
**Sustainability in buildings and civil
engineering works — Core rules for
environmental product declarations of
construction products and services**

*Développement durable dans les bâtiments et les ouvrages de génie
civil — Règles principales pour les déclarations environnementales
des produits de construction et des services*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 17, *Sustainability in buildings and civil engineering works*.

This second edition cancels and replaces the first edition (ISO 21930:2007), which has been technically revised with the following changes:

- updated to apply as the core set of product category rules (PCR) for environmental product declarations (EPDs) of any construction product or service used in any type of construction works;
- updated to apply to all construction products and services used in any type of construction works;
- guidance on PCR for sub-categories of construction products has been added;
- specific requirements on how to define system boundaries, allocation principles and activities to be included in information modules has been revised;
- framework for documentation of technical data and guidance for defining scenarios has been added;
- an option to provide supplementary environmental information (module D), which contains supplementary LCA-based information that describes potential environmental aspects (benefits and loads) if the primary product is reused, recycled or recovered for energy at the end-of-life has been added;
- process on how to develop an average EPD for product groups has been added;
- data requirements and data quality have been specified;
- accounting and reporting of biogenic carbon during the life cycle has been added;
- accounting and reporting of delayed emissions of biogenic carbon – biogenic carbon sinks has been added;
- accounting and reporting of carbonation has been added;

- mandatory reporting of radioactive waste has been added;
- optional impact category abiotic depletion potentials (ADP_{elements}) and the mandatory inventory indicator abiotic depletion potential (ADP_{fossil}) have been added;
- an informative annex discussing possible approaches for reporting product volatile organic compound (VOC) emissions to indoor air and gamma radiation emitted during the use stage of the life cycle has been added;
- information on methods for reporting product emissions to air, soil and water during the use stage of the life cycle has been added.

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Introduction

Designers, manufacturers, users, owners and other stakeholders in the building and construction sector are increasingly demanding information that enables them to make decisions to address environmental impacts of construction works. These demands are currently addressed only through various national initiatives applying a variety of approaches.

It is essential that there is uniformity in the means and methods of expressing environmental product declarations (EPDs) using a modular approach, which enables consistent assessment at the construction works level. This includes a consistent outline and process for developing the parts of the EPD that are based on basic life cycle inventory data, as well as additional information not based on life cycle assessment (LCA). The different interested parties expect non-biased information that is consistent with the current best practice and understanding.

Type III environmental declarations (see ISO 14025) are EPDs providing quantified environmental data using predetermined parameters that are based on ISO 14040 and ISO 14044 and, where relevant, additional environmental information.

This document is one in a suite of documents dealing with sustainability in construction works that includes the following:

- a) ISO 15392;
- b) ISO 16745-1;
- c) ISO 16745-2;
- d) ISO 21929-1;
- e) ISO 21931-1;
- f) ISO/TS 12720;
- g) ISO/TS 21929-2;
- h) ISO/TR 21932;
- i) ISO/CD 20887;¹⁾
- j) ISO/DIS 21931-2.¹⁾

This document deals only with environmental impacts and aspects and excludes consideration of the social and economic aspects of sustainability. The relationship among the documents is elaborated in [Figure 1](#).

1) Under preparation.

Methodological basics	ISO 15392: Sustainability in building construction — General principles ISO/TS 12720: Sustainability in buildings and civil engineering works — Guidelines on the application of the general principles in ISO 15392 ISO/TR 21932: Sustainability in buildings and civil engineering works — A review of terminology ISO/CD 20887: Sustainability in buildings and civil engineering works — Design for disassembly and adaptability of buildings (under preparation) ISO 21929-1: Sustainability in building construction — Sustainability indicators — Part 1: Framework for the development of indicators and a core set of indicators for buildings ISO/TS 21929-2: Sustainability in building construction — Sustainability indicators — Part 2: Framework for the development of indicators for civil engineering works		
Construction works	ISO 16745-1: Sustainability in buildings and civil engineering works — Carbon metric of an existing building during use stage — Part 1: Calculation, reporting and communication ISO 16745-2: Sustainability in buildings and civil engineering works — Carbon metric of an existing building during use stage — Part 2: Verification ISO 21931-1: Sustainability in building construction — Framework for methods of assessment of the environmental performance of construction works — Part 1: Buildings		
Construction products and services	ISO 21930: Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services		
	Environmental aspects	Economic aspects	Social aspects

Figure 1 — Suite of related documents for sustainability in buildings and civil engineering works

Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services

1 Scope

This document provides the principles, specifications and requirements to develop an environmental product declaration (EPD) for construction products and services, construction elements and integrated technical systems used in any type of construction works.

This document complements ISO 14025 by providing specific requirements for the EPD of construction products and services.

This document establishes a core set of requirements to be considered as core product category rules (PCR) to develop an EPD for any construction product or service.

In addition, this document, as the core PCR document for construction products, construction elements and integrated technical systems:

- a) includes the rules for calculating the life cycle inventory analysis (LCI), the predetermined environmental indicators and the life cycle impact assessment (LCIA) results that are reported in the EPD;
- b) describes which life cycle stages are considered in a particular type of EPD, which processes are to be included in the life cycle stages and how the stages are subdivided into information modules;
- c) defines rules for the development of scenarios;
- d) includes the rules for reporting relevant environmental and technical information that are not covered by LCA;
- e) defines the core elements to be included in an EPD;
- f) establishes the structure of a project report;
- g) defines the conditions under which construction products can be compared, based on the information provided by an EPD;
- h) provides requirements and guidelines on PCR for sub-categories of construction products;
- i) includes mandatory and unalterable requirements for any PCR based on this document.

EPDs for construction products, as described in this document, are primarily intended for use in B2B communication, but their use in B2C communication under certain conditions is not precluded. For EPDs intended for B2C communication, refer to ISO 14025 (see [5.4](#)).

The assessment of social and economic impacts at the product level is not covered by this document.

NOTE 1 In this document, unless otherwise designated, the term construction product is used for any good(s) or service(s) related to construction works.

NOTE 2 Construction assemblies, construction elements and integrated technical systems, incorporated within construction works, can be considered construction products.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6707-1, *Buildings and civil engineering works — Vocabulary — Part 1: General terms*

ISO 14020:2000, *Environmental labels and declarations — General principles*

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 14046:2014, *Environmental management — Water footprint — Principles, requirements and guidelines*

ISO 14050:2009, *Environmental management — Vocabulary*

ISO 15392:2008, *Sustainability in building construction — General principles*

ISO 15686-1:2011, *Buildings and constructed assets — Service life planning — Part 1: General principles and framework*

ISO 15686-2, *Buildings and constructed assets — Service life planning — Part 2: Service life prediction procedures*

ISO 15686-7, *Buildings and constructed assets — Service life planning — Part 7: Performance evaluation for feedback of service life data from practice*

ISO 15686-8, *Buildings and constructed assets — Service life planning — Part 8: Reference service life and service-life estimation*

ISO 21931-1:2010, *Sustainability in building construction — Framework for methods of assessment of the environmental performance of construction works — Part 1: Buildings*

ISO/TR 21932, *Sustainability in buildings and civil engineering works — A review of terminology*

EN 15804, *Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1, ISO 14050, ISO/TR 21932 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Terms relating to environmental labelling and declarations

3.1.1

environmental product declaration

EPD

Type III environmental declaration

environmental declaration (ISO 14025:2006, 3.1) providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information

Note 1 to entry: The predetermined parameters are based on ISO 14040 and ISO 14044.

Note 2 to entry: The additional environmental information can be quantitative or qualitative.

Note 3 to entry: The shorter initialism, EPD, is used as the primary preferred term in this document.

[SOURCE: ISO 14025:2006, 3.2, modified — Two new preferred terms and Note 3 to entry have been added.]

3.1.2

programme operator

body or bodies that conduct an *EPD programme* (ISO 14025:2006, 3.3)

Note 1 to entry: A programme operator can be a company or a group of companies, industrial sector or trade association, public authority or agency, or an independent scientific body or other organization.

Note 2 to entry: The responsibilities of a programme operator are summarized in ISO 14025:2006, 6.3.

[SOURCE: ISO 14025:2006, 3.4, modified — Note 2 to entry has been added.]

3.1.3

product category

group of *construction products* (3.2.2), *construction elements* (3.2.3) or *integrated technical systems* (3.2.4) that can fulfil equivalent functions

Note 1 to entry: Where the function of the construction product is not otherwise described, the product category can be established on the basis of using the same rules when assessing the *environmental performance* (3.2.9) within an *EPD* (3.1.1). An example of this would be a product category for solid wood (ISO 6707-1:2004, 6.3.1), where EPDs based on the same *PCR* (3.1.3) are published for a number of different *timber* (ISO 6707-1:2004, 6.3.2) construction products, e.g. softwood *plywood* (ISO 6707-1:2004, 6.3.29), *sawn timber* (sawn wood) (ISO 6707-1:2004, 6.3.18), *oriented strandboard* (ISO 16894:2009, 3.1.1), etc.

Note 2 to entry: This definition reflects and allows for current practice, in that it provides the ability for a product category to be established and not include the necessity of common functionality within such a product category.

[SOURCE: ISO 14025:2006, 3.12, modified — Notes 1 and 2 to entry have been added to allow for the establishment of the product category and basis for assessment to be either equivalent function or equivalent PCR.]

3.1.4

product category rules

PCR

set of specific rules, requirements and guidelines for developing *EPDs* (3.1.1) for one or more *product categories* (3.1.3)

Note 1 to entry: The shorter initialism, PCR, is used as the primary preferred term in this document.

[SOURCE: ISO 14025:2006, 3.5, modified — Note 1 to entry has been added.]

3.1.5

sub-category PCR

set of specific rules, requirements and guidelines, which provide additional, consistent requirements to the core *PCR* (3.1.4), for developing *EPDs* (3.1.1) for sub-categories of the overall *product category* (3.1.3) of *construction products* (3.2.2)

Note 1 to entry: A sub-category PCR is meant to be used together with this document.

3.1.6

PCR review

process whereby a *third party* (3.1.7) panel verifies the *PCR* (3.1.4)

[SOURCE: ISO 14025:2006, 3.6]

3.1.7

third party

person or body that is recognized as being independent of the parties involved concerning the issues in question

Note 1 to entry: "Parties involved" are usually the *supplier* (ISO 6707-1:2004, 8.6) or *manufacturer* (ISO 6707-1:2004, 8.5) ("first party"), the LCA practitioner conducting the *LCA* (3.3.2) and/or developing the *EPD* (3.1.1) ("second party") and the *verifier* (ISO 14050:2009, 5.3) ("third party").

[SOURCE: ISO 14024:1999, 3.7, modified— Note 1 to entry has been revised.]

3.1.8

scenario

collection of assumptions and information relevant to possible future events

[SOURCE: EN 15804:2012 +A1:2013, 3.27, modified — Reference to "concerning an expected sequence" has been removed.]

3.1.9

information module

compilation of data to be used as a basis for an *EPD* (3.1.1), covering a *unit process* (3.4.1) or a combination of unit processes that are part of the *life cycle* (ISO 14040:2006, 3.1) of a *product* (ISO 14050:2009, 3.2)

[SOURCE: ISO 14025:2006, 3.13]

3.1.10

additional technical information

information (ISO 6707-1:2004, 7.2.1) that forms part of the *EPD* (3.1.1) by providing a basis for the development of *scenarios* (3.1.8)

[SOURCE: EN 15804:2012 +A1:2013, 3.1]

3.1.11

declared unit

quantity of a *construction product* (3.2.2) for use as a reference unit in an *EPD* (3.1.1) based on *LCA* (3.3.2), for the expression of environmental information needed in *information modules* (3.1.9)

EXAMPLE Mass (kilogram or metric tonne), volume (cubic metre).

Note 1 to entry: The declared unit is used where the *function* (ISO 15686-10:2010, 3.10) and the reference *scenario* (3.1.8) for the whole *life cycle* (3.3.1), on the *construction works* (3.2.1) level, cannot be stated.

3.1.12

average EPD

EPD (3.1.1) based on *average data* (3.5.6)

3.2 Terms relating to construction works and construction products

3.2.1

construction works

everything that is constructed or results from construction operations

Note 1 to entry: Construction works covers all *buildings* (ISO 6707-1:2004, 3.1.3) and *civil engineering works* (ISO 6707-1:2004, 3.1.2).

[SOURCE: ISO 6707-1:2004, 3.1.1, modified — Note 1 to entry has been added.]

3.2.2

construction product

item manufactured or processed for incorporation in *construction works* (3.2.1)

Note 1 to entry: Construction products are items supplied by a single responsible body.

Note 2 to entry: In this document, unless otherwise designated, the term construction product is used for any good(s) or service(s) related to construction works.

Note 3 to entry: *Construction assemblies* (ISO 6707-1:2004, 5.5.5), *construction elements* (3.2.3) and *integrated technical systems* (3.2.4), incorporated within construction works, can be considered construction products.

[SOURCE: ISO 6707-1:2004, 6.1.2, modified — “Construction product” has been indicated as the primary preferred term used to designate this concept and Notes to entry have been added.]

3.2.3

construction element

part of a *construction* (ISO 6707-1:2004, 5.5.6) containing a defined combination of *construction products* (3.2.2)

[SOURCE: EN 15804:2012 +A1:2013, 3.9]

3.2.4

integrated technical systems

installed technical equipment to support the operation of *construction works* (3.2.1)

Note 1 to entry: This includes technical equipment for heating, cooling, ventilation, domestic hot water, lighting and electricity production and other systems for sanitation, security, fire safety and internal transport.

Note 2 to entry: This can include technical systems that are integrated into *construction products* (3.2.2), such as interfaces for electronic controls.

Note 3 to entry: Derived from the definition of “technical building systems” in ISO 16818:2008, 3.225.

3.2.5

product group

group of *construction products* (3.2.2), *construction elements* (3.2.3) or *integrated technical systems* (3.2.4) that can fulfil equivalent functions for a specific *sub-category PCR* (3.1.5)

Note 1 to entry: The product group can be made by the same *manufacturer* (ISO 6707-1:2004, 8.5) or made by different manufacturers.

3.2.6

construction service

activity that supports the *construction works* (3.2.1) or subsequent *maintenance* (ISO 6707-1:2004, 7.1.40)

[SOURCE: EN 15804:2012 +A1:2013, 3.6, modified — Reference to construction works has been inserted.]

3.2.7

performance

ability of a *construction product* (3.2.2) or *construction service* (3.2.6) to fulfil required functions under intended use conditions

[SOURCE: ISO 6707-1:2004, 9.1.1, modified — Specific reference to construction product and construction service have been added and the second intension, “behaviour in use”, has been removed.]

3.2.8

functional equivalent

quantified functional requirements and/or technical requirements for a *construction works* (3.2.1) or a *construction* (ISO 6707-1: 2004, 5.5.6) (part of works) for use as a basis for comparison

[SOURCE: ISO 21931-1:2010, 3.7, modified — References have been added to expand concept to apply to all construction works and also indicate that a construction (part of the works) can also be assigned a functional equivalent.]

3.2.9

environmental performance

performance (3.2.7) related to *environmental impacts* (ISO 15392:2008, 3.13.2) and *environmental aspects* (ISO 15392:2008, 3.10)

[SOURCE: ISO 15392:2008, 3.12]

3.2.10

construction site

area where *construction work* (ISO 6707-1:2004, 7.1.1) is undertaken or *construction services* (3.2.6) are provided

[SOURCE: ISO 6707-1:2004, 3.1.6, modified — To indicate “construction site” as the preferred term, generalize the concept to an “area”, and to include construction services and exclude other development.]

3.2.11

service life

period of time after installation during which a *construction works* (3.2.1) or its parts meet or exceed the *performance requirement(s)* (ISO 6707-1:2004, 9.1.16)

[SOURCE: ISO 6707-1:2004, 9.3.84, modified — Reference to building has been changed to construction works.]

3.2.12

reference service life

RSL

service life (3.2.11) of a *construction product* (3.2.2) which is known to be expected under a set of *reference in-use conditions* (3.2.16) and which can form the basis for estimating the service life under other *in-use conditions* (3.2.15)

Note 1 to entry: The RSL is described as part of the *functional unit* (3.4.5) and considered in the calculation of replacements at both the construction product level and *construction works* (3.2.1) level (B4) and *refurbishment* (ISO 6707-1:2004, 7.19) (B5) (see 7.1.7.4).

Note 2 to entry: The shorter initialism, RSL, is used as the primary preferred term in this document.

[SOURCE: ISO 15686-1:2011, 3.22, modified — Reference to construction product has been inserted to capture broad group and Notes to entry have been added.]

3.2.13**estimated service life****ESL**

service life (3.2.11) that part(s) of a *construction works* (3.2.1) would be expected to have in a set of specific *in-use conditions* (3.2.15), determined from *RSL data* (3.2.17) after taking into account any differences from the *reference in-use conditions* (3.2.16)

Note 1 to entry: The ESL is considered in the calculation of replacements at both the *construction product* (3.2.2) level and *construction works* (3.2.1) level (B4) and *refurbishment* (ISO 6707-1:2004, 7.19) (B5) (see 7.1.7.4).

Note 2 to entry: The shortened term, ESL, is used as the primary preferred term in this document.

[SOURCE: ISO 15686-1:2011, 3.7, modified — Specific reference has been made to (a) part(s) of a construction works and Notes to entry have been added.]

3.2.14**required service life**

service life (3.2.11) required by the client or through regulations

Note 1 to entry: The required service life is considered in the calculation of replacements at both the *construction product* (3.2.2) level and *construction works* (3.2.1) level (B4) and *refurbishment* (ISO 6707-1:2004, 7.19) (B5) (see 7.1.7.4).

3.2.15**in-use condition**

any circumstance that can impact on the *performance* (3.2.7) of a *construction works* (3.2.1) or a *constructed asset* (ISO 15686-1:2011, 3.1.15), or a part thereof, under normal use

Note 1 to entry: See ISO 15686-8 for further discussion.

