TECHNICAL SPECIFICATION

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Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification and communication

Gaz à effet de serre — Empreinte carbone des produits — Exigences et lignes directrices pour la quantification et la communication

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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The committee responsible for this document is Technical Committee ISO/TC 207, *Environmental management*, Subcommittee SC 7, *Greenhouse gas management and related activities*.

Introduction

Climate change arising from anthropogenic activity has been identified as one of the greatest challenges facing countries, governments, business and individuals, with major implications for both human and natural systems. In response, international, regional, national and local initiatives are being developed and implemented to limit greenhouse gas (GHG) concentrations in the Earth's atmosphere. Such GHG initiatives rely on the assessment, monitoring, reporting and verification of GHG emissions and/or removals.

GHGs are emitted and removed throughout the life cycle of a product (i.e. cradle-to-grave) from raw material acquisition through production, use and end-of-life treatment.

This Technical Specification[1)] details principles, requirements and guidelines for the quantification and communication of the carbon footprint of products (CFPs), including both goods and services, based on GHG emissions and removals over the life cycle of a product. Requirements and guidelines for the quantification and communication of a partial carbon footprint of products (partial CFP) are also provided. The communication of the CFP to the intended audience is based on a CFP study report that provides an accurate, relevant and fair representation of the CFP.

This Technical Specification is based on existing International Standards ISO 14020, ISO 14024, ISO 14025, ISO 14040 and ISO 14044 and aims to set specific requirements for the quantification and communication of a CFP, including additional requirements where the CFP information is intended to be publicly available.

This Technical Specification is expected to benefit organizations, governments, communities and other interested parties by providing clarity and consistency in quantifying and communicating CFPs. Specifically, using life cycle assessment according to this Technical Specification with climate change as the single impact category may offer benefits through:

— providing requirements for the methods to be adopted in assessing the CFP;

— facilitating the tracking of performance in reducing GHG emissions;

— assisting in the creation of efficient and consistent procedures to provide CFP information to interested parties;

— providing a better understanding of the CFP such that opportunities for GHG reductions may be identified;

— providing CFP information to encourage changes in consumer behaviour which could contribute to reductions in GHG emissions through improved purchasing, use and end-of-life decisions;

— providing correct and consistent communication of CFPs which supports comparability of products in a free and open market;

— enhancing the credibility, consistency and transparency of the quantification, reporting and communication of the CFP;

— facilitating the evaluation of alternative product design and sourcing options, production and manufacturing methods, raw material choices, recycling and other end-of-life processes;

— facilitating the development and implementation of GHG management strategies and plans across product life cycles as well as the detection of additional efficiencies in the supply chain;

CFPs prepared in accordance with this Technical Specification contribute to the objectives of GHG related policies and/or regimes.

1) As the subject on quantification and communication of a carbon footprint of products is still under development, the agreement to publish an International Standard could not be reached and ISO/TC 207/SC 7 decided that the publication of a Technical Specification (according to the ISO/IEC Directives, Part 1) is appropriate.

An organization may wish to publicly communicate a CFP for many reasons which may include:

— providing information to consumers and others for decision-making purposes;

— enhancing climate change awareness and consumer engagement on environmental issues;

