



March 2022

Exposure Draft

IFRS[®] Sustainability Disclosure Standard

[Draft] IFRS S2 Climate-related Disclosures Appendix B Industry-based disclosure requirements

Volume B57—Semiconductors

Comments to be received by 29 July 2022



This industry from Appendix B Industry-based disclosure requirements accompanies the Exposure Draft ED/2022/S2 *Climate-related Disclosures* (published March 2022; see separate booklet). It is published by the International Sustainability Standards Board (ISSB) for comment only. Comments need to be received by 29 July 2022 and should be submitted by email to commentletters@ifrs.org or online at <https://www.ifrs.org/projects/open-for-comment/>.

All comments will be on the public record and posted on our website at www.ifrs.org unless the respondent requests confidentiality. Such requests will not normally be granted unless supported by a good reason, for example, commercial confidence. Please see our website for details on this policy and on how we use your personal data. If you would like to request confidentiality, please contact us at commentletters@ifrs.org before submitting your letter.

Disclaimer: To the extent permitted by applicable law, the ISSB and the IFRS Foundation (Foundation) expressly disclaim all liability howsoever arising from this publication or any translation thereof whether in contract, tort or otherwise to any person in respect of any claims or losses of any nature including direct, indirect, incidental or consequential loss, punitive damages, penalties or costs.

Information contained in this publication does not constitute advice and should not be substituted for the services of an appropriately qualified professional.

© 2022 SASB, part of Value Reporting Foundation.

All rights reserved. Reproduction and use rights are strictly limited. Please contact the Foundation for further details at permissions@ifrs.org.

Copies of ISSB publications may be ordered from the Foundation by emailing customerservices@ifrs.org or visiting our shop at <https://shop.ifrs.org>.

The Foundation has trade marks registered around the world (Marks) including 'IAS[®]', 'IASB[®]', the IASB[®] logo, 'IFRIC[®]', 'IFRS[®]', the IFRS[®] logo, 'IFRS for SMEs[®]', the IFRS for SMEs[®] logo, 'International Accounting Standards[®]', 'International Financial Reporting Standards[®]', the 'Hexagon Device', 'NIIF[®]' and 'SIC[®]'. Further details of the Foundation's Marks are available from the Foundation on request.

The Foundation is a not-for-profit corporation under the General Corporation Law of the State of Delaware, USA and operates in England and Wales as an overseas company (Company number: FC023235) with its principal office in the Columbus Building, 7 Westferry Circus, Canary Wharf, London, E14 4HD.

Introduction

This volume is part of Appendix B of [draft] IFRS S2 Climate-related Disclosures and is an integral part of that [draft] Standard. It has the same authority as the other parts of that [draft] Standard.

This volume sets out the requirements for identifying, measuring and disclosing information related to an entity's significant climate-related risks and opportunities that are associated with specific business models, economic activities and other common features that characterise participation in this industry.

The industry-based disclosure requirements are derived from SASB Standards (see paragraphs B10–B12 of [Draft] IFRS S2 *Climate-related Disclosures*). Amendments to the SASB Standards, described in paragraph B11, are marked up for ease of reference. New text is underlined and deleted text is struck through. The metric codes used in SASB Standards have also been included, where applicable, for ease of reference. For additional context regarding the industry-based disclosure requirements contained in this volume, including structure and terminology, application and illustrative examples, refer to Appendix B paragraphs B3–B17.

Semiconductors

Industry Description

The Semiconductors industry includes companies that design or manufacture 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.

Sustainability Disclosure Topics & Metrics

Table 1. Sustainability Disclosure Topics & Metrics

TOPIC	METRIC	CATEGORY	UNIT OF MEASURE	CODE
Greenhouse Gas Emissions	(1) Gross global Scope 1 emissions and (2) amount of total emissions from perfluorinated compounds	Quantitative	Metric tons (t) CO ₂ -e	TC-SC-110a.1
	Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	TC-SC-110a.2
Energy Management in Manufacturing	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	Quantitative	Gigajoules (GJ), Percentage (%)	TC-SC-130a.1
Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m ³), Percentage (%)	TC-SC-140a.1
Product Lifecycle Management	Percentage of products by revenue that contain IEC 62474 declarable substances ¹⁰¹	Quantitative	Percentage (%)	TC-SC-410a.1
	Processor energy efficiency at a system-level for: (1) servers, (2) desktops, and (3) laptops ¹⁰²	Quantitative	Various, by product category	TC-SC-410a.2

¹⁰¹ Note to TC-SC-410a.1 – Disclosure shall include a discussion of efforts to minimize usage of these substances.

