



SUSTAINABILITY ACCOUNTING STANDARD
TECHNOLOGY & COMMUNICATION SECTOR

SEMICONDUCTORS

Sustainability Accounting Standard

Sustainable Industry Classification System™ (SICS™) #TC0201

Prepared by the
Sustainability Accounting Standards Board®

April 2014
Provisional Standard

SEMICONDUCTORS

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 issues 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 and is accredited to set standards by the American National Standards Institute (ANSI).

SASB is developing standards for more than 80 industries in 10 sectors. SASB's standards-setting process includes evidence-based analysis with in-depth industry research and engagement with a broad range of stakeholders. The end result of this process is the creation of a complete, industry-specific accounting standard which accurately reflects the material issues for each industry.

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INTRODUCTION

Purpose & Structure

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

SASB 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's disclosure guidance identifies sustainability topics at an industry level, which may be material— depending on a company's specific operating context— to a company within that industry.

Each company is ultimately responsible for determining which information is material and is therefore required to be included in its Form 10-K or 20-F and other periodic SEC filings.

SASB's accounting standards provide companies with standardized accounting metrics to account for performance on industry-level sustainability topics. When making disclosure on sustainability topics, companies adopting SASB's accounting standards will help to ensure that disclosure is standardized and therefore useful, relevant, comparable and auditable.

Industry Description

The Semiconductors industry includes companies that design or manufacturing semiconductor devices, Integrated Circuits, their raw materials and components, or capital equipment. Some companies in the industry provide outsourced manufacturing, assembly or other services for designers of semiconductor devices. Outsourcing of manufacturing and offshoring of operations is common to the industry.

Guidance for Disclosure of Material Sustainability Topics in SEC filings

1. Industry-Level Material Sustainability Topics

For the Semiconductors industry, SASB has identified the following material sustainability topics:

- **Greenhouse Gas Emissions**
- **Energy Management in Manufacturing**
- **Water & Waste Management in Manufacturing**
- **Recruiting & Managing a Global Skilled Workforce**
- **Employee Health & Safety**
- **Product Lifecycle Management**
- **Supply Chain Management & Materials Sourcing**
- **Intellectual Property Protection & Competitive Behavior**

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”.^{1,2}

SASB has attempted to identify those sustainability topics that it believes may be material for all companies within each SICS industry. SASB recognizes, however, that each company is ultimately responsible for determining what is material to it.

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.”²

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

In determining whether a trend or uncertainty should be disclosed, the SEC has stated that management should use a two-part assessment based on probability and magnitude:

- 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.
- 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

Companies should consider making disclosure on sustainability topics as a complete set in the MD&A, in a sub-section titled **“Sustainability Accounting Standards Disclosures.”**³

b. Other Relevant Sections of Form 10-K

¹ TSC Industries v. Northway, Inc., 426 U.S. 438 (1976).

² C.F.R. 229.303(Item 303)(a)(3)(ii).

³ [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.”

In addition to the MD&A section, companies should consider disclosing sustainability information in other sections of Form 10-K, as relevant, including:

- **Description of business**—Item 101 of Regulation S-K requires a company to provide a description of its business and its subsidiaries. Specifically 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 targeting discharge of materials into the environment or 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 of Material Sustainability Topics

For material sustainability topics in the Semiconductors industry, SASB identifies accounting metrics.

SASB recommends that each company consider using these sustainability accounting metrics when disclosing its performance with respect to each of the sustainability topics it has identified as material.

As appropriate—and consistent with Rule 12b-20⁴—for each sustainability topic, 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 **competitive positioning**;
- the **degree of control** the registrant has;
- any **measures the registrant has undertaken or plans to undertake** to improve performance; and
- data for 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 \(SICST™\)](#). If a registrant generates significant revenue from multiple industries, SASB recommends that it consider the materiality of the sustainability issues that SASB has identified for those industries and disclose the associated SASB accounting metrics.

Users of the SASB Standards

The SASB Standards are intended 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)⁵, 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. Nevertheless, 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.

⁴ 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.”

⁵ 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.