[SOURCE: ISO 15686-1:2011, 3.10, modified — Reference to building has been changed to construction works and Note 1 to entry has been revised.]

3.2.16**reference in-use condition**

in-use condition (3.2.15) under which the reference *RSL data* (3.2.17) are valid

Note 1 to entry: See ISO 15686-8 for further discussion.

Note 2 to entry: The reference in-use conditions can be based upon information gathered through testing or from recorded *performance* (3.2.7) and actual *service life* (3.2.11) data of a *component* (ISO 6707-1:2004, 6.1.3).

[SOURCE: ISO 15686-1:2011, 3.21, modified — Note 1 to entry has been revised.]

3.2.17**reference service life data****RSL data**

information that includes the *RSL* (3.2.12) and any qualitative or quantitative data describing the validity of the RSL

Note 1 to entry: Typical data describing the validity of the RSL include the description of the *component* (ISO 6707-1:2004, 6.1.3) for which it applies, the *reference in-use conditions* (3.2.16) under which it applies and its *quality* (ISO 6707-1:2004, 9.1.12).

Note 2 to entry: The shortened term, RSL data, is used as the primary preferred term in this document.

[SOURCE: ISO 15686-1:2011, 3.23, modified — Note 1 entry has been replaced by Note 2 to entry and a new Note 2 to entry has been added.]

3.3 Terms relating to life cycle assessment

3.3.1

life cycle

all consecutive and interlinked stages in the life of the object under consideration

Note 1 to entry: For consideration of *environmental impacts* (ISO 21931-1:2010, 3.4) and *environmental aspects* (ISO 15392:2008, 3.10), the life cycle comprises all stages, from *raw material* (ISO 14040:2006, 3.15) acquisition or generation from natural resources to end-of-life.

Note 2 to entry: Adapted from the definition of “life cycle” in ISO 14040:2006, 3.1.

3.3.2

life cycle assessment

LCA

compilation and evaluation of the *inputs* (ISO 14040:2006, 3.21), *outputs* (ISO 14040:2006, 3.25) and the potential *environmental impacts* (ISO 21931-1:2010, 3.4) of a *product system* (ISO 14040:2006, 3.28) throughout its *life cycle* (ISO 14040:2006, 3.1)

Note 1 to entry: The shorter initialism, LCA, is used as the primary preferred term in this document.

[SOURCE: ISO 14040:2006, 3.2, modified — Note 1 to entry has been added.]

3.3.3

life cycle inventory analysis

LCI

phase of *LCA* (3.3.2) involving the compilation and quantification of *inputs* (ISO 14040:2006, 3.21) and *outputs* (ISO 14040:2006, 3.25) for a *product* (ISO 14050:2009, 3.2) throughout its *life cycle* (ISO 14040:2006, 3.1)

Note 1 to entry: The shorter initialism, LCI, is used as the primary preferred term in this document.

[SOURCE: ISO 14040:2006, 3.3, modified — Note 1 to entry has been added.]

3.3.4

life cycle inventory analysis result

LCI result

outcome of a *LCI* (3.3.3) that catalogues the flows crossing the *system boundary* (3.4.4) and provides the starting point for *LCIA* (3.3.5)

[SOURCE: ISO 14040:2006, 3.24]

3.3.5

life cycle impact assessment

LCIA

phase of *LCA* (3.3.2) aimed at understanding and evaluating the magnitude and significance of the potential *environmental impacts* (ISO 21931-1:2010, 3.4) for a *product system* (ISO 14040:2006, 3.28) throughout the *life cycle* (ISO 14040:2006, 3.1) of the *product* (ISO 14050:2009, 3.2)

Note 1 to entry: The shorter initialism, LCIA, is used as the primary preferred term in this document.

[SOURCE: ISO 14040:2006, 3.4, modified — Note 1 to entry has been added.]

3.3.6

characterization factor

factor derived from a characterization model that is applied to convert an assigned *LCI result* (3.3.4) to the common unit of the *impact category indicator* (ISO 14040:2006, 3.40)

[SOURCE: ISO 14044:2006, 3.37, modified — Note 1 to entry has been removed.]

3.3.7**CO₂e****carbon dioxide equivalent****CO₂equivalent**

unit for comparing the radiative forcing of a *greenhouse gas* (ISO 14064-1:2006, 3.1) to that of carbon dioxide

Note 1 to entry: Mass of a greenhouse gas is converted into CO₂e using *global warming potentials* (ISO 14050:2009, 9.3.4).

Note 2 to entry: The shortened term, CO₂e, is used as the primary preferred term in this document.

[SOURCE: ISO 14050:2009, 9.3.5, modified — Original Note 1 to entry has been clarified and Note 2 to entry has been added.]

3.3.8**gate**

point at which the *construction product* (3.2.2) or *material* (ISO 6707-1:2004, 6.1.1) leaves the factory before it becomes an input into a subsequent manufacturing *process* (ISO 21931-1:2010, 3.11) or before it is transported to a distributor, another factory or a *construction site* (3.2.10)

[SOURCE: ISO 21931-1:2010, 3.8, modified — Building references have been revised to broaden concept to implicate all forms of construction works.]

3.3.9**transparency**

open, comprehensive and understandable presentation of information

[SOURCE: ISO 14040:2006, 3.7]

3.3.10**transparent**

open, comprehensive and understandable

Note 1 to entry: Derived from the definition of *transparency* (3.3.9).

3.3.11**waste**

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

Note 1 to entry: The 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 document to hazardous waste.

[SOURCE: ISO 14040:2006, 3.35]

3.4 Terms relating to product systems**3.4.1****unit process**

smallest element considered in the *LCI* (3.3.3) for which *input* (ISO 14040:2006, 3.21) and *output* (ISO 14040:2006, 3.25) data are quantified

[SOURCE: ISO 14040:2006, 3.34]

3.4.2**upstream process**

process (ISO 21931-1:2010, 3.11) that is carried out before the designated process in the stream of relevant processes

[SOURCE: ISO 21931-1:2010, 3.15]

3.4.3

downstream process

process (ISO 21931-1:2010, 3.11) that is carried out after the designated process in the stream of relevant processes

[SOURCE: ISO 21931-1:2010, 3.2]

3.4.4

system boundary

boundary representing which *unit processes* (3.4.1) are part of a *product system* (ISO 14040:2006, 3.28)

Note 1 to entry: The term “system boundary” is not used in this document in relation to *LCIA* (3.3.5).

Note 2 to entry: The system boundary is established based on a set of criteria within the *LCA* (3.3.2) study or *PCR* (3.1.4).

[SOURCE: ISO 14040:2006, 3.32, modified — Indication of (a) boundary as the genus for the intentional definition and Note 2 to entry has been added.]

3.4.5

functional unit

quantified *performance* (3.2.7) of a *product system* (ISO 14040:2006, 3.28) for a *construction product* (3.2.2) or *construction service* (3.2.6) for use as a reference unit in an *EPD* (3.1.1) based on *LCA* (3.3.2) that includes all stages of the *life cycle* (3.3.1)

Note 1 to entry: The four stages of the life cycle are: production stage, construction stage, use stage and end-of-life stage.

[SOURCE: ISO 14040:2006, 3.20, modified — Reference to construction product or service has been inserted, the need for an LCA basis and Note 1 to entry has been added.]

3.4.6

co-product

any of one or more *products* (ISO 14050:2009, 3.2) from the same *unit process* (3.4.1), but which is not the object of the assessment

Note 1 to entry: Co-product and product have the same status and are used for identification of several distinguishable flows of products from the same unit process. Where one of two or more co-products is the object of assessment of the *EPD* (3.1.1), this is normally considered the product and the other *output(s)* (ISO 14040:2006, 3.25) as the co-product(s). Where one of the co-products is an *input* (ISO 14040:2006, 3.21) to a *process* (ISO 14040:2006, 3.11), this is normally considered as a product input. From co-product and product, *waste* (3.3.11) is the only output to be distinguished as a non-product.

[SOURCE: ISO 14040:2006, 3.10, modified — The definition has been clarified relative to the object of assessment and Note 1 to entry has been added.]

3.4.7

by-product

co-product (3.4.6) from a *process* (ISO 14040:2006, 3.11) that is incidental or not intentionally produced and which cannot be avoided

Note 1 to entry: *Wastes* (3.3.11) are not by-products.

3.4.8

joint co-production process

process (ISO 14040:2006, 3.11) of producing a *product* (ISO 14050:2009, 3.2) and one or more *co-products* (3.4.6) or *by-products* (3.4.7) where the proportion of outputs is not commonly changed or cannot be varied

3.5 Terms relating to data and data quality

3.5.1

foreground data

primary data

quantified value of a *unit process* (3.4.1) or an activity obtained from a direct measurement or a calculation based on direct measurements at its original source

[SOURCE: ISO/TS 14067:2013, 3.1.7.1, modified — An additional preferred term has been added as the primary term and Notes 1 and 2 to entry have been removed.]

3.5.2

secondary data

background data

indirectly measured, calculated or obtained quantified value of a *unit process* (3.4.1) or activity and related information within a *product system* (ISO 14040:2006, 3.28) or organization, not based on specific original source measurements

[SOURCE: ISO 16759:2013, 3.8.2, modified — An additional preferred term has been added and reference to company has been changed to organization.]

3.5.3

specific data

data representative of a *construction product* (3.2.2) or *construction service* (3.2.6), provided by one *supplier* (ISO 6707-1:2004, 8.6), either from multiple plants or based on multiple similar construction products of the supplier

[SOURCE: EN 15804:2012 +A1:2013, 3.30, modified — Reference to multiple plants or multiple similar products has been added.]

3.5.4

generic data

general data used if no system *specific data* (3.5.3) are available

Note 1 to entry: Data can be site specific or average.

3.5.5

proxy data

approximate data used if no system *specific data* (3.5.3) or *generic data* (3.5.4) are available

EXAMPLE Data for production of acetic acid used in lieu of data for production of formic acid or selection of a generic data set of electricity from one region to represent another region.

Note 1 to entry: Data can be site specific or average.

3.5.6

average data

data based on a fully representative sample for a *construction product* (3.2.2) or *construction service* (3.2.6), provided by one or more *suppliers* (ISO 6707-1:2004, 8.6), either from their multiple plants or based on multiple similar construction products of the supplier(s)

Note 1 to entry: The *product category* (3.1.3) or construction service can contain similar construction products or construction services.

[SOURCE: EN 15804:2012 +A1:2013, 3.3, modified — Focus has been shifted to focus on a construction product and product category instead of product group and data from a single supplier has been included.]

3.5.7

data quality

characteristics of data that relate to their ability to satisfy stated requirements

[SOURCE: ISO 14044:2006, 3.19]

3.6 Terms relating to resources and materials

3.6.1

primary resources

energy or material resources generated by, acquired from or extracted from the environment/nature (the geosphere or biosphere) within the *life cycle* (3.3.1) of the *construction product* (3.2.2)

Note 1 to entry: Primary resources can be *renewable resources* (3.6.2) or *non-renewable resources* (3.6.3) depending on the status of the material when it was originally extracted from the environment.

3.6.2

renewable resource

resource that is grown, naturally replenished or cleansed on a human time scale

EXAMPLE Trees in forests, grasses in grasslands and fertile soil, wind.

Note 1 to entry: A renewable resource is capable of being exhausted but can last indefinitely with proper stewardship.

Note 2 to entry: Activities that occur in the *technosphere* (3.8.4) such as recycling are not considered natural replenishment or cleansing.

Note 3 to entry: In this context, human time scale refers to the typical life time of a human rather than the time humans have been in existence.

[SOURCE: ISO 21931-1:2010, 3.12, modified — Notes 2 and 3 to entry have been added.]

3.6.3

non-renewable resource

resource that exists in a fixed amount that cannot be naturally replenished or cleansed on a human time scale

Note 1 to entry: Activities that occur in the *technosphere* (3.8.4) such as recycling are not considered natural replenishment or cleansing.

Note 2 to entry: In this context, human time scale refers to the typical life time of a human rather than the time humans have been in existence.

Note 3 to entry: Adapted from definitions for renewable resource and non-renewable resource in ISO/TR 21932.

3.6.4

secondary material

material (ISO 5659 2:2012, 3.6) recovered from previous use or recovered from *waste* (3.3.11) derived from another *product system* (ISO 14040:2006, 3.28) and used as an *input* (ISO 14040:2006, 3.21) in another product system

EXAMPLE Recycled scrap metal, crushed concrete, glass cullet, recycled wood chips, recycled plastic granulate.

Note 1 to entry: Secondary material is measured at the point [i.e., *system boundary* (3.4.4)] where the secondary material enters the product system from another product system.

[SOURCE: EN 15804:2012 +A1:2013, 3.29, modified — Reference to substituting primary materials has been removed, references to derivation from a previous product system and use as input have been added to replace Note 2 to entry and Note 3 to entry has been changed to examples.]

3.6.5**secondary fuel**

fuel recovered from previous use or from *waste* (3.3.11), derived from a previous *product system* (ISO 14040:2006, 3.28) and used as an *input* (ISO 14040:2006, 3.21) in another product system

Note 1 to entry: *Processes* (ISO 14040:2006, 3.11) providing a secondary fuel are considered from the point [i.e., *system boundary* (3.4.4)] where the secondary fuel enters the product system from a previous product system.

Note 2 to entry: Secondary fuels can be recovered from previous use or from wastes such as solvents, *wood* (ISO 6707-1:2004, 6.3.1), tyres, oil, animal fats.

Note 3 to entry: Secondary fuels can be renewable or non-renewable, depending on the status of the material before it became waste.

[SOURCE: EN 15804:2012 +A1:2013, 3.28, modified —Substituting primary materials has been removed and references to derivation from a reference to previous product system and use as input have been added, original Notes 2, 3 and 4 to entry replaced by new Notes 2 and 3 to entry.]

3.6.6**recovered energy**

energy recovered from a *process* (ISO 14040:2006, 3.11), including *waste* (3.3.11) treatment processes

Note 1 to entry: Recovered energy can be renewable or non-renewable, depending on the status of the resource originally used to generate the energy.

3.6.7**water body**

entity of water with definite hydrological, hydrogeomorphological, physical, chemical and biological characteristics in a given geographical area

EXAMPLE Lakes, rivers, groundwaters, seas, icebergs, glaciers and reservoirs.

Note 1 to entry: In case of availability, the geographical resolution of a water body should be determined at the goal and scope stage: it may regroup different small water bodies.

[SOURCE: ISO 14046:2014, 3.1.7]

3.6.8**drainage basin**

area from which direct surface runoff from precipitation drains by gravity into a stream or other *water body* (3.6.7)

Note 1 to entry: The terms “watershed”, “drainage area”, “catchment”, “catchment area” and “river basin” are sometimes used for the concept of “drainage basin”.

Note 2 to entry: Groundwater drainage basin does not necessarily correspond in area to surface drainage basin.

Note 3 to entry: The geographical resolution of a drainage basin should be determined at the goal and scope stage: it may regroup different sub-drainage basins.

[SOURCE: ISO 14046:2014, 3.1.8]

3.6.9**freshwater**

water having a low concentration of dissolved solids

Note 1 to entry: Freshwater typically contains less than 1 000 mg/l of dissolved solids and is generally accepted as suitable for withdrawal and conventional treatment to produce potable water.

Note 2 to entry: The concentration of total dissolved solids can vary considerably over space and/or time.

[SOURCE: ISO 14046:2014, 3.1.1]

3.6.10

consumption of freshwater

net *freshwater* (3.6.9) entering the *product system* (ISO 14040:2006, 3.28) being studied that is not returned to the same *drainage basin* (3.6.8) from which it originated

3.7 Terms relating to biogenic material and land use

3.7.1

biogenic

produced in natural processes by living organisms but not fossilized or derived from fossil resources

[SOURCE: ISO 13833:2013, 3.1]

3.7.2

biogenic carbon

carbon derived from *biomass* (3.7.3)

[SOURCE: ISO/TS 14067:2013, 3.1.8.2]

3.7.3

biomass

material of biological origin excluding material embedded in geological formations or transformed to fossilized material and excluding peat

Note 1 to entry: Biomass includes organic material (both living and dead) from above and below ground, e.g. trees, crops, grasses, tree litter, algae, animals and *waste* (3.3.11) of biological origin, e.g. manure.

[SOURCE: ISO 14021:2016, 3.1.1]

3.7.4

biobased

derived from *biomass* (3.7.3)

[SOURCE: ISO 16559:2014, 4.23]

3.7.5

land use change

change in human use or management of land at the location of the production, use or disposal of raw *materials* (ISO 14050:2009, 6.12), *intermediate products* (ISO 14050:2009, 6.2.1) and final *products* (ISO 14050:2009, 3.2) or *wastes* (3.3.11) in the *product system* (ISO 14040:2006, 3.28) being assessed

[SOURCE: ISO/TS 14067:2013, 3.1.8.4, modified — Preferred term has been changed from “direct land use change” and the specific land locations implicated within the product system have been indicated.]

3.8 Miscellaneous terms

3.8.1

carbonation

carbon dioxide reaction with cementitious products to form calcium carbonate

3.8.2

landfill

waste (3.3.11) disposal site for the deposit of waste onto or into *land* (ISO 6707-1:2004, 10.1) under controlled or regulated conditions

[SOURCE: ISO 472:2013, 2.1694]

3.8.3**landfill gas**

mixture of permanent gases (main components) dominated by methane and carbon dioxide, formed by the decomposition of degradable wastes (3.3.11) within a landfill (3.8.2)

Note 1 to entry: It can also include a large number of VOCs (3.8.5) (trace components).

[SOURCE: ISO 11074:2015, 6.1.10]

3.8.4**technosphere**

sphere or realm of human technological activity which results in a technologically modified environment

Note 1 to entry: *Primary resources* (3.6.1) are acquired or extracted from the environment/nature (the geosphere or biosphere) into the technosphere and emissions to air, water or land are released from the technosphere into the environment.

