

CONSTRUCTION PRODUCTS

PCR 2019:14

DRAFT VERSION 2.0.0 FOR OPEN CONSULTATION. DO NOT USE OR CITE.

VALID UNTIL: 20YY-MM-DD



DRAFT FOR OPEN
CONSULTATION

INTRODUCTION TO OPEN CONSULTATION

This draft PCR document is available for open consultation from 2024-10-03 until 2024-11-28. Feel free to forward the draft to any other stakeholder you might think is relevant, including colleagues and other organisations.

We are interested in comments from stakeholders on:

- General
 - Alignment with relevant PCRs available in other programmes for type III environmental declarations, EN 15804, ISO 21930, industry-specific LCA guidelines or similar.
- Scope of PCR
 - Product category definition and description
 - Classification of product category using CPC codes
- Goal and scope, life cycle inventory and life cycle impact assessment
 - Functional unit/declared unit
 - System boundary
 - Allocation rules
 - Data quality requirements
 - Recommended databases for generic data
 - Impact categories and impact assessment methodology
- Additional information

The main aim with this update is to prolong the validity of the PCR with another five years and to comply with EN 15941 (published earlier 2024), the latest ECO Platform standards (to be released in December 2024), and version 5 of the General Programme Instructions (GPI). There are specific sections of the PCR on which we ask for input, as highlighted by yellow information boxes.

Comments shall be sent directly to the PCR Moderator (contact details available in Section 1) and to pcr@environdec.com. There is a template for comments on <https://www.environdec.com/product-category-rules-pcr/get-involved-in-pcr-development#pcrsinopenconsultation> that may be used.

For questions about the PCR, please contact the PCR Moderator. For general questions about the International EPD System, EPD or PCR development, please contact the Secretariat via <https://environdec.freshdesk.com/support/home>.

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1 INTRODUCTION

1.1 GENERAL

This document constitutes Product Category Rules (PCR) developed in the framework of the International EPD System: a programme for Environmental Product Declarations (EPD)¹ according to ISO 14025:2006, ISO 14040:2006, ISO 14044:2006/Amd:2020, and product-specific standards, such as EN 15804 and ISO 21930 for construction products. EPDs are voluntary documents for a company or an industry association to present transparent, consistent, and verifiable information about the environmental performance of their products (goods or services).

The General Programme Instructions (GPI), publicly available on www.environdec.com, includes the rules for the overall administration and operation of the programme and the basic rules for developing EPDs registered in the programme. A PCR complements the GPI and the normative standards by providing specific rules and guidelines for developing an EPD for one or more specific product categories (see Figure 1), thereby enabling the generation of consistent EPDs within a product category. In general, a PCR should not repeat the rules and guidelines of the GPI, but include additions, specifications and deviations to the rules set in the GPI. As such, a PCR shall be used together with the GPI. This specific PCR, however, repeats all rules on LCA method (Section 4), content of the LCA report (Section 5), and content of the EPD (Section 6) of the GPI, with adjustments, removals, and specifications. This means that the GPI rules on LCA method, content of the LCA report, and content of the EPD do not apply.²

This PCR is a main PCR that may be complemented with one or several complementary PCR (c-PCR). If there is an applicable and valid c-PCR, it shall be used in case it has been valid for at least 90 days when the EPD is verified.³ If it has been valid for less than 90 days, it is optional to use the c-PCR. The valid c-PCRs can be found on www.environdec.com.

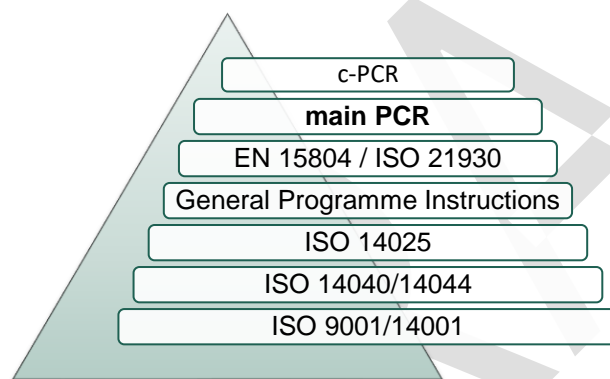


Figure 1. The hierarchy between PCRs, standards, and other documents. EN 15804 and ISO 21930 are normative standards for construction products only.

