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BSI Standards Publication

Round and sawn timber — Environmental Product Declarations — Product category rules for wood and wood-based products for use in construction

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National foreword

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Rund- und Schnittholz - Umweltproduktdeklarationen - Produktkategorieregeln für Holz und Holzwerkstoffe im Bauwesen

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Foreword

This document (EN 16485:2014) has been prepared by Technical Committee CEN/TC 175 “Round and sawn timber”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2014 and conflicting national standards shall be withdrawn at the latest by September 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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Introduction

European Standard EN 15804 provides core product category rules for all construction products and services. It provides a structure to ensure that all Environmental Product Declarations (EPD) of construction products, construction services and construction processes are derived, verified and presented in a harmonized way.

This European Standard provides rules for Environmental Product Declarations (EPD) specifically for wood and wood-based products. It complements the core product category rules for all construction products and services as established in EN 15804.

An EPD communicates verifiable, accurate, non-misleading environmental information for products and their applications, thereby supporting scientifically based, fair choices and stimulating the potential for market-driven continuous environmental improvement.

The standardization process has taken place in accordance with EN ISO 14025. All common issues are covered horizontally for all product types in order to minimise vertical (branch specific) deviations. All common issues are covered horizontally for all wood and wood-based products in order to minimise intra-sectoral deviations.

EPD information is expressed in information modules as defined in EN 15804, which allow easy organization and expression of data packages throughout the life cycle of wood and wood-based products. The approach requires that the underlying data should be consistent, reproducible and comparable.

In line with EN 15804, the EPD is expressed in a form that allows aggregation (addition) to provide complete information for buildings. This standard does not deal with aggregation at the building level nor does this standard describe the rules for applying EPD in a building assessment.

The standard deals with a limited number of quantifiable parameters as predefined in EN 15804. Future revisions of EN 15804 may lead to the incorporation of additional predetermined parameters.

This European Standard provides the means for developing a Type III environmental declaration of wood and wood-based construction products in the context of the suite of standards that are intended to assess the sustainability of construction works.

This suite of standards includes:

— EN 15643-1, *Sustainability of construction works — Sustainability assessment of buildings — Part 1: General framework*

— EN 15643-2, *Sustainability of construction works — Assessment of buildings — Part 2: Framework for the assessment of environmental performance*

— EN 15978, *Sustainability of construction works — Assessment of environmental performance of buildings — Calculation method*

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

— CEN/TR 15941, *Sustainability of construction works — Environmental product declarations — Methodology for selection and use of generic data*

— EN 15942, *Sustainability of construction works — Environmental product declarations — Communication format business to business*

1 Scope

This European Standard provides general Product Category Rules (PCR) for Type III environmental declarations for wood and wood-based products for use in construction and related construction and in-service processes.

This European Standard complements the core rules for the product category of construction products as defined in EN 15804 and is intended to be used in conjunction with EN 15804.

NOTE The assessment of social and economic performances at product level is not covered by this standard.

The core PCR:

— define the parameters to be declared and the way in which they are collated and reported;

— describe which stages of a product's life cycle are considered in the EPD and which processes are to be included in the life cycle stages;

— define rules for the development of scenarios;

— include the rules for calculating the Life Cycle Inventory and the Life Cycle Impact Assessment underlying the EPD, including the specification of the data quality to be applied;

— include the rules for reporting predetermined, environmental and health information, that is not covered by LCA for a product, construction process and construction service where necessary;

— define the conditions under which construction products can be compared based on the information provided by EPD.

For the EPD of construction services, the same rules and requirements apply as for the EPD of construction products.

Additionally to the common parts of EN 15804, this European Standard for wood and wood-based products:

— defines the system boundaries;

— defines the rules for modelling and assessment of material-specific characteristics such as carbon storage and energy content of wood;

— defines allocation procedures for multi-output processes along the wood chain;

— defines allocation procedures for reuse, recycling and energy recovery;

— includes the rules for calculating the Life Cycle Inventory and the Life Cycle Impact Assessment underlying the EPD, including the assessment of carbon and energy content of wood;

— provides guidance/specific rules for the determination of the Reference Service Life (RSL).

This European Standard is intended to be used for cradle to gate or cradle to grave assessment, provided the intention is properly stated in the system boundary description.

2 Normative references

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

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

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

EN 15804:2012, *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 EN 15084:2012 and the following apply.

3.1
co-product
any of two or more marketable materials, products or fuels from the same unit process, but which is not the object of the assessment

Note 1 to entry: Co-product, by-product and product have the same status and are used for identification of several distinguished flows of products from the same unit process. From co-product, by-product and product, waste is the only output to be distinguished as a non-product.

[SOURCE: EN 15804:2012, 3.7]

Note 2 to entry: When further used as a material or fuel, according to COM (2007)59, (Communication from the Commission to the Council and the European Parliament on the Interpretative Communication on waste and by-products) Annex I, sawdust, wood chips and off-cuts from untreated wood as generated at saw mills or at secondary operation such as the manufacturing of furniture or pallets and packaging and customarily referred to as by-products are, for the purpose of this document, considered co-products. Materials of this type fall outside the definition of waste. However, where material of this kind requires a full recycling or recovery operation, or contains contaminants that need to be removed before it can be further used or processed, this would indicate that the material is a waste until the recycling or recovery operation is completed.