3.8.5**volatile organic compound****VOC**

any organic liquid and/or solid that evaporates spontaneously at the prevailing temperature and pressure of the atmosphere with which it is in contact

Note 1 to entry: The shortened term, VOC, is used as the primary preferred term in this document.

[SOURCE: ISO 12944-5:2007, 3.17, modified — Note 1 to entry has been added.]

4 Abbreviated terms

ADP _{elements}	abiotic depletion potential for non-fossil mineral resources
ADP _{fossil}	abiotic depletion potential for fossil resources
AP	acidification potential
B2B	business-to-business
B2C	business-to-consumer
CFC11e	chloroflourcarbon-11 equivalent
C ₂ H ₂ e	acetylene equivalent
Ci	emission concentrations of individual compounds in the mixture
EP	eutrophication potential
GWP	global warming potential
IM	information module
LCIi	lowest concentration of interest value
NCV	net calorific value
NRPR _E	non-renewable primary resources used as an energy carrier (fuel)
NRPR _M	non-renewable primary resources with energy content used as materials
NRSF	non-renewable secondary fuels

ODP	ozone depletion potential
POCP	photochemical oxidant creation potential
PO _{4e}	phosphate equivalent
PS	product systems
R	risk
RE	recovered energy
Ri	individual risk-value (= Ci/LCi)
RPR _E	renewable primary resources used as an energy carrier (fuel)
RPR _M	renewable primary resources with energy content used as material
RSF	renewable secondary fuels
Sbe	antimony equivalent
SB	system boundary
SF	secondary fuel
SM	secondary material
SO _{2e}	sulfur dioxide equivalent
WMO	World Meteorological Organization

5 General aspects

5.1 Objectives of this core PCR

This document is intended for both providers and users of information related to environmental performance, including those setting up Type III environmental declaration programmes.

As the core PCR, this document provides the set of rules, requirements and guidelines that shall be applied to the development of an EPD for construction products.

This document contains specifications and requirements for the EPD of construction products. In addition to the requirements of this document, the principles and procedures set out in ISO 14025, ISO 21931-1 and ISO 15392 shall apply, along with the principles of environmental declarations as described in ISO 14020. Where this document contains more specific requirements, it seeks to complement ISO 14025 for the EPD of construction products. However, where the requirements of this document go beyond the requirements of ISO 14025 for the development of PCR for construction products, the requirements of this document shall apply.

In an EPD of construction products, the results for the indicators evaluated are based on LCA and are reported in defined information modules. Relevant environmental aspects that have not been covered by LCA are addressed as additional environmental information (see [Clause 8](#)).

The objectives of this core PCR is to provide consistent rules to:

- ensure that EPDs provide verifiable and consistent data, based on LCA and additional information;

- ensure that EPDs provide verifiable and consistent product-related technical data to support development of scenarios for the assessment of the environmental performance of construction works, where relevant;
- ensure that EPDs provide verifiable and consistent product data related to the content of substances of very high concern;
- ensure that EPDs enable clear communication of information from B2B regarding the environmental performance of construction products;
- provide requirements and guidelines for product data related to release of dangerous substances to air, indoor air, soil and water;
- provide requirements and guidelines on the development of specific rules for sub-categories of products within the product category of construction products;
- explain how EPDs can be used for comparison of construction products in the context of construction works.

5.2 Life cycle stages and their information modules and module D

5.2.1 General

The life cycle of a construction product and a construction works is divided into four life cycle stages, which include a number of information modules (see [Figure 2](#)). These life cycle stages describe the entire product system of any construction product and the corresponding LCA results are reported according to these life cycle stages in an EPD.

The modular set up of the LCA underlying an EPD (see [Figure 2](#)) allows easy organization and expression of data packages throughout the life cycle of the construction product. This approach requires that the system boundary for each of the life cycle stages, as well as the information modules, included in the EPD are transparent, well defined and applicable to any construction product.

^a Replacement information module (B4) not applicable at the product level.

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The environmental information of an EPD shall be subdivided into the four life cycle stages shown in [Figure 2](#). To comply with this document, as a minimum, an EPD shall contain the production stage information modules, A1 to A3. All other information modules are optional. In addition, the optional supplementary information (module D) can be included.

For construction products that require activity during the use stage information modules B2 to B5, for example, cleaning or refurbishment of parts, the provision of technical information for the relevant module(s) shall be mandatory.

For construction products that use energy and/or water in the use stage, the provision of technical information for the relevant information module(s) B6 and B7, which are important for the assessment at construction works level, shall be mandatory.

As an option, supplementary environmental information may also be provided (module D) that addresses potential loads and benefits beyond the system boundary of the product under study.

It is important to note that module D is not part of the product system or within the construction works system boundary.

NOTE This supplementary information (module D) can be relevant for the consideration of subsequent product systems as it relates to the potential environmental aspects of the net output flows of secondary materials and/or fuels or recovered energy, which might result if the construction product is reused, recycled or recovered in the future.

5.2.2 Types of EPD with respect to life cycle stages covered

An EPD of a construction product provides information modules for the assessment of the environmental performance of buildings (see ISO 21931-1) and civil engineering works. An EPD provides information in a transparent manner to help in the application of such information to meet the requirements set out in building codes and rating systems that address environmental performance. The information modules (A1 to C4) may be used to combine the environmental impacts from materials, products, components and/or services to an assessment of construction works or a part of such construction works over its complete life cycle or portion thereof.

The LCA-based information in an EPD may cover different combinations of information modules, i.e. cover different life cycle stages or parts thereof. There are three types of EPDs: “cradle to gate”, “cradle to gate with options” and “cradle to grave”.

Cradle to gate: Covers the mandatory production stage that includes the following information modules: extraction and upstream production (raw material supply), transport to factory and manufacturing. The LCA results shall be reported based on a declared unit.

NOTE 1 If an EPD provides additional technical information for one or more information module(s) beyond the factory gate but does not report their impact, then it is a cradle to gate EPD.

Cradle to gate with options: Covers the mandatory production stage and optional information modules from the construction stage, use stage and end-of-life stage. The LCA results shall be reported based on either a declared unit or functional unit, as appropriate. Optional information modules beyond the gate shall be based on scenarios that shall be described in the EPD according to [7.1.7.3](#) to [7.1.7.5](#). Different approaches and requirements for cradle to gate with options EPDs include the following.

- Cradle to construction site: Covers the mandatory production stage (A1 to A3) and transportation to construction site (A4). The LCA result shall be reported based on a declared unit.
- Cradle to installation: Covers the mandatory production stage (A1 to A3) and both transport to construction site and construction installation on site (A4 and A5). The LCA result shall be reported based on a declared unit.
- Cradle to gate and maintenance: Covers the mandatory production stage (A1 to A3) and maintenance processes of the product during its service life (B2). The LCA result may be reported based on a declared unit or a functional unit.

- Cradle to gate and end-of-life: Covers the mandatory production stage (A1 to A3) and any of the relevant end-of-life information modules of demolition or extraction by de-construction from the construction works (C1), transportation from the construction site to the location for the end-of-life processes (C2), any waste management processes up to the system boundary between product systems, e.g. scrap collection (C3) and/or final deposition of wastes; e.g. deposition of waste on landfill or incineration without energy recovery (C4). The LCA result shall be reported based on a declared unit.

Cradle to grave: Covers the mandatory production stage (A1 to A3) and all of the information modules from the construction stage (A4 to A5), use stage (B1 to B7) (see Note 2), and end-of-life stage (C1 to C4). The LCA results are reported based on a functional unit. Modules beyond the factory gate shall be based on scenarios that shall be described in the EPD according to 7.1.7.3 to 7.1.7.5 and should contain the values of the predetermined parameters and technical information underlying their quantification. It may also contain only the relevant technical information for further calculation of the environmental performance in the scenarios.

If no activity is expected in an information module, then the scenario and assessment of the module should reflect this rather than declaring the module not relevant or not applicable for a cradle to grave EPD. Sub-category PCR should define default scenarios for all the information modules A4, A5, B1 to B7 and C1 to C4, if it is intended to be used for a cradle to grave EPD. Any mandatory information modules shall have the scenarios defined. EPDs declaring information modules with scenarios not defined in the PCR shall clearly state the scenario within the EPD.

NOTE 2 Information modules can supply information for processes for which there is no EPD available, for example a cleaning process.

Any of the three types of EPDs may optionally include information developed under module D to provide supplementary environmental information on the potential loads and benefits of net outflows of secondary material, secondary fuels or recovered energy crossing the system boundary (see 7.1.7.6). Information modules C1 to C4 shall be declared when module D is declared.

5.2.3 Use of scenarios for assessment of information modules beyond the production stage

The assessment of information modules beyond the production stage provides manufacturers with an opportunity to demonstrate aspects of product stewardship beyond the supply chain and manufacture of the product.

If a comparison of products is required to be conducted at the construction works level (see 5.5), it shall consider life cycle stages that occur beyond the production stage within the product system. If a quantitative and/or scenario-based assessment is provided in an EPD for a module beyond the production stage, such information may be applied provided it is relevant to the comparison being made at the construction works level.

However, if no appropriate data are provided in the EPD as technical quantitative data and/or information for the assessment of a scenario in an information module, then generic data or new scenarios can be developed within the context of the construction works.

For example, if a manufacturer has invested in a packaging and distribution system that minimizes waste and transport impacts for their product, then it may be advantageous to provide technical information or an assessment of the system within information module A4 so that it can be used in a construction works level assessment, rather than using generic information, which may assume increased waste and/or less fuel efficient transport.

Some construction products are designed and produced for a specific use in a construction works and the manufacturer might, for example, have control over the transport and installation processes, maintenance, replacement and/or end-of-life processes through a leasing contract or take-back scheme. In these instances, the manufacturer may provide an assessment of the production stage or may wish to

provide technical information or an assessment of detailed scenarios for the construction, use and/or end-of-life of the product within the EPD, demonstrating the effect of this product stewardship.

NOTE 1 These scenarios could be based, for example, on a specific instance (e.g. transport from the factory to a particular location using the most common vehicle type to determine transport impacts), on the average installation using the average transport distance and mode for the product assessed or the assessment of 100 km of typical transport.

NOTE 2 Upstream products can be used as input for other construction products. In such cases, an upstream manufacturer (e.g. of a coating) could deliver useful information for the life cycle stages of the final product, by providing a scenario for the maintenance of a coating, which could be used by the downstream construction product manufacturer within their EPD for the downstream product's maintenance scenario. Alternatively, the upstream manufacturer could choose to provide only the production stage data for the coating.

5.3 Average EPDs for groups of similar products

Average EPDs may be derived for similar products from one or more sites of one company or multiple companies using data specific to that product. Average EPDs may also be developed for groups of similar products using averaged environmental performance data. Both these types of average EPDs might significantly reduce the effort associated with producing separate EPDs for similar products.

NOTE 1 Products can be considered similar on the basis of materials, manufacturing or function, as relevant to the product category.

The larger the variance among the products covered by an average EPD, the less the average represents the intended typical product. The selection of products to be covered in an average EPD should be made in such a way that the resulting average EPD is reasonably descriptive for the products covered in the average EPD when considering the use of the average EPD information in an overall assessment of a construction works.

Average EPDs, for example EPDs from trade associations, shall describe what they represent. This means, as a minimum, providing details on the variation in the composition of the product compared with the average product. Such information shall give the user an indication, either qualitatively or quantitatively, of the range of results that are likely for the products covered by the average EPD. See [Annex B](#) for examples of average EPDs.

When there is a selection of sites or products assessed, the type of average and what it represents shall be clearly stated in the EPD. To ensure an average EPD is representative, the information provided in the average EPD and in the LCA report shall include, but not be limited to:

- a technical description of the average product group (see EXAMPLES 1 to 3);
- the number of manufacturing plants included in the EPD;
- the names of manufacturing companies or brands or associations;
- a description of the relative production representativeness covered by the EPD;
- the geographical coverage;
- the range of products for which the EPD is relevant;
- the information on restrictions to the use of the average EPD.

In addition, the following information shall be provided in the project report in order to be transparent:

- description of how the selection of the sites/products was done and how the average was determined;
- information on parameters in the LCA having the most influence.

EXAMPLE 1 For an average EPD for a declared unit of R-value of a specific type of insulation material, the representativeness of the average EPD could be described by relevant technical properties such as the range of density, thermal conductivity and thickness for which the average EPD is representative.

EXAMPLE 2 For an average EPD for a declared unit of 1 m² of carpet with a given pile mass, the representativeness of the average EPD could be described by relevant technical properties, such as the range of pile mass/m² as the most influencing parameter.

EXAMPLE 3 For an average EPD for declared unit of 1 m² of insulated steel cladding panel, the representativeness of the average EPD could be described by relevant technical properties such as kg/m² or thickness of steel and insulation.

NOTE 2 Average EPDs are important at the early stages of planning. Apart from this, there is a need for product-specific EPDs for the selection/sourcing of particular products.

Average EPD may be developed for a group of similar products from the same or different manufacturing plants produced using the same processes and having the same functionality.

EXAMPLE 4 An example is a mortar, where the manufacturing is done by mixing different components. Different types of mortar used, for example as a plaster, can vary in their composition while using a limited number of components. In that case, data specific to a typical product can be used. The typical product is modelled and calculated by assuming an average composition taken from the range of the group of similar products. The calculation of the environmental indicators then results in representative values.

A sensitivity analysis should be conducted on the differences between the similar products in the grouped system.

Where an average composition, representative composition or worst case environmental indicators are used, the products included in an average EPD shall not differ in their environmental impact indicators by more than $\pm 10\%$. Similar products included in other average EPDs should not differ in their environmental impact indicators by more than $\pm 10\%$. Where larger impact differences are found for the companies/sites and/or products evaluated, these need to be justified in the project report or the system separated.

NOTE 3 An average EPD can provide the impact of an average product, for example, by weighting impacts considering total production volume or a representative sample of the products. For some aspects of technical performance, a conservative estimate of product performance, ensuring adequate technical functionality in the context of the construction works, might be relevant.

5.4 Use of EPDs for construction products

The environmental information on construction products is intended mainly for B2B communication and its prime purpose is to provide measurable and verifiable input for the assessment and improvements of the environmental performance of construction works. However, some EPDs may be used in the B2C marketplace and, when doing so, the user of this document shall follow the provisions of ISO 14025:2006, Clause 9.

The manufacturer, or group of manufacturers, of the construction product is the sole owner of the EPD and is responsible for developing the EPD of the construction product according to the PCR. Only the manufacturer or group of manufacturers is authorized to declare the environmental performance of the construction product using an EPD.

5.5 Comparability of EPDs for construction products

Comparison of construction products using an EPD shall be carried out in the context of the construction works. Consequently, comparison of the environmental performance of construction products using the EPD shall consider all the relevant information modules over the full life cycle of the products within the construction works. Such a comparison requires scenarios in the construction works context. The provisions of ISO 14025:2006, 6.7.2 on comparability shall apply.

Comparisons are possible at the sub-construction works level, for example for assembled systems, components or services for one or more life cycle stages. In all cases of comparing construction

products, the principle that the basis for comparison of the assessment is the construction works level shall be maintained by ensuring that the same functional requirements are met and:

- the products/systems shall have the same functional performance;
- the comparison is based on the same functional unit;
- the environmental performance and technical performance of any excluded elements of the construction works (e.g. assembled systems, components, construction products or construction services) are the same;
- the type and amount of any materials excluded are exactly the same;
- any excluded processes and life cycle stages are the same;
- equivalent scenarios are used (see Note 2);
- the elementary flows related to material inherent properties such as biogenic carbon, the potential to carbonate or the net calorific value of a material, are considered completely and consistently within the scope of comparison;
- the influence of the product systems on the use stage of the construction works, including operational aspects and impacts of the construction works, are taken into account or are the same;
- module D shall not be aggregated with the life cycle information modules A1 to C4 to assess the total impact of the products or construction works being compared, as it is outside the system boundary. It can be taken into consideration as optional supplementary environmental information using equivalent scenarios.

NOTE 1 EPD that cannot be considered in a construction works context with equivalent scenarios are not tools to compare construction products and construction services.

NOTE 2 The scenarios for information module A5 for two products could be equivalent, as they both model the typical installation of the products and resulting waste management, but not identical, because of, for example, different ancillary material requirements, packaging waste and product wastage generated. The products could show different impacts but could still be compared.

The information provided for any comparison shall be transparent to allow a clear understanding of the limitations of comparability.

5.6 Documentation

[Clause 9](#) gives the content of an EPD in accordance with this document.

The result from an EPD project shall be presented as an EPD and a project report. The project report is the systematic and comprehensive summary of the project documentation supporting the verification of an EPD. The project report shall record that the LCA-based information and the additional information as declared in the EPD meet the requirements of this document. The project report shall contain data and information that is of importance to the data published in the EPD and shall meet the requirements of this document and any relevant sub-category PCR used for the EPD development. Special care shall be taken to demonstrate, in a transparent manner, how the data and information declared in the EPD were derived from the LCA study and how the RSL was established. The project report shall be made available to the verifier with the requirements on confidentiality stated in ISO 14025.

The requirements for the project report are given in [Clause 10](#).

6 PCR development and use

6.1 Core PCR structure

This core PCR (this document) includes all the rules that are needed for the development of an EPD that can be applied to any construction product. In addition, general rules for developing sub-category PCR are described.

When overarching PCR are developed for product categories, they shall be developed in accordance with this document and a PCR review shall be conducted in accordance with ISO 14025:2006, 8.1.2.

Any sub-category PCR shall include the following elements of this core PCR that shall not be changed in any way.