Scope of Disclosure

Unless otherwise specified, SASB recommends:

- That a registrant disclose on sustainability issues and metrics for itself and for entities in which the registrant has a controlling interest and therefore are consolidated for financial reporting purposes (controlling interest is generally defined as ownership of 50% or more of voting shares);⁶
- 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 such registrant considers the information necessary for investors to understand its performance with respect to sustainability issues (typically this disclosure would be limited to risks and opportunities associated with these entities).

Reporting Format

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 users of SASB accounting metrics (e.g., investors) 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.

⁶ See US GAAP consolidation rules (Section 810).

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 production ⁷	Quantitative	See note	TC0201-A
Percentage of production from owned facilities	Quantitative	Percentage	TC0201-B

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 like the imperfectness of third-party reporting systems 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 be necessary 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.

⁷ Note to **TC0201-A** – The registrant shall disclose total production from its own manufacturing facilities and those with which it contracts for manufacturing services. For semiconductor equipment manufacturers the total production shall be reported on a per unit basis. For semiconductor device manufacturers the total production shall be reported consistent with International SEMATECH Manufacturing Initiative's Semiconductor Key Environment Performance Indicators Guidance, Technology Transfer #09125069A-ENG:

- For fabrication facilities, as square centimeters times number of mask layers (cm² x # mask layers), which represents the area of good die on a wafer in cm² units for a product type times the number of mask layers on the wafer for a product type
- For assembly and test (A/T) facilities, as units out, which represents the good package, system, or gross unit of final product from A/T facilities

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."

Assurance

In reporting on SASB Standards, it is expected that registrants report with the same level of rigor, accuracy, and responsibility as all other information contained in their SEC filings.

SASB encourages registrants to use independent assurance (attestation), for example, an Examination Engagement to AT Section 701.

Table 1. Material Sustainability Topics & Accounting Metrics

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Greenhouse Gas Emissions	Gross global Scope 1 emissions and amount of total emissions from perfluorocompounds (PFCs)	Quantitative	Metric tons CO ₂ -e	TC0201-01
	Description of long-term and short-term strategy or plan to manage Scope 1 emissions, including emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	TC0201-02
Energy Management in Manufacturing	Total energy consumed, percentage grid electricity, percentage renewable energy	Quantitative	Gigajoules, Percentage (%)	TC0201-03
Water & Waste Management in Manufacturing	Total water withdrawn, percentage recycled, percentage in regions with High or Extremely High Baseline Water Stress	Quantitative	Cubic meters (m ³), percentage (%)	TC0201-04
	Amount of hazardous waste from manufacturing, percentage recycled	Quantitative	Tons (t), percentage (%)	TC0201-05
Recruiting & Managing a Global Skilled Workforce	Percentage of employees that are (1) foreign nationals and (2) located offshore ⁸	Quantitative	Percentage (%)	TC0201-06
Employee Health & Safety	Discussion of efforts to assess, monitor, and reduce exposure of employees to human health hazards	Discussion and Analysis	n/a	TC0201-07
	Amount of legal and regulatory fines and settlements associated with employee health and safety violations ⁹	Quantitative	U.S. dollars (\$)	TC0201-08

⁸ Note to **TC0201-06** –Disclosure shall include a description of potential risks of recruiting foreign nationals and/or offshore employees, and management approach to addressing these risks.

⁹ Note to **TC0201-08** –Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.

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

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Product Lifecycle Management	Percentage of products by revenue that contain IEC 62474 declarable substances ¹⁰	Quantitative	Percentage by revenue (\$)	TC0201-09
	Processor energy efficiency at a system-level for: (1) servers (2) desktops, and (3) laptops ¹¹	Quantitative	Overall ssj_ops/watt; base SPECint score/watt, base SPECfp score/watt; performance qualification score, battery life score (in minutes)	TC0201-10
Supply Chain Management & Materials Sourcing	Percentage of products by revenue that contain critical materials	Quantitative	Percentage by revenue (\$)	TC0201-11
	Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free	Quantitative	Percentage (%)	TC0201-12
	Discussion of the management of risks associated with use of critical materials and conflict minerals	Discussion and Analysis	n/a	TC0201-13
Intellectual Property Protection & Competitive Behavior	Number of patent litigation cases, number successful, and number as patent holder	Quantitative	Number	TC0201-14
	Amount of legal and regulatory fines and settlements associated with anti-competitive practices ¹²	Quantitative	U.S. dollars (\$)	TC0201-15

¹⁰ Note to **TC0201-09** –Disclosure shall include a discussion of efforts to minimize usage of these substances.