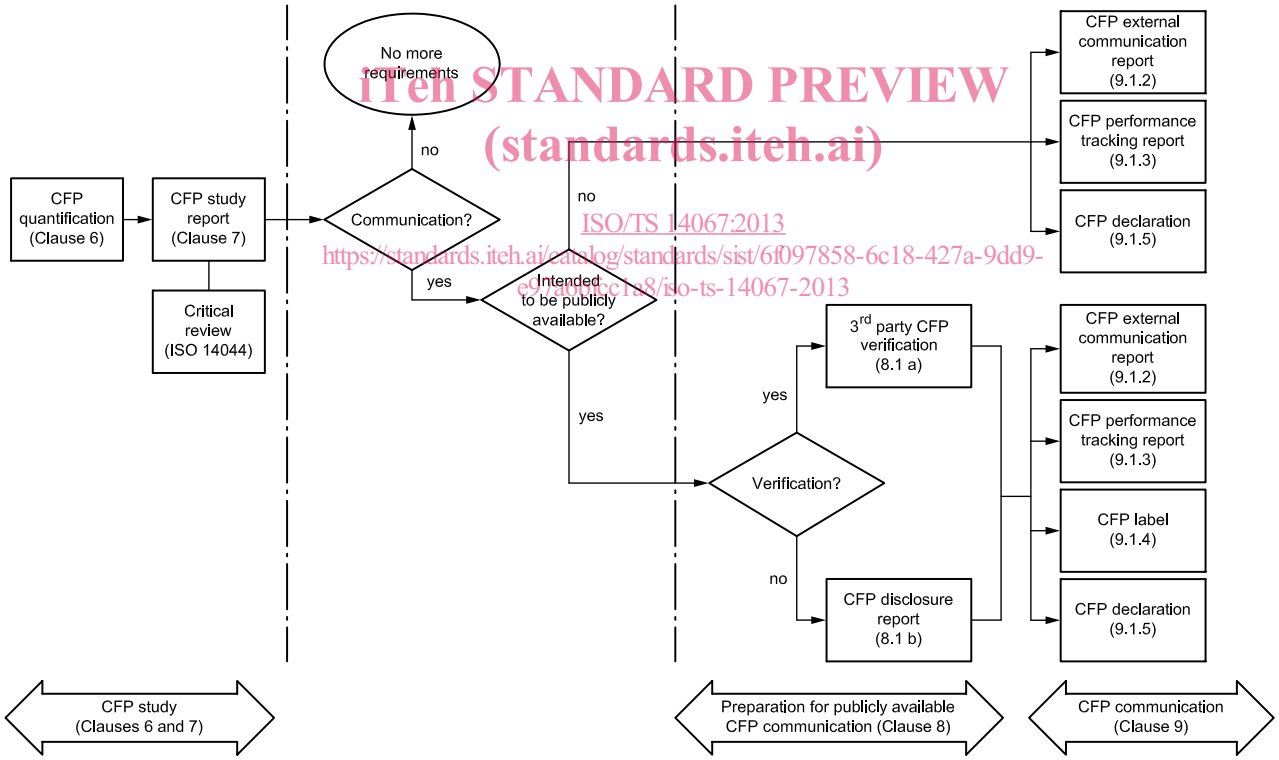
— supporting an organization's commitment to tackling climate change;

— supporting implementation of policies on climate change management.

The requirements for communication provided in this Technical Specification vary with the option chosen for the CFP communication and the intended target group.

Figure 1 shows how CFP quantification is linked to CFP communication in this Technical Specification. The specific linkage depends on the choice of different options with respect to communication and verification. The structure of this Technical Specification corresponds to the flow as presented in Figure 1.

This Technical Specification addresses the single impact category of climate change. It does not assess any social or economic aspects or impacts or any other potential environmental aspects and related impacts arising from the life cycle of a product. Therefore a CFP assessed in accordance with this Technical Specification does not provide an indicator of any social or economic impact or the overall environmental impact of a product. Information on limitations of the CFPs based on this Technical Specification is included in Clause 4 and Annex B.



NOTE For more information on CFP communication options, see Figure 3.

Figure 1 — Linkage of CFP quantification and CFP communication

Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification and communication

1 Scope

This Technical Specification specifies principles, requirements and guidelines for the quantification and communication of the carbon footprint of a product (CFP), based on International Standards on life cycle assessment (ISO 14040 and ISO 14044) for quantification and on environmental labels and declarations (ISO 14020, ISO 14024 and ISO 14025) for communication.

Requirements and guidelines for the quantification and communication of a partial carbon footprint of a product (partial CFP) are also provided.

This Technical Specification is applicable to CFP studies and different options for CFP communication based on the results of such studies.