- a) The methodological framework which shall include:
 - 1) definition of system boundaries (e.g. assignment of processes to modules);
 - 2) additional technical information (as a basis for scenarios);
 - 3) criteria for cut-off;
 - 4) selection of data;
 - 5) data quality requirements;
 - 6) units;
 - 7) requirements for comparability.
- b) The inventory analysis which shall include:
 - 1) data collection requirements;
 - 2) inventory calculation rules (i.e. allocation of flows to processes);
 - 3) data quality requirements.
- c) The impact assessment which shall include:
 - 1) characterization methods.
- d) The content of EPD which shall include:
 - 1) demonstration of verification;
 - 2) declaration of general information;
 - 3) declaration of the methodological framework by reference to this document and other standards or sub-category PCR used;
 - 4) declaration of environmental parameters derived from LCA:
 - i) declaration of LCA results from LCIA;
 - ii) declaration of LCA results from LCI.
 - 5) declaration of additional environmental information.
- e) The project report.
- f) Verification.

6.2 Relation between core PCR and sub-category PCR

At the highest level, all products used in construction works belong to the overall product category of construction products. This core PCR provides all common requirements for the overall category of construction products. However, for some sub-categories among the overall product category of construction products, these common requirements might have to be specified further. More specific sub-categories may be defined for certain groups of construction products to develop specific rules for LCA modelling and calculations, to address additional environmental information not based on LCA and to provide specific scenarios for the optional information modules (see [Figure 2](#)).

NOTE 1 Construction assemblies, construction elements and integrated technical systems, as they are integrated into construction works, can be considered as construction products.

For such product sub-categories, this should include:

- more precise product descriptions;
- definition of the type of EPD and any information modules to be assessed;
- definition of declared unit, functional unit and RSL, where relevant;
- detailed application of this core PCR's allocation rules, cut-off criteria, etc.;
- detailed definition of technical information to be provided for specific information modules;
- provision of specific scenarios for information modules beyond the factory gate;
- detailed descriptions of the system boundaries with nature and/or between product systems for the specific product sub-category;
- detailed description of which processes belong to which information modules in the end-of-life stage;
- additional requirements for descriptions of the specific technical information that should be provided for the product, for example transparency about constituents and/or descriptions of manufacturing processes.

Such additional requirements and further specifications for sub-categories of construction products shall result in a sub-category PCR document that includes:

- a) the same structure and text as in this core PCR and the additional elements and specifications valid for the sub-category PCR, or alternatively;
- b) only the headings from and references to this core PCR and supplementary text describing the additional elements and specifications.

The structure of a sub-category PCR may follow that of this document, with all headings and section numbers kept the same. Then, where a section of this document applies without modification, this should be indicated. Where a section of this document is not relevant for EPDs covered by the sub-category PCR, this should also be indicated.

Requirements and descriptions from this core PCR shall be followed for any sub-category PCR.

B2C communication shall follow the requirements given in ISO 14025. The sub-category PCR may then define a functional unit and other requirements as defined in ISO 14025 and define how the declared information shall be presented for B2C communication.

NOTE 2 This information can be presented in an additional summary coversheet to an EPD.

Requirements for Type III environmental declarations that are verified by a third party and based on LCA are found in ISO 14025 and are followed in this document.

6.3 Development of sub-category PCR

All sub-category PCR for construction products shall meet the requirements of the core rules according to this document. This is to ensure consistent assessment and comparability when considering the overall construction works and where the requirements of ISO 14025:2006, 6.7.2 are met.

The sub-category PCR review shall be conducted in accordance with ISO 14025:2006, 8.1.2.

The product group covered by a sub-category PCR shall be described unambiguously.

The definition may consider product functionality (e.g. conveyance of materials through pipes), typical production processes (e.g. mining or oil refinery) or applications (e.g. for use in cold climates).

If there is potential ambiguity in the product sub-category, the description shall also state which products are not covered by the sub-category PCR.

7 PCR for LCA

7.1 Methodological framework

7.1.1 Overarching principles for LCA modelling and calculation

Two main modelling approaches exist for LCA: attributional and consequential.

This document follows the attributional LCA approach. The attributional life cycle model depicts the actual or anticipated specific or average supply chain, use and end-of-life scenarios. The consequential life cycle model depicts the anticipated generic supply chain as a consequence of a potentially relevant decision.

The attributional and the consequential life cycle models differ with respect to the selection of data and the manner in which co-production processes are considered. In the attributional approach, co-production processes are allocated based on physical or economic relationships; in the consequential approach, system expansion including avoided processes is applied.

The setting of the system boundary for the product system shall follow two principles:

- The “modularity principle”: Where processes influence the construction product’s environmental performance during its life cycle, they are assigned to the information module of the life cycle stage where they occur; all environmental aspects and potential impacts are declared in the life cycle stage where they can be attributed (see [Figure 2](#)).
- The “polluter pays principle”: Processes relevant to waste processing are assigned to the product system that generates the waste until the system boundary between product systems is reached.

7.1.2 Functional unit

The functional unit defines the way in which the identified functions and performance characteristics of the product are quantified. The primary purpose of the functional unit is to provide a reference by which product, material and energy flows (input and output data) of a construction product’s LCA results and any other information are normalized to produce data expressed on a common basis.

NOTE 1 Comparisons of construction products with the same functional unit follow the rules in [5.5](#).

The functional unit, used as the denominator, provides the basis for the addition of product, material or energy flows and the relevant environmental impacts for any of the life cycle stages and their information modules for the construction product or construction service.

The description of the functional unit of a construction product shall include, but not be limited to

- the quantified function and performance characteristics of the construction product when integrated into a construction works, taking into account the intended use of the product with respect to the functional equivalent of the works, and
- the product's RSL (see 7.1.4), under defined reference in-use conditions or specific in-use conditions.

In this way, quantification of both the qualitative and quantitative aspects of the function in relation to end use in a construction works context, for example, "what", "how much", "how well" and "for how long" has to be performed.

NOTE 2 Guidance on establishing "how well" and "how long" aspects of performance is provided in Annex A.

NOTE 3 Guidance on the development of a functional unit is given in ISO 14040:2006, 4.2.2.

NOTE 4 Guidance on describing in-use conditions is given in ISO 15686-1, ISO 15686-2, ISO 15686-7 and ISO 15686-8.

NOTE 5 The functional unit for a product might incorporate aspects of functionality that are not always required for a particular use case of that product. For example, a concrete block can have structural performance functionality, acoustic functionality and thermal functionality, but in a given use case one or more of these functions might not be required. If this is the case, then these aspects of functional unit can be disregarded, if for example, functional unit is being used as the basis for comparison of two or more products for the given use case.

EXAMPLE A functional unit can be: a roofing product sufficient to cover 100 m² of a building, maintain a barrier to water penetration into the building and to include any repair, refurbishment or replacement of replaceable components over a required service life of 50 years.

7.1.3 Declared unit

When the precise function of the product or scenarios at the construction works level is not stated, or is unknown, a declared unit may be used instead of the functional unit. The declared unit provides a reference by which product, material and energy flows (input and output data) of the information module of a construction product's LCA results and any other information are normalized to produce data expressed on a common basis.

The declared unit, used as the denominator, provides the basis for the addition of product, material and energy flows attributed to the product and the relevant environmental impacts for EPDs that do not cover the full life cycle (see Figure 2). It shall relate to the typical applications of products and their product categories.

The declared unit in the EPD shall be one of the following:

- an item, an assemblage of items, for example, 1 window (dimensions of items shall be specified);
- mass (kg or metric tonne), for example, 1 000 kg or 1 t of cement;
- length (m), for example, 1 m of pipe, 1 m of a beam (dimensions of elements shall be specified);
- area (m²), for example, 1 m² of wall elements, 1 m² of roof elements (dimensions of elements shall be specified);
- volume (m³), for example, 1 m³ of timber, 1 m³ of ready-mixed concrete.

A different unit may be declared for reasons that shall be explained and in such cases, information shall be provided on how to convert this unit to one or more of the required unit types.

EXAMPLE If an EPD for an insulation material is declared in units of thermal resistance, R (m²K/W), in the construction works, then a conversion factor, for example, to 1 kg of material is required.

For the development of, for example, transport and disposal scenarios, conversion factors to mass per declared unit shall be provided.

NOTE Reasons for declaring units other than those listed include the need to use units normally used for design, planning, procurement and sale.

The following information is the minimum that shall be provided together with the declared unit for the construction product or component:

- intended application, where relevant;
- statement that comparability of EPDs is limited to those applying a functional unit.

7.1.4 Requirements for the use of RSL

The RSL information to be declared in an EPD covering the use stage shall be provided by the manufacturer. The RSL shall refer to the declared technical and functional performance of the product within a construction works. It shall be established in accordance with any specific rules given in product standards and shall take into account ISO 15686-1, ISO 15686-2, ISO 15686-7 and ISO 15686-8. Where product standards provide guidance on deriving the RSL, such guidance shall have priority.

The RSL is dependent on the properties of the product and reference in-use conditions. Information on the product's RSL, therefore, requires specification of compatible scenarios for the production stage, construction stage and use stage. These conditions shall be declared together with the RSL and it shall be stated that the RSL applies for the reference in-use conditions only.

Default values shall be provided and be based on published references. If longer RSLs are used, they shall be guaranteed by the signature of the most senior officer of the product manufacturer.

NOTE Default values can be provided in a sub-category PCR.

Requirements and guidance on both the RSL and ESL for the estimation of service life are given in normative [Annex A](#). A sub-category PCR should specify requirements to define the RSL for the given product group, where relevant.

7.1.5 System boundary with nature

The system boundary with nature is defined when material flows move from natural systems to the technosphere (i.e. when they are flows caused or influenced by human technological activity) and when emissions are released from the technosphere to the environment. The studied system should therefore include all processes in the technosphere which are necessary to provide the function or declared unit of the product.

NOTE Biogenic carbon enters the product system during managed agricultural processes or during harvest of biogenic material from natural systems.

7.1.6 System boundary between products systems

Product systems can use secondary materials, secondary fuels and recovered energy from previous product systems, and can generate wastes and energy that are recovered to produce secondary materials, secondary fuels and recovered energy for use in subsequent product systems. To ensure that there is no double counting or undercounting of burdens, it is essential that a system boundary between product systems is defined and the same system boundary is used to assign burdens to the appropriate product system for both inputs and outputs from the studied product system.

See [Table 1](#) for application of the system boundary between product systems. For input flows to the studied product system, the product system that generates waste is the upstream product system. For output flows from the studied product system, it is the studied product system generating the waste.

For input flows to the studied product system, the product system that uses waste, secondary materials or secondary fuels is the studied product system. For output flows used from the studied product system, it is the downstream product system.

The setting of the system boundary between products systems shall follow the polluter pays principle set out in [7.1.1](#).

A flow shall be considered as reaching the system boundary between product systems when it complies with all the following criteria:

- the recovered material, product or fuel is commonly used for specific purposes;
- a market or demand, identified, for example by a positive economic value, exists for such a recovered material, product or fuel;
- the recovered material, product or fuel fulfils the technical requirements for the specific purposes for which it is used and meets the existing legislation and standards applicable to products or secondary fuels.

NOTE The “specific purpose” in this context is not restricted to the function of a certain product but can also be applied to a material serving as input to the production process of another product or of energy.

As the criteria for the system boundary between product systems relate to common use, demand, economic value, legislation, standards and regulations, it is clear that a particular substance can have a different status in different locations at different points in time. For manufacturers that use wastes, secondary materials and/or secondary fuels as a resource and also produce waste that is recovered in terms of time of data collection and geography of the supply chain for the use of these substances, the current situation shall be used to identify the system boundary between product systems.

A conservative approach shall be used, meaning that if there is uncertainty as to whether a substance has reached the system boundary between product systems, it should be included in the studied product system in the relevant life cycle stage. Additionally, if wastes are used for energy or material recovery and do not have a clearly defined point when they cross the system boundary between product systems in all regions, the most conservative figures shall be specified in the communication of the LCA results in information modules A1 to A3 and shall include the environmental impacts caused by the emissions including processing, incineration and/or co-incineration of waste (gross figure).

For transparency reasons, a net figure can be provided as additional information:

- the environmental impacts caused excluding the processing, e.g. incineration of waste (net figure), see [Table 1](#).

For the end-of-life stage, any waste treatment or recovery process that occurs before the system boundary between product systems is reached shall be included in information module C3 or C4.

Table 1 — Application of the “system boundary between product systems” following the overarching principles for LCA modelling and calculation provided in 7.1.1

Has the recovered material, product or fuel reached the SB between PS?	Subsequent process	Use of discharged products	PS that generates waste ^a	PS that uses waste, SM or SF ^b
Yes, it is certain that the SB between PS is reached and all the criteria described in 7.1.6 are met. ^c	N/A	SM or SF; e.g. wood chips recovered from untreated wood; steel; crushed concrete	Declare — SMs/SFs from recycling or recovery in the IM where the waste is generated or, if at the end-of-life, in information module C3, — impacts of recovery processes to reach the SB between PS in the IM where the discharged product is generated or, if at the end-of-life, in IM C3, — optionally, the potential loads and benefits of any resulting net output flows of SM/SF in module D.	Declare — use of SM or SF, — environmental impact from the use of SM or SF in the IM where it is used.
No, it is certain that the SB between PS is not reached, as one or more of the criteria in 7.1.6 are not met. ^c	Further waste processing or material recovery	Waste for recycling or recovery e.g. mixed demolition waste	Declare — environmental impact from further waste processing in the IM where the waste is generated or, if at the end-of-life, in IM C3. Waste treatment stops when the SB between PS is crossed. — Optionally, once the SB between PS is crossed following this further waste processing, the potential loads and benefits of any resulting net output flow of SF/SM in module D.	Do not declare — impacts from any waste processing, e.g. recycling or waste treatment until the SB between PS is reached. Declare — any impacts from processes only after the SB between PS is reached, in the IM where the SM/SF/RE is used. — Use of SM/SF once the further waste processing is complete, and the SB between PS is crossed in the IM where the SM/SF is used.

Table 1 (continued)

Has the recovered material, product or fuel reached the SB between PS?	Subsequent process	Use of discharged products	PS that generates waste ^a	PS that uses waste, SM or SF ^b
No, it is certain that the SB between PS is not reached, as one or more of the criteria in 7.1.6 are not met. ^c	Co-incineration of waste with other fuels for energy recovery	Co-incineration of waste with other fuels, e.g. waste used in cement kiln	Declare - environmental impact from waste processing including the incineration of the waste in the IM where the waste is generated or, if at the end-of life, in IM C3, - RE exported from the system in the IM where the waste is co-incinerated, - optionally, any potential loads and benefits from the net output flow of RE in module D, once the SB between PS is crossed.	Option 1: Declare the impacts from the co-incineration process in the IM that it occurs, but waste use and specific emissions from wastes that can be physically associated with the wastes can be excluded. Any excluded waste use and emissions shall be noted as additional information in the EPD and evidence provided in the project report. Option 2: As a conservative approach, consider the wastes as if they were secondary fuels and declare the use of waste as - use of SF, and - declare the environmental impact from the use of waste considered SF in the IM where the waste considered as SF is used. The quantity of waste considered as SF and the environmental impact associated with the co-incineration of the waste can be provided as additional information in the EPD and evidence provided in the project report.
	Energy recovery from waste with efficiency $\geq 60\%$	Energy recovery from waste, e.g. municipal waste incineration	Declare - environmental impact from waste processing, e.g. processing in the IM where the waste is generated or, if at the end-of life, in IM C3 - output of RE in the IM where the waste is generated or, if at the end-of life, in IM C3, - optionally, any potential loads and benefits from the net output flow of RE in module D, once the SB between PS is crossed.	Declare use of RE in the IM where it is used.

Table 1 (continued)

Has the recovered material, product or fuel reached the SB between PS?	Subsequent process	Use of discharged products	PS that generates waste ^a	PS that uses waste, SM or SF ^b
No, it is certain that the SB between PS is not reached, as one or more of the criteria in 7.1.6 are not met. ^c	Incineration of energy recovery from waste with efficiency <60 %	Waste disposal, e.g. hazardous waste incineration	Declare — environmental impact from waste processing and disposal, e.g. incineration, in the IM where the waste is generated or, if at the end-of-life, in IM C4 — any output of RE in the IM where the waste is generated or, if at the end-of-life, in IM C4. — optionally, any potential loads and benefits from any net output flow of RE in module D, once the SB between PS is crossed.	Do not declare the — impacts from use of waste. Declare — use of recovered energy from the waste as “use of recovered energy.” It is recommended to note this in the EPD.
It is not clear – the SB between PS is uncertain or not consistently applied in different regions	N/A	N/A	As a conservative approach, use the last point at which the SB between PS could be reached and consider the substance as waste to that point. The environmental impact associated with processes between the first and last point at which the SB between PS could be set can be provided as additional information and evidence provided in the project report.	As a conservative approach, use the first point at which the SB between PS could be reached as the SB and consider the substance as SM or SF from that point. The environmental impact associated with processes between the first and last point at which the SB between PS could be set can be provided as additional information and evidence provided in the project report.
IM, information module. N/A, not applicable. PS, product system(s). RE, recovered energy. SB, system boundary. SF, secondary fuel. SM, secondary material.				
^a For input flows to the studied product system, this is the upstream product system generating the waste. For output flows from the studied product system, this is the studied product system. ^b For input flows to the studied product system, this is the studied product system. For output flows from the studied product system, this is the downstream product system using the system outputs. ^c The criteria are: — the recovered material, product or fuel is commonly used for specific purposes; — a market or demand, exists for such a recovered material, product or fuel; and — the recovered material, product or fuel fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products.				

7.1.7 System boundaries and technical information for scenarios

7.1.7.1 General

The LCA is divided into a number of information modules. When an information module in the LCA is included, it shall follow the scope as defined in this clause.

The information modules A1, A2 and A3 are based on the actual and representative data of the production process of the product. However, as soon as a construction product leaves the factory gate, the assessment shall be based on scenarios and assumptions. The scenarios and assumptions considered depend upon various details including location, type of transport, method of installation and construction, type of construction works, use, maintenance and repair, end-of-life treatment and waste handling.

Scenarios and technical information are necessary for the application of EPDs in the assessment of the environmental performance of a building and other types of construction works. Scenarios shall be realistic and be representative of one of the most likely alternatives. More than one scenario can be assessed. A scenario shall allow users to scale the results to assess realistic options. The scenarios used shall be justified in the project report. Scenarios shall not include processes or procedures that are not in current use or which have not been demonstrated to be practical.