¹¹ Note to **TC0201-10** –Disclosure shall include a discussion of efforts to design for new and emerging usage patterns with respect to energy efficiency in all product categories (i.e., applications for servers, desktops, laptops, workstations, netbooks, tablets, mobile phones, and storage).

¹² Note to **TC0201-15** –Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.

Greenhouse Gas Emissions

Description

Greenhouse gas (GHG) emissions, particularly those from perfluorocompounds, from semiconductor manufacturing operations are a source of risk for companies arising from current and potential future regulations in the U.S. and abroad and the related operational challenges with compliance. With the offshoring trend in the industry, the likelihood and impact of climate change regulations may vary depending on the location of facilities. Semiconductors companies focused on mitigating GHG emissions from operations under their control are likely to be better able to manage long-term regulatory risks.

Accounting Metrics

TC0201-01. Gross global Scope 1 emissions and amount of total emissions from perfluorocompounds (PFCs)

- .01 The registrant shall report its total Scope 1 direct GHG emissions in metric tons of carbon dioxide equivalent (CO₂-e).
- .02 The CO₂-e calculation shall include emissions of CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆ (the six Kyoto gases), calculated in accordance with the World Resources Institute / World Business Council on Sustainable Development's (WRI/WBCSD) Greenhouse Gas Reporting Protocol-Corporate Standard, or equivalent.
- .03 The registrant shall also report the amount of direct greenhouse gas emissions from its use of perfluorocompounds (PFCs) in metric tons CO₂-e.
 - PFCs shall continue to be included in the gross global Scope 1 GHG emissions figure.

TC0201-02. Description of long-term and short-term strategy or plan to manage Scope 1 emissions, including emissions reduction targets, and an analysis of performance against those targets

- .04 The registrant shall discuss the following where relevant:
 - The scope, such as if strategies, plans, and/or reduction targets pertain differently to different business units, geographies, or emissions sources;
 - If strategies, plans, and/or reduction targets are related to or associated with an emissions disclosure (reporting) or reduction program (e.g., EU 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.
- .05 For emission-reduction targets the registrant shall disclose:
 - The percentage of emissions within the scope of the reduction plan;

- The percentage reduction from base year
 - The base year is the first or starting year against which emissions are evaluated towards the achievement of the target;
 - If 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;
 - The mechanism(s) for achieving the target, such as energy efficiency efforts, energy source diversification, carbon capture and storage, etc.

.06 Where necessary, the registrant shall discuss any circumstances in which the target base year emissions have been or may be re-calculated retrospectively or where the target base year has been reset.

.07 The registrant should focus its disclosure on Scope 1 emissions from perfluorocompounds (PFCs).

.08 Disclosure corresponds with:

- CDSB Section 4, "Management actions."¹³
- CDP questionnaire "CC3. Targets and Initiatives."

¹³ 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.

Energy Management in Manufacturing

Description

Manufacturing semiconductor devices is an energy-intensive process that involves high energy costs. Fossil-fuel based energy production and consumption create significant environmental impacts. These impacts have the potential to affect the results of operation of semiconductor companies as costs of carbon-intensive energy rise from pricing of GHG emissions. However, companies may benefit from opportunities created and be able to utilize incentives for energy efficiency and renewable energy. As industry innovation adds complexity to manufacturing processes, new technologies to manufacture semiconductors are likely to consume more energy unless companies invest in the energy efficiency of their operations. It is becoming increasingly material for companies in energy-intensive industries such as semiconductors to manage their overall energy efficiency, their reliance on different types of energy and the associated risks, and their ability to access alternative energy sources.

