-A**—For any forest management certifications that were suspended or terminated, the registrant shall disclose the number, associated acreage, and stated reason for suspension or termination.
[13] Note to **RR0201-01-B**—The registrant shall describe forestry management practices for non-certified forestlands.

Ecosystem Services & Impacts

Description

Along with their timber output, forests provide other valuable ecosystem services including carbon sequestration, wildlife habitat and biodiversity, water purification and storage, soil formation, and recreational opportunities. In some instances, there may be opportunities to generate additional revenue from non-timber ecosystem services, such as recreational fees. However, certain forestry management practices could adversely affect water quality, wildlife habitat, and biodiversity in the absence of action to mitigate such impacts. In developed economies such as the U.S. and Canada, stringent regulations related to water quality and endangered species protection, as well as harvesting rights that are contingent on environmental preservation, can create operational risks for companies. Some U.S.-listed companies have forestry operations in countries which may lack effective legal frameworks or incentives for sustainable forestry management, posing higher risks of illegal logging, deforestation, and other unsustainable practices. Protecting or enhancing ecosystem services within forestlands could mitigate reputational, demand, and operational risks related to the potential adverse environmental impacts of forestry. Companies increasingly utilize third-party certification to demonstrate sustainable forest management practices that serve to enhance the value and productivity of their forest assets, as well as to meet rising customer demand for sustainably produced forest products.

Accounting Metrics

RR0201-01. Area of forestland certified to a third-party forest management standard, percentage certified to each standard

.01 The registrant shall disclose its total forestland area, in acres, that is certified to a third-party forest management standard, where:

- The scope includes forestlands owned, leased, and/or managed by the registrant.
- Third-party forest management standards are those that certify that forests are harvested in a sustainable manner and cover environmental and social criteria including legal compliance, land rights, community and worker relations, environmental impact and biodiversity, forest management plans and practices, land use, wildlife habitat conservation, and water conservation, among others.
- Third-party forest management certifications include, but are not limited to, those promulgated by the following organizations (or the equivalent):
  - American Tree Farm System (ATFS)
  - Forest Stewardship Council (FSC)
  - Programme for the Endorsement of Forest Certification (PEFC)
  - Forest certification systems endorsed by the PEFC
  - Sustainable Forest Initiative (SFI)

.02 If a forestland area is certified to multiple certification standards, the registrant shall not account for the acreage more than once when calculating the total forestland area certified to a third-party forest management standard.

.03 The registrant shall disclose the percentage of the total certified forestland that is certified to each forest management standard (e.g., FSC, SFI, PEFC, and ATFS) and indicate the associated certification(s) (e.g., FSC Forest Management Certification, SFI Forest Management Standard, PEFC Sustainable Forest Management certification, or ATFS Individual Third-Party certification).

- The registrant shall calculate the percentage of forestland certified to each forest management standard as the number of acres that are third-party certified to the respective standard divided by the total number of certified acres owned, leased, and/or managed by the registrant.

.04 The registrant shall disclose the percentage of acres that are certified to multiple certification schemes.

Note to **RR0201-01-A**

.05 The registrant shall disclose whether any forest management certifications were involuntarily suspended or terminated during the fiscal year (i.e., for failure to meet the standard or resolve major non-conformities).

.06 The registrant shall disclose which certification(s) was suspended or terminated, the total acreage of land for which certification was suspended or terminated, the reason stated by the certification body or bodies for why the certification was suspended or terminated, and any other explanatory information about the suspension or termination.

.07 The registrant should discuss any relevant corrective actions that it has put in place in response to a certification being suspended or terminated.

Note to **RR0201-01-B**

.08 The registrant shall provide a brief description of its forestry management practices implemented for non-certified forestlands owned, leased, and/or managed by the registrant.

.09 The registrant should discuss:

- The topics and criteria addressed by the practices(s), such as forest productivity and health, protection from ecological and biodiversity impacts, protection of water resources, noise impacts, discharges to water, protection of special sites, plantation farming, harvesting techniques, use of monocultures, use of genetically modified organisms (GMO), chemical usage, community involvement, indigenous communities, and aesthetics and recreation, among others.

- The underlying references for its forestry management plan(s) for non-certified forestlands, including the degree to which its forest management practices are aligned with criteria outlined in third-party sustainable forestry management standards and ASTM D7480, *Guide for Evaluating the Attributes of a Forest Management Plan*; whether these references are codes, guidelines, standards, or regulations; and whether they were developed by the registrant, an industry

organization, a third-party organization (e.g., a non-governmental organization), a governmental agency, or some combination of these groups.

- How the registrant enforces the sustainable forestry management plans in its non-certified forestlands, including the type and frequency of inspections.

.10 Where policies and practices to ensure sustainable forest management differ significantly by forestland, the registrant shall describe differences for each non-certified forestland and indicate the percentage of acres to which they were applied.

RR0201-02. Area of forestland with protected conservation status

.11 The registrant shall disclose the area of its owned, leased, and/or managed forestland (by acreage) that has protected conservation status, where an area is considered to have protected conservation status if it is located within any of the following:

- Areas legally designated as protected by government regulation, including national parks, national wildlife refuge sites, wilderness areas, state forests, state parks, and Natura 2000 sites.
- Areas protected by international bodies and/or treaties, including Ramsar Wetlands of International Importance, International Union for Conservation of Nature (IUCN) Protected Areas (categories I-VI), UNESCO World Heritage sites, and Biosphere Reserves recognized within the framework of UNESCO's Man and the Biosphere (MAB) Programme.
- Sites that meet the IUCN's definition of a protected area: "A protected area is a clearly defined geographical space, recognized, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values."
    - These sites may be listed in the World Database of Protected Areas (WDPA) and mapped on ProtectedPlanet.net.

.12 The scope includes areas of conservation status that are actively logged by or for the registrant and excludes areas of conservation status that are exclusively set aside for conservation and are not actively logged.

.13 The registrant may choose to disclose the percentage of the area of forestland with protected conservation status that is certified to a third-party forest management standard.

.14 The registrant should discuss the likelihood of a change to the area of its owned, leased, and/or managed forestland that is considered to have protected conservation status.

.15 The registrant may choose to separately identify forestland areas with additional ecological, biodiversity, or conservation designations, such as those listed by the A-Z Guide of Areas of Biodiversity Importance prepared by the United Nations Environment Programme's World Conservation Monitoring Centre (UNEP-WCMC).

.16 The registrant may choose to provide discussion around forestlands that are located in protected areas but present low risk to biodiversity or ecosystem services. The registrant may choose to provide similar discussion for forestlands located in areas with no official designation of high biodiversity value but that present high biodiversity or ecosystem services risks.

RR0201-03. Area of forestland in endangered species habitat

.17 Forestlands are considered to be in endangered species habitat if a species that is classified by local, state, or federal law as endangered or threatened inhabits the registrant's forestlands.

.18 The scope of disclosure includes forestlands owned, leased, and/or managed by the registrant.

.19 An endangered species is defined in the U.S. Endangered Species Act as any species that is in danger of extinction throughout all or a significant portion of its range.

.20 A threatened species is defined in the U.S. Endangered Species Act as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

.21 Endangered species habitat includes critical habitat areas where the registrant owns, leases, and/or manages forestlands that are officially designated by applicable state and/or federal regulations including:

- The U.S. Endangered Species Act;
- The Canada Species at Risk Act; and
- Applicable regulatory endangered species lists in the regions where the registrant owns, leases, and/or manages forestlands.

.22 The registrant may disclose the types of endangered or threatened species in its forestlands.

.23 The registrant shall disclose whether there is any overlap between the areas identified in RR0201-02 and RR0201-03.

.24 The registrant may choose to provide discussion around forestlands that are located in endangered species habitat, but present low risk to biodiversity or ecosystem services.

.25 The registrant should discuss the likelihood of a change to the area of its owned, leased, and/or managed forestland that is considered to be endangered species habitat, including if:

- There are endangered or threatened species habitat(s) near, but not currently in, the registrant's forestlands, and the likelihood that the habitat(s) could overlap with the registrant's forestlands.
- There are species in or near the registrant's forestlands that are classified as endangered or threatened in non-regulatory lists, but not currently by regulatory lists, and the likelihood that these species may be classified as endangered or threatened by a regulatory endangered species list.
    - Examples of non-regulatory endangered species lists include the IUCN Red List of Threatened Species.