¹⁰² Note to TC-SC-410a.2 – 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).

APPENDIX B OF [DRAFT] IFRS S2 CLIMATE-RELATED DISCLOSURES

Table 2. Activity Metrics

ACTIVITY METRIC	CATEGORY	UNIT OF MEASURE	CODE
Total production ¹⁰³	Quantitative	See note	TC-SC-000.A
Percentage of production from owned facilities	Quantitative	Percentage (%)	TC-SC-000.B

¹⁰³ Note to TC-SC-000.A – The entity 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.

Greenhouse Gas Emissions

Topic Summary

Companies in the Semiconductors industry generate greenhouse gas (GHG) emissions, particularly those from perfluorinated compounds, from semiconductor manufacturing operations. GHG emissions can create regulatory compliance costs and operating risks for semiconductor companies, although resulting financial impacts will vary depending on the magnitude of emissions and the prevailing emissions regulations. Companies that cost-effectively manage GHG emissions through greater energy efficiency, the use of alternative chemicals, or manufacturing process advances could benefit from improved operating efficiency and reduced regulatory risk.

Metrics

TC-SC-110a.1. (1) Gross global Scope 1 emissions and (2) amount of total emissions from perfluorinated compounds

- 1 The entity shall disclose its (1) gross global Scope 1 greenhouse gas (GHG) emissions to the atmosphere of the seven GHGs covered under the Kyoto Protocol—carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆), and nitrogen trifluoride (NF₃).
 - 1.1 Emissions of all GHGs shall be consolidated and disclosed in metric tons of carbon dioxide equivalents (CO₂-e), calculated in accordance with published 100-year time horizon global warming potential (GWP) values. To date, the preferred source for GWP values is the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2014).
 - 1.2 Gross emissions are GHGs emitted into the atmosphere before accounting for offsets, credits, or other similar mechanisms that have reduced or compensated for emissions.
- 2 The entity shall disclose its (2) gross global Scope 1 GHG emissions, in metric tons of CO₂-e, originated from perfluorinated compounds.
- 3 Scope 1 emissions are defined and shall be calculated according to the methodology contained in *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (GHG Protocol), Revised Edition, March 2004, published by the World Resources Institute and the World Business Council on Sustainable Development (WRI/WBCSD).
 - 3.1 Acceptable calculation methodologies include those that conform to the GHG Protocol as the base reference, but provide additional guidance, such as industry- or region-specific guidance. Examples include, but are not limited to:
 - 3.1.1 *GHG Reporting Guidance for the Aerospace Industry* published by International Aerospace Environmental Group (IAEG)
 - 3.1.2 *Greenhouse Gas Inventory Guidance: Direct Emissions from Stationary Combustion Sources* published by the U.S. Environmental Protection Agency (EPA)

APPENDIX B OF [DRAFT] IFRS S2 CLIMATE-RELATED DISCLOSURES

- 3.1.3 India GHG Inventory Program
 - 3.1.4 ISO 14064-1
 - 3.1.5 *Petroleum Industry Guidelines for reporting GHG emissions*, 2nd edition, 2011, published by IPIECA
 - 3.1.6 *Protocol for the quantification of greenhouse gas emissions from waste management activities* published by Entreprises pour l'Environnement (EpE)
- 3.2 GHG emissions data shall be consolidated and disclosed according to the approach with which the entity consolidates its financial reporting data, which is generally aligned with the “financial control” approach defined by the GHG Protocol, and the approach published by the Climate Disclosure Standards Board (CDSB) described in REQ-07, “Organisational boundary,” of the *CDSB Framework for reporting environmental information, natural capital and associated business impacts* (April 2018).
- 4 The entity may discuss any change in its emissions from the previous reporting period, including whether the change was due to emissions reductions, divestment, acquisition, mergers, changes in output, and/or changes in calculation methodology.
- 5 In the case that current reporting of GHG emissions to the CDP or other entity (e.g., a national regulatory disclosure program) differs in terms of the scope and consolidation approach used, the entity may disclose those emissions. However, primary disclosure shall be according to the guidelines described above.
- 6 The entity may discuss the calculation methodology for its emissions disclosure, such as if data are from continuous emissions monitoring systems (CEMS), engineering calculations, or mass balance calculations.