3.2
biogenic carbon
carbon derived from/contained in biomass

3.3
biomass
material of biological origin excluding material embedded in geological formations and material transformed to fossilised material

3.4
biogenic carbon neutrality
balance of biogenic carbon uptake during growth of biomass and release during natural decay or incineration

3.5
carbon storage
biogenic carbon stored over a specific period of time

3.6
direct 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 (3.4.1) or wastes (ISO 14050:2009, 3.12) in the product system being assessed

3.7
forest carbon pools
compartments storing biogenic carbon in the forest: above-ground biomass, below-ground biomass, litter, dead wood and soil organic carbon

[SOURCE: IPCC 2006, Table 1.1]

3.8
fossil carbon
carbon which is contained in fossilised material

Note 1 to entry: Examples of fossilised material are coal, oil and natural gas.

4 Abbreviations

EPD	Environmental Product Declaration
PCR	Product Category Rules
LCA	Life Cycle Assessment
LCI	Life Cycle Inventory analysis
LCIA	Life Cycle Impact Assessment
RSL	Reference Service Life
ESL	Estimated Service Life
EPBD	Energy Performance of Buildings Directive
GWP	Global Warming Potential
GHG	Greenhouse Gas
CHP	Combined Heat and Power

5 General aspects

5.1 Objective of this general PCR for wood and wood-based construction products

An EPD according to this standard provides quantified environmental information for wood and wood-based construction product or related service on a harmonized and scientific basis. It also provides information on health related emissions to indoor air, soil and water during the use stage of the building. The purpose of an EPD in the construction sector is to provide the basis for assessing buildings and other construction works and identifying those which cause less stress to the environment.

Thus the objective of this general PCR for wood and wood-based products is to ensure:

— the provision of verifiable and consistent data for an EPD, based on LCA;

— the provision of verifiable and consistent product related technical data or scenarios for the assessment of the environmental performance of buildings;

— the provision of verifiable and consistent product related technical data or scenarios potentially related to the health of users for the assessment of the performance of buildings;

— that comparisons between construction products are carried out in the context of their application in the building;

— the communication of the environmental information of construction products from business to business;

— the basis, subject to additional requirements, for the communication of the environmental information of construction products to consumers.

Declarations based on this standard are not comparative assertions.

NOTE See definition 3.4 of EN 15804:2012 and EN ISO 14044:2006, 5.1 for more information concerning LCA used for comparative assertion.

5.2 Types of EPD with respect to life cycle stages covered

As in EN 15804.

5.3 Comparability of EPD for construction products

As in EN 15804.

5.4 Additional information

As in EN 15804.

5.5 Ownership, responsibility and liability for the EPD

As in EN 15804.

5.6 Communication formats

As in EN 15804.

6 Product Category Rules for LCA

6.1 Product category

The product category referred to in this standard includes all wood and wood-based construction products as well as related construction services for buildings and other construction works.

6.2 Life cycle stages and their information modules to be included

6.2.1 General

As in EN 15804.

6.2.2 A1-A3, Product stage, information modules

As in EN 15804.

6.2.3 A4-A5, Construction process stage, information modules

As in EN 15804.

6.2.4 B1-B5, Use stage, information modules related to the building fabric

As in EN 15804.

6.2.5 B6-B7, use stage, information modules related to the operation of the building

As in EN 15804.

6.2.6 C1-C4 End-of-life stage, information modules

As in EN 15804.

6.2.7 D, Benefits and loads beyond the system boundary, information module

As in EN 15804.

6.3 Calculation rules for the LCA

6.3.1 Functional unit

As in EN 15804 with the following addition:

When communicating the functional unit of an EPD, the apparent density and moisture content of wood and wood-based products shall be provided as complementary information.

Values for apparent density and moisture content can be taken from product or application standards and should reflect the respective values underlying the LCA calculations.

6.3.2 Declared unit

As in EN 15804 with the following addition:

The declared unit is used instead of the functional unit when the precise function of the product or scenarios at the building level is not stated or is unknown. The declared unit shall be applied when an EPD covers one or more life cycle stages as information modules, i.e. in the case of a "cradle to gate" EPD and "cradle to gate with options" EPD and when the EPD is not based on a full “cradle to grave” LCA. The declared unit provides a reference by means of which the material flows of the information module of a construction product are normalised (in a mathematical sense) to produce data, expressed on a common basis. It provides the reference for combining material flows attributed to the construction product and for combining environmental impacts for the selected stages of the construction product’s incomplete life cycle (see 7.5). The declared unit shall relate to the typical applications of products.

The declared unit in the EPD shall be one of the unit types listed below. 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:

— an item, an assemblage of items, e.g. 1 wood window;

— Volume (m^3), e.g. 1 m^3 of sawn timber;

— Mass (kg), e.g. wood chips, recovered wood;

— Length (m), e.g. 1 m of wood moulding;

— Area (m^2), e.g. 1m^2 of wall elements; 1 m^2 of wood flooring; 1 m^2 of wood-based panel.

If the declared unit is not expressed in mass, then a conversion factor, e.g. to 1 kg of material shall be provided.

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

For the development of, e.g. transport and disposal scenarios, the apparent density and moisture content shall be part of the declared unit provided.

NOTE 1 Reasons for declaring units other than those listed include the need to use units normally used for design, planning, procurement and sale.

NOTE 2 CEN Technical Committees for product standards are expected to harmonize the declared unit to be used for their product families.

6.3.3 Reference service life (RSL) (valid for cradle to gate with options and cradle to grave EPDs)

As in EN 15804.

6.3.4 System boundaries

6.3.4.1 General

As in EN 15804.