The technical scenario information provided in an EPD shall be detailed so as to enable the user of the EPD to assess whether the scenario assumptions are applicable to the context for which the EPD information is to be used.

NOTE If two alternative types of recycling are commonly used at the end-of-life, then a scenario for one type, scenarios for each alternative or scenarios for the typical mix plus each alternative could be provided. Only providing the typical mix of two alternatives might not assist in assessing the best option for recycling.

Providing a road transport scenario in A4 for 100 km may not be the most likely transport distance but will allow users to scale the results to represent the transport to their particular construction site.

Within an EPD, the indicators declared in the individual information modules of a product life cycle (i.e. A1 to A5, B1 to B7, C1 to C4) and the optional supplementary information beyond the life cycle (module D) shall not be aggregated in any combination of the individual information modules into a total or subtotal of the life cycle stages. As an exception, individual indicators for information modules A1, A2 and A3 may be aggregated to a total for each indicator in the production stage.

7.1.7.2 A1 to A3, production stage

7.1.7.2.1 General

The production stage includes the following three information modules A1 to A3:

- A1, extraction and upstream production;
- A2, transport to factory;
- A3, manufacturing.

Information modules A1 to A3 shall be included in every EPD. The system boundary with nature shall include those technical processes that provide the material and energy inputs into the system and the subsequent manufacturing and transport processes up to the factory gate, as well as the processing of any waste arising from those processes.

7.1.7.2.2 A1, extraction and upstream production

The information module “extraction and upstream production” covers raw material extraction and processing, processing of secondary material input (e.g. recycling processes). This includes:

- A1 extraction and processing of raw materials (e.g. mining processes) and biomass production and processing (e.g. agricultural or forestry operations), including the production of inputs where they are used;
- A1, reuse of products or materials from a previous product system;
- A1, processing of secondary materials used as input for manufacturing the product, but not including those processes that are part of the waste processing in the previous product system;
- A1, generation of electricity, steam and heat from primary energy resources used for extraction and processing of raw materials, including their extraction, refining and transport;
- A1, generation of electricity, steam and heat from secondary fuels, but not including those processes that are part of waste processing in the previous product system to recover secondary fuels;
- A1, energy recovery and other recovery processes from secondary fuels, but not including those processes that are part of waste processing in the previous product system;
- A1, waste management from manufacturing packaging and manufacturing wastage including transport up to the recycler or disposal.

7.1.7.2.3 A2, transport to factory

The information module “transport to factory” covers transport of raw materials and other inputs to the factory and internal transport.

7.1.7.2.4 A3, manufacturing

The information module “manufacturing” includes:

- A3, production of ancillary materials or pre-products;
- A3, generation of electricity, steam and heat from primary energy resources used in manufacturing, including their extraction, refining and transport;
- A3, energy recovery and other recovery processes from secondary fuels, but not including those processes that are part of waste processing in the previous product system;
- A3, emissions from the combustion of secondary fuels and waste used in the manufacturing process;
- A3, manufacturing of products and co-products, including their extraction, manufacturing and transport;
- A3, manufacturing of packaging, including their extraction, manufacturing and transport;
- A3, waste management from manufacturing packaging and manufacturing wastage including transport up to the recycler or disposal.

7.1.7.2.5 Input of secondary materials or recovered energy

In the case of input of secondary materials or energy recovered from waste or generated from secondary fuels, the system boundary between the system under study and the previous system (providing the secondary materials and secondary fuels) is set where outputs from the previous system, for example materials, products, construction works elements or energy, reach the system boundary between product systems (see [7.1.7.5](#)).

7.1.7.2.6 Co-products leaving the system

Co-products from unit processes leaving the system at the production stage (A1 to A3) shall be allocated in accordance with 7.2.5. Loads and benefits from allocated co-products shall not be declared in module D (see 7.1.7.6).

7.1.7.2.7 Output of waste

The output of waste during this life cycle stage may become a useable output flow, such as a secondary material/fuel or recovered energy, when it has been through a recovery process and complies with the conditions described in the system boundary between product systems (see 7.1.6). These useable output flows shall not be considered as co-products but shall be considered waste and no allocation to secondary material, secondary fuels or recovered energy shall be permitted. As an option, the potential loads and benefits from the net useable output flows from recovery processes may be considered as supplementary information in module D.

7.1.7.2.8 End-of-life scenarios for packaging

To support the development of the end-of-life scenarios for packaging at the construction works level where the information module A5 is not declared, data shall be provided about any packaging used for the product as specified in 7.1.7.3.

7.1.7.3 A4 to A5, construction stage

7.1.7.3.1 General

The construction stage includes the following two information modules A4 to A5:

- A4, transport to site;
- A5, installation.

Information modules A4 to A5 include provision of all materials, products and energy, as well as waste processing up to the system boundary between product systems or disposal of final residues during the construction stage. They also include all aspects and impacts related to any losses during this construction stage (i.e. production, transport and waste processing and disposal of the lost products and materials).

7.1.7.3.2 A4, transport to site

The information module “transport to site” includes:

- A4, transportation from the factory gate to the central warehouse or intermediate storage site, if relevant;
- A4, transportation to the construction site.

Transport distance should be as specific as possible. The distance to the construction site may be estimated based on weighted average distance to the market of the product.

For the assessment at the construction works level, more complex logistics may have to be considered.

7.1.7.3.3 A5, installation

The information module “installation” covers installation of the construction product into any type of construction works. This includes:

- A5, wastage of construction products including the production processes (A1 to A3) and transport to site (A4) to account for the material lost from wastage of products;

- A5, waste processing of the waste from product packaging and product wastage including transport during the construction processes up to the system boundary between product systems or disposal of final residues;
- A5, installation of the product into the construction works including manufacture and transportation of ancillary materials and any direct use of energy or consumption of freshwater required for installation at the construction site;
- A5, installation specific site preparation for the declared product including ancillary materials and waste management if relevant.

7.1.7.3.4 End-of-life scenarios for packaging

The information in [Table 2](#) shall be provided for all construction products to specify the end-of-life scenarios used for packaging or to support development of the end-of-life scenarios for packaging at the construction works level where the module is not declared. Scenarios shall only model processes, for example recycling systems that have been proven to be economically and technically viable.

Table 2 — A5 product packaging waste

Module	Parameter	Unit (expressed per functional unit or per declared unit)	Value
A5 Installation of the product	Mass of packaging waste Specify by type	kg or other unit as appropriate	
A5 Installation of the product	GWP based in biogenic carbon content of packaging, specify by type, (where relevant)	kg CO ₂ e	

7.1.7.4 Use stage

7.1.7.4.1 General

The use stage of the construction works includes information modules covering the period from the handover to when it is deconstructed or demolished. Product level use stage may be vastly different when considered in the context of the construction works since the products will have varying RSLs, encounter differing exposure conditions (with corresponding ESLs) and might be replaced, repaired and maintained several times over the span of the required service life of a construction works.

The use stage of the construction product includes the use of construction products, equipment and services in their proper function. It also includes construction product use to protect, conserve, moderate or control a construction works, for example modules describing the impact of any given product upon building operation through integrated technical systems such as heating, cooling, lighting, water supply and internal transport (e.g. provided by lifts and escalators). It also includes product level related maintenance (e.g. cleaning) and repair, both of which can include replacement of replaceable components/parts and refurbishment.

It is recognized that it may be difficult to separate all use stage processes and the connected aspects and impacts into these separate modules. However, any deviation from the categorization of aspects and impacts into modules B1 to B5 and B6 to B7 shall be reported in a transparent manner and justified.

7.1.7.4.2 B1 to B5, use stage (related to the use of the construction works)

7.1.7.4.2.1 General

The use stage of the construction works includes the following five information modules:

- B1, use or application of the installed product;

- B2, maintenance;
- B3, repair;
- B4, replacement;
- B5, refurbishment.

This includes provision and transport of all materials, products and related energy and water use, as well as waste processing up to the system boundary between product systems or disposal of final residues during this part of the use stage. These information modules also include all aspects and impacts related to losses during the use stage (i.e. production, transport and waste processing and disposal of the lost products and materials).

7.1.7.4.2.2 B1, use or application of the installed product

In terms of any emissions to the environment not covered by information modules B2 to B7, the information module “use or application of the installed product” covers environmental aspects and impacts connected to the normal (i.e. anticipated) use of products, not including those related to energy and water use, which are dealt with in B6 and B7, for example release of substances from the facade, roof, floor covering, walls and different surfaces (interior or exterior). They are reported as mandatory additional environmental information according to the requirements stated in [8.4](#) or as optional additional environmental information, for example as described in [Annex C](#).

7.1.7.4.2.3 B2, maintenance

The information module “maintenance” covers the combination of all planned technical actions during the reference service life to maintain the construction product installed in a construction works or its parts in a state in which it can perform its required functional and technical performance, as well as preserve the aesthetic qualities of the product.

This includes:

- B2, preventative and regular maintenance activity such as cleaning and the planned servicing, replacement of replaceable components or repair of worn, damaged or degraded parts;
- B2, production (A1 to A3) of any component and ancillary products used for maintenance, for example cleaning agents;
- B2, transportation (A4) of any component and ancillary products used for maintenance;
- B2, use of related energy and water, including generation and distribution;
- B2, transportation of any waste from maintenance processes or from maintenance related transportation;
- B2, end-of-life processes of any waste including transportation and the maintenance process, including any part of the component and ancillary materials removed.

Water and energy usage (including production and distribution) required for cleaning, as part of maintenance shall be included in this module and not in modules B6 and B7.

NOTE 1 Maintenance of a whole section of the construction works as part of a concerted programme is considered as refurbishment.

EXAMPLE 1 Painting work on window frames, doors, etc., as well as the annual inspection and maintenance of the (oil or gas) boiler, replacement of filters in the heat recovery or air conditioning system.

7.1.7.4.2.4 B3, repair

The module “repair” covers a combination of all technical actions during the service life associated with corrective, responsive or reactive treatment of a construction product or its parts installed in the construction works to return it to an acceptable condition in which it can perform its required functional and technical performance. It also covers the preservation of the aesthetic qualities of the product. At the product level, replacement of a broken component or part due to damage should be assigned to “repair”, whereas replacement of a whole element due to damage should be assigned to the module “replacement” at the construction works level.

This includes:

- B3, repair process of the repaired part of a component;
- B3, production (A1 to A3) of any component and ancillary products used for the repair;
- B3, transportation (A4) of any component and ancillary products used for the repair;
- B3, use of related energy and water; including generation and distribution;
- B3, transportation of any waste from repair processes or from repair related transportation;
- B3, end-of-life processes of any waste from transportation and the repair process, including any part of the component and ancillary materials removed.

NOTE 2 Repair of a whole section of the construction works as part of a concerted programme is considered as refurbishment.

EXAMPLE 2 For a window with broken glass, this includes the production and transportation of new glass and packaging, and all impacts due to the repair process (rubber seal, water for cleaning, etc.) and the end-of-life stage of the glass waste and any related packaging.

7.1.7.4.2.5 B4, replacement

The information module “replacement” covers the combination of all technical actions during the service life of the constructions works associated with the return of the construction works to a condition in which it can perform its original required functional or technical performance by replacement of the construction product or construction element.

At the product level, “replacement” of a broken component or part due to damage should be assigned to “maintenance” (B2) or “repair” (B3), whereas replacement of a whole construction product or construction element due to damage should be assigned to “replacement” at the construction works level.

This includes:

- B4, production (A1 to A3) of any component and ancillary products used for replacement;
- B4, transportation (A4) of any component and ancillary products used for replacement;
- B4, use of related energy and water, including generation and distribution;
- B4, transportation of any waste from replacement processes or from replacement-related transportation;
- B4, end of life processes of any waste from transportation and the replacement process, including any part of the component and ancillary materials removed.

NOTE 3 Replacement of a whole construction element as part of a concerted replacement programme for the construction works would be considered as “refurbishment”.

EXAMPLE 3 For a carpet being replaced at the end of its service life, this includes the production and transportation of the new carpet and packaging and all impacts due to the replacement process (adhesive, vacuum cleaning, etc.) and the end-of-life stage of the original carpet, any waste from the installation of the replacement carpet, packaging waste and adhesive.

7.1.7.4.2.6 B5, refurbishment

The information module “refurbishment” covers the combination of all technical actions during the service life of a product associated with the return of construction works or their parts to a condition in which it can perform its required functions.

Restoration activities should be included within refurbishment.

This includes:

- B5, production (A1 to A3) of any component and ancillary product used for refurbishment;
- B5, transportation (A4) of the component and ancillary materials used for refurbishment, including production aspects and impacts of any losses during transportation;
- B5, use of related energy and water, including generation and distribution;
- B5, transportation of any waste from refurbishment processes or from refurbishment-related transportation;
- B5, end-of-life processes of any losses suffered during transportation and the refurbishment process, including the components and ancillary materials removed.

NOTE 4 Refurbishment covers a concerted programme of maintenance, repair and/or replacement activity, across a significant part of or the entire service life of the construction product.

7.1.7.4.3 B6 to B7, use stage, information modules related to the operation of the construction works

7.1.7.4.3.1 General

The use stage related to the operation of the construction works includes the following two information modules:

- B6, operational energy;
- B7, operational water use.

Information modules B6 to B7 include provision and transport of all materials, products, as well as energy and water provisions, waste processing up to the system boundary between product systems or disposal of final residues during this part of the use stage.

7.1.7.4.3.2 B6, operational energy use

The information module “operational energy use” covers the operation of integrated technical systems (e.g. operation of heating system and other construction works related installed services).

Integrated technical systems are installed technical equipment that support operation of a construction works. This includes technical systems for heating, cooling, ventilation, lighting, domestic hot water and other systems for sanitation, security, fire safety, internal transport, building automation and control and IT communications.

This includes generation, distribution and use of energy during the operation of the product (the integrated technical system), together with its associated environmental aspects and impacts including processing and transportation of any waste arising on site from the use of energy.

NOTE 5 Use of energy for heating of domestic water is assigned to B6, while consumption of freshwater associated with use of hot water is assigned to B7.

If relevant for the product group, aspects related to the production of integrated technical systems equipment shall be assigned to information modules A1 to A3, for example radiators, boiler, ventilation system. Aspects related to transportation and installation of integrated technical systems equipment shall be assigned to information modules A4 to A5. Energy use and other impacts during maintenance, repair, replacement or refurbishment activities for the equipment shall be assigned to information modules B2 to B5. Aspects related to the waste processing and final disposal of equipment shall be assigned to information modules C1 to C4.

7.1.7.4.3.3 B7, operational water use

The information module “operational water use” covers water use by integrated technical systems during the period from the handover of the construction works to when it is deconstructed or demolished.

This includes water use during the operation of the product (the integrated technical system), together with its associated environmental aspects and impacts considering the life cycle of water including production and transportation and waste water treatment.

7.1.7.5 C1 to C4, end-of-life stage

The end-of-life stage of the construction product starts when it is replaced, dismantled or deconstructed from the construction works and does not provide any further functionality.

The end-of-life stage includes the following four information modules C1 to C4:

- C1, deconstruction/demolition, which includes dismantling or demolition, of the construction product from the construction works and the energy use for this, including initial on-site sorting of the materials;
- C2, transportation to waste processing or disposal, which includes the transportation of the discarded construction product as part of the waste processing, for example to a recycling site and transportation of waste, for example to final disposal;
- C3, waste processing, which includes, for example collection of waste fractions from the deconstruction, recovery and waste processing of material flows resulting in materials for reuse, secondary materials, secondary fuels or export of recovered energy from the energy recovery from waste with an efficiency of energy recovery of at least 60 %, without prejudice to existing legislation;
- C4, disposal of waste which includes physical pre-treatment and management of the disposal site, including provision and transport of all materials, products and related energy and water use.

If there are, for example three different recovery and disposal options, the most commonly used one, or all three scenarios, shall be declared separately.

NOTE 1 A recycling system is not practical if it includes a reference to a return system for which the logistics have not been established.

Energy recovery shall be based on existing technology and current practice.

A scenario based on a typical end-of-life, for example a mix of recovery and disposal options based on a national situation, shall only be provided if the scenarios for the separate individual options are also provided.

Waste processing shall be modelled and the elementary flows shall be included in the inventory. When materials have reached the system boundary between product systems, they may be considered as materials for energy recovery provided the energy recovery process has an energy efficiency rate of at least 60 %. Processes where energy is recovered from waste with an efficiency rate below 60 % shall be considered as disposal processes and modelled in information module C4.

Waste processing shall be considered as part of the product system under study. In the case of materials leaving the product system as secondary materials or fuels, processes such as collection and transport before the system boundary between product systems is reached are part of the waste processing of the product system under study. However, after having reached the system boundary between product systems, further processing may be necessary in order to replace primary material or fuel input in another product system. Such processes are considered to be beyond the system boundary, but may be considered in optional module D.

NOTE 2 The efficiency with which a secondary fuel is used has no bearing on its status in terms of having crossed the system boundary between product systems.

The process of energy recovery from landfill gas shall be considered as part of the disposal process in information module C4. Loads and benefits of the recovered energy may be considered in optional module D.

Loads (e.g. emissions) from all end-of-life information modules (C1 to C4) shall be considered part of the product system under study, according to the “polluter pays principle”. The loads associated with the use of secondary fuels shall always be part of the product system using the secondary fuel.

During the end-of-life stage of the construction product or the construction works, all output from dismantling, deconstruction or demolition, from maintenance, repair, replacement or refurbishing processes, all debris, all construction products, materials or construction elements, etc., are accounted for as part of the studied system. In the case of materials leaving the system as secondary materials or fuels, processes such as collection, transport and waste processing until the system boundary between product systems is reached, are part of current product system under study.