Accounting Metrics

TC0201-03. Total energy consumed, percentage grid electricity, percentage renewable energy

- .09 The registrant shall disclose total energy consumption from all sources as an aggregate figure in gigajoules or its 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.
- .10 In calculating energy consumption from fuels and biofuels, the registrant shall use higher heating values (HHV), also known as gross calorific values (GCV), and 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).
- .11 When reporting self-generated energy consumption, the registrant shall not double-count fuel consumption. For example, if a registrant generates electricity from natural gas and then consumes the generated electricity, the energy consumption is counted once as energy from fuel consumption.
- .12 The registrant shall disclose purchased grid electricity consumption as a percentage of its total energy consumption.
- .13 The registrant shall disclose renewable energy consumption as a percentage of its total energy consumption.
- The scope of renewable energy includes the renewable energy the registrant directly produces, purchases through a renewable power purchase agreement (PPA) which explicitly includes renewable energy certificates (RECs), or for which Green-e Energy Certified RECs are paired with grid electricity. For all renewable energy consumed as electricity in this manner, RECs must be retired on behalf of the registrant to be claimed as renewable energy as part of this disclosure.

- 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 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 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.¹⁴
- .14 Renewable energy is defined as energy from sources that are capable of being replenished in a short time through ecological cycles, such as geothermal, wind, solar, hydro, and biomass.
- For the purposes of this disclosure, the scope of renewable energy from hydro and biomass sources are limited to the following:
 - Energy from hydro sources that are certified by the Low Impact Hydropower institute.
 - Energy from biomass sources that are Green-e Energy certified or eligible for a state Renewable Portfolio Standard.
- .15 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 (including for electricity from solar or wind energy).

¹⁴ SASB recognizes that RECs reflect the environmental attributes of renewable energy that has been introduced to the grid, and that a premium has been paid by the purchaser of the REC to enable generation of renewable energy beyond any renewable energy already in the grid mix absent the market for RECs.

Water & Waste Management in Manufacturing

Description

Significant volumes of ultra-pure water are critical to the semiconductor production process. As manufacturing becomes more complex, companies are finding it challenging to reduce water use, which is likely to pose operational risks as a result of increasing global water stress. Furthermore, contamination of local water resources, including from underground storage of hazardous materials used in semiconductors manufacturing, as well as inadequate waste management practices can increase operating costs of water purification and lead to social unrest or governmental intervention. Such actions can affect company reputation, halt production, or impose additional legal or regulatory costs on companies. Companies that address water and waste management in manufacturing operations and incorporate water stress considerations in decisions about fab locations will be better positioned to deal with existing, and emerging, regulations in the U.S. and globally.

Accounting Metrics

TC0201-04. Total water withdrawn, percentage recycled, percentage in regions with High or Extremely High Baseline Water Stress

- .16 The registrant shall disclose the amount of water (in cubic meters) that was withdrawn from freshwater sources for use in operations.
- 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 total dissolved solids (TDS) concentration of less than 1000 mg/l per the Water Quality Association [definition](#).
 - Water obtained from a water utility, can be assumed to meet the definition of freshwater.¹⁵
- .17 The registrant shall disclose the percentage of water recycled as the volume (in cubic meters) recycled divided by the volume of water withdrawn.
- Any volume of water reused multiple times shall be counted as recycled each time it is recycled and reused.
- .18 Using the World Resources Institute's (WRI) Water Risk Atlas tool, Aqueduct (publicly available online [here](#)), the registrant shall analyze all of its operations for water risks and identify facilities that are in a location with High (40–80%) or Extremely High (>80%) Baseline Water Stress. Water withdrawn in locations with High or Extremely High Baseline Water Stress shall be indicated as a percentage of the total water withdrawn.

TC0201-05. Amount of hazardous waste from manufacturing, percentage recycled

- .19 The registrant shall calculate and disclose the amount of waste (in metric tons) that meets the definition of hazardous waste under Subtitle C of the U.S. Environmental Protection Agency's (EPA) Resource Conservation and Recovery Act (RCRA).
- This includes wastes that display the following characteristics: ignitability, corrosivity, reactivity, or toxicity.