The present PCR uses the following terminology:

- The term “shall” is used to indicate what is obligatory, i.e., a requirement.
- The term “should” is used to indicate a recommendation. Any deviation from a recommendation shall be justified in the EPD development process.
- The terms “may” or “can” are used to indicate an option that is permissible.

For definitions of other terms used in the document, see the GPI and normative standards.

Any references to this PCR shall include the PCR registration number, name, and version number.

¹ Termed type III environmental declarations in ISO 14025.

² This is to reduce the number of documents that needs to be checked, as this PCR requires EPD developers and verifiers to check several other documents: EN 15804, EN 15941, and c-PCR, if applicable.

³ This does not apply when the EPD is re-verified during its validity, unless the validity period is extended.

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The programme operator maintains the copyright of the PCR to ensure that it is possible to publish, update, and make it available to all organisations to develop and register EPDs. Stakeholders participating in PCR development should be acknowledged in the final document and on the website.

1.2 DEVELOPMENT OF C-PCR

A complementary PCR (c-PCR) may be developed for a more specific category of construction products, for example cement or thermal insulation. Such a c-PCR should be the implementation of a standard from CEN Technical Committees, if available. Adoption of such CEN standards as c-PCRs are made by the Secretariat. If no such CEN standard is available, a c-PCR may be developed within the framework of the International EPD System using the regular PCR development procedure. A c-PCR should not repeat the rules and guidelines of the main PCR (this document), but include additions, specifications and deviations to the rules set in the main PCR. As such, a PCR shall be used together with the main PCR. Read more in the GPI.

A c-PCR should contain:

- general information, for example scope of the c-PCR, programme-related information, and information about its development, and
- further specifications and additional requirements on LCA modelling and EPD content in relation to the main PCR (this document), for example regarding type(s) of EPD allowed, system boundaries, declared or functional unit, environmental performance indicators or additional information.

For the development of c-PCRs, the c-PCR template available on www.environdec.com shall be used.

All c-PCRs currently available or under development are listed on www.environdec.com.

1.3 ADDITIONAL RULES AND SPECIFICATIONS TO EN 15804

This main PCR aims to provide a link between the rules in the General Programme Instructions (GPI) of the International EPD System, EN 15804:2012+A2:2019/AC:2021, EN 15941:2024, ISO 21930:2017, and the ECO Platform standards. As such, the PCR introduces some rules and specifications that are not found in EN 15804. These rules and specifications are summarised in the below list and further described in subsequent sections. If an additional rule or specification is missing in the below list, it is still valid.

- Additionally, the PCR covers construction services (in contrast to goods), in line with ISO 21930. An addition to ISO 21930 is that this does not only refer to services carried out in the construction (module A5) or in the use stage (particularly in modules B2-B5) of construction works, but also demolition services (in module C1). Another addition to ISO 21930 is that modules A4 and A5 are mandatory for such EPDs.
- Additional requirement that an EPD of type c, “cradle to grave and module D”, shall be based on a functional unit. In EN 15804, a declared unit may be used for this type of EPD. This PCR allows for the same type of EPD to be created, but the scope of the EPD shall be classified as an “EPD type b, cradle to gate with options, modules A4-A5, modules B, modules C1-C4, and module D”. See Section 2.2.2.
- Additional requirement that an EPD based on a functional unit shall use this PCR together with a c-PCR available on www.environdec.com. See Section 2.2.2.
- Additional rules for EPD validity and follow-up requirements to comply with the GPI, see Sections 2.2.4 and 6.4.2.3.
- Additional requirements on sector EPDs, see Section 4.10.2, and EPDs developed by traders, see Section 4.10.3.
- Additional rules for modelling electrical and electronic equipment (EEE products), see Section 4.3.7.
- The allocation rules are further specified by merging specifications in ISO 21930 to the stepwise procedure in EN 15804, see Section 4.4.
- Additional clarifications and requirements on the modelling of infrastructure/capital goods and personnel activities compared to EN 15804 and ISO 21930, see Section 4.3.6.
- Additional requirements regarding transparency of the modelling of material for recycling (e.g., scrap), see Section 4.5.3.
- Introduction of alternative terms for the data categories (see Section 4.6.126), connected to the introduction of a data quality indicator reflecting share of primary data and other requirements on data quality declaration, whereof some are