Where the results of a CFP study are reported according to this Technical Specification, procedures are provided to support both transparency and credibility and also to allow for informed choices.

This Technical Specification also provides for the development of CFP-product category rules (CFP-PCR), or the adoption of product category rules (PCR) that have been developed in accordance with ISO 14025 and that are consistent with this Technical Specification.

This Technical Specification addresses only one impact category: climate change.

Offsetting is outside of the scope of this Technical Specification.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14025:2006, *Environmental labels and declarations — Type III environmental declarations — Principles and procedures*

ISO 14044:2006, *Environmental management — Life cycle assessment — Requirements and guidelines*

ISO 14050, *Environmental management — Vocabulary*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14050[2)] and the following apply.

2) Terms and definitions in ISO 14050 are available via the ISO Online Browsing Platform (https://www.iso.org/obp/ui/).

3.1.1 Terms relating to CFP quantification

3.1.1.1
carbon footprint of a product
CFP
sum of *greenhouse gas emissions* (3.1.3.5) and *removals* (3.1.3.6) in a *product system* (3.1.4.2), expressed as *CO_2 equivalents* (3.1.3.2) and based on a *life cycle assessment* (3.1.5.3) using the single *impact category* (3.1.5.8) of climate change

Note 1 to entry: The CO_2 equivalent of a specific amount of a *greenhouse gas* (3.1.3.1) is calculated as the mass of a given greenhouse gas multiplied by its *global warming potential* (3.1.3.4).

Note 2 to entry: A list of greenhouse gases with their recognized global warming potentials is provided in Annex A.

Note 3 to entry: A CFP can be disaggregated into a set of figures identifying specific GHG emissions and removals (see Table 1).

Note 4 to entry: Results of the quantification of the CFP are documented in the CFP study report expressed in mass of CO_2e per *functional unit* (3.1.4.8).

3.1.1.2
partial CFP
sum of *greenhouse gas emissions* (3.1.3.5) and *removals* (3.1.3.6) of one or more selected *process(es)* (3.1.4.6) of a *product system* (3.1.4.2), expressed as *CO_2 equivalents* (3.1.3.2) and based on the relevant stages or processes within the *life cycle* (3.1.5.2)

Note 1 to entry: A partial CFP is based on or compiled from data related to (a) specific process(es) or *information modules* (3.1.4.5), which is (are) part of a product system and may form the basis for quantification of a *CFP* (3.1.1.1). More detailed information on information modules is given in ISO 14025:2006, 5.4.

3.1.1.3
CFP study
study that quantifies the *CFP* (3.1.1.1) or a *partial CFP* (3.1.1.2)

3.1.1.4
offsetting
mechanism for compensating for all or for a part of the *CFP* (3.1.1.1) through the prevention of the release of, reduction in, or removal of an amount of *greenhouse gas emissions* (3.1.3.5) in a *process* (3.1.4.6) outside the boundary of the *product system* (3.1.4.2)

EXAMPLE Investment outside the relevant product system, e.g. in renewable energy technologies, energy efficiency measures, afforestation/reforestation.

Note 1 to entry: Offsetting is not allowed in the CFP quantification, and communication of offsetting related to the CFP is outside of the scope of this Technical Specification (see 6.3.4.1).

[SOURCE: ISO 14021:1999/Amd.1:2011, 3.1.12, modified — To refer to all or part of the CFP, to revise the Example to identify types of investments implicated and delete “external” and to add a new Note 1 to entry providing information on rules regarding offsetting]

3.1.2 Terms relating to CFP communication

3.1.2.1
CFP communication programme
programme for the development and use of CFP communication based on a set of operating rules

Note 1 to entry: The programme may be voluntary or mandatory, international, national or sub-national.

3.1.2.2
CFP programme operator
body or bodies that conduct a *CFP communication programme* (3.1.2.1)

Note 1 to entry: A CFP programme operator can be a company or a group of companies, industrial sector or trade association, public authorities or agencies, or an independent scientific body or other *organization* (3.1.6.1).