TC-SC-110a.2. Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets

- 1 The entity shall discuss its long-term and short-term strategy or plan to manage its Scope 1 greenhouse gas (GHG) emissions.
- 1.1 Scope 1 emissions are defined according to *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (GHG Protocol), Revised Edition, March 2004, published by the World Resources Institute and the World Business Council on Sustainable Development (WRI/WBCSD).
 - 1.2 The scope of GHG emissions includes the seven GHGs covered under the Kyoto Protocol—carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆), and nitrogen trifluoride (NF₃).
 - 1.3 The entity shall specifically discuss its strategy or plan to manage Scope 1 GHG emissions that originate from perfluorinated compounds.
- 2 The entity shall discuss its emission reduction target(s) and analyze its performance against the target(s), including the following, where relevant:

- 2.1 The scope of the emission reduction target (e.g., the percentage of total emissions to which the target is applicable);
 - 2.2 Whether the target is absolute- or intensity-based, and the metric denominator, if it is an intensity-based target;
 - 2.3 The percentage reduction against the base year, with the base year representing the first year against which emissions are evaluated toward the achievement of the target;
 - 2.4 The timelines for the reduction activity, including the start year, the target year, and the base year;
 - 2.5 The mechanism(s) for achieving the target; and
 - 2.6 Any circumstances in which the target or base year emissions have been, or may be, recalculated retrospectively or the target or base year has been reset.
- 3 The entity shall discuss the activities and investments required to achieve the plans and/or targets, and any risks or limiting factors that might affect achievement of the plans and/or targets.
- 3.1 Relevant activities and investments may include, but are not limited to, energy efficiency efforts, demand-response programs, and development of renewable energy portfolios consistent with the IPCC Fifth Assessment Report: Climate Change 2014: Mitigation of Climate Change, Contribution of Working Group III.
- 4 The entity shall discuss the scope of its strategies, plans, and/or reduction targets, such as how they relate to different business units, geographies, or emissions sources.
- 5 The entity shall discuss whether its strategies, plans, and/or reduction targets are related to, or associated with, emissions limiting and/or emissions reporting-based programs or regulations (e.g., the EU Emissions Trading Scheme, Quebec Cap-and-Trade System, California Cap-and-Trade Program), including regional, national, international, or sectoral programs.
- 6 Disclosure of strategies, plans, and/or reduction targets shall be limited to activities that were ongoing (active) or reached completion during the reporting period.

Energy Management in Manufacturing

Topic Summary

Energy is a critical input for manufacturing semiconductor devices. The price of conventional grid electricity and volatility of fossil fuel prices may increase as a result of evolving climate change regulations and new incentives for energy efficiency and renewable energy, among other factors, while alternative energy sources become more cost-competitive. Decisions regarding energy sourcing and type, as well as the use of alternative energy, can create trade-offs related to the energy supply's cost and reliability for operations. 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. The manner in which a company manages energy efficiency, its reliance on different types of energy and the associated sustainability risks, and its ability to access alternative energy sources is likely to impact financial performance.

Metrics

TC-SC-130a.1. (1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable

- 1 The entity shall disclose (1) the total amount of energy it consumed as an aggregate figure, in gigajoules (GJ).
 - 1.1 The scope of energy consumption includes energy from all sources, including energy purchased from sources external to the entity and energy produced by the entity itself (self-generated). For example, direct fuel usage, purchased electricity, and heating, cooling, and steam energy are all included within the scope of energy consumption.
 - 1.2 The scope of energy consumption includes only energy directly consumed by the entity during the reporting period.
 - 1.3 In calculating energy consumption from fuels and biofuels, the entity shall use higher heating values (HHV), also known as gross calorific values (GCV), which are directly measured or taken from the Intergovernmental Panel on Climate Change (IPCC), the U.S. Department of Energy (DOE), or the U.S. Energy Information Administration (EIA).
- 2 The entity shall disclose (2) the percentage of energy it consumed that was supplied from grid electricity.
 - 2.1 The percentage shall be calculated as purchased grid electricity consumption divided by total energy consumption.
- 3 The entity shall disclose (3) the percentage of energy it consumed that is renewable energy.
 - 3.1 Renewable energy is defined as energy from sources that are replenished at a rate greater than or equal to their rate of depletion, such as geothermal, wind, solar, hydro, and biomass.
 - 3.2 The percentage shall be calculated as renewable energy consumption divided by total energy consumption.