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adopted from EN 15941 (see Section 4.6.4). Related to this, the data quality requirements on primary and secondary data have been specified, merging requirements from EN 15804, EN 15941, and ISO 21930 (see Sections 4.6.2 and 4.6.3).

- Additional requirements on the modelling of the generation of electricity (see Section 4.7.2) and biogas (see Section 4.7.3), which largely are adoptions from the ECO Platform standards and EN 15941.
- Additional requirement to report the climate impact (in kg CO₂ eq./kWh using the GWP-GHG indicator) of the electricity purchased in the manufacturing process in A3, see Section 4.8.1.
- An additionally required indicator for climate impact (GWP-GHG), see Section 4.9.
- Additional rules and specifications on EPDs of multiple products, by adding and specifying the rules of ISO 21930, see Section 4.10.1.
- Additional rules on EPDs of sector EPDs, EPDs of traders as well as EPDs of products not yet on the market or recently on the market, see Sections 4.10.2 to 4.10.5.
- Additional requirements that an EPD describing a specific product shall be calculated using specific data for (at least) the processes for which the producer has operational control, i.e., module A3 for construction goods or modules A4-A5 for construction services. Additionally, if the EPD owner is a trader, module A4 is mandatory, see Section 4.10.3.
- Additional requirement on the EPD format, for example that an EPD shall specify its product category in accordance with the UN CPC classification system, if possible, and further alignments with the GPI of the International EPD System. See Section 6.4.4.
- Additional requirements and recommendations on the content declaration compared to EN 15804 and ISO 21930, see Section 6.4.5.
- Additional requirement to declare the results of modules A1-A3 in aggregated form. This solves the problem that EN 15804 and ISO 21930 assign some processes (e.g., generation of electricity) to different modules. By declaring modules A1-A3 in aggregated form, the EPD can comply with both EN 15804 and ISO 21930. See Section 6.4.7.
- In addition to the core and additional indicators in EN 15804, this PCR allows the declaration of other environmental indicators such as the indicators in ISO 21930 and/or the indicators in the previous version of EN 15804 (EN 15804:2012+A1:2013), see Section 6.4.7.
- Additional specifications for modelling of the GWP-biogenic and primary energy use indicators, see Annexes 2 and 3.


1.4 ADDITIONAL REQUIREMENTS TO COMPLY WITH ISO 21930

EPDs based on this PCR do not by default comply with ISO 21930. To claim compliance with ISO 21930, the following additional requirements, which are further described in subsequent sections, shall be met:

- For EPDs of multiple products, compliance with ISO 21930 is only possible if variation between included products is lower than 10% for the results of all environmental impact indicators, see Section 2.2.2.1. Sector EPDs are exempt from this rule.
- To comply with ISO 21930, the indicators in ISO 21930 applicable for the geographical context of the EPD shall be declared.
- To comply with ISO 21930, the biogenic carbon content of product and packaging shall additionally be declared as kg CO₂ eq. per product or declared unit, see Section 6.4.5.