[SOURCE: ISO 14025:2006, 3.4, modified — Specific references added to CFP in the preferred term, definition and Note to relate concept to CFP instead of a "type III environmental declaration programme"]

3.1.2.3
CFP disclosure report
report required for publicly available CFP communication without third-party *CFP verification* (3.1.9.1)

3.1.2.4
CFP external communication report
report on the *CFP* (3.1.1.1) that is based on the CFP study report and intended to be communicated externally

3.1.2.5
CFP performance tracking report
report comparing the *CFP* (3.1.1.1) of one specific *product* (3.1.4.1) of the same *organization* (3.1.6.1) over time

3.1.2.6
CFP label
mark on a *product* (3.1.4.1) identifying its *CFP* (3.1.1.1) within a particular *product category* (3.1.4.11) according to the requirements of a *CFP communication programme* (3.1.2.1)

3.1.2.7
CFP declaration
declaration of the *CFP* (3.1.1.1) made according to the *CFP-PCR* (3.1.4.13) or relevant *PCR* (3.1.4.12)

3.1.3 Terms relating to greenhouse gases

3.1.3.1
greenhouse gas
GHG
gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the earth's surface, the atmosphere, and clouds

Note 1 to entry: A list of greenhouse gases with their recognized *global warming potentials* (3.1.3.4) is provided in Annex A.

Note 2 to entry: Water vapour and ozone are anthropogenic as well as natural greenhouse gases but are not included as recognized greenhouse gases due to difficulties, in most cases, in isolating the human-induced component of global warming attributable to their presence in the atmosphere.

[SOURCE: ISO 14064-1:2006, 2.1, modified — Notes 1 and 2 to entry have been added; original Note listing examples of GHGs has been omitted]

3.1.3.2
carbon dioxide equivalent
CO_2 equivalent
CO_2e
unit for comparing the radiative forcing of a *greenhouse gas* (3.1.3.2) to that of carbon dioxide

Note 1 to entry: Mass of a greenhouse gas is converted into CO_2 equivalents using *global warming potentials* (3.1.3.4).

Note 2 to entry: A list of GHGs with their recognized global warming potentials is provided in Annex A.

[SOURCE: ISO 14064-1:2006, 2.19, modified — An additional preferred term has been included; Note 1 to entry has been reworded due to clarification; the reference in Note 2 to entry has been specified]

3.1.3.3
carbon storage
<in product> carbon removed from the atmosphere and stored as carbon in a *product* (3.1.4.1)

3.1.3.4
global warming potential
GWP
characterization factor describing the radiative forcing impact of one mass-based unit of a given *greenhouse gas* (3.1.3.2) relative to that of carbon dioxide over a given period of time

Note 1 to entry: A list of greenhouse gases with their recognized global warming potentials is provided in Annex A.

Note 2 to entry: "Characterization factor" is defined in ISO 14040:2006, 3.37.

[SOURCE: ISO 14064-1:2006, 2.18, modified — A specific reference to characterization factor has been added and reference to an equivalent unit has been deleted; Notes 1 and 2 to entry have been added]

3.1.3.5
greenhouse gas emission
GHG emission
mass of a *greenhouse gas* (3.1.3.1) released to the atmosphere

[SOURCE: ISO 14064-1:2006, 2.5, modified — The phrase "over a specified time period" has been omitted because the time period for a CFP is determined by the life cycle of the product; the term "total" has been omitted because a CFP allows for the quantification of emissions relevant to footprint calculation]

3.1.3.6
greenhouse gas removal
GHG removal
mass of a *greenhouse gas* (3.1.3.1) removed from the atmosphere

[SOURCE: ISO 14064-1:2006, 2.6, modified — The phrase "over a specified time period" has been omitted because the time period for a CFP is determined by the life cycle of the product; the term "total" has been omitted because CFP allows for the quantification of removals relevant to footprint calculation]

3.1.3.7
greenhouse gas emission factor
GHG emission factor
mass of a greenhouse gas (3.1.3.1) emitted relative to an input or an output of a unit process (3.1.4.7) or a combination of unit processes

Note 1 to entry: "Input" is defined in ISO 14040:2006, 3.21; "output" is defined in ISO 14040:2006, 3.25.