6.3.4.2 Product stage

As in EN 15804 with the following addition:

The product stage is an information module required to be included in the EPD. As illustrated in Figure 1 of EN 15804:2012 it includes the information modules A1 to A3. The system boundary with nature is set to include those technical processes that provide the material and energy inputs into the system and the following manufacturing, and transport processes up to the factory gate as well as the processing of any waste arising from those processes.

NOTE 1 In accordance with European policies forests are understood as a natural system with multiple functions, the production function of timber being one of them. The existence of forests as natural systems is protected by European and national legislation. Therefore, natural growth and decay processes including natural disturbances etc. are not attributable to the production function of forests and are therefore - and as common practice - not considered in LCA.

NOTE 2 Harvesting operations lead to temporal decreases in forest carbon pools in the respective stand. Impacts on forest carbon pools resulting from the sustainable or unsustainable management of forests, however, cannot be defined or assessed on stand level but requires the consideration of carbon pool changes on landscape level, i.e. the level based on which management decisions are made. Resulting from the fundamental principle of sustainable forest management to preserve the production function of forest, total forest carbon pools can be considered stable (or increasing) under sustainable forest management. This is due to the fact that temporal decreases of forest carbon pools resulting from harvesting on one site are compensated by increases of carbon pools on the other sites, forming together the forest area under sustainable forest management.

NOTE 3 It is acknowledged that excessive extraction of slash, litter or roots for the purpose of bioenergy generation can lead to decreases in forest carbon pools. These activities, however, are not causally linked to the extraction of timber for the material use of wood. Effects on forest carbon pools related to the extraction of slash, litter or roots are not attributable to the material use of wood and are therefore not considered in this document.

In order to reflect the biogenic nature of wood, its renewability and its potential carbon neutrality, the system boundary between nature and the product system under study is defined as follows:

— Wood entering the product system from nature accounts for the energy content and the biogenic carbon content as material inherent properties.

— All technical processes related to forestry operations intended to produce timber, (e.g. stand establishment, tending, thinning(s), harvesting, establishment and maintenance of forest roads) are considered within the system boundary and are subject to co-product allocations as outlined in 6.4.3.2.

— Potential implications due to the unknown origin of wood or unsustainably produced timber are considered.

— Human induced impacts on forest carbon pools resulting deforestation are included.

NOTE 4 As the degradation of forest carbon pools resulting from unsustainable management of forests cannot be attributed to a specific log but is a process on landscape level, the effect of forest degradation is taken into account by not assuming carbon neutrality. In the case of land-use changes from forests to other land uses (i.e. deforestation), the loss of carbon in the forest carbon pools are taken into account in addition (see below).

Consideration of the biogenic carbon neutrality of wood is valid for wood from countries that have decided to account for Art. 3.4 of the Kyoto Protocol or for wood originating from forests which are operating under established certification schemes for sustainable forest management.

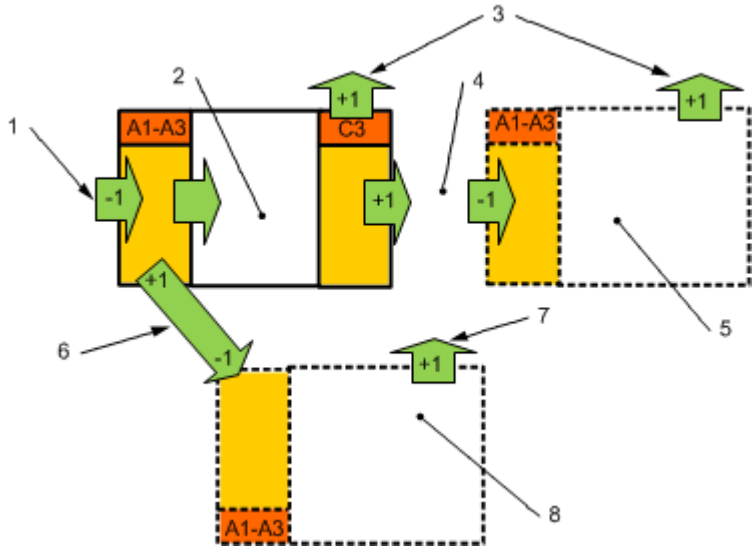
NOTE 5 Currently, all major European producing countries of timber report increasing forest carbon pools under Art. 3.4 of the Kyoto Protocol.

NOTE 6 Chain of custody certification demonstrates that wood meets the requirement to originate from certified forests.

In order to systematically quantify as part of the GWP, the input and output of stored carbon as a material inherent property in line with 6.4.3.2 of EN 15804:2012 in the framework of the modularity of EN 15804, the oven-dry mass of wood entering or leaving a product system is multiplied by the characterization factors as detailed in the Figures 1 and 2.

NOTE 7 The same principle applies for the consideration of inputs and outputs biogenic carbon flows as material inherent properties of wood for module D.