2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	Construction products
Registration number and version:	2019:14, version 2.0.0
Programme:	 EPD [®] The International EPD System
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com E-mail: support@environdec.com
PCR Moderator:	Martin Erlandsson, IVL Swedish Environmental Research Institute, martin.erlandsson@ivl.se
PCR Committee:	IVL Swedish Environmental Research Institute, Secretariat of the International EPD System, CTME, Concrete NZ, Monk Spaces, Aquafil SpA
Publication date:	<i>To be added by the Secretariat</i> See Section 9 for a version history of the PCR.
Valid until:	<i>To be added by the Secretariat</i> The validity may change. See www.environdec.com for the latest version of the PCR and the latest information on its validity and transition periods between versions.
Development and updates:	<p>The PCR has been developed following ISO 14027, including public consultation and review. The rules for the development and updating processes are described in Section 9 of the GPI.</p> <p>The PCR is valid for a pre-determined time period to ensure that it is updated at regular intervals. When the PCR is about to expire, the PCR Moderator shall initiate a discussion with the Secretariat on if and how to proceed with updating the PCR and renewing its validity. A PCR may be updated before it expires, based on changes in normative standards or provided significant and well-justified proposals for changes or amendments are presented.</p> <p>When there has been an update of the PCR, the new version should be used to develop EPDs. For small updates (change of third-digit version number), the previous version is normally immediately removed from the PCR library on www.environdec.com and there is no transition period. For medium updates (change of second-digit version number), the previous version of the PCR is valid in parallel during a transition period of at least 90 days, but not exceeding its previously set validity period. For large updates (change of first-digit version number), the previous version is valid in parallel during a transition period of at least 180 days, but not exceeding its previously set validity period.</p> <p>Stakeholder feedback on PCRs is very much encouraged. Any comments on this PCR may be sent directly to the PCR Moderator and/or the Secretariat during its development or during its period of validity.</p>

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Standards and documents conformance:	<ul style="list-style-type: none"> General Programme Instructions of the International EPD System, version 5.0.0, based on ISO 14025 and ISO 14040/14044.⁴ EN 15804:2012+A2:2019/AC:2021 EN 15941:2024 ISO 21930:2017. This standard is used in selected sections, such as allocation, when it provides additional but not contradictory rules to EN 15804. EPDs may comply with this standard if additional requirements are met, see Section 1.5. ECO Platform standards (versions valid December 2024).
PCR language(s):	At the time of publication, this PCR was available in English. If the PCR is available in several languages, these are available on www.environdec.com . In case of translated versions, the English version takes precedence in case of any discrepancies.

2.2 SCOPE OF PCR

2.2.1 PRODUCT CATEGORY DEFINITION AND DESCRIPTION

This document provides Product Category Rules (PCR) for the assessment of the environmental performance of construction products, defined to include both goods and services, and construction works (e.g. buildings, railways, highways), and the declaration of this performance by an EPD.

All construction goods and services for buildings and other construction works (including civil engineering works) are included in the scope, with the same product category definition as the standard EN 15804, as well as construction works. As the standard provides limited guidance on the definition of a construction product, the best available definition is found in the European construction product regulation (CPR):

"construction product" means any product or kit which is produced and placed on the market for incorporation in a permanent manner in construction works or parts thereof and the performance of which has an effect on the performance of the construction works with respect to the basic requirements for construction works."

There is no exhaustive list of products and product categories covered by this definition. All products that are covered by a harmonized standard for construction products according to the European construction product regulation (or the earlier construction product directive, CPD) should, however, be considered as construction products.⁵

The above definition is used in the present PCR, with the addition that the term "product" also encompasses services, which are not incorporated in a permanent manner in the constructions works but support construction processes (in module A5); maintenance, repair, replacement, or refurbishment processes (in modules B2-B5); or demolition processes (in module C1) of the construction works.