¹⁵ <http://water.epa.gov/drink/contaminants/secondarystandards.cfm>

- .20 The percentage recycled shall be calculated as the weight of hazardous waste material that was reused plus the amount 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 material, where:
- 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 a production or manufacturing process and made into a final product or made into a component for incorporation into a product.
 - The scope of recycled and remanufactured products include primary recycled materials, co-products (outputs of equal value to primary recycled materials), and by-products (outputs of lesser value to 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 sent for further recycling include those materials which are transferred to a third party for the expressed purpose of reuse, recycling, or refurbishment.
 - 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.
- .21 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) to which the entities it has transferred e-waste are compliant.

Recruiting & Managing a Global Skilled Workforce

Description

Employees are key contributors to value creation in the semiconductors industry. Companies face competition and challenges in recruiting qualified employees, including electrical engineers, research scientists, and process engineers, and compensation for such employees is a significant cost component for the industry. To respond to domestic talent shortages, semiconductors companies are increasingly recruiting foreign nationals, even as they offshore operations, bringing with it associated sustainability and employee management challenges. Semiconductors companies that are able to put in place education, training, or recruitment policies that develop and leverage the talents of global skilled employees to fill their business needs can improve their competitive positioning.

Accounting Metrics

TC0201-06. Percentage of employees that are (1) foreign nationals and (2) located offshore

- .22 The registrant shall disclose the percentage of employees that are foreign nationals where:
- Foreign Nationals are defined as anyone requiring a visa for work in the country in which they are employed.
- .23 The registrant shall indicate the percentage of employees that are located offshore from the registrant's country of domicile, by region.

Note to **TC0201-06**

- .24 The registrant shall describe potential risks from recruiting foreign nationals and/or offshore employees, which may arise from immigration, naturalization, or visa regulations; loss of control; threats to intellectual property; or cultural or political sensitivities.
- .25 The registrant shall describe management's approach to addressing the risks it has identified related to recruiting foreign nationals, which may include developing local talent pools, political lobbying for immigration reform, outsourcing of operations, or joining or forming industry partnerships.
- .26 The registrant shall describe management's approach to addressing the additional risks it has identified related to conducting offshore business activities, which may include implementing safeguards for data security, piracy, and IP protection and diversifying the locations of offshore operations.

Employee Health & Safety

Description

The long-term impact on worker health from chemical usage in semiconductor manufacturing is a major area of concern for the industry. Workers in fabs, particularly maintenance workers, are at risk of exposure to chemicals known to be hazardous to human health. Companies taking measures to protect employee health and safety will protect themselves from adverse litigation rulings from lawsuits related to both regulated and unregulated hazardous substances. Violations of employee health and safety regulations could result in monetary and non-monetary penalties and reputational impacts. Impacts may increase in magnitude over the medium- to long-term as the quality and availability of data on health hazards, particularly on long-term health effects, improves.

Accounting Metrics

TC0201-07. Discussion of efforts to assess, monitor, and reduce exposure of employees to human health hazards

- .27 The registrant shall discuss efforts to assess, monitor, and reduce exposure of employees to human health hazards including, but not limited to, solvents, corrosives, lead (and its compounds), arsenic (and its compounds), as well as known or suspected carcinogens, teratogens, and mutagens.
- .28 The registrant shall describe management approach in the context of short term (i.e., acute risks) and long term (i.e., chronic) risks.
- .29 Relevant efforts to discuss include, but are not limited to, risk assessments, participation in long-term health studies, ambient air monitoring in clean rooms, implementation of technology to control worker exposure, worker use of personal protective equipment, automation of processes, and phasing out, substituting, or using alternative materials.
- .30 The scope of employees shall focus on cleanroom workers in fabrication plants but should discuss other employees as relevant.

TC0201-08. Amount of legal and regulatory fines and settlements associated with employee health and safety violations

- .31 The registrant shall disclose the amount (excluding legal fees) of all fines or settlements associated with health and safety violations.
- .32 Disclosure shall include civil actions (e.g., civil judgments, settlements, or regulatory penalties) and criminal actions (e.g., criminal judgment, penalties, or restitutions) taken by any entity (government, businesses, or individuals).