- The current endangered or threatened species habitat in the registrant's forestlands is expected to change and/or expand in the future.
- The registrant should disclose the likelihood of these scenarios occurring and the area of its forestlands that could be affected.

RR0201-04. Discussion of approach to optimizing opportunities from ecosystem services provided by forestlands

.26 The registrant shall discuss its strategy to optimize the opportunities created by the ecosystem services that its forestlands provide, where:

- Ecosystem services are defined by the Millennium Ecosystem Assessment as the benefits obtained from ecosystems, which include provisioning services (i.e., goods or products obtained from ecosystems) such as food, fresh water, timber, and fiber; regulating services (i.e., benefits obtained from an ecosystem's control of natural processes) such as climate, erosion, and pollination; cultural services (i.e., nonmaterial benefits obtained from an ecosystem) such as recreational and spiritual benefits; and supporting services (i.e., services that maintain the other ecosystem services) such as nutrient cycling, primary production, and water cycling.
- Opportunities from effective ecosystem services management can include higher land value, increased productivity and timber yield, direct payments for timber and non-timber forest products, and improved relationships with stakeholders.

.27 For ecosystems services that the registrant currently does not receive direct payments for, the registrant shall describe its approach to managing these ecosystem services. The discussion shall include:

- The type(s) of ecosystem service(s) the registrant currently manages, where types of ecosystem services include, but are not limited to: air quality, soil stabilization and erosion control, and cultural value.
- The registrant's management actions, including decisions about harvesting, management of conservation areas or areas of high biodiversity, or conserving forested watershed.

.28 For the ecosystem services that the registrant does receive direct payments for, the registrant should disclose the amount (in U.S. dollars) the registrant receives for non-timber ecosystem goods and services and the type of compensation it receives, which can include:

- Public payments to landowners (from the government);
- Voluntary payments to landowners (from businesses, individuals, and non-governmental organizations); and
- Compliance-driven payments (payments made to comply with government regulations).

.29 The registrant should disclose whether it expects the revenues received from these non-timber or timber ecosystem services to change in the future and the methods or models used to develop these scenarios, including the use of global models or scientific research provided by governmental and non-governmental organizations.

.30 The registrant should discuss how management of non-timber ecosystem services is expected to affect tree growth and timber yield.

Rights of Indigenous Peoples

Description

Forests contribute directly to the livelihoods of millions of people worldwide. Effective relations and engagement with local communities and indigenous populations can be of critical importance to forestry companies. Communities may be affected by forestry and logging operations as a result of environmental degradation or competition for natural resources such as land and water. The rights of indigenous peoples are being more formally recognized worldwide, which could create risks for companies that poorly manage community relations. Formal disagreements with communities and indigenous populations can affect a company's ability to operate and can cause reputational impacts. Conversely, companies can provide benefits to community stakeholders through employment opportunities, revenue sharing, and increased commerce. Companies can adopt various community engagement strategies to manage the risks and opportunities associated with community rights and interests, such as maintaining positive relations with local stakeholders and accommodating communities' needs. A strong engagement process can mitigate the risk of protests and legal challenges and the loss of the ability to operate on or near indigenous peoples' lands. Sustainable forestry certifications incorporate the considerations of community relations and the rights of indigenous peoples, which can influence reputations and demand for the products of forestry and logging companies.

Accounting Metrics

RR0201-05. Area of forestland in indigenous land

.31 The registrant shall disclose the area (by acreage) of its owned, leased, and/or managed forestlands that are located in areas that are considered to be indigenous peoples' land.

.32 Indigenous lands are defined as those occupied by those who self-identify as indigenous and likely have one or more of the following characteristics based on the working definition of "Indigenous Peoples" adopted by the United Nations:

- Historical continuity with pre-colonial and/or pre-settler societies
- A strong link to territories and surrounding natural resources
- Distinct social, economic, or political systems
- Distinct language, culture, and beliefs
- Forming non-dominant groups of society
- A resolve to maintain and reproduce ancestral environments and systems as distinctive peoples and communities

.33 The registrant should disclose if there are adjacent indigenous communities that may be impacted by the registrant's operations and/or may pose a risk to the registrant's logging operations.

RR0201-06. Discussion of engagement processes and due diligence practices with respect to human rights, indigenous rights, and the local community

.34 Due diligence processes and practices the registrant employs to ensure compliance can include, but are not limited to, impact evaluations, assessment reports, monitoring and audits, processes to receive and respond to public inquiries, partnerships and agreements with indigenous peoples and local communities, community meetings and multi-stakeholder dialogues, or other industry-specific practices.

.35 The registrant shall describe its due diligence practices and procedures with respect to upholding the principles covered in human rights frameworks, such as:

- International Labour Organization (ILO) Declaration on Fundamental Principles and Rights at Work and the fundamental ILO conventions on freedom of association (No. 87), collective bargaining (No. 98), forced labor (No. 29 and No. 105), child labor (No. 138 and No. 182), fair wages (No. 100), and discrimination (No. 111)
- United Nations Guiding Principles on Business and Human Rights, specifically Human Rights Due Diligence (Principle 17a-c)
- United Nations Declaration on the Rights of Indigenous Peoples
- Voluntary Principles on Security and Human Rights
- FSC International Standard Principle 4: Community
- SFI Forest Management Standard Objective 12: Community Involvement and Landowner Outreach
- PEFC International Forestry Management Standard Criterion 6: Maintenance of other socioeconomic functions and conditions

.36 The registrant shall describe its due diligence practices and procedures with respect to indigenous rights of communities in which it operates or intends to operate, including:

- Upholding ILO Convention No. 169
- Use of free, prior, and informed consent (or consultation) processes
- FSC International Standard Principle 3: Indigenous Rights
- SFI Forest Management Standard Objective 8: Recognize and Respect Indigenous Peoples' Rights

.37 The registrant shall describe its processes and practices with respect to the communities in areas where it conducts business, including practices to protect the following principles:

- Economic rights and interests, including the right to employment opportunities, training, fair wages, payment transparency, and respect for infrastructure and agricultural land.
- Environmental rights and interests, including the right to clean local air and water, as well as safe discharge and disposal of waste.

- Social rights and interests, including the right to adequate health care, education, and housing.
- Cultural rights and interests, including the right to protection of places of cultural significance (e.g., sacred sites or burial sites).

.38 The discussion shall include how practices apply to business partners, such as contractors, sub-contractors, suppliers, and joint venture partners.

Additional References

Clifford Hickey and Mark Nelson, *Partnerships Between First Nations and the Forest Sector: A National Survey*, Sustainable Forest Management Network, January 2005.

FSC International Standard

SFI Forest Management Standard

PEFC International Forestry Management Standard

Climate Change Adaptation

Description

Global climate change may create long-term business uncertainty for some forestry companies. Variations in precipitation patterns and temperatures, more frequent extreme weather events and forest fires, and an increased prevalence of tree diseases and pests could adversely impact timberlands. Conversely, climate change could also facilitate forest productivity through increased atmospheric carbon dioxide, a longer growing season, moderating temperatures in high latitudes, greater precipitation, and expanded geographic ranges for some species. Therefore, companies are likely to experience variations in the productivity of their timberlands. Firms can begin to manage climate change's effects by identifying and understanding its potential impacts.

Accounting Metrics

RR0201-07. Discussion of strategy to manage opportunities for and risks to forest management and timber production presented by climate change

.39 The registrant shall discuss the risks and/or opportunities that are presented by climate change scenarios to its owned, leased, and/or managed forestlands, including, where relevant, those presented by:

- Physical impacts including, but not limited to: increased temperatures, changes in growth rates, changes in seasonality, availability of water, pest migration, increased frequency of fires, and increased frequency of extreme weather events.
- Existing and potential legislation and regulation related to climate change, including those that limit emissions, tax emissions, set up cap-and-trade systems, affect the demand for the registrant's products, or otherwise affect the registrant.
- International accords relating to climate change.
- Indirect consequences of regulation or business trends, including legal, technological, or other developments related to climate change.
- Other political and social risks, such as increased harvesting restrictions, or stakeholder perceptions or concerns (e.g., those from local communities, non-governmental organizations, and regulatory agencies).