Under the consideration of carbon neutrality of wood as defined above, the factors to be applied for the characterization of biogenic carbon fluxes when calculating the global warming potential (GWP) are detailed in Figure 1:



Key

1	transfer of biogenic carbon from the forest to the product system	5	subsequent product system, receiving recycled wood
2	product system under study	6	co-product
3	emission into atmosphere	7	emission into atmosphere
4	recycled wood	8	parallel product system, receiving co-products as input

NOTE For all product systems over the wood chain:

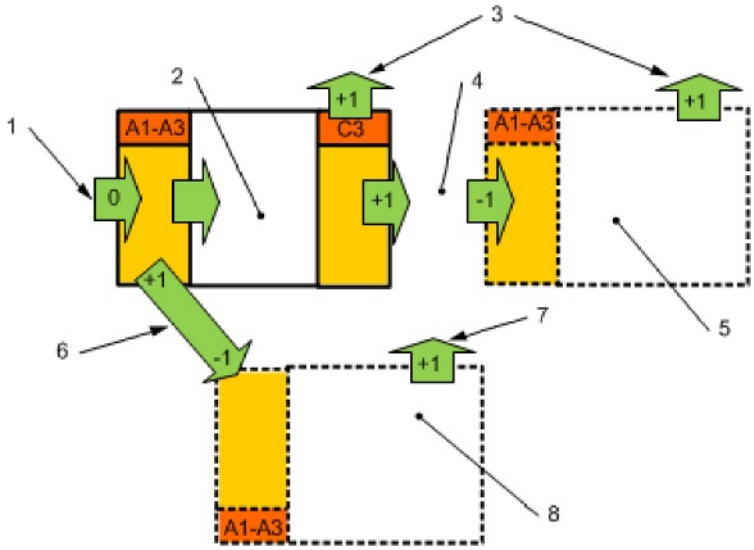
— Biogenic carbon balance *over life cycle* = 0;

— Contribution of biogenic CO_2 to GWP over life cycle =0.

Figure 1 — Characterization of biogenic carbon fluxes in cases where carbon neutrality can be assumed (in CO_2-eq./kg C as CO_2-eq stored in wood)

EXAMPLE 1 1 m^3 of wood at an oven-dry density of 450 kg/m^3 is imported from a forest into the product system under condition where carbon neutrality can be assumed. This import of wood is quantified as part of the GWP for module A1-A3 as 450 kg of wood x 0,5 kg C/kg dry matter x 44/12 x (-1 kg CO_2-eq/kg CO_2 in wood) = - 825 kg CO_2 eq. In line with the rules established in 6.4.3.2 of EN 15804:2012, 100 kg oven-dry matter of co-products from processing in module A1-A3 are quantified as part of the GWP for module A1-A3 as 100 kg of wood x 0,5 kg C/kg dry matter x 44/12 x (1 kg CO_2-eq/kg CO_2 in wood) = 183 kg CO_2 eq. In module C3, 200 kg of wood is burned, resulting in the emission of 367 kg CO_2 (neglecting the contribution of other emissions to the GWP for the sake of the example) and 150 kg of wood is recovered for recycling in another product system, resulting in the export of 150 kg of wood x 0,5 kg C/kg dry matter x 44/12 x (1 kg CO_2-eq/kg CO_2 in wood) = 275 kg CO_2 eq. The result is that over the life cycle of the product, the biogenic carbon balance and the contribution of biogenic CO_2 to the GWP are zero (neglecting the contribution of other emissions to the GWP for the sake of the example). The input of recycled wood or of wood stemming from co-production processes are treated in analogy to wood being imported into the product system from a forest for which carbon neutrality can be assumed.

Under all other circumstances, the characterization factors to be applied when calculating the global warming potential (GWP) are detailed in Figure 2:



Key

1	transfer of biogenic carbon from the forest to the product system	5	subsequent product system, receiving recycled wood
2	product system under study	6	co-product
3	emission into atmosphere	7	emission into atmosphere
4	recycled wood	8	parallel product system, receiving co-products as input

NOTE For all product systems over the wood chain:

— Biogenic carbon balance *over life cycle* = 0;

— Contribution of biogenic CO_2 to GWP *over life cycle* > 0.

Figure 2 — Characterization of biogenic carbon fluxes in cases where carbon neutrality cannot be assumed (in CO2-eq./kg C as CO2-eq stored in wood)

EXAMPLE 2 1 m^3 of wood at an oven.dry density of 450 kg/m^3 is imported from a forest into the product system under condition where carbon neutrality cannot be assumed. This import of wood is quantified as part of the GWP for module A1-A3 as 450 kg of wood x 0,5 kg C/kg dry matter x 44/12 x (0 kg CO_2-eq/kg CO_2 in wood) = 0 kg CO_2 eq. In line with the rules established in 6.4.3.2 of EN 15804:2012, 100 kg oven-dry matter of co-products from processing in module A1-A3 are quantified as part of the GWP for module A1-A3 as 100 kg of wood x 0,5 kg C/kg dry matter x 44/12 x (1 kg CO_2-eq/kg CO_2 in wood) = 183 kg CO_2 eq. In module C3, 200 kg of wood is burned, resulting in the emission of 367 kg CO_2 (neglecting the contribution of other emissions to the GWP for the sake of the example) and 150 kg of wood is recovered for recycling in another product system, resulting in the export of 150 kg of wood x 0,5 kg C/kg dry matter x 44/12 x (1 kg CO_2-eq/kg CO_2 in wood) = 275 kg CO_2 eq. The result is that over the life cycle of the product, the biogenic carbon balance is zero but the contribution of biogenic CO_2 to the GWP is > 0 (neglecting the contribution of other emissions to the GWP for the sake of the example). In this way, the first product system is held liable for the sourcing of wood from forests for which carbon neutrality cannot be assumed. In subsequent product systems and in line with the “polluter pays principle”, the input of recycled wood or of wood stemming from co-production processes are treated in analogy to the procedure outlined in Example 1.