The inventory for the end-of-life stage includes all unit operations for the discarded construction product until it is determined to have crossed the system boundary between product systems and becomes a usable material flow for reuse, energy recovery and/or recycling. If the discarded product does not cross the system boundary, it is considered as waste and all waste treatment processes including those of disposal shall be assigned to the product system under study.

The system boundary between the construction product system and optional module D, which is not a part of the studied product system, is set at the system boundary between the studied product system and any subsequent product systems (see [7.1.6](#)).

7.1.7.6 Benefits and loads beyond the system boundary in optional supplementary module D

Module D is not a life cycle stage like the life cycle stages assessed in information modules A1 to C4. Module D is outside the system boundary of the studied product system and construction works system. Module D is not an allocation approach and does not report impacts that are allocated to other product systems as a result of co-production or recovery processes.

Module D provides optional supplementary information about the potential net benefits from reuse, recycling and energy recovery beyond the system boundary of the studied product system.

Where relevant, optional supplementary module D information declares potential loads and benefits of secondary material, secondary fuel or recovered energy leaving the product system based on scenarios. Module D information aims at transparency for the resulting potential environmental benefits from reused products, recycled materials, secondary fuels and/or recovered energy leaving a product system and being used in a subsequent product system. Impacts from allocated co-products are not part of module D information (see [7.2.4](#)).

The information in module D may contain qualitative technical information, as well as the quantified predetermined LCA-derived parameters. The LCA results from module D shall always be reported separately. If module D information is included, the net output flow for all products for reuse, secondary materials, secondary fuels and/or recovered energy leaving a product system is calculated by adding all output flows of the secondary material or fuel or recovered energy and subtracting any input flows of this secondary material or fuel or recovered energy from each information module (e.g. A1 to A5, B1 to B5, C1 to C4) thus arriving at the net output flow of secondary material or fuel or recovered energy from the product system.

If module D includes the result from an LCA, the following shall be applied.

- The potential environmental loads and benefits of the net output flow are calculated by:
 - identifying the point of substituted functional equivalence where the secondary material or fuel or recovered energy substitutes primary production;
 - adding the loads associated with any further processing occurring beyond the system boundary that is required to reach the point of substituted functional equivalence;
 - subtracting the impacts resulting from the substituted production of the product or generation of the energy;
 - applying a justified correction factor to reflect the difference in functional equivalence where the processed net output flow does not reach the functional equivalence of the substituting process.
- In the case of recovered energy, the average production mix shall be substituted, for example national average LCI for grid electricity or district heating. In cases where the substituted production primary process is not clear, as a conservative approach, the typical production mix, rather than primary product, should be substituted so that the benefit of recovery is not overstated. This is usually the case for electricity and heat generation.
- The EPD is developed for construction products and will be part of a construction works that, in reality, will affect the recyclability potential. Even though module D deals with the future (e.g. after end-of-life of the construction product or the construction works), current practice shall be used for the scenario setting in order to achieve a verifiable result. If today's average is not available for the quantification of potential benefits or avoided loads, a conservative approach shall be used.

7.1.8 Criteria for the inclusion and exclusion of inputs and outputs

The criteria for the exclusion of inputs and outputs (cut-off rules) in the LCA and information modules and any additional information are intended to support an efficient calculation procedure. Cut-off rules shall not be applied in order to hide data. Any application of the criteria for the exclusion of inputs and outputs shall be documented.

When impacts are assessed and reported, the cut-off rules shall be based on the environmental impacts related to the respective material flows. The cut-off rules shall be justified and documented in the EPD and project report.

The following procedure shall be followed for the inclusion and exclusion of inputs and outputs.

- All inputs and outputs to a (unit) process shall be included in the calculation of the pre-set parameters results, for which data are available. Data gaps shall be filled by conservative assumptions with average, generic or proxy data. Any assumptions for such choices shall be documented.
- Particular care should be taken to include material and energy flows that are known or suspected to release substances into the air, water or soil in quantities that contribute significantly to any of the pre-set indicators of this document. In cases of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1 % of renewable primary resource (energy), 1 % non-renewable primary resource (energy) usage, 1 % of the total mass input of that unit process and 1 % of environmental impacts. The total of neglected input flows per module shall be a maximum of 5 %

of energy usage, mass and environmental impacts. When assumptions are used in combination with plausibility considerations and expert judgement to demonstrate compliance with these criteria, the assumptions shall be conservative.

- All substances with hazardous and toxic properties that can be of concern for human health and/or the environment shall be identified and declared according to normative requirements in standards or regulation applicable in the market for which the EPD is valid, even though the given process unit is under the cut-off criterion of 1 % of the total mass.

7.1.9 Selection of data and data quality requirements

Data quality has an influence on the content of an EPD. As a general rule, specific data derived from specific production processes shall be the first choice as a basis for calculating an EPD. In addition, the following rules apply.

- An EPD describing a specific product shall be calculated using specific data for at least the processes over which the manufacturer of the specific product has influence. Generic and proxy data may be used for the processes over which the manufacturer has no influence, for example processes dealing with the production of input commodities, such as raw material extraction or electricity generation, often referred to as upstream data (see [Table 3](#)).
- An EPD describing a specific product covering all life cycle stages (cradle to grave) may also be calculated using generic and proxy data for some downstream processes, e.g. waste incineration.
- An EPD describing products from more than one factory or manufacturer shall be calculated using representative average data of the products declared by the EPD (see [Table B.1](#)).
- The additional technical information for the development of scenarios of the construction works' life cycle stages shall be specific or specific average information, when an average product is declared.

Table 3 — Application of generic and specific data

Modules	A1 to A3		A4 to A5	B1 to B7	C1 to C4
	Production of commodities, raw materials	Product manufacture	Installation processes	Use processes	End-of-life processes
Process type	Upstream processes	Manufacturer's processes	Downstream processes		
Data type	Generic data or EPD of upstream processes See also Annex B .	Manufacturer's average or specific data See also Annex B .	Scenario based generic data based on technical information given in 7.1.7.3 to 7.1.7.5 .		

The quality of the data used to calculate an EPD shall be addressed in the project report (see [Clause 10](#) and ISO 14044:2006, 4.2.3.6). In addition, the following specific requirements apply for construction products.

- Data sets used for calculations shall have been updated within the last 10 years for background data and within the last 5 years for producer-specific (foreground) data; deviations shall be justified.

An EPD can have a period of validity for up to 5 years and it does not have to be recalculated at the end of the period of validity, if the underlying primary and secondary data have not changed significantly (see [Clause 11](#)). Thus, it is accepted that data older than 5 years may be used when the validity period of the EPD has been extended according to this document.

- Manufacturer-specific data sets shall be based on average data from 12 consecutive months; deviations shall be justified in the project report.

- The time period over which inputs to and outputs from the system shall be accounted for is 100 years from the year for which the data set is deemed representative. A longer time period shall be used if relevant and shall be justified in the project report.
- Emissions from a landfill should be accumulated over 100 years after the material was deposited on or in the landfill.

NOTE Long-term emissions are considered emissions occurring beyond 100 years after the material was deposited on or in the landfill.

- Technological coverage shall reflect the physical reality for the declared product or product group.

7.1.10 Units

SI units shall be used. Basic units are metre (m), kilogram (kg), metric tonne (t) and molecular weight in grams (mol). With the exceptions noted below, all resources are expressed in kg.

Exceptions are:

- the indicators RPR_E and $NRPR_E$, which are expressed as kWh or MJ, including renewable energy sources, e.g. hydropower, wind power;
- the indicators RPR_M and $NRPR_M$, which are both expressed as kWh or MJ. However, measurement of these materials as inputs, for example in the description of the product's content, are expressed in mass. Primary resources used as energy or material input shall have the same unit;
- water use, which is expressed in m^3 (cubic metres);
- temperature, which is expressed in $^{\circ}C$;
- time, which is expressed in practical units depending on the assessment scale: minutes, hours, days, years.

7.2 Inventory analysis

7.2.1 Data collection

Data collection shall follow the requirements and guidance provided in ISO 14044:2006, 4.3.2.

7.2.2 Calculation procedures

The calculation procedures described in ISO 14044 shall apply. The same calculation procedures shall be applied consistently throughout the study.

When transforming the inputs and outputs of combustible material into inputs and outputs of energy, the net calorific value of fuels shall be applied according to scientifically based and accepted values specific to the combustible material.

7.2.3 Allocation situations

Two allocation situations are dealt with in this document, allocation to co-products and allocation between product systems.

7.2.4 Principles for allocation for both allocation situations

When co-products or secondary flows crossing the system boundary are considered in any EPD study, the following principles shall be followed.

- The inputs and outputs shall be allocated to the different products according to clearly stated procedures that shall be documented and explained together with the allocation procedure.

- For all allocation situations, the sum of the allocated inputs and outputs of a unit process shall be equal to the inputs and outputs of the unit process before allocation. This means no double counting or omission of inputs or outputs through allocation is permitted.
- Irrespective of the allocation approach chosen for a co-production process or for secondary flows crossing the system boundary between product systems, specific inherent properties of such co-products or flows, for example calorific content, composition [biogenic carbon content, $\text{CaO}/\text{Ca}(\text{OH})_2$ content etc.], shall not be allocated but always reflect the physical flows.
- Allocation to co-products shall respect the main purpose of the processes studied, allocating all relevant products and functions appropriately. The purpose of a plant and therefore of the related processes is generally declared in its permit and shall be taken into account. Where the revenue from a process is a significant reason for its existence, the proportion of revenue associated with each co-product should be broadly reflected in whichever allocation approach is used for co-products. This is to avoid disproportionate allocation of impacts to co-products.
- In situations where it is unclear if an output is a co-product, by-product or a waste, a conservative approach of allocating burdens to the primary product system under consideration shall be used. The final disposal of wastes is included in the system boundary of the process that generated them.
- Consistent allocation procedures shall be uniformly applied to similar inputs and outputs of the system under consideration. For example, the approaches of allocation to co-products or to secondary materials crossing the system boundary between product systems should use the same procedure used for co-products or to secondary material flows entering the product system.
- Impacts from allocated co-products shall not be included in module D.

A conservative approach may be used for the assessment of the primary product by not allocating any environmental flows to a co-product and retaining all impacts within the primary product system.

Where a co-product is a relevant input, then the allocation procedure shall be followed to understand the impacts that are allocated from the joint co-production process to the co-product.

The use of upstream data that do not respect the allocation principles described in this document shall be

- clearly identified,
- subjected to a sensitivity analysis conducted and documented so as to illustrate the likely influence on the results with the upstream data used,
- justified in the project report, and
- as a minimum, be in line with ISO 14044 allocation rules and attributional LCA.

7.2.5 Allocation for co-products

7.2.5.1 General

Most industrial processes produce more than the intended product. Sometimes products are co-produced with other products. As a rule, the material flows between them are not distributed in a simple way. Intermediate products and co-products, which are not required in further processes, leave the product system to become inputs for other product systems.

When a unit process produces one or more co-products, which may include by-products, then it is necessary to ascertain the impact associated with the construction product that is the focus of the study. The allocation procedure set out in ISO 14044:2006, 4.3.4 deals with this situation. However, the other co-products from these unit processes can also be used as inputs or as construction products themselves. For this reason, this document has further refined the allocation procedures in ISO 14044 so that the impacts of both studied products and co-products can be calculated using the same procedure.

7.2.5.2 Co-product allocation procedure

Co-product allocation shall be performed in the order of the following steps:

- Identify whether the unit process is a joint co-production process; if each of the co-products can be produced without the other(s) or the ratio of the co-products typically varies in normal production, then it is not a joint co-production process. By-products cannot be avoided and processes producing by-products are therefore joint co-production processes.
- If the unit process is not a joint co-production process, then the unit process should be subdivided (see 7.2.5.5) into two or more unit processes (one of which represents the studied product) having separate input and output data for each individual unit process.
- If the unit process is not a joint co-production process and the unit process should be subdivided (see 7.2.5.5) but if respective data are not available, the inventory of the unit process under study should be allocated between its different products or functions in a way that reflects the underlying physical relationships between them.
- In other cases, such as joint co-production processes, the inventory of the process should be allocated between the products and co-products in a way that reflects underlying physical relationships between them, i.e. they should reflect the way in which the inputs and outputs are changed by quantitative changes in the products or functions delivered by the system.
- In all other cases, including joint co-production processes, where no relevant underlying physical relationships between the products and co-products can be identified, the inventory of the process should be allocated between the products and co-products in a way that reflects the economic value of the co-products when they leave the unit process.

The economic value of the co-products may be assessed by considering the proportion of revenue generated by each co-product.

The revenue is the price multiplied by the output. For both price and output, representative values should be identified (e.g. rolling annual averages). Prices alone are not considered to be the appropriate basis for the decision.

NOTE For an example of allocation on a purely economic basis refer to ISO/TR 14049:2012, 7.3.2.

Allocation on a purely economic basis shall not be used so as to avoid impacts to any co-products that are either produced or used in the manufacture of construction products.

7.2.5.3 Avoiding allocation generally

Avoiding allocation is not a type of allocation. However, for the purposes of this document, any approach to assigning impacts to co-products, whether by allocation or by avoiding allocation, shall be considered as allocation and shall follow the principles for allocation set out in this document.

7.2.5.4 Avoiding allocation by system expansion

If there is a need to calculate impact data for both products and co-products, system expansion (the approach of expanding the product system to include the additional functions related to the co-products) is not considered as an option for avoiding allocation within EPD studies. It shall not be used to avoid the allocation of impacts to any co-products which are produced or used in the manufacture of construction products.

7.2.5.5 Allocation by subdivision

The LCA study shall first identify any unit process that produce more than one product, then determine whether it is possible to divide the unit process into one or more subprocesses that each have a single output. Then separate input and output data related to these individual subprocesses can be collected.

Avoiding allocation by subdivision is suitable for unit processes with co-products whose manufacture is not intrinsically linked. This may occur, for instance, when data collection is performed at a given location without going deeper into detail regarding specific processes occurring at that site, for example separate production lines or sequential manufacture of products. For these types of processes, the ratio between the co-products could be significantly altered or only one co-product produced, when required. In such cases, subdivision shall not be used and the co-product allocation procedure given in 7.2.5.2 shall be used. If a unit process is suitable for subdivision, but the required data are not available, the inputs and outputs of the unit process under study should be segregated into its different products or functions in a way that reflects the underlying physical relationships between them, i.e. they shall reflect the way in which the inputs and outputs are changed by quantitative changes in the products or functions delivered by the system. Such segregation shall be described and justified in the project report.

Subdivision is more problematic for unit processes where the co-products manufactured are intrinsically linked and are true joint co-products. This is normally the case if the ratio between the co-products cannot be significantly varied, for example, because they are produced from the same input material(s) and co-production is unavoidable.

7.2.6 Allocation between product systems (across the system boundary)

The allocation procedure for flows crossing the system boundary between product systems (allocation to recycling) is simple. No burdens are allocated across the system boundary with secondary material, secondary fuel or recovered energy flows arising from waste.

There is no allocation across the system boundary between product systems with respect to secondary materials, secondary fuels or recovered energy arising from pre-consumer and post-consumer recycling. Recovery processes carry no allocated burdens and have no impact when they cross the system boundary between product systems and there is no allocation of impacts away from the studied product system to any wastes that are reused, recycled or recovered for use in subsequent product systems.

Module D does not show allocated impact and is not a form of allocation as there is no allocation of burdens across the system boundary. Module D is provided as optional and supplementary information that can be used to demonstrate the potential loads and benefits associated with any net outflows of secondary material, secondary fuel or recovered energy crossing the system boundary between product systems.

In this document, the rules for allocation are based on the guidance given in ISO 14044:2006, 4.3.4. However, the basic procedures and assumptions used in ISO 14044 have been refined in order to reflect the goal and scope of this document as described in detail below.

7.2.7 Accounting of biogenic carbon uptake and emissions during the life cycle

Bio-based materials originating from renewable resources (such as wood, linseed oil, cork or bio-based polymers) contain biogenic carbon. The mass flows to and from nature and biogenic carbon removal(s) and emissions throughout the product system shall be reported as a flow of biogenic carbon expressed in CO₂ in the LCI. When entering the product system (i.e. a flow to the technosphere from nature), this biogenic carbon flow shall be characterized in the LCIA with $-1 \text{ kg CO}_2\text{e/kg CO}_2$ of biogenic carbon in the calculation of the GWP, since it represents a removal of carbon that is part of the carbon cycle of bio-based materials. When this bio-based material, partly or as a whole, is converted to emissions, for example, by combustion or biodegradation, it shall be accounted for as emitted biogenic CO₂ and other emissions such as biogenic CH₄ in the information module where they occur, depending on the end-of-life scenario. Emissions of biogenic CO₂ shall be characterized with $+1 \text{ kg CO}_2\text{e/kg CO}_2$ of biogenic carbon in the calculation of the GWP. If a bio-based material containing biogenic carbon leaves the studied product system at the system boundary between product systems in information modules C1 to C4 (or any other information module), this export of bio-based material and associated flow of biogenic carbon is reported as an export of biogenic carbon expressed in CO₂ in the LCI and characterized with $+1 \text{ kg CO}_2\text{e/kg CO}_2$ of biogenic carbon in the calculation of the GWP in the respective information module C1 to C4 (or any other information module). Similarly, any import of bio-based material into the product system as secondary fuel or secondary material is reported as an input of biogenic carbon

removal(s) expressed in CO₂ in the LCI and shall be characterized with –1 kg CO₂e/kg CO₂ of biogenic carbon in the calculation of the GWP. For wood, biogenic carbon may be characterized with a –1 kg CO₂e/kg CO₂ biogenic carbon flow when entering the product system only when the wood originates from sustainably managed forests (see also NOTE 2 in 7.2.11).

NOTE 1 The flows of biogenic carbon expressed in CO₂ in bio-based materials that are reused, recycled or combusted as the end-of-life scenario will result in zero net contribution to the GWP when the GWP is considered over the whole life cycle (information modules A1 to C4), except for the part of biogenic carbon that is converted to CH₄ or other emissions over the life cycle.