- 3.3 The scope of renewable energy includes renewable fuel the entity consumed, renewable energy the entity directly produced, and renewable energy the entity purchased, if purchased through a renewable power purchase agreement (PPA) that explicitly includes renewable energy certificates (RECs) or Guarantees of Origin (GOs), a Green-e Energy Certified utility or supplier program, or other green power products that explicitly include RECs or GOs, or for which Green-e Energy Certified RECs are paired with grid electricity.
 - 3.3.1 For any renewable electricity generated on-site, any RECs and GOs must be retained (i.e., not sold) and retired or cancelled on behalf of the entity in order for the entity to claim them as renewable energy.
 - 3.3.2 For renewable PPAs and green power products, the agreement must explicitly include and convey that RECs and GOs be retained or replaced and retired or cancelled on behalf of the entity in order for the entity to claim them as renewable energy.
 - 3.3.3 The renewable portion of the electricity grid mix that is outside of the control or influence of the entity is excluded from the scope of renewable energy.
- 3.4 For the purposes of this disclosure, the scope of renewable energy from ~~hydro and biomass sources is limited to the following:~~
 - 3.4.1 ~~Energy from hydro sources is limited to those that are certified by the Low Impact Hydropower Institute or that are eligible for a state Renewable Portfolio Standard;~~
 - 3.4.2 ~~Energy from biomass sources is limited to~~ materials certified to a third-party standard (e.g., Forest Stewardship Council, Sustainable Forest Initiative, Programme for the Endorsement of Forest Certification, or American Tree Farm System), materials considered eligible sources of supply according to the *Green-e Framework for Renewable Energy Certification, Version 1.0* (2017) or Green-e regional standards, and/or materials that are eligible for an applicable state renewable portfolio standard.
- 4 The entity 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 kilowatt hours (kWh) to GJ (for energy data including electricity from solar or wind energy).

Water Management

Topic Summary

Water is critical to the semiconductor production process, which requires significant volumes of “ultra-pure” water for cleaning purposes, to avoid trace molecules from affecting product quality. As manufacturing becomes more complex, companies in the industry are finding it important to reduce the use of ultra-pure water. Water is becoming a scarce resource around the world, due to increasing consumption from population growth and rapid urbanization, and reduced supplies due to climate change. Furthermore, water pollution in developing countries makes available water supplies unusable or expensive to treat. Without careful planning, water scarcity can result in higher supply costs, social tensions with local communities and governments, and/or loss of access to water in water-scarce regions thereby presenting a critical risk to production. Semiconductor companies that are able to increase the efficiency of water use during manufacturing will maintain a lower risk profile and face lower regulatory risks as local, regional, and national environmental laws place increasing emphasis on resource conservation.

Metrics

TC-SC-140a.1. (1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress

- 1 The entity shall disclose the amount of water, in thousands of cubic meters, that was withdrawn from all sources.
 - 1.1 Water sources include surface water (including water from wetlands, rivers, lakes, and oceans), groundwater, rainwater collected directly and stored by the entity, and water and wastewater obtained from municipal water supplies, water utilities, or other entities.
- 2 The entity may disclose portions of its supply by source if, for example, significant portions of withdrawals are from non-freshwater sources.
 - 2.1 Fresh water may be defined according to the local laws and regulations where the entity operates. Where there is no legal definition, fresh water shall be considered to be water that has less than 1,000 parts per million of dissolved solids ~~per the U.S. Geological Survey.~~
 - 2.2 Water obtained from a water utility in compliance with ~~U.S. National Primary Drinking Water Regulations~~ jurisdictional drinking water regulations can be assumed to meet the definition of fresh water.
- 3 The entity shall disclose the amount of water, in thousands of cubic meters, that was consumed in its operations.
 - 3.1 Water consumption is defined as:
 - 3.1.1 Water that evaporates during withdrawal, usage, and discharge;
 - 3.1.2 Water that is directly or indirectly incorporated into the entity’s product or service;

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

- 4 The entity shall analyze all of its operations for water risks and identify activities that withdraw and consume water in locations with High (40–80 percent) or Extremely High (>80 percent) Baseline Water Stress as classified by the World Resources Institute's (WRI) Water Risk Atlas tool, Aqueduct.
- 5 The entity shall disclose its water withdrawn in locations with High or Extremely High Baseline Water Stress as a percentage of the total water withdrawn.
- 6 The entity shall disclose its water consumed in locations with High or Extremely High Baseline Water Stress as a percentage of the total water consumed.