In addition and when significant, the GHG emissions occurring in forest carbon pools as a result of the land use change ‘deforestation’ resulting from harvesting operations should be assessed in accordance with internationally recognised methods such as the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories. These GHG emissions shall be documented separately in the report. Double-counting shall be avoided.

In the case of input of secondary materials or energy recovered from secondary fuels, the system boundary between the system under study and the previous system (providing the secondary materials) is set where outputs of the previous system, e.g. materials, products, building elements or energy, reach the end-of-waste state (see 6.4.3 and Annex B of EN 15804:2012). Wood entering the product system as wood from secondary sources accounts for the energy content and the biogenic carbon content as material inherent properties (see also 6.3.4.5).

Flows leaving the system at the end-of-waste boundary of the product stage (A1-A3) shall be allocated as co-products. Care has to be taken that energy content and biogenic carbon content are allocated reflecting the physical flows, irrespective of the allocation chosen for the process.

In analogy, wood entering a product system as wood from a co-production process accounts for the energy content and the biogenic carbon content as material inherent properties (see also 6.3.4.5).

Loads and benefits from allocated co-products shall not be declared in Module D (see 6.3.4.6). If such a co-product allocation is not possible, other methods may be chosen and shall be justified. Therefore, as a general rule, potential loads or benefits from A1-A3 do not appear in module D.

Further guidance on this subject particularly with respect to energy recovery can be found in 6.4.3.2.

6.3.4.3 Construction stage

As in EN 15804.

6.3.4.4 Use stage

6.3.4.4.1 General

As in EN 15804.

6.3.4.4.2 B1–B5 Use stage information modules related to the building fabric:

As in EN 15804 with the following addition:

B1 Use of the installed product in terms of any emissions to the environment (not covered by B2-B7).

The module “use of the installed product” covers environmental aspects and impacts arising from components of the building and construction works during their normal (i.e. anticipated) use, which are assigned to module B1.

EXAMPLE Release of substances from the facade, roof, floor covering and other surfaces (interior or exterior) to indoor air, soil or water.

NOTE 1 The EPD does not need to give this information if the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonized test methods according to the provisions of the respective technical committees for European product standards are not available; the EPD can lack this information.

For wood and wood-based products, the amount of biogenic carbon stored, calculated in accordance with EN 16449, shall be documented in CO_2-eq. as technical scenario information.

NOTE 2 Storage time is the reference service life.

6.3.4.4.3 B6 – B7 use stage information modules related to the operation of the building:

As in EN 15804.

6.3.4.5 End-of-life stage

The end-of-life stage of the construction product starts when it is replaced, dismantled or deconstructed from the building or construction works and does not provide any further functionality. It can also start at the end-of-life of the building, depending on choice of the product's end-of-life scenario.

During the end-of-life stage of the product or the building, all output from dismantling, deconstruction or demolition of the building, from maintenance, repair, replacement or refurbishing processes, all debris, all construction products, materials or construction elements etc. leaving the building, are at first considered to be waste. This output however reaches the end-of-waste state when it complies with all of the following criteria:

— the recovered material, product or construction element is commonly used for specific purposes;

— a market or demand, identified e.g. by a positive economic value, exists for such a recovered material, product or construction element;

— the recovered material, product or construction element fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products;

— the use of the recovered material, product or construction element will not lead to overall adverse environmental or human health impacts.

NOTE 1 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.

The criterion for "overall adverse environmental or human health impacts" shall refer to the limit values for pollutants set by regulations in place at the time of assessment and where necessary and shall take into account adverse environmental effects. The presence of any hazardous substances exceeding these limits in the waste or showing one or more properties as listed in existing applicable legislation, e.g. in the European Waste Framework Directive, prevents the waste from reaching the end-of-waste state.

The end-of-life system boundary of the construction product system to module D is set where outputs, i.e. secondary materials or fuels, have reached the "end-of-waste" state (see 6.4.3).

In the absence of product-specific scenario information, the end-of-waste status for wood and wood-based construction products can be assumed to be reached [16]:

— after sorting and chipping/crushing of any post-consumer wood excluding pressure impregnated wood, considering that a positive market value can be expected at this processing stage, a specific purpose is defined (use as fuel, use in particle board production), the chipped/wood fulfils the technical specifications of solid fuels/chips for the production of particle boards and no hazardous substances exceeding legal limits can be expected;

— after thermal treatment (i.e. incineration) for pressure treated wood, as the potential content of hazardous substances can exceed legal limits of such flows for their consideration not to be waste.

The end-of-life stage includes the optional information modules:

— C1 deconstruction, including dismantling or demolition, of the product from the building, including initial on-site sorting of the materials;

— C2 transportation of the discarded product as part of the waste processing, e.g. to a recycling site and transportation of waste e.g. to final disposal;

— C3 waste processing, e.g. collection of waste fractions from the deconstruction and waste processing of material flows intended for reuse, recycling and energy recovery. Waste processing shall be modelled and the elementary flows shall be included in the inventory. Materials for energy recovery are identified

based on the efficiency of energy recovery with a rate higher than 60 % without prejudice to existing legislation. Materials from which energy is recovered with an efficiency rate below 60 % are not considered materials for energy recovery.

NOTE 2 Only when materials have reached the end of waste state can they be considered as materials for energy recovery, provided the energy recovery process has an energy efficiency rate higher than 60 %.