[SOURCE: ISO 14064-1:2006, 2.7, modified — Definition is written specifically to relate only to GHG emissions relative to given sources and units of activity; Note 1 to entry has been added]

3.1.3.8
greenhouse gas source
GHG source
process (3.1.4.5) that releases a *greenhouse gas* (3.1.3.1) into the atmosphere

Note 1 to entry: The process can be natural or anthropogenic.

[SOURCE: ISO 14064-1:2006, 2.2, modified — Reference to "physical unit" has been removed]

3.1.3.9
greenhouse gas sink
GHG sink
process (3.1.4.6) that removes a *greenhouse gas* (3.1.3.1) from the atmosphere

Note 1 to entry: The process can be natural or anthropogenic.

[SOURCE: ISO 14064-1:2006, 2.2, modified — Reference to "physical unit" has been removed]

3.1.4 Terms relating to products, product systems and processes

3.1.4.1
product
any goods or service

Note 1 to entry: The product can be categorized as follows:

— service (e.g. transport, implementation of events, electricity);

— software (e.g. computer programme);

— hardware (e.g. engine mechanical part);

— processed material (e.g. lubricant, ore, fuel);

— unprocessed material (e.g. agricultural produce).

Note 2 to entry: Services have tangible and intangible elements. Provision of a service can involve, for example, the following:

— an activity performed on a customer-supplied tangible product (e.g. automobile to be repaired);

— an activity performed on a customer-supplied intangible product (e.g. the income statement needed to prepare a tax return);

— the delivery of an intangible product (e.g. the delivery of information in the context of knowledge transmission);

— the creation of ambience for the customer (e.g. in hotels and restaurants).

[SOURCE: ISO 14044:2006, 3.9, modified — Notes 1 and 2 to entry have been slightly modified, and Note 3 to entry dealing with the origin of the definition has been omitted]

3.1.4.2
product system
collection of *unit processes* (3.1.4.7) with *elementary flows* (3.1.4.10) and product flows, performing one or more defined functions and which models the *life cycle* (3.1.5.2) of a *product* (3.1.4.1)

Note 1 to entry: "Product flow" is defined in ISO 14040:2006, 3.27.

[SOURCE: ISO 14044:2006, 3.28, modified — Note 1 to entry has been added]

3.1.4.3
co-product
any of two or more *products* (3.1.4.1) coming from the same *unit process* (3.1.4.7) or *product system* (3.1.4.2)

[SOURCE: ISO 14040:2006, 3.10]

3.1.4.4
system boundary
set of criteria specifying which *unit processes* (3.1.4.7) are part of a *product system* (3.1.4.2)

[SOURCE: ISO 14044:2006, 3.32]

3.1.4.5
information module
compilation of data covering a *unit process* (3.1.4.7) or a combination of unit processes that are part of the *life cycle* (3.1.5.2) of a *product* (3.1.4.1)

Note 1 to entry: One or more information modules can be the basis of a *partial CFP* (3.1.1.2), and several information modules can be the basis of a *CFP* (3.1.1.1).

[SOURCE: ISO 14025:2006, 3.13, modified — Removed reference in definition to being used as a basis for type III environmental declarations and added new Note 1 to entry]

3.1.4.6
process
set of interrelated or interacting activities that transforms inputs into outputs

[SOURCE: ISO 14044:2006, 3.11]

3.1.4.7
unit process
smallest element considered in the *life cycle inventory analysis* (3.1.5.6) for which input and output data are quantified

[SOURCE: ISO 14040:2006, 3.34]

3.1.4.8
functional unit
quantified performance of a *product system* (3.1.4.2) for use as a reference unit

Note 1 to entry: As the *CFP* (3.1.1.1) treats information on a *product* (3.1.4.1) basis, an additional calculation based on a product unit, sales unit or service unit can be presented.