Note to **TC0201-08**

- .33 The registrant shall briefly describe the nature (e.g., guilty plea, deferred agreement, non-prosecution agreement) and context of fines and settlements.
- .34 The registrant shall describe any corrective actions it has implemented as a result of each incident. This may include, but is not limited to, specific changes in operations, management, processes, products, business partners, training, or technology.

Product Lifecycle Management

Description

Semiconductor machinery and device manufacturers can reduce the environmental and human health impacts of their products by increasing the energy-efficiency of equipment and chips and reducing the amount of harmful materials in products. Semiconductors companies face increasing demand for devices that enable higher computing power and lower energy consumption. Semiconductors companies contributing to the development of cutting-edge energy-efficient devices that enable a longer battery life, reduce heat output, and allow end users to lower energy bills can gain a competitive advantage. Companies can also benefit from working to reduce and eventually eliminate the use of toxic materials from chips destined for consumer devices, which has implications in end of life management of electronic waste, an issue of growing legislative importance in the U.S. and abroad.

Accounting Metrics

TC0201-09. Percentage of products by revenue that contain IEC 62474 declarable substances

- .35 The registrant shall calculate the percentage as: the revenue, in U.S. dollars, from products that contain declarable substances according to International Electrotechnical Commission's IEC 62474 - Material Declaration for Products of and for the Electrotechnical Industry divided by total revenue from products.
- .36 A product contains a declarable substance if, according to IEC 62474, it contains an amount of the substance above the "reporting threshold", is within the scope of the "reporting application" identified, and for which the "reporting requirement" is mandatory.
- .37 The IEC 62474 database of declarable substance groups and declarable substances may be interactively queried or the complete list may be downloaded as an Excel spreadsheet.

Note to TC0201-09

- .38 The registrant shall discuss its approach to managing the use of substances that appear as declarable substance groups or declarable substances in IEC 62474, including specific operational processes which take these substances into consideration.
- .39 Relevant operational processes may include, but are not limited to, product design, materials and parts procurement, product safety testing, product labeling, and product declarations (e.g. material safety data sheets).
- .40 Relevant actions to discuss may include the exclusion of substances (e.g. banned substances lists), use of material substitution assessments, product labeling, or any other methods considering usage of substances from these lists.
- .41 If the registrant assesses and manages the impact of known or potentially toxic substances with reference to other regulations, industry norms or accepted chemical lists it may identify those practices, and it shall describe the degree of overlap with IEC 62474.

TC0201-10. Processor energy efficiency at a system-level for: (1) servers (2) desktops, and (3) laptops

- .42 The registrant shall disclose the energy efficiency of its processors based on benchmarked performance per watt of energy consumed, using the following parameters:
- Representative product – The registrant shall calculate performance using a representative product for each product category (i.e., servers, desktops, laptops), where representative product would typically be the registrant’s bestselling specification of processor in the product category. If the registrant determines its representative product differently, it shall explain the criteria it used in this determination.
 - System-level testing – Testing shall be conducted – and disclosure shall be made – at the system-level for a computer integrating the registrant’s processor and not at a component-level. The registrant shall conduct testing using a representative computer system structure, such as the bestselling system using the registrant’s processor or one that is widely commercially available.
 - Specified benchmark – At a minimum the registrant shall disclose performance to the benchmarks defined below for each product category; the registrant may choose to disclose performance to additional benchmarks.
- .43 The registrant shall disclose the efficiencies for processors used in systems for the following product categories:
- Servers
 - Desktop computers
 - Laptops
- .44 For servers the registrant shall conduct testing according to the SPEC Power SPECpower_ssj2008 and disclose the results as:
- Overall ssj_ops/watt
- .45 For desktop computers the registrant shall conduct testing according to the SPEC CPU2006 benchmark and disclose two results:
- Base SPECint score/watt
 - Base SPECfp score/watt
- .46 For laptops the registrant shall conduct testing according to the MobileMark® 2012 v1.5 and disclose two results:
- Performance qualification score
 - Battery life score (in minutes)
- .47 Updates to the aforementioned benchmarks constitute updates to the requirements of this metric.