.40 Disclosure shall be additional but complementary to the SEC's Commission Guidance Regarding Disclosure Related to Climate Change.

.41 For each of the risks and/or opportunities identified, the registrant shall provide the following:

- A description of the risk or opportunity, including an explanation and qualitative assessment of current and anticipated (long-term and short-term) significant risks or opportunities associated with climate change.
    - Disclosure corresponds to CDSB Climate Change Reporting Framework 4.9, 4.10, and 4.11.

- Strategic analysis of the long-term and short-term impact climate change actually and potentially has on the registrant's strategic objectives.
    - Disclosure corresponds to CDSB Climate Change Reporting Framework 4.6.
- The potential impact (direct or indirect) the risk or opportunity may have on the registrant's business, and the projected magnitude of the impact.
    - Where the registrant has quantified the potential financial impacts of the risk or opportunity, it shall disclose this information (Disclosure corresponds to CDSB Climate Change Reporting Framework 4.7.)
- The timeframe in which the risk or opportunity is expected to manifest.
    - Disclosure corresponds to CDSB Climate Change reporting framework 4.11.
- The likelihood that the risk or opportunity will manifest.
- Disclosure corresponds to CDP Climate Change Questionnaire CC5.1 and CC6.1.

.42 The registrant shall discuss how potential climate change risks or opportunities may vary among the following, and how it prioritizes the risks and opportunities identified (disclosure corresponds to CDP Climate Change Questionnaire CC2.1c):

- the geographic regions where the registrant owns, leases, and/or manages forestlands
- the registrant's products, services, and/or markets
- the types of tree species harvested by the registrant
- the registrant's plantation forestlands and its natural forestlands

.43 The registrant shall provide a discussion of the scenarios it uses to determine the risks and opportunities presented by climate change, including:

- The methods or models used to develop these scenarios, including the use of global models or scientific research provided by governmental and non-governmental organizations (e.g., Intergovernmental Panel on Climate Change Climate Scenario Process).

.44 The registrant shall discuss its risk management procedures with respect to climate change risks and opportunities, including:

- How far into the future risks are considered;
- The frequency of monitoring;
- The registrant's alleviation strategies, which may include, but are not limited to, use of insurance; diversifying tree species; actions to strengthen the adaptive capacity of forestlands; strategies to

reduce the risk and intensity of pest, disease, and fire outbreaks; or plans to reduce risk and intensity of potential damage;

- The registrant's adaptation strategies, which may include, but are not limited to, improving ecosystem management and biodiversity, monitoring changes, developing tolerant tree varieties, and optimizing the timing of planting and harvesting.
- The costs associated with these actions; and
    - Disclosure corresponds with CDSB Climate Change Reporting Framework 4.12.
- Disclosure corresponds to CDP Climate Change Questionnaire CC2.1.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD®

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

SUSTAINABILITY ACCOUNTING STANDARD
RENEWABLE RESOURCES & ALTERNATIVE ENERGY SECTOR

PULP & PAPER PRODUCTS

Sustainability Accounting Standard

Sustainable Industry Classification System™ (SICS™) #RR0202

Prepared by the
Sustainability Accounting Standards Board®

December 2015
Provisional Standard

PULP & PAPER PRODUCTS

Sustainability Accounting Standard

About SASB

The Sustainability Accounting Standards Board (SASB) provides sustainability accounting standards for use by publicly-listed corporations in the U.S. in disclosing material sustainability information for the benefit of investors and the public. SASB standards are designed for disclosure in mandatory filings to the Securities and Exchange Commission (SEC), such as the Form 10-K and 20-F. SASB is an independent 501(c)3 non-profit organization. Through 2016, SASB is developing standards for 79 industries in 10 sectors.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org

Table of Contents

INTRODUCTION

Purpose & Structure

This document contains the SASB Sustainability Accounting Standard (SASB Standard) for the Pulp & Paper Products industry.

SASB Sustainability Accounting Standards are comprised of **(1) disclosure guidance and (2) accounting standards on sustainability topics** for use by U.S. and foreign public companies in their annual filings (Form 10-K or 20-F) with the U.S. Securities and Exchange Commission (SEC). To the extent relevant, SASB Standards may also be applicable to other periodic mandatory filings with the SEC, such as the Form 10-Q, Form S-1, and Form 8-K.

SASB Standards identify sustainability topics at an industry level, which may constitute material information—depending on a company's specific operating context—for a company within that industry. SASB Standards are intended to provide guidance to company management, which is ultimately responsible for determining which information is material and should therefore be included in its Form 10-K or 20-F and other periodic SEC filings.

SASB Standards provide companies with standardized sustainability metrics designed to communicate performance on industry level sustainability topics. When making disclosure on sustainability topics, companies can use SASB Standards to help ensure that disclosure is standardized and therefore decision-useful, relevant, comparable, and complete.

SASB Standards are intended to constitute "suitable criteria" as defined by AT 101.23–.32[1] and referenced in AT 701[2], as having the following attributes:

- *Objectivity*—Criteria should be free from bias.
- *Measurability*—Criteria should permit reasonably consistent measurements, qualitative or quantitative, of subject matter.
- *Completeness*—Criteria should be sufficiently complete so that those relevant factors that would alter a conclusion about subject matter are not omitted.
- *Relevance*—Criteria should be relevant to the subject matter.

Industry Description

The Pulp & Paper Products industry consists of companies that manufacture a range of wood pulp and paper products, including pulp fiber, paper packaging and sanitary paper, office paper, newsprint, and paper for industrial applications. Companies in the industry typically function as business-to-business entities and may have international operations, including in Canada and Brazil. While some integrated companies own or manage timber

[1] http://pcaobus.org/Standards/Attestation/Pages/AT101.aspx#at_101_fn7
[2] http://pcaobus.org/Standards/Attestation/Pages/AT701.aspx

tracts and are engaged in forest management or logging, sustainability issues arising from these activities are addressed in SASB's Forestry & Logging (RR0201) industry standards.

Guidance for Disclosure of Sustainability Topics in SEC Filings

1. Industry-Level Sustainability Topics

For the Pulp & Paper Products industry, SASB has identified the following sustainability disclosure topics:

- Greenhouse Gas Emissions
- Air Quality
- Energy Management
- Water Management
- Fiber Sourcing & Recovery

2. Company-Level Determination and Disclosure of Material Sustainability Topics

Sustainability disclosures are governed by the same laws and regulations that govern disclosures by securities issuers generally. According to the U.S. Supreme Court, a fact is material if, in the event such fact is omitted from a particular disclosure, there is "a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of the information made available."[3,4]

SASB has attempted to identify those sustainability topics that are reasonably likely to have a material effect on the financial condition or operating performance of companies within each SICS industry. SASB recognizes, however, that each company is ultimately responsible for determining what information should be disclosed within the context of Regulation S-K and other guidance.

Regulation S-K, which sets forth certain disclosure requirements associated with Form 10-K and other SEC filings, requires companies, among other things, to describe in the Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) section of Form 10-K "any known trends or uncertainties that have had or that the registrant reasonably expects will have a material favorable or unfavorable impact on net sales or revenues or income from continuing operations. If the registrant knows of events that will cause a material change in the relationship between costs and revenues (such as known future increases in costs of labor or materials or price increases or inventory adjustments), the change in the relationship shall be disclosed."

Furthermore, Instructions to Item 303 state that the MD&A "shall focus specifically on material events and uncertainties known to management that would cause reported financial information not to be necessarily indicative of future operating results or of future financial condition."[2]

[3] TSC Industries v. Northway, Inc., 426 U.S. 438 (1976).
[4] C.F.R. 229.303(Item 303)(a)(3)(ii).

The SEC has provided guidance for companies to use in determining whether a trend or uncertainty should be disclosed. The two-part assessment prescribed by the SEC, based on probability and magnitude, can be applied to the topics included within this standard:

- First, a company is not required to make disclosure about a known trend or uncertainty if its management determines that such trend or uncertainty is not reasonably likely to occur.

- Second, if a company's management cannot make a reasonable determination of the likelihood of an event or uncertainty, then disclosure is required unless management determines that a material effect on the registrant's financial condition or results of operation is not reasonably likely to occur.