NOTE 3 The efficiency rate (R1-value) of an incineration plant is calculated as follows [7]:

$$Efficiency\_rate = \frac{E_{pe} \times 2.6 + E_{ph,use} \times 1.1 - E_f - E_i}{0.97 \times (E_w + E_f)} \quad (1)$$

where

E_{pe} is the annual energy produced as electricity (GJ/a);

$E_{ph,use}$ is the annual energy produced as heat for commercial use (GJ/a);

E_f is the annual energy input into the system from fuels contributing to the production of steam (GJ/a);

E_i is the annual energy imported excluding E_w and E_f (GJ/a);

E_w is the annual energy contained in the treated waste calculated using the net calorific value of the waste (GJ/a);

0,97 is the factor accounting for energy losses due to bottom ash and radiation.

— C4 waste disposal including physical pre-treatment and management of the disposal site.

NOTE 4 In principle, waste processing is part of the product system under study. In the case of materials leaving the system as secondary materials or fuels, such processes as collection and transport before the end-of-waste state are, as a rule, part of the waste processing of the system under study. However, after having reached the “end-of-waste” state, further processing may also 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 and are assigned to module D. Secondary material having left the system can be declared as substituting primary production in module D, when it has reached functional equivalence of the substituted primary material.

Loads, (e.g. emissions) from waste disposal in module C4 are considered part of the product system under study, according to the “polluter pays principle”. If however this process generates energy such as heat and power from waste incineration or landfill, the potential benefits from utilisation of such energy in the next product system are assigned to module D and are calculated using current average substitution processes.

Therefore, for wood and wood-based construction products, the following attribution of end-of-life processes applies (see Table 1):

Table 1 — Attribution of end-of-life processes of wood and wood-based products to modules C1 – C4 and D depending on whether a flow reaches the end-of-waste status and on the R1 value of the incineration facility (if applicable)

	Landfill	**Thermal waste treatment**	**Energy recovery**	**Use of secondary fuel**	**Recycling**
Criterion 1	Flow does not reach end-of-waste status			Flow reaches end-of-waste status	
Criterion 2	[not applicable]	R1 value of incineration facility < 0,6	R1 value of incineration facility > 0,6	[not applicable]	[not applicable]
Resulting attribution of processes to information modules					
C1	Deconstruction/ Demolition	Deconstruction/ Demolition	Deconstruction/ Demolition	Deconstruction/ Demolition	Deconstruction/ Demolition
C2	Transport to landfill	Transport to the incineration site	Transport to the incineration site	Transport to the sorting platform	Transport to the sorting platform
C3			Crushing, site operation and wood combustion	Sorting and crushing at the platform	Sorting and crushing at the platform
C4	Landfilling (waste operation, leachate treatment and landfill gas combustion)	Crushing, site operation and wood combustion			
D	Avoided impact of electricity production and/or thermal energy recovery from landfill gas recovery	Avoided impact of electricity production and thermal energy recovery	Avoided impact of electricity production and thermal energy recovery	Site operation and wood combustion and avoided impact of electricity production and thermal energy recovery	Avoided impact of forestry, harvesting, wood chips preparation and drying

NOTE 5 The same attribution of processes related to waste processing and benefits and loads beyond the system boundary applies to waste from modules A4, A5 and B2 to B5.

The biogenic carbon and the energy content of the wood or wood-based product as quantified in the indicators “Use of renewable primary energy resources used as raw materials” and “Use of non-renewable primary energy resources used as raw materials” are considered as specific inherent properties. As a result, these specific material inherent properties are exported from Module C3. When quantifying Module D, it shall be ensured that the same amount of biogenic carbon and the same values for the indicators “Use of renewable primary energy resources used as raw materials” and “Use of non-renewable primary energy resources used as raw materials” are transferred to Module D.

6.3.4.6 Benefits and loads beyond the product system boundary in module D

As in EN 15804.

6.3.5 Criteria for the exclusion of inputs and outputs

As in EN 15804.

6.3.6 Selection of data

As in EN 15804.

6.3.7 Data quality requirements

As in EN 15804.

6.3.8 Developing product level scenarios

As in EN 15804.

6.3.9 Units

As in EN 15804.

6.4 Inventory analysis

6.4.1 Collecting data

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

6.4.2 Calculation procedures

As in EN 15804 with the following addition:

The fluxes of biogenic carbon expressed in CO_2-eq. shall be inventoried separately from fossil carbon fluxes expressed in CO_2-eq. and shall be documented separately in the project report.

6.4.3 Allocation of input flows and output emissions

6.4.3.1 General

As in EN 15804.

6.4.3.2 Co-product allocation

Allocation shall be avoided as far as possible by dividing the unit process to be allocated into different sub-processes that can be allocated to the co-products and by collecting the input and output data related to these sub-processes.

EXAMPLE 1 The process chain in a sawmill can be sub-divided. These sub-processes can be allocated to specific co-products by determining the main purpose of the process, e.g. the energy consumption of chipping of residual wood during the profiling process to the resulting chip; energy consumption of ventilation and re-collection of sawdust and particles could be allocated to these two co-products. Co-product allocation at plant level may be necessary in addition to allocate other inputs than energy (see Example 4). In any case, material inherent properties such as biogenic carbon and energy content are allocated according to their physical flows, i.e. by mass.

If a process can be sub-divided but respective data are not available, the inputs and outputs of the system under study should be partitioned between its different products or functions in a way which 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.

EXAMPLE 2 The environmental impacts and aspects of fibre production are allocated to fibre boards of different densities according to the amount of fibres per m^3, i.e. based on their recipes.