This PCR can also be used for raw materials and intermediate products that can among others be used as input to construction products. If another PCR in the International EPD System covers this raw material/intermediate product, but that PCR does not comply with EN 15804, the present PCR may be used instead if there is a market demand for EPDs compliant with EN 15804. Note, however, that if another sector has requirements on LCA method and EPD content that deviate to those in EN 15804 and in the present PCR, there may be a need to issue two separate EPDs for the same raw material/intermediate product, following different PCRs and targeting different customers.

The International EPD System uses the UN CPC system for classification for PCRs. As this PCR covers a product category where the final sector of use is the defining factor, it is difficult to classify it according to the UN CPC system. The UN CPC

⁴ Some rules influencing EPD development are independent of the GPI version referred to in the PCR. For example, the latest rules on EPD verification procedures in the GPI shall be followed within 90 days of its publication. See Section 5.1 in the GPI for a description of the four categories of rules and when they shall be followed.

⁵ See https://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/construction-products_en for a list of products that are covered by a harmonized standard.

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codes listed in Table 1 are a non-exhaustive list of those included in the scope of this PCR if the products are incorporated in a permanent manner in construction works.

Table 1. Non-exhaustive list of UN CPC codes and names included in the scope of this PCR, if the application of the product is in construction.

Code	Name
151	Monumental or building stone
153	Sands, pebbles, gravel, broken or crushed stone, natural bitumen and asphalt
154	Clays
311	Wood, sawn or chipped lengthwise, sliced or peeled, of a thickness exceeding 6 mm; railway or tramway sleepers (cross-ties) of wood, not impregnated
313	Wood in the rough, including those treated with paint, stains, creosote or other preservatives; railway or tramway sleepers (cross-ties) of wood, impregnated
314	Boards and panels
315	Veneer sheets; sheets for plywood; densified wood
316	Builders' joinery and carpentry of wood (including cellular wood panels, assembled parquet panels, shingles and shakes)
362	Other rubber products
363	Semi-manufactures of plastics
369	Other plastics products
371	Glass and glass products
373	Refractory products and structural non-refractory clay products
374	Plaster, lime and cement
375	Articles of concrete, cement and plaster
376	Monumental or building stone and articles thereof
379	Other non-metallic mineral products n.e.c.
412	Products of iron or steel
415	Semi-finished products of copper, nickel, aluminium, lead, zinc and tin or their alloys
416	Other non-ferrous metals and articles thereof (including waste and scrap of some metals); cermets and articles thereof
421	Structural metal products and parts thereof
541	General construction services of buildings
542	General construction services of civil engineering works
543	Site preparation services
544	Assembly and erection of prefabricated constructions
545	Special trade construction services
546	Installation services
547	Building completion and finishing services

2.2.2 TYPE OF EPD AND INFORMATION MODULES INCLUDED

According to EN 15804 Section 5.2 the following type of EPDs are possible for construction products:

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- a) Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D).
- b) Cradle to gate with options, modules C1–C4, module D and with optional modules (A1–A3 + C + D and additional modules). The additional modules may be one or more selected from A4–A5 and/or B1–B7.
- c) Cradle to grave and module D (A + B + C + D).
- d) Cradle to gate (A1–A3).
- e) Cradle to gate with options (A1–A3 and additional modules). The additional modules may be A4 and A5.

Besides the goods-oriented types of EPD listed above, this PCR also defines the following minimum scope for a construction service EPD:

- f) Construction service EPD: Cradle to gate with modules A1–A5 and optional modules. Such an EPD will potentially be used as an information module to model processes in modules A5, B2–B5 or C1 for a construction works.

EPDs of type d and type e in the list above shall only be used if the following three conditions are valid:

- the product or material is physically integrated with other products during installation so they cannot be physically separated from them at end of life,
- the product or material is no longer identifiable at end of life as a result of a physical or chemical transformation process,
- the product or material does not contain biogenic carbon, and
- the EPD shall not be used for business-to-consumer communication.

If the packaging contains more than 5% biogenic carbon, module A5 shall be included at least for balancing out the emission of this carbon, see Annex 2.