3. Sustainability Accounting Standard Disclosures in Form 10-K

a. Management's Discussion and Analysis

For purposes of comparability and usability, companies should consider making disclosure on sustainability topics in the MD&A, in a sub-section titled **"Sustainability Accounting Standards Disclosures."**[5]

b. Other Relevant Sections of Form 10-K

In addition to the MD&A section, it may be relevant for companies to disclose sustainability information in other sections of Form 10-K, including, but not limited to:

- **Description of business**—Item 101 of Regulation S-K requires a company to provide a description of its business and its subsidiaries. Item 101(c)(1)(xii) expressly requires disclosure regarding certain costs of complying with environmental laws:

Appropriate disclosure also shall be made as to the material effects that compliance with Federal, State and local provisions which have been enacted or adopted regulating the discharge of materials into the environment, or otherwise relating to the protection of the environment, may have upon the capital expenditures, earnings and competitive position of the registrant and its subsidiaries.

- **Legal proceedings**—Item 103 of Regulation S-K requires companies to describe briefly any material pending or contemplated legal proceedings. Instructions to Item 103 provide specific disclosure requirements for administrative or judicial proceedings arising from laws and regulations that target discharge of materials into the environment or that are primarily for the purpose of protecting the environment.

- **Risk factors**—Item 503(c) of Regulation S-K requires filing companies to provide a discussion of the most significant factors that make an investment in the registrant speculative or risky, clearly stating the risk and specifying how a particular risk affects the particular filing company.

[5] SEC [Release Nos. 33-8056; 34-45321; FR-61] Commission Statement about Management's Discussion and Analysis of Financial Condition and Results of Operations: "We also want to remind registrants that disclosure must be both useful and understandable. That is, management should provide the most relevant information and provide it using language and formats that investors can be expected to understand. Registrants should be aware also that investors will often find information relating to a particular matter more meaningful if it is disclosed in a single location, rather than presented in a fragmented manner throughout the filing."

c. Rule 12b-20

Securities Act Rule 408 and Exchange Act Rule 12b-20 require a registrant to disclose, in addition to the information expressly required by law or regulation, "such further material information, if any, as may be necessary to make the required statements, in light of the circumstances under which they are made, not misleading."

More detailed guidance on disclosure of material sustainability topics can be found in the **SASB Conceptual Framework**, available for download via http://www.sasb.org/approach/conceptual-framework/.

Guidance on Accounting for Sustainability Topics

For each sustainability topic included in the Pulp & Paper Products industry Sustainability Accounting Standard, SASB identifies accounting metrics.

SASB recommends that each company consider using these sustainability accounting metrics when preparing disclosures on the sustainability topics identified herein.

As appropriate—and consistent with Rule 12b-20[6]—when disclosing a sustainability topic identified by this Standard, companies should consider including a narrative description of any material factors necessary to ensure completeness, accuracy, and comparability of the data reported. Where not addressed by the specific accounting metrics, but relevant, the registrant should discuss the following, related to the topic:

- The registrant's **strategic approach** to managing performance on material sustainability issues;
- The registrant's **relative performance** with respect to its peers;
- The **degree of control** the registrant has;
- Any measures the registrant has undertaken or plans to undertake to improve performance; and
- Data for the registrant's **last three completed fiscal years** (when available).

SASB recommends that registrants use SASB Standards specific to their primary industry as identified in the Sustainable Industry Classification System (SICS™). If a registrant generates significant revenue from multiple industries, SASB recommends that it also consider sustainability topics that SASB has identified for those industries and disclose the associated SASB accounting metrics.

In disclosing to SASB Standards, it is expected that registrants disclose with the same level of rigor, accuracy, and responsibility as they apply to all other information contained in their SEC filings.

[6] SEC Rule 12b-20: "In addition to the information expressly required to be included in a statement or report, there shall be added such further material information, if any, as may be necessary to make the required statements, in the light of the circumstances under which they are made, not misleading."

Users of the SASB Standards

The SASB Standards are intended to provide guidance for companies that engage in public offerings of securities registered under the Securities Act of 1933 (the Securities Act) and those that issue securities registered under the Securities Exchange Act of 1934 (the Exchange Act),[7] for use in SEC filings, including, without limitation, annual reports on Form 10-K (Form 20-F for foreign issuers), quarterly reports on Form 10-Q, current reports on Form 8-K, and registration statements on Forms S-1 and S-3. Disclosure with respect to the SASB Standards is not required or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Scope of Disclosure

Unless otherwise specified, SASB recommends:

- That a registrant disclose on sustainability issues and metrics for itself and for entities that are consolidated for financial reporting purposes as defined by accounting principles generally accepted in the United States for consistency with other accompanying information within SEC filings;[8]
- That for consolidated entities, disclosures be made, and accounting metrics calculated, for the whole entity, regardless of the size of the minority interest; and
- That information from unconsolidated entities not be included in the computation of SASB accounting metrics. A registrant should disclose, however, information about unconsolidated entities to the extent that the registrant considers the information necessary for investors to understand the effect of sustainability topics on the company's financial condition or operating performance (typically, this disclosure would be limited to risks and opportunities associated with these entities).

Reporting Format

Use of Financial Data

In instances where accounting metrics, activity metrics, and technical protocols in this standard incorporate financial data (e.g., revenues, cost of sales, expenses recorded and disclosed for fines, etc.), such financial data shall be prepared in accordance with the accounting principles generally accepted in the United States of America ("US GAAP") and be consistent with the corresponding financial data reported within the registrant's SEC filings. Should accounting metrics, activity metrics and technical protocols in this standard incorporate disclosure of financial data that is not prepared in accordance with US GAAP, the registrant shall disclose such information in accordance with the SEC Regulation G.

[7] Registration under the Securities Exchange Act of 1934 is required (1) for securities to be listed on a national securities exchange such as the New York Stock Exchange, the NYSE Amex, and the NASDAQ Stock Market or (2) if (A) the securities are equity securities and are held by more than 2,000 persons (or 500 persons who are not accredited investors) and (B) the company has more than $10 million in assets.

[8] See US GAAP consolidation rules (Section 810).

Activity Metrics and Normalization

SASB recognizes that normalizing accounting metrics is important for the analysis of SASB disclosures.

SASB recommends that a registrant disclose any basic business data that may assist in the accurate evaluation and comparability of disclosure, to the extent that they are not already disclosed in the Form 10-K (e.g., revenue, EBITDA, etc.).

Such data—termed "activity metrics"—may include high-level business data such as total number of employees, quantity of products produced or services provided, number of facilities, or number of customers. It may also include industry-specific data such as plant capacity utilization (e.g., for specialty chemical companies), number of transactions (e.g., for Internet media and services companies), hospital bed days (e.g., for health care delivery companies), or proven and probable reserves (e.g., for oil and gas exploration and production companies).

Activity metrics disclosed should:

- Convey contextual information that would not otherwise be apparent from SASB accounting metrics.
- Be deemed generally useful for an investor relying on SASB accounting metrics in performing their own calculations and creating their own ratios.
- Be explained and consistently disclosed from period to period to the extent they continue to be relevant. However, a decision to make a voluntary disclosure in one period does not obligate a continuation of that disclosure if it is no longer relevant or if a better metric becomes available.[9]

Where relevant, SASB recommends specific activity metrics that—at a minimum—should accompany SASB accounting metric disclosures.

ACTIVITY METRIC	CATEGORY	UNIT OF MEASURE	CODE
Pulp production	Quantitative	Air-dried metric tons (t)	RR0202-A
Paper production	Quantitative	Air-dried metric tons (t)	RR0202-B
Total wood fiber sourced[10]	Quantitative	Metric tons (t)	RR0202-C

Units of Measure

Unless specified, disclosures should be reported in International System of Units (SI units).

[9] *Improving Business Reporting: Insights into Enhancing Voluntary Disclosures*, FASB Business Reporting Research Project, January 29, 2001.

[10] Note to **RR0202-C**—The scope of wood-fiber-based raw materials includes all inputs that are processed to be sold as a finished good, including recycled raw materials, virgin raw materials, and goods that will be consumed directly in the production process and excluding biomass for energy use.