In the case of joint co-production, where the processes cannot be sub-divided, allocation 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 should be taken into account. Processes generating a very low contribution to the overall revenue may be neglected. Joint co-product allocation shall be allocated as follows:

— Allocation shall be based on physical properties (e.g. mass, volume) when the difference in revenue from the co-products is low.

— In all other cases allocation shall be based on economic values.

— Material flows carrying specific inherent properties, e.g. energy content, elementary composition (e.g. biogenic carbon content), shall always be allocated reflecting the physical flows, irrespective of the allocation chosen for the process.

NOTE 1 Contributions to the overall revenue of the order of 1 % or less is regarded as very low. A difference in revenue of more than 25 % is regarded as high.

NOTE 2 A common position on the definition on the most appropriate allocation rule needs to be defined together with other relevant sectors.

NOTE 3 Products and functions are the outputs and/or services provided by the process, having a positive economic value.

NOTE 4 In industrial processes there is a wide variety of different types of materials produced in conjunction with the intended product. In business vocabulary, these may be identified as by-products, co-products, intermediate products, non-core products or sub-products. In this standard, these terms are treated as being equivalent. However, for the allocation of environmental aspects and impacts, a distinction between co-products and products is made in this standard.

EXAMPLE 3 In the case of a sustainably managed forest and where no further subdivision of forestry operations is made to avoid allocation, all environmental aspects and impacts associated with the different management activities over one (assumed) average rotation period, i.e. from thinning(s) and final harvest can be allocated to the different wood assortments, e.g. roundwood, industrial wood and energy wood-based on revenues. Further activities such as debarking or chipping can then be attributed to the assortments undergoing these processes. In any case, material inherent properties such as biogenic carbon and energy content are allocated according to their physical flows, i.e. by mass.

EXAMPLE 4 For a sawmill, all the processes related to the procurement of roundwood, i.e. forestry processes allocated to roundwood (see above) and transport to the sawmill can be allocated by revenues between the co-products rough cut sawn timber, sidings, chips and sawdust. Depending on the availability of data, further processes of sawing/profiling, drying, planing, chipping, etc. can be treated as further (co-production) processes to be allocated between the further co-products (see Example 1). Market prices from official statistics should be used for the determination of revenues for assortments for which no company specific prices are available. In any case, material inherent properties such as biogenic carbon and energy content are allocated according to their physical flows, i.e. by mass.

EXAMPLE 5 In the case of exporting heat or electricity to the grid from a combined heat and power plant used for wood drying, the CHP process including the (internal) production of fuels are allocated based on exergy and considered as part of the product system under study to the extend to which heat and electricity is used within the product system.

6.4.3.3 Allocation procedure of reuse, recycling and recovery

The end-of-life system boundary of the construction product system is set where outputs of the system under study, e.g. materials, products or construction elements, have reached the end-of-waste state. Therefore, waste processing of the material flows (e.g. undergoing recovery or recycling processes) during any module of the product system (e.g. during the production stage, use stage or end-of-life stage) are included up to the system boundary of the respective module as defined above.

Where relevant (see 6.3.4.5 and 6.3.4.6), the informative module D declares potential loads and benefits of secondary material, secondary fuel or recovered energy leaving the product system. Module D recognises the

"design for reuse, recycling and recovery" concept for buildings by indicating the potential benefits of avoided future use of primary materials and fuels while taking into account the loads associated with the recycling and recovery processes beyond the system boundary.

NOTE 1 Module D also contains benefits from exported energy from waste disposal processes declared in module C4.

Where a secondary material or fuel crosses the system boundary, e.g. at the end-of-waste state, and if it substitutes another material or fuel in the following product system, the potential benefits or avoided loads can be calculated based on a specified scenario which is consistent with any other scenario for waste processing and is based on current average technology or practice.

For wood and wood-based products, the default scenario for the quantification of potential benefits is:

— for recycling, substitution of primary material from forest and/or sawmills for the production of wood-based boards (e.g. particle board);

— for energy recovery, substitution of heat from fossil fuels, e.g. natural gas as a conservative choice.

If today's average technology is not available for the quantification of potential benefits or avoided loads, a conservative approach shall be used.

In module D, the net impacts are calculated as follows:

— by adding all output flows of a secondary material or fuel and subtracting all input flows of this secondary material or fuel from each sub-module first (e.g. B1-B5, C1-C4 etc.), then from the modules (e.g. B, C), and finally from the total product system thus arriving at net output flows of secondary material or fuel from the product system;

EXAMPLE 1 If a product system requires 0,5 m^3 sob (solid over bark) of wood chips from secondary wood used as a fuel for the production a wood product of 1 m^3 sob, the net amount of secondary wood to be considered in module D for energy recovery is 1 m^3 sob of the product minus the losses of waste preparation for recycling until the end-of waste status (i.e. chipped wood) minus 0,5 m^3 sob considered closed loop with the input side of the product system. The net amount of secondary wood to be considered in module D for recycling is 1 m^3 sob of the product minus the losses of waste preparation for recycling until the end-of waste status (i.e. chipped wood). In a recycling scenario the input of secondary wood for energy purposes in production need not be considered closed-loop.

— by adding the impacts connected to the recycling or recovery processes from beyond the system boundary (after the end-of-waste state) up to the point of functional equivalence where the secondary material or energy substitutes primary production and subtracting the impacts resulting from the substituted production of the product or substituted generation of energy from primary sources;

— by applying a justified value-correction factor to reflect the difference in functional equivalence where the output flow does not reach the functional equivalence of the substituting process.