NOTE 2 This accounting approach is valid for all information modules from A1 to C4.

The amount of biogenic carbon contained within bio-based material leaving the product system shall be declared as technical scenario information in the module where the material is leaving the product system, irrespective of whether the environmental impacts and aspects of this module are declared. For bio-based packaging material, the quantity of biogenic carbon (expressed in kg CO₂) contained within the packaging for the declared unit shall be documented in information module A5 as technical scenario information. For construction products, the quantity of removals of biogenic carbon (expressed in kg CO₂) within the declared unit of the product (excluding packaging) shall be documented at the end-of-life stage in information modules C3/C4 technical scenario information.

NOTE 3 The quantity of biogenic carbon contained within packaging and/or product provided as technical scenario information in information module A5 and/or modules C3/C4 will allow the correct calculation of end-of-life scenarios for the packaging and product where the module is not declared or the scenario is not appropriate for a particular construction works level assessment.

7.2.8 Carbonation

Carbonation is the reaction of atmospheric carbon dioxide with calcium oxide or calcium hydroxide containing products to form calcium carbonate.

NOTE 1 Calcium oxide dissolved in water forms Ca(OH)₂ and then reacts with the dissolved CO₂.

NOTE 2 Products containing calcium oxide or calcium hydroxide include hydrated lime, quick lime, mortars, screeds and all types of concrete.

Environmental impacts considered during the production, use and end-of-life stages shall include carbonation.

NOTE 3 For lime-based products, carbonation is the essential mechanism to gain strength. Carbonation takes place quickly and is complete in the early stage of the service life. The amount of carbon dioxide absorbed will equal the amount of carbon dioxide emitted from the calcium carbonate during lime production.

NOTE 4 In the case of concrete, the amount of carbon dioxide absorbed depends upon the concrete surface exposed to air/ground, the concrete strength, the concrete texture and the environment to which it is exposed. Low strength, open textured and thin section concrete will carbonate fully within a few years of manufacture. This process will start immediately after manufacture and be complete in the use stage. High performance, reinforced and fully compacted concrete will carbonate more slowly. Such concretes will not carbonate fully until they are crushed at or after the end-of-life stage.

The ability to carbonate is an inherent quality of a material related to the content of calcium oxide or calcium hydroxide. Environmental benefits attributed to carbonation in a product shall not be allocated to co-products or secondary materials.

The quantification of carbonation as a part of the GWP shall be based on recognized methods for the calculation of carbonation and the underlying methodology shall be referenced in the project report and results interpreted with respect to uncertainty of calculations.

NOTE 5 Examples of recognized methods for calculation of carbonation can be found in the bibliography of this document.

7.2.9 Accounting of delayed emissions

Several methodological approaches have been proposed to address delayed emissions in the quantification of the GWP, for example approaches based on discounting or approaches based on time-dependent characterization factors within a predefined reference study period. Since there is no common acceptance of these approaches, such calculations are not part of the quantification of the GWP. If a manufacturer wishes to declare quantitative or qualitative information on delayed emissions within the EPD, the information shall be reported under "Additional environmental information not derived from LCA" (see 9.6) and the underlying methodology shall be referenced.

7.2.10 Inventory indicators describing resource use

The declaration of use of renewable and non-renewable primary resources (energy and materials), along with the use of secondary resources (secondary materials, secondary fuels and recovered energy), shall be derived from LCI and specified for all information modules.

To provide transparency, when declaring the use of primary and secondary resources, the individual inventory indicators shall not be combined, aggregated or amalgamated.

The following indicators shall be included.

- a) Renewable primary resources used as an energy carrier (fuel), RPR_E , are (first use) bio-based materials used as an energy source. Hydropower, solar and wind power used in the technosphere are also included in this indicator.
- b) Renewable primary resources with energy content used as material, RPR_M , are (first use) bio-based materials used as materials (e.g. wood, hemp, etc.).
- c) Non-renewable primary resources used as an energy carrier (fuel), $NRPR_E$, are (first use) materials such as peat, oil, gas, coal, uranium used as an energy source.
- d) Non-renewable primary resources with energy content used as material, $NRPR_M$, are (first use) primary resources such as oil, gas and coal, used for products (e.g. plastic-based products).
- e) Secondary materials, SM , are materials recycled from previous use or waste (e.g. scrap metal, broken concrete, broken glass, plastic and wood) that are used as a material input from another product system. These include both renewable and non-renewable resources, with or without energy content, depending on the status of the material when it was originally extracted from the environment.
- f) Renewable secondary fuels, RSF , are renewable materials with energy content that have crossed the system boundary between product systems and are used as fuel input (energy source) in another product system (e.g. biomass residue pellets, chipped waste wood).
- g) Non-renewable secondary fuels, $NRSF$, are non-renewable materials with energy content that have crossed the system boundary between product systems and are used as fuel input (energy source) in another product system (e.g. processed solvents, shredded tyres).
- h) Recovered energy, RE , is energy recovered from disposal of waste in previous systems, such as energy recovery from combustion of landfill gas or energy recovered from other systems using energy sources.

The quantification on the indicators RPR_M and $NRPR_M$ is calculated by multiplication of the mass (kg) of the material input (or its components) with the net calorific value (lower heating value) (MJ/kg) of this input (or its components) for each functional or declared unit. The result for each indicator is a value of MJ/functional or declared unit.

When the total primary energy is given in LCA tools, the indicators RPR_E and $NRPR_E$ may be calculated as the difference between the total primary energy used and the primary resources used as raw material for the product.

Where a product consists of a mix of renewable and non-renewable primary resources, then the NCV and the mass of each individual input material should be considered so that a separate value for renewable and non-renewable resources used as material is provided.

NOTE These indicators are about use or inputs of resources into the product system. Outputs of secondary resources and recovered energy are considered as a separate set of indicators.

Since no burdens are allocated across the system boundary between product systems with respect to secondary resources and recovered energy, they might not be itemized in the inventory for background datasets. Considering the cut-off criteria (see 7.1.8), such missing data should be estimated to calculate these indicators for background data or the lack of inventory shall be described in the project report and EPD. These indicators shall always be provided for the foreground system according to the cut-off criteria.

The abiotic depletion potential for fossil resources (ADP_{fossil}) shall be reported. It includes all fossil resource indicators (e.g. coal, oil, fossil gas) used as energy and material.

7.2.11 Greenhouse gas emissions from land-use change

When significant, the greenhouse gases (GHG) emissions occurring as a result of land-use change shall be included in the quantification of the GWP. They should be assessed in accordance with internationally recognized methods such as the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories.

This contribution to GWP shall be declared separately in the EPD as GWP (land-use change) as additional environmental information, including a short interpretation of the data.

The project report shall include an interpretation of the results reflecting the influence of data availability and the underlying methodology shall be referenced.

NOTE 1 The consideration of GHG emissions arising from land-use change is not restricted to biogenic materials, for example in the context of deforestation or conversion of grassland to energy crops, but can also include other materials and processes, for example related to the conversion of land to quarries, infrastructure, production plants, etc.

Wood from sustainably managed forests may be accounted for as having zero emissions concerning land-use change. This includes wood products responsibly sourced and certified to the Canadian Standards Association (CSA), Forest Stewardship Council (FSC) and Sustainable Forestry initiative (SFI) Standards, as well as all other standards globally endorsed by the Programme for the Endorsement of Forest Certification International (PEFC International) and the FSC.

NOTE 2 The concept of sustainably managed forests is linked but not limited to respective certification schemes. Other evidences such as national reporting under the United Nations Framework Convention on Climate Change (UNFCCC) can be used to identify forests with stable or increasing forest carbon stocks.

7.2.12 Additional inventory indicators describing emissions and removals of carbon

For transparency, the following indicators on the uptake and emissions of CO₂ shall be separately reported, where relevant and available, if included in the quantification of the GWP:

- biogenic CO₂, reporting the removals and emissions associated with biogenic carbon content contained within bio-based products, occurring in each module;
- biogenic CO₂, reporting the removals and emissions associated with biogenic carbon content contained within bio-based packaging, occurring in each module;
- CO₂ from calcination and carbonation, reporting the emissions and uptake of CO₂ from calcination and carbonation occurring in the relevant module;
- biogenic CO₂, reporting the emissions from combustion of waste from renewable sources used in production processes;

— CO₂ emissions from combustion of waste from non-renewable sources used in production processes.

These indicators enhance the transparency on the different contributions to the GWP in each module.

7.2.13 Inventory indicator describing consumption of freshwater

This document uses the consumption (or net use) of freshwater as LCI indicator for declaring water consumption related to a construction product during its life cycle. This indicator shall be calculated in compliance with ISO 14046.

The use of water, which is not consumed (e.g. water used for river transport, used to power hydroelectric turbines or used as coolant and returned to the original source), should not be considered within the indicator.

That water which would have been lost from the original, natural system, for example from evaporation of rainwater or from a water body, should not be considered within the losses from the technical system studied.

Evaporated freshwater is considered consumption unless it is demonstrated otherwise. For each process, the water flows should be identified, in terms of volume extracted, volumes discharged and the source or the destination, for example surface water, ground water, sea water.

Where tap water (water from the public grid) is used, the water treatment and distribution systems should be included as an upstream process, which will have its own resource use and discharges.

Similarly, where water is discharged to the sewer, then the sewer and water treatment system should be included as a downstream process with its own resource use and discharges.

Other water flows, for example, water that evaporates or water that is incorporated into the product, should ideally be itemized in the process inventory so that a full water balance can be made.

For each process, the water consumed is the sum of the water that is lost from a drainage basin. This may be more easily calculated as the sum of water, which evaporates, transpires from biomass as a result of human activity (e.g. irrigation), is incorporated into products or is discharged to a different drainage basin. As previously mentioned, water consumption does not need to account for water that would have been lost from the drainage basin in the natural system before the technical system was implemented.

EXAMPLE 1 Rainwater would normally be expected to drain to surface or ground water. If a factory or building is placed on the site, then water could instead be directed to the sewer and could be discharged, after treatment, to the sea, surface or ground water. Water, which is diverted through the water treatment system from its original drainage basin is consumed. If rainwater is used in the building before discharging it into the sewer, then this will be considered no differently than if the water was discharged directly to the sewer. However, if rainwater is used for cleaning and evaporates, then this water is consumed.

EXAMPLE 2 For an agricultural process, water that evaporates or transpires from the plants as a result of human activity (irrigation) is considered as consumption. Water such as rainwater, which evaporates or goes to the drainage basin in the same way as if it would, were there was no agricultural process, is not consumption. The assumption is that natural vegetation would have the same effect.

EXAMPLE 3 For a quarry, where dewatering takes place, if this water is returned to the same drainage basin it would naturally have drained to, then it is not consumption. If, however, it is used in a process and evaporates, then it is consumption.

7.2.14 Environmental information describing waste categories and output flows

The indicators describing waste categories and other material flows are output flows derived from the LCI.

The following waste categories shall be declared and specified for all information modules included in the EPD:

- hazardous waste disposed, in kg;
- non-hazardous waste disposed, in kg;
- radioactive waste disposed;
 - high-level radioactive waste, conditioned, to final repository, in kg or m³;
 - intermediate- and low-level radioactive waste, conditioned, to final repository, in kg or m³.

NOTE 1 Hazardous waste disposed does not include radioactive waste.

NOTE 2 High-level radioactive waste, e.g., when generated by electricity production, consists mostly of spent fuel from reactors.

NOTE 3 Low- and intermediate-level radioactive wastes, e.g., when generated by electricity production, arise mainly from routine facility maintenance and operations.

The following output flow categories shall be declared and specified for all information modules included in the EPD:

- components for reuse;
- materials for recycling, i.e. secondary material for use in the next product system;
- materials for energy recovery, i.e. secondary fuels for use in the next product system;
- recovered energy exported from the product system.

Table 4 shows how to assign output flows at the construction product's end-of-life to information modules C1-C4 (see also Table 1). Output flows from other information modules shall be assigned to the information modules where they occur.

Table 4 — Assignments of output flows at the construction product's end-of-life

Type of flow	Fate	Material specifications	Unit	Exits the system boundary from			Comments
				C1	C3	C4	
Material flows reached the boundary between product systems (see 7.1.6)	Components for reuse ^a	Type 1	kg				Reused components to be declared in C1. If the component needs processing before reuse, then it will be declared in C3.
		Type n	kg				
	Materials for recycling used in the next product system ^a	Type 1	kg				Output of secondary material to be declared in C3. If the material reaches the system boundary between product systems when collected at the construction site, it is declared in C1.
		Type n	kg				
	Material for energy recovery used as secondary fuels in the next product system ^a	Secondary fuel 1, with NCV	kg				Output of renewable secondary fuels or non-renewable secondary fuels to be declared in C3 (assuming processing in C3 to create secondary fuel). NCV of any net output of secondary fuels to be provided.
		Type n, with NCV	kg				

^a Potential loads and benefits from net outflows may be considered in module D.

^b Shall not be considered in module D.

Table 4 (continued)

Type of flow	Fate	Material specifications	Unit	Exits the system boundary from			Comments
				C1	C3	C4	
Material flows have not reached the system boundary between product systems (see 7.1.6) or material converted to energy within the system boundary	Exported energy from waste with energy recovery ≥ 60 % efficiency ^a	Energy Type 1	MJ				Electricity and/or heat from energy recovery processes to be declared in C3.
		Energy Type n	MJ				(Waste from energy recovery processes within the system boundary are considered below.)
	Incineration of waste with energy recovery <60 % efficiency	Waste disposed 1 ^b	kg				Waste disposed is the input of waste into the incinerator.
		Waste disposed n ^b	kg				
		Energy Type 1 ^a	MJ				Any output of recovered electricity and/or heat from waste incineration to be declared in C4.
		Energy Type n ^a	MJ				(Waste generated by incineration processes within the system boundary, see below.)
	Wastes disposed in landfill and where relevant energy recovered from landfill gas	Waste disposed 1 ^b	kg				Waste entering landfill to be declared in C4 ^b .
		Waste disposed n ^b	kg				
		Energy Type 1 ^a	MJ				Energy recovered from landfill gas to be declared in C4 ^a as exported energy.
		Energy Type n ^a	MJ				

^a Potential loads and benefits from net outflows may be considered in module D.

^b Shall not be considered in module D.

NOTE 4 The indicators in Table 4 are calculated on the net amounts leaving the system boundary if they have crossed the system boundary between product systems, as described in 7.1.7.5.

NOTE 5 The declaration of “components for reuse” and “materials for recycling” fulfils the conditions of 7.1.7.5.

NOTE 6 The indicator “material for energy recovery” does not include materials for waste incineration. Waste incineration is a method of waste processing and is assigned within the system boundary. Waste incineration plants have a lower energy efficiency rate than power stations using secondary fuels. Materials for energy recovery are based on thermal energy efficiency rate of the power station not less than 60 %.

NOTE 7 Recovered energy relates to energy exported from waste incineration and landfill.

7.3 Impact assessment indicators describing main environmental impacts derived from LCA

An EPD developed using this document shall, as a minimum, report the set of impact categories stated in Table 5.

In order to evaluate and use EPDs at a construction works level in a particular market or geographical location, the life cycle impacts (LCIA) indicators that are reported in the EPD shall be based on characterization factors recommended by a programme operator and suitable for the market(s) and geographical location(s) where the EPD is intended to be used. For European-market EPDs developed with this document as the core PCR, the characterization method included in the latest edition of EN 15804 shall be used.

The EPD results shall be developed using one of the relevant, commonly used characterization methods. In the absence of specificity or preference regarding a characterization method, the default references provided in Table 5 shall be used.

Values reported for GWP are based on accumulated radiative forcing over 100 years.

Impact category results may be provided using more than one characterization method including the default references. Results shall be reported separately for each method that is used.

Impact category results may be reported that are in addition to those minimum results mandated in Table 5 (see also 8.2). Scientifically developed characterization methods should be used for these additional indicators. In order to evaluate and use EPDs at a construction works level, the impact categories relevant for that particular market shall be used.

A sub-category PCR may specify additional impact categories to be reported for a given product group based on market, regulatory and other relevant and applicable factors.

ADP_{element} is optional (see 8.2) as there is great uncertainty related to characterization factors. ADP_{element} includes all non-renewable material resources (e.g. minerals, uranium, sulphur) used as energy and material resource.

NOTE 1 The comparability of EPDs with different impact categories reported is limited (see 5.5).

NOTE 2 Characterization factors of the Default International Characterization Method are publicly available on <http://cml.leiden.edu/software/data-cmlia.htm>

NOTE 3 It is considered good practice to identify any LCI data that has no calculated environmental impact within the project report. This can help to identify the need to generate complementary and consistent characterization factors for relevant LCI flows.

Table 5 — Mandatory impact categories and default characterization methods

Impact category and abbreviation	Default international characterization method	Default North American market characterization method	Default European market characterization method as provided in
Global warming potential (GWP 100)	IPCC[30]	TRACI	EN 15804
Ozone depletion potential (ODP)	WMO[34]	TRACI	EN 15804
Eutrophication potential (EP)	Heijungs et al.[31]	TRACI	EN 15804
Acidification potential (AP)	Hauschild and Wenzel[32]	TRACI	EN 15804
Photochemical oxidant creation potential (POCP)	Goedkoop et al.[41]	TRACI	EN 15804

8 Additional environmental information

8.1 General

An LCA should consider all significant aspects related to the product during its life cycle. Significant environmental aspects that are not covered by the LCA shall be reported in the EPD, where relevant, as additional environmental information. Such information may be either qualitative or quantitative information related to the product's life cycle (see ISO 14025:2006, 7.2.3) and shall be verifiable and comply with the requirements stated in ISO 14025:2006, 7.2.4.

Significant quantitative aspects not currently covered by LCA include measures still under development that may at some time in the future be included in pre-set LCIA indicators as outlined in 8.2. Other significant aspects, whether qualitative or quantitative, are outlined in 8.3. In markets where the emission of dangerous substances are regulated, this information is a mandatory part of additional environmental information as outlined in 8.4.