Uncertainty

SASB recognizes that there may be inherent uncertainty when disclosing certain sustainability data and information. This may be related to variables such as the reliance on data from third-party reporting systems and technologies, or the unpredictable nature of climate events. Where uncertainty around a particular disclosure exists, SASB recommends that the registrant should consider discussing its nature and likelihood.

Estimates

SASB recognizes that scientifically based estimates, such as the reliance on certain conversion factors or the exclusion of *de minimis* values, may occur for certain quantitative disclosures. Where appropriate, SASB does not discourage the use of such estimates. When using an estimate for a particular disclosure, SASB expects that the registrant discuss its nature and substantiate its basis.

Timing

Unless otherwise specified, disclosure shall be for the registrant's fiscal year.

Limitations

There is no guarantee that SASB Standards address all sustainability impacts or opportunities associated with a sector, industry, or company, and therefore, a company must determine for itself the topics—sustainability-related or otherwise—that warrant discussion in its SEC filings.

Disclosure under SASB Standards is voluntary. It is not intended to replace any legal or regulatory requirements that may be applicable to user operations. Where such laws or regulations address legal or regulatory topics, disclosure under SASB Standards is not meant to supersede those requirements. Disclosure according to SASB Standards shall not be construed as demonstration of compliance with any law, regulation, or other requirement.

SASB Standards are intended to be aligned with the principles of materiality enforced by the SEC. However, SASB is not affiliated with or endorsed by the SEC or other entities governing financial reporting, such as FASB, GASB, or IASB.

Forward-Looking Statements

Disclosures on sustainability topics can involve discussion of future trends and uncertainties related to the registrant's operations and financial condition, including those influenced by external variables (e.g., environmental, social, regulatory, and political). Companies making such disclosures should familiarize themselves with the safe harbor provisions of Section 27A of the Securities Act and Section 21E of the Exchange Act, which preclude civil liability for material misstatements or omissions in such statements if the registrant takes certain steps, including, among other things, identifying the disclosure as "forward-looking" and accompanying such disclosure with "meaningful cautionary statements identifying important factors that could cause actual results to differ materially from those in the forward-looking statements."

The following sections contain the disclosure guidance associated with each accounting metric such as guidance on definitions, scope, accounting, compilation, and presentation.

The term "shall" is used throughout this document to indicate those elements that reflect requirements of the Standard. The terms "should" and "may" are used to indicate guidance, which, although not required, provides a recommended means of disclosure.

Table 1. Sustainability Disclosure Topics & Accounting Metrics

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Greenhouse Gas Emissions	Gross global Scope 1 emissions	Quantitative	Metric tons (t) CO_2-e	RR0202-01
	Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emission-reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	RR0202-02
Air Quality	Air emissions for the following pollutants: NO_x (excluding N_2O), SO_x, volatile organic compounds (VOCs), particulate matter (PM), and hazardous air pollutants (HAPs)	Quantitative	Metric tons (t)	RR0202-03
Energy Management	Total energy consumed, (1) percentage grid electricity, (2) percentage from biomass, and (3) percentage from other renewables[11]	Quantitative	Gigajoules (GJ), Percentage (%)	RR0202-04
Water Management	(1) Total water withdrawn and (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Cubic meters (m^3), Percentage (%)	RR0202-05
	Discussion of water management risks and description of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	RR0202-06
Fiber Sourcing & Recovery	Percentage of wood fiber sourced (1) from third-party certified forestlands and percentage to each standard and (2) meeting other fiber sourcing standards and percentage to each standard[12]	Quantitative	Percentage (%) by weight	RR0202-07
	Amount of recycled and recovered fiber procured[13]	Quantitative	Metric tons (t)	RR0202-08

[11] Note to **RR0202-04**—The registrant shall discuss risks and uncertainties associated with the use of biomass for energy.
[12] Note to **RR0202-07**—The registrant shall discuss due diligence practices for fiber that is not from certified forestlands or certified to other fiber sourcing standards.
[13] Note to **RR0202-08**—The registrant shall discuss its strategy to incorporate environmental lifecycle analyses into decisions to source recycled and recovered fiber versus virgin fiber.

Greenhouse Gas Emissions

Description

The Pulp & Paper Products industry generates significant direct greenhouse gas (GHG) emissions, contributing to climate change and creating additional regulatory risks for companies because of climate change mitigation policies. Direct greenhouse gases are produced by the combustion of fossil fuels and biomass in stationary and mobile internal combustion engines, cogeneration boilers, and other processing equipment. Emissions-reduction regulations can significantly increase operational costs and capital expenditures. Companies in this industry typically use significant amounts of biomass for their energy needs. Carbon dioxide (CO2) emissions from the use of biomass generally are not covered by regulatory regimes. The use of biomass can therefore largely reduce the costs associated with purchasing fossil fuels, as well as mitigate regulatory risks under the current guidelines. However, regulatory authorities such as the U.S. Environmental Protection Agency are currently assessing the role of biogenic (biomass-derived) CO2 emissions from stationary sources, creating uncertainty about the scope of future GHG regulations. Reducing GHG emissions through improved energy efficiency, using energy sources with lower lifecycle emissions relative to fossil fuels, or advancing processes can lower costs and protect companies from further regulations that limit or put a price on carbon emissions.

Accounting Metrics

RR0202-01. Gross global Scope 1 emissions

.01 The registrant shall disclose gross global Scope 1 greenhouse gas (GHG) emissions to the atmosphere of the seven GHGs covered under the Kyoto Protocol (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride).

- Emissions of all gases shall be disclosed in metric tons of carbon dioxide equivalents (CO_2-e), calculated in accordance with published global warming potential (GWP) factors. To date, the preferred source for GWP factors is the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2013).

- Gross emissions are GHGs emitted to the atmosphere before accounting for any GHG reduction activities, offsets, or other adjustments for activities in the reporting period that have reduced or compensated for emissions.

    - The registrant shall consider the CDP Climate Change Questionnaire as a normative reference, thus any updates made year-on-year shall be considered updates to this guidance.

- Disclosure corresponds to section CC8.2 of the Carbon Disclosure Project (CDP) Questionnaire (2015) and REQ-04 of the Climate Disclosure Standards Board (CDSB) *Framework for reporting environmental information & natural capital* (2015).

.02 Scope 1 emissions are defined by the World Resources Institute and the World Business Council on Sustainable Development (WRI/WBCSD) in *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*, Revised Edition, March 2004 (hereafter, the "GHG Protocol").

- These emissions include direct emissions of GHGs from stationary or mobile sources that include, but are not limited to, equipment, production facilities, office buildings, and transportation (i.e., marine, road, or rail).

.03 GHG emission data shall be consolidated according to the approach with which the registrant consolidates its financial reporting data, which is generally aligned with:

- The Financial Control approach defined by the GHG Protocol and referenced by the *CDP Guidance for companies reporting on climate change on behalf of investors & supply chain members 2015* (hereafter, the "CDP Guidance").[14]

- The approach detailed in REQ-07, "Organisational boundary," of the CDSB Framework (2015).

.04 The underlying technical approach to data collection, analysis, and disclosure shall be consistent with the CDP Guidance.

- The registrant shall consider the CDP Guidance as a normative reference, thus any updates made year-on-year shall be considered updates to this guidance.

.05 The registrant should discuss any change in its emissions from the previous fiscal year, such as if the change was due to emissions reductions, divestment, acquisition, mergers, changes in output, and/or changes in calculation methodology.

.06 In the case that current reporting of GHG emissions to the CDP or other entity (e.g., a national regulatory disclosure program) differs in terms of the scope and consolidation approach used, the registrant may disclose those emissions. However, primary disclosure shall be according to the guidelines described above.

.07 The registrant should discuss the calculation methodology for its emissions disclosure, such as if data are from continuous emissions monitoring systems (CEMS), engineering calculations, mass balance calculations, etc.

.08 The registrant should consult the most recent version of each document referenced in this standard at the time disclosure occurs.

[14] "An organization has financial control over an operation if it has the ability to direct the financial and operating policies of the operation with a view to gaining economic benefits from its activities. Generally an organization has financial control over an operation for GHG accounting purposes if the operation is treated as a group company or subsidiary for the purposes of financial consolidation." *Guidance for companies reporting on climate change on behalf of investors & supply chain members 2013,* p. 95.