When secondary wood is recycled, e.g. into particle board, the point of functional equivalence is reached at the point of equivalent dimensions and moisture content of the two types of chips.

EXAMPLE 2 Wood chips from secondary wood at 20 % moisture content are functionally equivalent to wood chips with comparable dimensions and at 20 % moisture content from primary production processes, e.g. technically dried chips from forestry or chips from sawmills at 20 % moisture content. In such a case, no value-correction factor needs to be applied.

In module D, substitution effects are calculated only for the resulting net output flow.

The amount of secondary material output, which is for all practical purposes able to replace one to one the input of secondary material as closed loop is allocated to the product system under study and not to module D.

NOTE 2 Avoided impacts from allocated co-products are not part of Module D information; see 6.3.4.6.

6.5 Impact assessment

As in EN 15804 with the following addition:

The GHG emission factor of biogenic CO_2 is 1 kg CO_2-equiv./kg. The import or export of carbon stored in wood as material inherent property is characterised with the respective factor (see 6.3.4.2) and considered as part of the global warming potential.

7 Content of the EPD

7.1 Declaration of general information

As in EN 15804 with the following addition:

A description of the main product components and or materials, including information on responsible sourcing such as forest certification schemes for sustainable management.

7.2 Declaration of environmental parameters derived from LCA

As in EN 15804.

7.2.1 Rules for declaring LCA information per module

As in EN 15804.

7.2.2 Parameters describing environmental impacts

As in EN 15804.

7.2.3 Parameters describing resource use

As in EN 15804.

7.2.4 Other environmental information describing different waste categories and output flows

As in EN 15804.

7.3 Scenarios and additional technical information

7.3.1 General

As in EN 15804.

7.3.2 Construction process stage

7.3.2.1 A4, Transport to the building site

As in EN 15804.

7.3.2.2 A5, Installation in the building

As in EN 15804.

7.3.3 B1-B7 use stage

7.3.3.1 B1-B5 use stage related to the building fabric

As in EN 15804 with the following in addition:

For wood and wood-based products, the biogenic carbon content shall be reported.

7.3.3.2 Reference service life

As in EN 15804.

7.3.3.3 B6, use of energy and B7, use of water

As in EN 15804.

7.3.4 End-of-life

As in EN 15804.

7.4 Additional information on release of dangerous substances to indoor air, soil and water during the use stage

7.4.1 Indoor air

As in EN 15804.

7.4.2 Soil and water

As in EN 15804.

7.5 Aggregation of information modules

As in EN 15804.

7.6 Additional environmental information

The effect of timing of GHG emissions due to biogenic carbon storage may be included as additional environmental information, for example on the basis of PAS 2050 or IPCC (KP supplement 2013).

8 Project report

8.1 General

As in EN 15804.

8.2 LCA-related elements of the project report

The results, data, methods, assumptions and limitations and conclusions of the LCA shall be completely and accurately reported without bias. They shall be transparent 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 give the following:

a) General aspects:

   1) commissioner of the LCA study, internal or external practitioner of the LCA study;

   2) date of report;

   3) statement that the study has been conducted according to the requirements of this standard.

b) Goal of the study:

   1) reasons for carrying out the study and its intended application and audience, i.e. providing information and data for an EPD for business-to-business and/or business-to-consumer communication;

c) Scope of the study:

   1) declared/functional unit, including:

      i) definition, including relevant Technical Specification(s), apparent density and moisture content;

      ii) calculation rule for averaging data, e.g. when the declared/functional unit is defined for:

         1. a group of similar products produced by different suppliers, or

         2. the same product produced at different production sites;

   2) system boundary according to the modular approach as outlined in Figure 1 of EN 15804:2012, including:

      i) omissions of life cycle stages, processes or data needs;

      ii) quantification of energy and material inputs and outputs, taking into account how plant-level data is allocated to the declared products;

      iii) assumptions about electricity production and other relevant background data;

      iv) amount of biogenic carbon stored and period of carbon storage;

   3) cut-off criteria for initial inclusion of inputs and outputs, including:

      i) description of the application of cut-off criteria and assumptions;

      ii) list of excluded processes.

d) Life cycle inventory analysis:

1) qualitative/quantitative description of unit processes necessary to model the life cycle stages of the declared unit, taking into account the provisions of EN ISO 14025 regarding data confidentiality;

2) sources of generic data or literature used to conduct the LCA;

3) validation of data, including:

   i) data quality assessment; and

   ii) treatment of missing data;

4) allocation principles and procedures, including:

   i) documentation and justification of allocation procedures; and

   ii) uniform application of allocation procedures.

e) Life cycle impact assessment:

1) the LCIA procedures, calculations and results of the study;

2) the relationship of the LCIA results to the LCI results;

3) reference to all characterization models, characterization factors and methods used, as defined in this European Standard;

4) a statement that the LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

f) Life cycle interpretation:

1) the results;

2) assumptions and limitations associated with the interpretation of results as declared in the EPD, both methodology and data related;

3) the variance from the means of LCIA results should be described, if generic data are declared from several sources or for a range of similar products;

4) data quality assessment;

5) full transparency in terms of value-choices, rationales and expert judgements.

8.3 Documentation on additional information

As in EN 15804.

8.4 Data availability for verification

As in EN 15804.

9 Verification and validity of an EPD

As in EN 15804.

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