8.2 Additional LCA-related environmental information not included in the pre-set LCIA indicators

An EPD based on the core rules according to this document may also address additional environmental information that is not part of the pre-set LCIA indicators. This may include impact categories that

are still under development or have high levels of uncertainty that preclude international acceptance pending further development. Such potential LCIA categories shall follow the requirements for characterization models given in ISO 14044. The following are examples of such potential impact categories:

- abiotic depletion potential for non-fossil mineral resources (ADP_{elements});
- land-use-related impacts, for example on biodiversity and/or soil fertility;
- toxicological aspects.

If such LCIA-type results are included in an EPD, the LCA report and the EPD shall include a written discussion of the results, including the limitations related to the LCIA-type methods used. This requirement also applies to the development of sub-category PCR.

NOTE 1 The same release scenario of emissions from construction products used here can also be linked to the LCA scenario development in the relevant modules.

8.3 Additional environmental information not derived from or related to LCA

The environmental information included here may be qualitative with a clarifying text if quantitative methods are not available. Examples of environmental aspects that may be included in the EPD are:

- geographical aspects relating to the declared environmental impacts at any stages of the life cycle;
- environmentally responsible sourcing;
- best environmental practice;
- energy use for operating pollution control systems;
- toxicity risks or hazards related to human health and/or the environment.

NOTE 1 Possible methods for assessing and reporting toxicity risks or hazards related to human health and/or the environment are provided in [Annex C](#).

Additional environmental issues are not limited to the above list or an indicator result. ISO 14025:2006, 7.2.3 provides a more detailed list of examples for additional environmental information.

This additional information shall be verifiable and any document supporting the claims shall be made available for the verifier.

EXAMPLE 1 The interpretation of the relation between the potential environmental impact(s) and the location of the relevant processes of the product system.

EXAMPLE 2 Forestry certification systems (PEFC, SFI or FSC) and responsible mining or quarrying systems (for information relating to environmentally responsible sourcing).

EXAMPLE 3 Adherence of the manufacturing organization to ISO 14001, Type I Environmental labels or other environmental labels (for best environmental practice).

8.4 Mandatory additional environmental information

8.4.1 Content of regulated hazardous substances

In any EPD, the declaration of material content of the finished product shall list, as a minimum, the substances contained in the construction product that are identified as hazardous according to normative requirements in standards or regulations applicable in the market for which the EPD is valid (see [Annex D](#)).

Substances with certain hazardous properties can be of concern for human health and/or the environment. Such substances are identified and subsequently regulated to make sure that the risks associated with these substances are properly controlled.

8.4.2 Release of dangerous substances from construction products

In markets where the release of dangerous substances is regulated, such information is a mandatory part of additional information required about health and environmental aspects. The methodology and reporting format shall be declared according to standards applicable in the market for which the EPD is valid.

Different risk-based methods are available for assessing safety and toxicological performance of construction products, with the intention of reducing release of dangerous substances and even replacing them with less harmful alternatives by applying limit values. Falling below such limit values means that a product is safe to use in the intended use situation. This information may also be provided as labels relevant, and accepted, in specific markets. See [Annex C](#) for basic examples of such risk-based approaches applicable for EPDs that include, but are not limited to

- emission into indoor air,
- emitted gamma radiation or ionizing radiation, and
- chemicals released to air or leached to water and soil.

When developing sub-category PCR, requirements shall be given on the measurement of releases of dangerous substances from construction products, where relevant for the construction product and its application, using harmonized test methods when possible.

9 Content of an EPD

9.1 General

The EPD shall include the following main parts as a minimum for B2B communication:

- declaration of general information (see [9.2](#));
- declaration of the methodological framework (see [9.3](#));
- declaration of technical information and scenarios (see [9.4](#));
- declaration of environmental indicators derived from LCA (see [9.5](#));
- declaration of additional environmental information (see [9.6](#));
- references (see [9.6.1](#)).

For B2C communication, the development and content of EPDs shall follow ISO 14025 and any relevant sub-category PCR that are in accordance with this document.

The detailed content of an EPD is specified further in this clause.

9.2 Declaration of general information

Construction product EPDs according to this document should follow the format defined in the following subclauses and shall include the indicators as identified in this document.

The manufacturer(s) of the product that is the subject of the EPD are responsible for the provision of all necessary information.

The following shall be declared in the EPD:

- a) the name and address of the EPD holder(s) (manufacturer, association, service provider, etc.);
- b) the description of the construction product's intended application and use (as identified when determining the product RSL), where relevant;
- c) construction product identification by name (including any product code) and a simple visual representation, if relevant, of the construction product or work to which the data relates;
- d) a description of the main product components or material that make up the construction product or work, given in percentage;

NOTE 1 This description is intended to enable the user of the EPD to understand the composition of the product in delivery condition and support a safe and effective installation, use and disposal of the product. With appropriate justification, this requirement does not apply to confidential or proprietary information relating to materials and substances that apply due to a competitive business environment or covered by intellectual property rights or similar legal restrictions. It also might not be appropriate for information concerning intangible products.

- f) name of the EPD programme used and the programme operator's name, address, logo and website;
- g) a reference to this document and, if used, the sub-category PCR version number, publisher and year published;
- h) the date the declaration was issued;
- i) the end of the period of validity (e.g. 5 years);
- j) a statement that EPDs are comparable only if they comply with this document, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works;
- l) any other environmental certification programme applied to the product and a statement on where an interested party can find details of the certification programme, if relevant;
- m) other environmental activities of the organization, such as participation in recycling or recovery programmes, provided that the details of these programmes are readily available to the purchaser or user and contact information is provided, if relevant;
- o) information on where explanatory material may be obtained.

NOTE 2 Guidance on the safe and correct installation, use and disposal of the product is supplied by the manufacturer.

In addition to the above mentioned general information, the information given in [Figure 3](#), excluding the footnotes, shall be completed and presented in the EPD.

ISO 21930:<insert year of publication>— serves as the core PCR <Sub-category PCR, if relevant> <PCR review^{a,b,c} was conducted by:> <Sub-category PCR review^{d,e} was conducted by:> <name and organization of the panel chair, and their contact information^f>	
Independent verification of the declaration and data, according to ISO 21930: <insert year of publication> and ISO 14025: <insert year of publication> ☐ internal ☐ external	
Third party verifier^g: <Name of the third party verifier>	
^a ^b ^c ^d ^e ^f ^g	If relevant. Any overarching PCR shall be in accordance with this document, particularly 6.1 and 6.2. Any overarching PCR review shall be in accordance with 6.1. Sub-category PCR shall be in accordance with 6.1, 6.2 and 6.3. Sub-category PCR review shall be in accordance with 6.3. The specific details of the review, including those to be named in the EPD, are the responsibility of the Programme Operator. Where appropriate — optional for B2B communication; mandatory for B2C communication (see ISO 14025:2006, 9.4).

Figure 3 — Demonstration of verification

9.3 Declaration of the methodological framework

The EPD shall specify the following:

- functional unit or declared unit depending on type of EPD;
- the type of EPD with respect to life cycle stages covered as given in [5.2.2](#);
- life cycle stages covered and not covered;
- for declarations representing an average of similar products from the same or different manufacturer, a description of what the average represents as stated in [5.3](#);
- the reference conditions for achieving the declared technical and functional performance and the RSL, where relevant as described in [7.1.4](#);
- allocation procedure;
- cut-off procedure;
- declaration of technical information and scenarios.

9.4 Declaration of technical information and scenarios

9.4.1 General

The information modules A1 to A3 are mandatory for the three types of EPDs (see 5.2.2). All other information modules are optional. If any of the information modules beyond the factory gate are included, technical information describing the declared information modules shall be provided in the EPD (see 7.1.7.3 to 7.1.7.5).

If additional technical information is provided in the EPD for any information modules beyond the factory gate, the information to specify the product's scenarios or to support development of the scenarios describing the product's installation or use at the level of the construction works assessment shall be provided as described in 7.1.7.3 to 7.1.7.5. Any scenarios for module D shall be reported in the EPD as described in 7.1.7.6.

9.4.2 All stages — Transport

The following information should, when relevant and depending on type of EPD (see 5.2.2), be provided to specify any transport after the gate:

- type of transport;
- type of vehicle;
- distance;
- type and amount of energy carrier.

9.4.3 Construction stage — A5, installation

The following information should, when relevant and depending on type of EPD (see 5.2.2), be provided to specify the installation process A5:

- description of the installation process or reference to where a description can be found;
- ancillary materials for installation specified by type and amount;
- product loss per functional unit or declared unit;
- quantitative description of energy use during installation, energy carrier type, for example electricity, and amount, if applicable and relevant;
- quantitative description of water type and use during installation, for example source, amount used and fate (amount evaporated, amount disposed to sewer, etc.);
- direct emissions to ambient air, soil and water;
- output from the installation process including any waste treatment included in the scenario within the system boundary specified by recovery process.

9.4.4 Use stage — B1 to B5

The following information should, when relevant and depending on type of EPD (see 5.2.2), be provided to specify the scenarios for information modules B1 to B5 or to support the development of scenarios for the modules at the construction works level:

- direct emissions to ambient air, soil and water;
- description of the maintenance, repair, replacement or refurbishment process or reference to where a description can be found;

- number of maintenance, repair, replacement or refurbishment cycles per reference service life or required service life for the construction works;
- ancillary materials specified by type (e.g. cleaning agent, specify materials) and amount;
- quantitative description of energy type and use during maintenance, repair, replacement or refurbishment, energy carrier type, for example electricity, and amount, if applicable and relevant;
- quantitative description of water type and use during maintenance, repair, replacement or refurbishment, for example source, amount used and fate (amount evaporated, amount disposed to sewer, etc.);
- output from the maintenance, repair, replacement or refurbishment process including any waste treatment included in the scenario within the system boundary specified by recovery process.

9.4.5 Use stage — B6 to B7

The following information should, when relevant and depending on type of EPD (see [5.2.2](#)), be provided to specify the scenarios for information modules B6 to B7:

- type and amount of energy carrier used (e.g. electricity, natural gas, district heating);
- power output of equipment;
- characteristic performance (e.g. energy efficiency, emissions, variation of performance with capacity utilisation);
- further assumptions for scenario development (e.g. frequency and time period of use, number of occupants);
- quantitative description of water type and use, for example source, amount used and fate (amount evaporated, amount disposed to sewer, etc.).

9.4.6 End-of-life stage — C1 to C4

The following information should, when relevant and depending on type of EPD (see [5.2.2](#)), be provided to specify the scenarios for information modules C1 to C4:

- assumptions for scenario development, for example description of method of deconstruction, recycling, energy recovery and final disposal;
- collection, recycling and/or recovery rates and conversion efficiencies, as applicable.

9.4.7 Module D

When any optional supplementary information regarding potential loads or benefits beyond the system boundary is provided under module D, the following information should be provided to specify the scenarios:

- assumptions for scenario development, for example further processing technologies and selected substitution processes;
- process and conversion efficiencies, as applicable, and assumptions on correction factors, as applicable.

9.5 Declaration of environmental indicators derived from LCA

9.5.1 LCA results from LCIA

Environmental impacts and resource use are expressed with the impact category parameters of LCIA using characterization factors. The following predetermined core indicators are required and shall, as a minimum, be specified for all information modules included in the EPD:

- global warming potential (GWP);
- depletion potential of the stratospheric ozone layer (ODP);
- eutrophication potential (EP);
- acidification potential of soil and water sources (AP);
- formation potential of tropospheric ozone (POCP).

Optional LCIA indicators may be included in the EPD. Examples are:

- abiotic depletion potential for non-fossil mineral resources (ADP_{elements});
- land-use-related impacts, for example on biodiversity and/or soil fertility;
- toxicological aspects.

Scientifically developed characterization methods should be used for these additional indicators and referenced in the EPD.

NOTE [Table E.1](#) provides one example of how declaration of both mandatory and optional LCIA results can be formatted and presented.

9.5.2 LCA results from LCI

The following parameters derived from LCI shall, as a minimum, be included and specified for all information modules:

- use of primary resources (several indicators);
- use of secondary resources (several indicators);
- abiotic depletion potential for fossil resources (ADP_{fossil});
- consumption of freshwater resources;
- waste and output flows (several indicators).

Use of primary and secondary resources and recovered energy shall be provided for the impact category indicators listed in [7.2.11](#). The inventory indicators describing primary and secondary resource use and recovered energy shall not be combined, aggregated or amalgamated with one another.

NOTE 1 [Table E.2](#) and [Table E.3](#) provide examples of how data on use of primary and secondary resources can be formatted and presented.

The following indicators shall be included for transparency and specified for all information modules, where the respective flows occur:

- removals and emissions associated with biogenic carbon content of the bio-based product;
- emissions from calcination and removals from carbonation;
- removals and emissions associated with biogenic carbon content of the bio-based packaging;

- emissions from combustion of waste from renewable sources used in production processes;
- emissions from combustion of waste from non-renewable sources used in production processes.

NOTE 2 [Table E.4](#) provides an example of how data on ADP_{fossil} , consumption of freshwater, and emissions and removals of CO_2 can be formatted and presented.

Waste should be declared in the format provided in [Table E.5](#).

The output flows that have crossed the system boundary between product systems shall be declared as stated in [Table 4](#) and specified for all information modules.

9.6 Declaration of additional environmental information

In markets where the emission of dangerous substances is regulated, this information is a mandatory part of additional environmental information.

Regulated substances of very high concern shall be declared, if relevant. Reporting of substances of very high concern shall include

- a description of the regulated substance,
- the chemical abstracts service (CAS) number, and
- a reference to standard(s) or regulation(s) applicable for the relevant market.

NOTE [Table D.1](#) provides one example of how data on regulated substances of very high concern can be formatted and presented.

If no such substances are identified, this should be stated in the EPD.

The declaration of emission of dangerous substances, if relevant, is mandatory if this is regulated in markets for which the EPD is valid.

Optional environmental information not derived from LCA are to be reported here together with a short interpretation and statement of possible limitations of the results (see [8.3](#)).

- Organization's adherence to any environmental management system, with a statement on where an interested party can find details of the system, if relevant.
- Instructions and limits for correct use, if relevant.

9.6.1 References

A list of references used shall be provided.

10 Project report

10.1 General

The manufacturer and/or programme operator shall provide the EPD project documentation and the EPD to the verifier. The project documentation contains basic data and supporting information necessary for the EPD project as specified in [Clause 7](#).

The project report is the systematic and comprehensive summary of the project documentation supporting the verification of an EPD. The project report shall record that the LCA-based information and the additional information as declared in the EPD meet the requirements of this document. The project report shall be made available to the verifier with the requirements on confidentiality stated in ISO 14025.

The project report is not part of the public communication.

The project report shall contain any data and information of importance to the results published in the EPD and as required by this document. The report shall demonstrate in a transparent way that the data and information declared in the EPD result from the LCA study and how the RSL has been established.

NOTE In this context, project means the LCA study on the primary product.

10.2 LCA-related elements of the project report

The results, data, methods, assumptions, limitations and conclusions of the LCA shall be completely and accurately reported without bias. They shall be reported in a transparent manner and presented in sufficient detail to allow independent verification and to permit an understanding of the complexities and trade-offs inherent in the LCA. The report should also allow the results and interpretation to be used in support of the data and additional information made available in the respective EPD.

The project report shall state the following:

a) General aspects:

- commissioner of the LCA study, internal or external practitioner of the LCA study;
- date of report;
- statement that the study has been conducted according to the requirements of this document.

b) Goal of the study:

- reasons for carrying out the study and its intended application and audience, i.e. providing information and data for an EPD for B2B and/or B2C communication.

c) Scope of the study:

- declared/functional unit, including:
 - definition, including relevant technical specification(s);
 - calculation rule for averaging data, for example when the declared/functional unit is defined for:
 - a group of similar products produced by different suppliers, or
 - the same product produced at different production sites.
- system boundary according to the modular approach as outlined in [Figure 2](#) including:
 - omissions of life cycle stages, processes or data needs;
 - quantification of energy and material inputs and outputs, taking into account how plant-level data are allocated to the declared products;
 - assumptions about electricity production and other relevant background data.
- cut-off criteria for initial inclusion of inputs and outputs, including:
 - description of the application of cut-off criteria and assumptions;
 - list of excluded processes.

d) LCI:

- qualitative/quantitative description of unit processes necessary to model the life cycle stages of the declared unit, taking into account the provisions of ISO 14025 regarding data confidentiality,
- sources of generic or proxy data or literature used to conduct the LCA;

- validation of data and discussion considering the dimensions of data quality set out in ISO 14044:2006, 4.2.3.6 including:
 - data quality assessment,
 - treatment of missing data;
- allocation principles and procedures including:
 - documentation and justification of allocation procedures,
 - uniform application of allocation procedures.
- e) LCIA:
 - the LCIA procedures, calculations and results of the study;
 - the relationship of the LCIA results to the LCI results;
 - reference to all characterization models, characterization factors and methods used, as defined in this document;
 - a statement that the LCIA results are relative expressions and do not predict impacts on category endpoints, the exceedance of thresholds, safety margins or risks.
- f) Life cycle interpretation:
 - the results;
 - assumptions and limitations associated with the interpretation of results as declared in the EPD, both methodology and data related;
 - data quality assessment;
 - full transparency in terms of value-choices, rationales and expert judgements.

10.3 Rules for data confidentiality

Product-specific data are very often confidential because of

- competitive business issues,
- intellectual property rights, or
- similar legal restrictions.

It is not a requirement to make such confidential data publicly available.

Confidential business data provided for the independent verification process shall be kept confidential upon request of the body supplying the data and with the approval of the programme operator, in accordance with programme operational rules; see ISO 14025:2006, 8.3.

10.4 Documentation on additional environmental information

The project report shall include any documentation on additional environmental information declared in the EPD as required in this document. Such documentation on additional environmental information may include, for example as copies or references:

- laboratory results or measurements for the content declaration;
- laboratory results or measurement of functional or technical performance;