Note to **TC0201-10**

- .48 The registrant shall include a discussion of efforts to design for new and emerging usage patterns with respect to energy efficiency in all relevant product categories (e.g., applications for servers, desktops, laptops, workstations, netbooks tablets, mobile phones, storage, etc.).
- Discussion should include how, in the registrant’s view, the energy efficiency of processors is influenced by factors such as growth of new product categories (e.g., machine-to-machine communication), new usage patterns (e.g., increased data consumption via mobile devices), purchasing specifications (e.g., ENERGY STAR), or consumer demand (e.g., environmentally conscious consumers).
- .49 For additional product categories, such as workstations, netbooks, tablets, mobile phones, and storage, for which a benchmark is not specified above the registrant may choose to disclose energy efficiency performance using a relevant benchmark.
- In this case the registrant shall describe the parameters it used to select and test to the benchmark.

Definitions

The Standard Performance Evaluation Corporation (SPEC) is a non-profit corporation formed to establish, maintain and endorse a standardized set of benchmarks that can be applied to high-performance computers. SPEC develops benchmark suites and also reviews and publishes submitted results from member organizations and other benchmark licensees.

SPECpower_ssj2008 is a benchmark that evaluates the power and performance characteristics of volume server class computers. The initial benchmark addresses the performance of server-side Java, and additional workloads are planned.

SPEC CPU2006 is an industry-standardized, CPU-intensive benchmark suite, stressing a system’s processor, memory subsystem and compiler. SPEC designed CPU2006 to provide a comparative measure of compute-intensive performance across the widest practical range of hardware using workloads developed from real user applications. SPEC CPU2006 is made up of two subcomponents that focus on two different types of compute intensive performance: CINT2006 for measuring and comparing compute-intensive integer performance; and CFP2006 for measuring and comparing compute-intensive floating point performance.

MobileMark® 2012 is an app-based benchmark for notebook PCs, promulgated by BAPCo, that measures battery life and performance simultaneously (showing how well a system design addresses the inherent tradeoffs between performance and power management).

Additional References

Registration, Evaluation, Authorisation and Restriction of Chemical (REACH) Regulation (EC) No 1907/2006

Candidate List of Substances of Very High Concern (SVHC) for Authorisation is published in accordance with Article 59(10) of the REACH Regulation).

The NIST 800 Series is a set of documents that describe United States federal government computer security policies, procedures, and guidelines. [NIST](http://nvl.nist.gov) (National Institute of Standards and Technology) is a unit of the Commerce Department. The documents are available free of charge, and can be useful to businesses and educational institutions, as well as to government agencies. (Available on-line at: <http://csrc.nist.gov/publications/PubsSPs.html>).

Supply Chain Management & Materials Sourcing

Description

The industry's reliance on critical and conflict minerals and metals has become a focus of attention due to associated supply constraints, resulting price volatility, and a low potential for substitution. Furthermore, companies face regulations related to their use of conflict minerals, which can lead to increased costs associated with new reporting requirements. Semiconductors companies with strong supply chain standards and an ability to adapt to increased resource scarcity will be better positioned to protect shareholder value. Innovations at the product-design phase to reduce dependence on some of these materials may also reduce risk.

Accounting Metrics

TC0201-11. Percentage of products by revenue that contain critical materials

- .50 The registrant shall calculate the percentage as: the revenue, in U.S. dollars, from product design and manufacturing services for products that contain critical materials divided by total revenues from product design and manufacturing services for products.
- .51 A critical material is defined as one that is both essential in use and subject to the risk of supply restriction.¹⁶
- .52 At a minimum the scope of critical materials includes the following minerals and metals:
- Antimony, cobalt, fluor spar, 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).

TC0201-12. Percentage of tungsten, tin, tantalum, and gold smelters within the supply chain that are verified conflict-free

- .53 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.
- .54 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.
 - Any other due diligence certification, audit, or program that meets the conflict mineral provisions of Dodd-Frank Section 1502.