RR0202-02. Description of long-term and short-term strategy or plan to manage Scope 1 emissions, including emission-reduction targets and an analysis of performance against those targets

.09 The registrant shall discuss the following, where relevant:

- The scope, such as whether strategies, plans, and/or reduction targets pertain differently to different business units, geographies, or emissions sources;
- Whether strategies, plans, and/or reduction targets are related to or associated with an emissions disclosure (reporting) or reduction program (e.g., E.U. ETS, RGGI, WCI, etc.), including regional, national, international, or sectoral programs; and
- The activities and investments required to achieve the plans, and any risks or limiting factors that might affect achievement of the plans and/or targets.

.10 For emission-reduction targets, the registrant shall disclose:

- The percentage of emissions within the scope of the reduction plan;
- The percentage reduction from the base year;
  - The base year is the first year against which emissions are evaluated toward the achievement of the target.
- Whether the target is absolute or intensity based, and the metric denominator if it is an intensity-based target;
- The timelines for the reduction activity, including the start year, the target year, and the base year. Disclosure shall be limited to activities that were ongoing (active) or reached completion during the fiscal year; and
- The mechanism(s) for achieving the target, such as energy-efficiency efforts, energy source diversification, carbon capture and storage, etc.

.11 Where necessary, the registrant shall discuss any circumstances in which the target base year emissions have been, or may be, recalculated retrospectively or where the target base year has been reset.

.12 Disclosure corresponds with:

- CDSB Framework REQ-01, "Management's environmental policies, strategy and targets."[15]
- CDP Questionnaire (2015) CC3, "Targets and Initiatives."

[15] 4.12, "Disclosure shall include a description of the organization's long-term and short-term strategy or plan to address climate change-related risks, opportunities, and impacts, including targets to reduce GHG emissions and an analysis of performance against those targets." *Climate Change Reporting Framework – Edition 1.1*, October 2012, CDSB.

Air Quality

Description

In addition to emitting GHGs, pulp and paper mills emit regulated air emissions, including sulfur oxides and particulate matter, which are linked with significant human health and environmental impacts. The sources of emissions include cogeneration fuel boilers, pulp and paper pressure chambers, wood chip pulping, pulping chemical recovery, and process engines. While emissions of hazardous substances from the industry have declined considerably in recent years, it is still among the largest industrial emitters of air toxics. Because of the industry's high emissions levels, air pollution abatement expenditures can be significant, while increasingly stringent air-quality regulations raise the likelihood of higher costs in the future. Emissions regulations may require the installation of costly emissions abatement equipment. Therefore, companies that can cost-effectively reduce harmful air emissions could improve operational efficiency, benefit from a lower cost structure, and decrease regulatory risk.

Accounting Metrics

RR0202-03. Air emissions for the following pollutants: NO_x (excluding N_2O), SO_x, volatile organic compounds (VOCs), particulate matter (PM), and hazardous air pollutants (HAPs)

.13 The registrant shall disclose its emissions of air pollutants (in metric tons) that are released to the atmosphere as a result of its activities:

- Direct air emissions from stationary or mobile sources that include, but are not limited to, production facilities, office buildings, marine vessels transporting products, and truck fleets.

.14 The registrant shall disclose emissions released to the atmosphere by emission type. Substances include:

- Oxides of nitrogen (including NO and NO_2 and excluding N_2O), reported as NO_x.
- Oxides of sulfur (SO_2 and SO_3), reported as SO_x.
- Nonmethane volatile organic compounds (VOCs), defined as any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and methane, that participates in atmospheric photochemical reactions, except those designated by the U.S. Environmental Protection Agency (EPA) as having negligible photochemical reactivity.
    - Where regional and national definitions supersede EPA regulations, such as EC Directive 1999/13/EC and Schedule 1 of the Canadian Environmental Protection Act 1999, the registrant may refer to the relevant regulations on VOCs.
- Particulate matter (PM), reported as the sum of PM_{10} and $PM_{2.5}$, or all particulates less than 10 micrometers in diameter.

- Hazardous air pollutants (HAPs), defined by the EPA as those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.

.15 This scope does not include CO_2, CH_4, and N_2O, which are disclosed in RR0202-01 as Scope 1 GHG emissions.

.16 Air emissions data shall be consolidated according to the approach with which the registrant consolidates its financial reporting data, which is aligned with the consolidation approach used for RR0202-01.

.17 The registrant should discuss the calculation methodology for its emissions disclosure, such as whether data are from continuous emissions monitoring systems (CEMS), engineering calculations, mass balance calculations, etc.

Energy Management

Description

Pulp and paper manufacturing is energy-intensive, and energy can account for a significant share of operating costs. In most facilities, energy is derived from the direct combustion of biomass and fossil fuels (leading to the regulatory risks and uncertainties covered under the disclosure topic Greenhouse Gas Emissions) and purchased from the electrical grid. The price volatility of fossil fuels and conventional grid electricity can increase as a result of evolving climate change regulations and new incentives for energy efficiency and renewable energy, among other factors, while alternative energy sources become cost-competitive. Decisions regarding generating electricity on-site versus sourcing it from the grid, as well as the use of biomass and other renewably energy, can create trade-offs related to the energy supply's cost and reliability for operations and the extent of the regulatory risk from Scope 1 or other air emissions. In this context, the potential regulatory consequences of using biomass energy must be considered. The manner in which a company manages its energy efficiency, its reliance on different types of energy and the associated sustainability risks, and its ability to access alternative energy sources is likely to significantly impact its financial performance.

Accounting Metrics

RR0202-04. Total energy consumed, (1) percentage grid electricity, (2) percentage from biomass, and (3) percentage from other renewables

.18 The registrant shall disclose total energy consumption from all sources as an aggregate figure in gigajoules or their multiples.

- The scope includes energy purchased from sources external to the organization or produced by the organization itself (self-generated).
- The scope includes only energy consumed by entities owned or controlled by the organization.
- The scope includes energy from all sources, including direct fuel usage, purchased electricity, and heating, cooling, and steam energy.

.19 In calculating energy consumption from fuels and biofuels, the registrant shall use higher heating values (HHV), also known as gross calorific values (GCV), which are directly measured or taken from the Intergovernmental Panel on Climate Change (IPCC), the U.S. Department of Energy (DOE), or the U.S. Energy Information Administration (EIA).

.20 The registrant shall disclose purchased grid electricity consumption as a percentage of its total energy consumption.

.21 The registrant shall disclose its biomass energy consumption as a percentage of its total energy consumption.

.22 For the purposes of this disclosure, the scope of renewable energy from biomass sources is limited to the following:

- Energy from biomass sources that meets at least one of the following criteria:
  - Certification to a third-party standard (e.g., Forest Stewardship Council, Sustainable Forest Initiative, Programme for the Endorsement of Forest Certification, or American Tree Farm System);
  - Classification as an "eligible renewable" according to the Green-e Energy National Standard Version 2.5 (2014); or
  - Eligibility for a state Renewable Portfolio Standard.

.23 The registrant shall disclose other renewable energy consumption (excluding biomass) as a percentage of its total energy consumption.

.24 The scope of other renewable energy includes renewable fuel the registrant consumes and renewable energy the registrant directly produces, purchases through a renewable power purchase agreement (PPA) that explicitly includes renewable energy certificates (RECs), or for which Green-e Energy Certified RECs are paired with grid electricity.

- For any renewable electricity generated on-site, any RECs must be retained (i.e., not sold) and retired on behalf of the registrant in order for the registrant to claim them as renewable energy.
- For renewable PPAs, the agreement must explicitly include and convey that RECs be retained and retired on behalf of the registrant in order for the registrant to claim them as renewable energy.
- The renewable portion of the electricity grid mix that is outside of the control or influence of the registrant is excluded from disclosure.
- Renewable energy is defined as energy from sources that are replenished at a rate greater than or equal to their rate of depletion, consistent with EPA definitions, such as geothermal, wind, solar, and hydro.

.25 For the purposes of this disclosure, the scope of renewable energy from hydro sources is limited to those that are certified by the Low Impact Hydropower Institute or are eligible for a state Renewable Portfolio Standard.

.26 The registrant shall apply conversion factors consistently for all data reported under this disclosure, such as the use of HHVs for fuel usage (including biofuels) and conversion of kWh to gigajoules (for energy data including electricity from solar or wind energy).

