



SUSTAINABILITY ACCOUNTING STANDARD  
RENEWABLE RESOURCES & ALTERNATIVE ENERGY SECTOR

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# 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](http://www.sasb.org)

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## 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<sup>1</sup> and referenced in AT 701<sup>2</sup>, 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

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<sup>1</sup> [http://pcaobus.org/Standards/Attestation/Pages/AT101.aspx#at\\_101\\_fn7](http://pcaobus.org/Standards/Attestation/Pages/AT101.aspx#at_101_fn7)

<sup>2</sup> <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:

- Workforce Health & Safety
- 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.”<sup>3,4</sup>

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 SIC 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.”<sup>2</sup>

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:

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<sup>3</sup> TSC Industries v. Northway, Inc., 426 U.S. 438 (1976).

<sup>4</sup> 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."**<sup>5</sup>

#### 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

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<sup>5</sup> [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."

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<sup>6</sup>—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.

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<sup>6</sup> 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),<sup>7</sup> 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;<sup>8</sup>
- 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.

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<sup>7</sup> 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.

<sup>8</sup> 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.<sup>9</sup>

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

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<sup>9</sup> *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 <sup>10</sup>	Quantitative	Number	RR0103-A
Aggregate capacity of delivered wind turbines, by wind turbine class <sup>11</sup>	Quantitative	Megawatts (MW)	RR0103-B
Amount of turbine backlog <sup>12</sup>	Quantitative	U.S. Dollars (\$)	RR0103-C
Aggregate capacity of turbine backlog <sup>13</sup>	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.

<sup>10</sup> 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.

<sup>11</sup> Note to **RR0103-B**—Ibid.

<sup>12</sup> 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.

<sup>13</sup> 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."

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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
<b>Workforce Health &amp; Safety</b>	(1) Total recordable injury rate (TRIR) and (2) fatality rate for (a) direct employees and (b) contract employees	Quantitative	Rate	RR0103-01
<b>Design to Mitigate Community &amp; Ecological Impacts</b>	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
<b>Materials Efficiency</b>	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
<b>Materials Sourcing</b>	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

# Workforce Health & Safety

## 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  $(\text{statistic count} / \text{total hours worked}) * 200,000$ .

# 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](mailto:info@sasb.org)

[www.sasb.org](http://www.sasb.org)