¹⁶ National Research Council. *Minerals, Critical Minerals, and the U.S. Economy*. Washington, DC: The National Academies Press, 2008.

.55 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 products 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 any of its suppliers of raw materials, components, or subassemblies.

TC0201-13. Discussion of the management of risks associated with the use of critical materials and conflict minerals

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

.57 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.

.58 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.

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

Intellectual Property Protection & Competitive Behavior

Description

While Intellectual Property (IP) protection is inherent to the business model of companies in the Semiconductors industry, companies' IP practices can sometimes conflict with the best interests of society. IP protection, on the one hand, is an important driver of innovation; on the other hand, some companies may also acquire and enforce patents and other IP protection in efforts to restrict competition, particularly if they are dominant market players. Industry standards setting can involve complex negotiations over patent rights and licensing terms, and companies are using cross-licenses and patent pools to address difficulties around patent thickets. However, such industry cooperation can also raise anti-trust concerns, for example, with provisions in portfolio cross-licenses that could enable price-fixing. Companies that are able to protect their IP and use it to spur innovation resulting in new products and services, while ensuring their IP management and other business practices do not unfairly restrict competition, have the potential to lower regulatory scrutiny and legal actions while improving revenues.

Accounting Metrics

TC0201-14. Number of patent litigation cases, number successful, and number as patent holder

.60 The registrant shall disclose the number of patent litigation cases in which it was involved as either the patent holder or the patent challenger.

- The scope of disclosure includes cases that were adjudicated during the fiscal year even if the decision is under appeal.
- A patent holder is defined as the owner of the exclusive right to prevent others from making, using, offering for sale or selling, or importing the inventions protected by the patent.
- A patent challenger is defined as the party seeking to invalidate or limit the scope of an existing patent or pending patent application by demonstrating that a patent fails to satisfy one or more of the statutory criteria of patentability (e.g., novelty, utility, nonobviousness).

.61 The registrant shall disclose the number of successful cases, where:

- Success is defined as the instances where a liability and damages or permanent injunction (if included) decision was made in favor of the registrant.¹⁷ Success encompasses findings made in summary judgment, trial by jury, and bench awards.
- Litigation success as a patent holder refers to the registrant's involvement in litigation for which it is successful in pursuing damages for unauthorized use of its intellectual property rights by others (i.e., suing for patent infringement), or litigation in which another entity challenges the scope or efficacy of the registrant's patent (i.e., defending patent against legal challenge).

¹⁷ From "2013 Patent Litigation Study: Big cases make headlines, while patent cases proliferate," by PwC. Available on-line at: http://www.pwc.com/en_US/us/forensic-services/publications/assets/2013-patent-litigation-study.pdf

- Litigation success as a patent challenger refers to the registrant's involvement in litigation through which it is successful in seeking, either proactively or reactively, to protect its own rights by challenging the scope of rights held by another patent owner or the scope of rights to be conveyed to another party as part of a pending patent application.

.62 The registrant shall disclose the number of cases in which it was the patent holder.

TC0201-15. Amount of legal and regulatory fines and settlements associated with anti-competitive practices

.63 The registrant shall disclose the amount (excluding legal fees) of all fines or settlements associated with anti-competitive behavior such as those related to enforcement of U.S. laws and regulations on price-fixing, anti-trust behavior (e.g., exclusivity contracts), patent misuse, or network effects and bundling of services and products to limit competition including violations of the Sherman Antitrust Act of 1890 and the Clayton Antitrust Act of 1914.

.64 Disclosure shall include civil actions (e.g., civil judgment, settlements, or regulatory penalties) and criminal actions (e.g., criminal judgment, penalties, or restitutions) taken by any entity (government, businesses, or individuals).

Note to TC0201-15

.65 The registrant shall briefly describe the nature (e.g., guilty plea, deferred agreement, or non-prosecution agreement) and context (e.g., price-fixing, patent misuse, anti-trust, etc.) of fines and settlements.

.66 The registrant shall describe any corrective actions it has implemented as a result of each incident. This may include but is not limited to specific changes in operations, management, processes, products, business partners, training, or technology.

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