Electric and Electronic Equipment (EEE) products included in the scope of this PCR, according to the definition in Section 2.2.1, shall include all B modules. This is in line with the requirements in EN 50693. But note that full compliance with EN 50693 is in general not possible for EPDs verified to the present PCR, as EN 15804 and EN 50693 have conflicting rules for setting the system boundary for waste flows (EN 15804 sets the system boundary at the point of end-of-waste, while EN 50693 sets the system boundary at the point of substitution) and for declaring consequences of recovered material or energy beyond the product system boundary.

EPDs of type c in the list above are only possible when using this PCR together with a complementary PCR (c-PCR). This is a stricter requirement than in EN 15804.

Table 2 provides an overview of the life-cycle stages, types of EPDs, and requirements for inclusion depending on type of EPD.

An EPD can also be classified into other types of EPDs depending on the ownership of the EPD and the products covered. These types and the corresponding additional rules are outlined in Section 4.10.

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Table 2. The life cycle of a construction product divided into life-cycle stages and information modules, and the requirements for inclusion depending on type of EPD.

Life-cycle stages	Information modules	Type of EPD			
		a) Cradle to gate with module C1-C4 and module D ¹⁾	b) Cradle to gate with options, module C1-C4, module D and optional modules ²⁾	c) Cradle to grave and module D	f) Construction service EPD: Cradle to gate with modules A1-A5 and optional modules
A1-A3 Product stage	A1) Raw material supply	Mandatory	Mandatory	Mandatory	Mandatory
	A2) Transport				
	A3) Manufacturing				
A4-A5 Construction process stage	A4) Transport	Not applicable	Optional for goods Mandatory for services (see alternative f) <i>Recommended if a default scenario can be defined</i>	Mandatory	Mandatory
	A5) Construction installation				
B Use stage	B1) Use	Not applicable	Optional	Mandatory	Mandatory/not applicable ⁶
	B2) Maintenance				
	B3) Repair				
	B4) Replacement				
	B5) Refurbishment				
	B6) Operational energy use				
C End-of-life stage	B7) Operational water use				
	C1) Deconstruction, demolition	Mandatory	Mandatory	Mandatory	Mandatory/not applicable ⁷
	C2) Transport				
	C3) Waste processing				
	C4) Disposal				
D Benefits and loads beyond the system boundary	D) Reuse, recovery, recycling, potential	Mandatory	Mandatory	Mandatory	Mandatory/not applicable ⁸
Declared or functional unit		Declared unit	Declared unit	Functional unit	Declared/functional unit ³

1, 2) An EPD may exclude the declaration of modules C1-C4 and module D if the requirements listed in Section 2.2.2 are met. These EPDs are then referred to as “d) Cradle to gate (A1-A3)” and “e) Cradle to gate with options”, respectively. 3) Type f EPDs may use a functional unit if specified by a c-PCR.

2.2.3 GEOGRAPHICAL SCOPE

This PCR may be used globally, aligning with the European standard EN 15804:2012+A2:2019/AC:2021 and the global standard ISO 21930:2017. See Section 1.5.

⁶ See the above footnote for “C End-of-life stage”. Life-cycle stage B may also be mandatory in such cases, if the physical product needs maintenance, repair, etc., between being used in subsequent construction works.

⁷ Modules C and D are mandatory if the service involves a physical product that is used in the construction, maintenance, repair, replacement, refurbishment, or demolition of several construction works. Then the end-of-life of this product is in life-cycle stage C in the EPD of the service. For example, this is the case for certain rental services. For other services, life-cycle stage C and module D are not applicable.

⁸ See the above footnote for “C End-of-life stage”.

2.2.4 EPD VALIDITY

An EPD becomes valid as of its version date (see Section 8.4.5 of the GPI). When an EPD is originally published, the validity period is normally five years starting from the version date or until the EPD has been de-registered from the International EPD System. Shorter validity periods are also accepted, for example if decided by the EPD owner.