Note 2 to entry: For the use of the term "product unit" see 6.3.3.

[SOURCE: ISO 14040:2006, 3.20, modified — Notes 1 and Note 2 to entry have been added]

3.1.4.9
reference flow
measure of the outputs from *processes* (3.1.4.6) in a given *product system* (3.1.4.2) required to fulfil the function expressed by the *functional unit* (3.1.4.8)

Note 1 to entry: For an example of applying the concept of a reference flow, see Example in 6.3.3.

[SOURCE: ISO 14040:2006, 3.29, modified — Note 1 to entry has been added]

3.1.4.10
elementary flow
material or energy entering the system being studied that has been drawn from the environment without previous human transformation, or material or energy leaving the system being studied that is released into the environment without subsequent human transformation

Note 1 to entry: "Environment" is defined in ISO 14001:2004, 3.5.

[SOURCE: ISO 14044:2006, 3.12, modified — Note 1 to entry has been added]

3.1.4.11
product category
group of *products* (3.1.4.1) that can fulfil equivalent functions

[SOURCE: ISO 14025:2006, 3.12]

3.1.4.12
product category rules
PCR
set of specific rules, requirements and guidelines for developing Type III environmental declarations for one or more *product categories* (3.1.4.11)

Note 1 to entry: PCR include quantification rules compliant with ISO 14044.

Note 2 to entry: "Type III environmental declaration" is defined in ISO 14025:2006, 3.2.

[SOURCE: ISO 14025:2006, 3.5, modified — Notes 1 and 2 to entry have been added]

3.1.4.13
carbon footprint of a product-product category rules
CFP-PCR
set of specific rules, requirements and guidelines for quantification of and communication on the *CFP* (3.1.1.1) for one or more *product categories* (3.1.4.11)

3.1.4.14
service life
period of time during which a *product* (3.1.4.1) in use meets or exceeds the performance requirements

[SOURCE: ISO 15686-1:2011, 3.25, modified — More general wording has been used]

3.1.5 Terms relating to life cycle assessment

3.1.5.1
cut-off criteria
specification of the amount of material or energy flow or the level of significance associated with *unit processes* (3.1.4.7) or *product system* (3.1.4.2) to be excluded from a *CFP study* (3.1.1.3)

Note 1 to entry: "Energy flow" is defined in ISO 14040:2006, 3.13.

[SOURCE: ISO 14044:2006, 3.18, modified — The term "environmental significance" has been changed to "significance" and "study" has been changed to "CFP study"; Note 1 to entry has been added]

3.1.5.2
life cycle
consecutive and interlinked stages of a *product system* (3.1.4.2), from raw material acquisition or generation from natural resources to final disposal

Note 1 to entry: "Raw material" is defined in ISO 14040:2006, 3.15.

[SOURCE: ISO 14044:2006, 3.1, modified — Note 1 to entry has been added]

3.1.5.3
life cycle assessment
LCA
compilation and evaluation of the inputs, outputs and the potential environmental impacts of a *product system* (3.1.4.2) throughout its *life cycle* (3.1.5.2)

Note 1 to entry: "Environmental impact" is defined in ISO 14001:2004, 3.7.