.27 The registrant may disclose a breakdown of the types of other renewable energy it uses as percentages of the total renewable energy consumed (i.e., percentage of renewable energy from (a) wind energy, (b) solar energy, etc.).

.28 The registrant may choose to disclose the amount of energy that it generates in excess of what it consumes and is net metered through an electric utility.

Note to **RR0202-04**

.29 The registrant shall discuss risks and uncertainties associated with the use of biomass as an energy source, and it shall describe how it manages those risks.

.30 Risks and uncertainties associated with the use of biomass as an energy source can include, but are not limited to:

- Risks from air emissions (such as oxides from nitrogen and sulfur), including costs to comply with emissions restrictions and reputational impacts from violations.
- Regulatory risks, including financial impacts associated with compliance with potential biogenic carbon dioxide regulations or reputational impacts associated with biomass failing to meet the definition of eligible renewable energy in a state Renewable Portfolio Standard
- Sourcing risks, including reputational risks associated with a lack of transparency about whether purchased biomass was sustainably harvested.

Water Management

Description

Pulp and paper production is a water-intensive process. Water is used primarily in raw-materials processing, process cooling, and steam generation at on-site cogeneration plants. Companies require ample, stable water supplies and produce large volumes of wastewater, which is commonly treated on-site and discharged into the environment. Process water is typically rich in dissolved organic compounds and other solids that can harm ecosystems, underscoring the importance of water treatment, which can be costly. In addition to water contamination, water availability is an increasing concern for the industry. The majority of the industry's water needs is met by surface-water withdrawals. Water is becoming a scarce resource around the world, given reduced supplies due to climate change and increased consumption due to population growth and rapid urbanization. Water scarcity can result in higher supply costs, supply disruptions, and tension with local water users. Pulp and paper manufacturing facilities, depending on their location, may be exposed to these risks. Companies can adopt various strategies to address water supply and treatment issues, such as cost-effectively enhancing the recycling of process water, improving production techniques to lower water intensity, and ensuring compliance with water-effluent regulations.

Accounting Metrics

RR0202-05. (1) Total water withdrawn and (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress

.31 The registrant shall disclose the amount of water (in thousands of cubic meters) that was withdrawn from all sources, where:

- Water sources include surface water (including water from wetlands, rivers, lakes, and oceans), groundwater, rainwater collected directly and stored by the organization, wastewater obtained from other entities, municipal water supplies, or other water utilities.
- Disclosure corresponds to CDP Water Questionnaire W1.2a.

.32 The registrant may choose to disclose the portion of its supply by source if, for example, significant portions of withdrawals are from non-freshwater sources, where:

- Fresh water may be defined according to the local statutes and regulations where the registrant operates. Where there is no regulatory definition, fresh water shall be considered to be water that has a solids (TDS) concentration of less than 1000 mg/l per the Water Quality Association definition.
- Water obtained from a water utility in compliance with U.S. National Primary Drinking Water Regulations can be assumed to meet the definition of fresh water.

.33 The registrant shall disclose the amount of water (in thousands of cubic meters) that was consumed in its operations, where water consumption is defined as:

- Water that evaporates during withdrawal, usage, and discharge;
- Water that is directly or indirectly incorporated into the product or service; and
- Water that does not otherwise return to the same catchment area from which it was withdrawn, such as water returned to another catchment area or the sea.
- Disclosure corresponds to CDP Water Questionnaire W1.2c.

.34 The registrant shall analyze all of its operations for water risks and identify activities that withdraw and consume water in locations with High (40–80%) or Extremely High (>80%) Baseline Water Stress as classified by the World Resources Institute's (WRI) Water Risk Atlas tool, Aqueduct (publicly available online here).

.35 The registrant shall disclose its water withdrawn in locations with High or Extremely High Baseline Water Stress as a percentage of the total water withdrawn.

.36 The registrant shall disclose its water consumed in locations with High or Extremely High Baseline Water Stress as a percentage of the total water consumed.

RR0202-06. Discussion of water management risks and description of strategies and practices to mitigate those risks

.37 The registrant shall discuss its risks associated with water withdrawals, water consumption, and discharge of water to the environment and describe how it manages these risks.

- Disclosure corresponds to CDP Water Questionnaire W3.1 and W3.2c.

.38 The registrant shall discuss, where applicable, risks to the availability of adequate, clean water resources.

- Relevant information to provide includes, but is not limited to:
  - Environmental constraints, such as operating in water-stressed regions, drought, interannual or seasonal variability, and risks due to the impact of climate change.
  - External constraints, such as volatility in water costs, stakeholder perceptions and concerns related to water withdrawals (e.g., those from local communities, non-governmental organizations, and regulatory agencies), direct competition with and impact from the actions of other users (commercial and municipal), restrictions to withdrawals due to regulations, and the ability to obtain and retain water rights or permits.
  - How risks may vary by withdrawal source, including wetlands, rivers, lakes, oceans, groundwater, rainwater, municipal water supplies, or supply from other water utilities.

.39 The registrant shall discuss, where applicable, risks associated with its discharge of wastewater.

- Relevant information to provide includes, but is not limited to:
  - Environmental constraints, such as the ability to maintain compliance with regulations focused on the quality of effluent discharged to the environment, the ability to eliminate existing and emerging pollutants of concern, and the ability to maintain control over runoff and storm water discharges.
  - External constraints, such as increased liability and/or reputational risks, restrictions to discharges and/or increased operating costs due to regulation, stakeholder perceptions and concerns related to water discharges (e.g., those from local communities, non-governmental organizations, and regulatory agencies), and the ability to obtain discharge rights or permits.
  - How risks may vary by discharges to different destinations, including wetlands, rivers, lakes, oceans, groundwater, rainwater, municipal water supplies, or other water utilities.

.40 The registrant should include a discussion of the potential impacts that these risks may have on its operations and the timeline over which such risks are expected to manifest.

- Impacts may include, but are not limited to, those associated with costs, revenues, liabilities, continuity of operations, and reputation.

.41 The registrant shall provide a description of its short-term and long-term strategy or plan to manage these risks, including the following, where relevant:

- Any water management targets it has set, and an analysis of performance against those targets.
  - Water management targets can include water management goals that the registrant prioritizes to manage its risks and opportunities associated with water withdrawal, consumption, or discharge.
  - Targets can include, but are not limited to, those associated with reducing water withdrawals, reducing water consumption, reducing water discharges, and improving water discharge quality.
- The scope of its strategy, plans, or targets, such as whether they pertain differently to different business units, geographies, or water-consuming operational processes.
- The activities and investments required to achieve the plans and targets, and any risks or limiting factors that might affect achievement of the plans and/or targets.
- Disclosure corresponds to CDP Water Questionnaire W8.1, W8.1a, and W8.1b.

.42 For water management targets, the registrant shall additionally disclose:

- The percentage reduction or improvements from the base year, where:
  - The base year is the first year against which water management targets are evaluated toward the achievement of the target.
- Whether the target is absolute or intensity based, and the metric denominator if it is an intensity-based target.
- The timelines for the water management plans, including the start year, the target year, and the base year.
- The mechanism(s) for achieving the target, including:
  - Efficiency efforts, such as the use of water recycling and/or closed-loop systems;
  - Product innovations such as redesigning products or services to require less water;
  - Process and equipment innovations, such as those that enable the use of less water in manufacturing or operations;
  - The use of tools and technologies (e.g., the World Wildlife Fund Water Risk Filter, WRI/WBCSD Global Water Tool, and Water Footprint Network Footprint Assessment Tool) to analyze water use, risk, and opportunities; and
  - Collaborations or programs in place with the community or other organizations.

.43 Disclosure of strategies, plans, and targets shall be limited to activities that were ongoing (active) or reached completion during the fiscal year.

.44 The registrant may choose to discuss if its water management decisions and practices incorporate consideration of any additional lifecycle impacts or environmental tradeoffs for the registrant, including tradeoffs associated with land-use impacts, energy consumption, and GHG emissions.