Product Lifecycle Management

Topic Summary

As an increasing number of devices become connected to each other and to the Internet, semiconductor companies face greater demand for products that will enable higher computing power and lower energy costs. 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. As consumer demand grows for energy-efficient devices that enable a longer battery life, reduce heat output, and allow end users to lower energy bills, semiconductor manufacturers that meet this need can gain a competitive advantage, driving revenues and market share growth. 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 for the end-of-life management of electronic waste, an issue of growing legislative importance in many countries.

Metrics

TC-SC-410a.1. Percentage of products by revenue that contain IEC 62474 declarable substances

- 1 The entity shall disclose percentage of its products sold during the reporting period that contain declarable substances.
 - 1.1 A product is considered to contain a declarable substance if, according to International Electrotechnical Commission's IEC 62474 – Material Declaration for Products of and for the Electrotechnical Industry, the product contains an amount of the declarable substance that is:
 - 1.1.1 Above the “reporting threshold”
 - 1.1.2 Within the scope of the “reporting application” identified
 - 1.1.3 Within mandatory “reporting requirement”
 - 1.2 The entity shall calculate the percentage as the revenue from electrical, electronic, and related technology products sold that contain a declarable substance(s) divided by total revenue from electrical, electronic, and related technology products sold.
- 2 The scope of disclosure includes all electrical, electronic, and related technology products, including products from a company not required to declare, or otherwise making declarations, according to IEC 62474.

Note to **TC-SC-410a.1**

- 1 The entity shall describe its approach to managing the use of substances that appear as declarable substance groups or declarable substances in IEC 62474, including a discussion of specific operational processes during which use of these substances is considered as well as a discussion of actions the entity has taken to manage the use of these substances.

- 1.1 Relevant management approaches and actions to describe may include, but are not limited to:
 - 1.1.1 Product design criteria for the exclusion of substances (e.g., banned substances lists)
 - 1.1.2 Use of material substitution assessments, materials and parts procurement guidelines, product safety testing, product declarations (e.g., material safety data sheets), and product labeling
- 2 If the entity 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.

TC-SC-410a.2. Processor energy efficiency at a system-level for: (1) servers, (2) desktops, and (3) laptops

- 1 The entity shall disclose the energy efficiency of its processors based on benchmarked performance per watt of energy consumed for (1) servers, (2) desktops, and (3) laptops, using the following parameters:
 - 1.1 Representative product: The entity shall calculate performance using a representative product for each product category (i.e., servers, desktops, laptops), where representative product would typically be the entity's bestselling specification of processor in the product category. If the entity determines its representative product differently, it shall explain the criteria it used in this determination.
 - 1.2 System-level testing: Testing shall be conducted—and disclosure shall be made—at the system-level for a computer integrating the entity's processor and not at a component-level. The entity shall conduct testing using a representative computer system structure, such as the bestselling system using the entity's processor or one that is widely commercially available.
 - 1.3 Specified benchmark: At a minimum the entity shall disclose performance to the benchmarks defined below for each product category; the entity may disclose performance to additional benchmarks.
- 2 As described below, the entity shall conduct testing and disclose performance, depending on product category, consistent with guidance provided by:
 - 2.1 The Standard Performance Evaluation Corporation (SPEC)
 - 2.2 MobileMark®
- 3 For (1) servers the entity shall conduct testing according to the SPEC Power SPECpower_ssj2008 and disclose the results as: overall ssj_ops/watt
- 4 For (2) desktop computers the entity shall conduct testing according to the SPEC CPU2006 benchmark and disclose results as both:
 - 4.1 SPECspeed2017_int_base score/watt
 - 4.2 SPECspeed2017_fp_basescore/watt

APPENDIX B OF [DRAFT] IFRS S2 CLIMATE-RELATED DISCLOSURES

- 5 For (3) laptops the entity shall conduct testing according to the MobileMark® 2014 v1.5 and disclose results as both:
 - 5.1 Performance qualification score
 - 5.2 Battery life score (in minutes)
- 6 The entity shall consider the references to guidance provided by SPEC and MobileMark® as normative references, thus any future updates made to them shall be considered updates to this guidance.
- 7 The entity may additionally disclose energy efficiency performance for other product categories, for which a benchmark is not specified above (e.g., workstations, netbooks, tablets, mobile phones, and storage), using a relevant benchmark.
 - 7.1 The entity shall describe the parameters it used to select and test to applicable benchmarks.

Note to **TC-SC-410a.2**

- 1 The entity shall discuss how it incorporates product energy efficiency considerations into design for new and emerging usage patterns in all relevant product categories.
 - 1.1 The discussion may include, but is not limited to, how, in the entity'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).