[SOURCE: ISO 14044:2006, 3.2, modified — Note 1 to entry has been added]

3.1.5.4
life cycle impact assessment
LCIA
phase of *life cycle assessment* (3.1.5.3) aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts for a *product system* (3.1.4.2) throughout the *life cycle* (3.1.5.2) of the *product* (3.1.4.1)

[SOURCE: ISO 14044:2006, 3.4]

3.1.5.5
life cycle interpretation
phase of *life cycle assessment* (3.1.5.3) in which the findings of either the *life cycle inventory analysis* (3.1.5.6) or the *life cycle impact assessment* (3.1.5.4), or both, are evaluated in relation to the defined goal and scope in order to reach conclusions and recommendations

[SOURCE: ISO 14044:2006, 3.5, modified — The "inventory analysis" has been expanded by using the term "life cycle inventory analysis"]

3.1.5.6
life cycle inventory analysis
LCI
phase of *life cycle assessment* (3.1.5.3) involving the compilation and quantification of inputs and outputs for a *product* (3.1.4.1) throughout its *life cycle* (3.1.5.2)

[SOURCE: ISO 14044:2006, 3.3]

3.1.5.7
sensitivity analysis
systematic procedures for estimating the effects of the choices made regarding methods and data on the outcome of a *CFP study* (3.1.1.3)

[SOURCE: ISO 14044:2006, 3.31, modified — By making specific reference to CFP study]

3.1.5.8
impact category
class representing environmental issues of concern to which *life cycle inventory analysis* (3.1.5.6) results may be assigned

[SOURCE: ISO 14040:2006, 3.39]

3.1.5.9
waste
substances or objects which the holder intends or is required to dispose of

Note 1 to entry: This definition is taken from the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal* (22 March 1989), but is not confined in this Technical Specification to hazardous waste.

[SOURCE: ISO 14040:2006, 3.35]

3.1.6 Terms relating to organizations and interested parties

3.1.6.1
organization
person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives

Note 1 to entry: The concept of organization includes, but is not limited to sole-trader, company, corporation, firm, enterprise, authority, partnership, charity or institution, or part or combination thereof, whether incorporated or not, public or private.

3.1.6.2
supply chain
those involved, through upstream and downstream linkages, in *processes* (3.1.4.6) and activities delivering value in the form of *products* (3.1.4.1) to the user

Note 1 to entry: In practice, the expression "interlinked chain" applies from suppliers to those involved in end-of-life processing which may include vendors, manufacturing facilities, logistics providers, internal distribution centres, distributors, wholesalers and other entities that lead to the end user.

[SOURCE: ISO/TR 14062:2002, 3.9, modified — Examples have been added to Note 1 to entry; Note 2 to entry has been deleted]

3.1.6.3
consumer
individual member of the general public purchasing or using goods, property or services for private purposes

[SOURCE: ISO 14025:2006, 3.16]

3.1.6.4
interested party
person or *organization* (3.1.6.1) that can affect, be affected by, or perceive themselves to be affected by a decision or activity

Note 1 to entry: This can be an individual or group that has an interest in any decision or activity of an organization.

3.1.7 Terms relating to data and data quality

3.1.7.1
primary data
quantified value of a *unit process* (3.1.4.7) or an activity obtained from a direct measurement or a calculation based on direct measurements at its original source

Note 1 to entry: Primary data need not necessarily originate from the *product system* (3.1.4.2) under study because primary data may relate to a different but comparable product system to that being studied.

Note 2 to entry: Primary data may include *GHG emission factors* (3.1.3.7) and/or GHG activity data (defined in ISO 14064-1:2006, 2.11).

3.1.7.2
site-specific data
data obtained from a direct measurement or a calculation based on direct measurement at its original source within the *product system* (3.1.4.2)

Note 1 to entry: All site-specific data are *primary data* (3.1.7.1) but not all primary data are site-specific data because they may also relate to a different product system.

3.1.7.3
secondary data
data obtained from sources other than a direct measurement or a calculation based on direct measurements at the original source

Note 1 to entry: Such sources can include databases and published literature validated by competent authorities.

3.1.7.4
uncertainty
parameter associated with the result of quantification which characterizes the dispersion of the values that could be reasonably attributed to the quantified amount

Note 1 to entry: Uncertainty information typically specifies quantitative estimates of the likely dispersion of values and a qualitative description of the likely causes of the dispersion.

[SOURCE: ISO 14064-1:2006, 2.37]