Fiber Sourcing & Recovery

Description

Pulp and paper products companies source wood and wood fiber from forestry and logging companies, paper fiber recyclers, and forests that the companies themselves manage. The potential for adverse environmental and social externalities in forestry and logging operations, such as deforestation, harm to endangered species, or impacts on indigenous communities, can create reputational damage and operational impacts for pulp and paper companies. To mitigate supply-chain risk and satisfy growing customer demand for sustainably sourced fiber and paper products, manufacturers utilize forest certification and fiber chain-of-custody standards, which verify that virgin and recycled fiber originate from sustainably managed forests. In addition, pulp and paper manufacturers face trade-offs from the use of recovered fiber. Products with recycled content are increasingly in demand, and using recycled fiber can minimize the need for virgin fiber, potentially mitigating adverse externalities from timber production, and reducing emissions from paper landfilling. Conversely, manufacturing products with a greater recycled content can increase waste generation and energy consumption, while recycled fiber can be more costly to purchase, given demand-supply gaps. Therefore, companies could benefit from a lifecycle approach that includes optimizing recycled fiber use to balance its environmental and economic trade-offs.

Accounting Metrics

RR0202-07. Percentage of wood fiber sourced (1) from third-party certified forestlands and percentage to each standard and (2) meeting other fiber sourcing standards and percentage to each standard

.45 The registrant shall disclose the percentage of its total wood-fiber-based raw materials that have been sourced from forestlands that are certified to forest management standards, where:

- Third-party forest management standards are those that certify that forests are harvested in a sustainable manner and that cover environmental and social criteria including legal compliance, land rights, community and worker relations, environmental impact and biodiversity, forest management plans and practices, land use, wildlife habitat conservation, and water conservation, among others.
- Third-party forest management certifications include, but are not limited to, those promulgated by the following organizations (or the equivalent):
  - American Tree Farm System (ATFS) (i.e., ATFS Certification)
  - Forest Stewardship Council (FSC) (i.e., FSC Forest Management and Chain of Custody certifications)
  - Programme for the Endorsement of Forest Certification (PEFC) (i.e., PEFC Chain of Custody certifications)
  - Forest certification systems endorsed by the PEFC
  - Sustainable Forest Initiative (SFI) (i.e., SFI Forest Management and Chain of Custody certifications)

- The scope of wood-fiber-based raw materials includes all inputs that are processed to be sold as a finished good, including recycled raw materials, virgin raw materials, and goods that will be consumed directly in the production process and excluding biomass for energy.

.46 The percentage of wood-fiber-based raw materials from third-party certified forestlands shall be calculated as the total weight (in air dried metric tons) of the registrant's wood-fiber-based raw materials that have been sourced from third-party certified forestlands divided by the total weight (in air dried metric tons) of wood-fiber-based raw materials sourced.

.47 The registrant shall disclose the percentage of the total wood-fiber-based raw materials from third-party certified forestlands that is certified to each standard (e.g., FSC Chain of Custody, SFI Chain of Custody, and PEFC Chain of Custody).

- The registrant shall calculate the percentage of wood-fiber-based raw materials certified to each standard as the amount of wood-fiber-based raw materials that is third-party certified to the respective standard divided by the total amount of wood fiber sourced by the registrant.

- Where wood-fiber is certified to multiple third-party certifications, the registrant shall include the amount of such fiber in its calculations for each relevant certification.

.48 The registrant shall disclose the percentage of its total wood-fiber-based raw materials that is sourced from non-third-party certified forestlands but meets other fiber sourcing standards, including, but not limited to:

- Responsible fiber sourcing standards (e.g., SFI Fiber Sourcing Standard);

- Controlled wood standards (e.g., FSC Controlled Wood Certification, PEFC Controlled Wood);

- Recycled fiber standards that include post- and pre-consumer reclaimed material (e.g., PEFC Controlled Sources, FSC Recycled Label, and SFI Recycled Label); and

- Any other due diligence standards that cover sourcing requirements for fiber from non-certified forestlands.

.49 For fiber from non-certified forestlands that meets multiple fiber sourcing standards, the registrant shall not account for the weight more than once when calculating the total percentage of fiber from non-certified forestlands that meets other fiber sourcing standards.

.50 The registrant shall disclose the percentage of wood fiber that meets each sourcing standard (e.g., FSC Controlled Wood, SFI Fiber Sourcing Standard, PEFC Controlled Sources, etc.).

- Where wood-fiber meets multiple sourcing standards, the registrant shall include the amount of such fiber in its calculations for each relevant sourcing standard.

Note to **RR0202-07**

.51 The registrant shall discuss its due diligence practices for fiber that is not from certified forestlands or certified to other fiber sourcing standards and its policies to verify the forestry management and harvesting practices of suppliers, which may include codes of conduct, audits, and/or contracts, among others.

.52 The registrant shall disclose how it verifies that its non-certified fiber includes criteria for the following:

- Wood legality and compliance with the Lacey Act of 1990 (16 U.S.C. §§ 3371–3378);
- Wood sourced from areas of protected conservation status or high biodiversity value;
- Logging in or near areas of endangered species habitat;
- Logging in or near areas of indigenous peoples' land;
- The forestry management and harvesting practices of suppliers, including reviews of environmental impact assessments or forestry management plans;
- The use of genetically modified organisms (GMOs), pesticides, or other chemicals in forests; and
- Criteria outlined in the definition of SFI "controversial sources," the definition of FSC "controlled wood," or the equivalent.

.53 The registrant may also choose to disclose the sources of its wood fiber (e.g., from corporate, private, or federally owned forestlands and whether fiber is grown domestically or internationally) and the potential risks associated with procuring fiber from these sources.

RR0202-08. Amount of recycled and recovered fiber procured

.54 The registrant shall disclose the amount of recycled and recovered fiber it procured (in metric tons) from suppliers as well as recycled and recovered fiber it obtained directly through collection programs.

.55 Recycled content is defined, consistent with definitions in ISO 14021:1999, "Environmental labels and declarations—Self-declared environmental claims (Type II environmental labelling)," as the portion, by mass, of recycled or recovered material in a product or packaging, where only pre-consumer and post-consumer materials shall be considered as recycled content, and where:

- Recycled material is defined as material that has been reprocessed from recovered (or reclaimed) material by means of a manufacturing process and made into a final product or a component for incorporation into a product.
- Recovered material is defined as material that would have otherwise been disposed of as waste or used for energy recovery, but has instead been collected and recovered (or reclaimed) as a material input, in lieu of new primary material, for a recycling or manufacturing process.

- Pre-consumer material is defined as material that has been diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap that are generated in a process and are capable of being reclaimed within the same process that generated them.

- Post-consumer material is defined as material generated by households or by commercial, industrial, and institutional facilities in their role as end-users of a product that can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

- Fiber shall be considered recycled or recovered if it meets the SFI definition of recycled content, the FSC definition of reclaimed material, or the PEFC definition of recycled wood and fibres.

Note to **RR0202-08**

.56 The registrant shall discuss its strategy to incorporate environmental lifecycle analyses into decisions to source recycled and recovered fiber versus virgin fiber.

- An environmental lifecycle tradeoff is defined as an environmental benefit or consequence of choosing to source one type of fiber over another.

  - Environmental lifecycle benefits from using recycled and recovered fiber can include, but are not limited to, reducing the need for deforestation, reducing GHG emissions from paper in landfills, and reducing landfill waste.

  - Environmental lifecycle consequences of using recycled and recovered fiber can include increased resource consumption and generation of air emissions during the transportation and processing of fiber.

.57 The registrant shall discuss how lifecycle tradeoff assessments are incorporated into its fiber sourcing decisions, including how the following risks and opportunities are managed:

- Costs of recycled and recovered materials;

- Constraints related to accessing the necessary supply of recycled and recovered fiber;

- Recycling infrastructure needed by the registrant or external paper collection facilities;

- Consumer behavior to improve recovery of paper for recycling;

- Virgin wood-fiber sourcing risks;

- Improving paper recovery rates;

- Regulation related to consumer recycling or minimum recycled content usage;

- Quality of fiber needed for products and the intended use of fiber for different product segments;
- Product innovation opportunities; and
- Increased revenue and reputational benefits related to products with recycled or recovered content.

.58 The registrant may choose to disclose a breakdown of its recycled and recovered fiber use by product segment.

SUSTAINABILITY ACCOUNTING STANDARDS BOARD®

1045 Sansome Street, Suite 450
San Francisco, CA 94111
415.830.9220
info@sasb.org

www.sasb.org