An EPD shall be updated and re-verified during its validity if there are errors in the declared information (see Section 5.5 in the GPI for the procedure to handle complaints) or if changes in technology or other circumstances have led to:

- an increase of 10% or more in the aggregated results over included life-cycle stages for any of the declared environmental performance indicators , or
- substantial changes to the declared product information (e.g., change of manufacturing site, change of lifespan, products added in EPD of multiple products), content declaration (e.g., new material/substance, changed composition), or additional environmental, social, or economic information.

If such changes have occurred, but the EPD is not updated, the EPD owner shall depublish the EPD (see Section 6.7 of the GPI).

If the change concerns the LCA model, the EPD owner can wait in updating the EPD until there is one year data available from after the change occurred, as this aligns with the default time period for data collection according to Section 4.6.2.

For validity periods in case of updates of EPDs, see Section 6.8 of the GPI.

The version date and the period of validity shall be stated in the EPD.

Publication of a new version of the PCR or the GPI does not affect the validity of already published EPDs.

3 REVIEW AND BACKGROUND INFORMATION

This PCR was developed in accordance with the PCR development process described in the GPI of the International EPD System, including open consultation and review.

3.1 OPEN CONSULTATION

3.1.1 VERSION 1.0

Version 1.0.0 of this PCR was available for open consultation from 2019-04-09 until 2019-06-09, during which any stakeholder was able to provide comments by posting on the PCR forum on www.environdec.com or by contacting the PCR moderator.

Stakeholders were invited via e-mail or other means to take part in the open consultation and were encouraged to forward the invitation to other relevant stakeholders. The following stakeholders provided comments during the open consultation and agreed to be listed as contributors to the PCR and on www.environdec.com:

- Rafael Bueno, University of Seville
- Rob Rouwette, Start2See

The draft PCR was revised significantly after the open consultation to take into account all requirements in the final version of the standard EN 15804:2012+A2:2019 after its publication.

3.1.2 VERSION 2.0.0

This PCR is available for open consultation from 2024-10-03 until 2024-11-28 during which any stakeholder is able to provide comments by contacting the PCR Moderator and/or the Secretariat.

Stakeholders were invited via e-mail or other means to take part in the open consultation and were encouraged to forward the invitation to other relevant stakeholders. The following stakeholders provided comments during the open consultation and agreed to be listed as contributors in the PCR and on www.environdec.com:

List of stakeholder names and affiliation (to be added after the open consultation).

The draft PCR was revised after the open consultation to account for all requirements in the updated ECO Platform standards released in December 2024. (If this turns out to be the case, otherwise this sentence will be removed.)

3.2 PCR REVIEW

3.2.1 VERSION 1.0

PCR review panel:	The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com . The review panel may be contacted via support@environdec.com . Members of the Technical Committee were requested to state any potential conflict of interest with the PCR Committee, and if there were conflicts of interest they were excused from the review.
Chair of the PCR review:	Claudia A. Peña
Review dates:	2019-11-28 until 2019-12-18

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3.2.2 VERSION 1.1

PCR review panel:	The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com . The review panel may be contacted via support@environdec.com . Members of the Technical Committee were requested to state any potential conflict of interest with the PCR Committee, and if there were conflicts of interest they were excused from the review.
Chair of the PCR review:	Claudia A. Peña
Review dates:	2020-07-10 until 2020-08-31

3.2.3 VERSION 1.2

PCR review panel:	The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com . The review panel may be contacted via support@environdec.com . Members of the Technical Committee were requested to state any potential conflict of interest with the PCR Committee, and if there were conflicts of interest they were excused from the review.
Chair of the PCR review:	Claudia A. Peña
Review dates:	2021-10-24 until 2021-12-10

3.2.4 VERSION 1.3.0

PCR review panel:	The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com . The review panel may be contacted via support@environdec.com . Members of the Technical Committee were requested to state any potential conflict of interest with the PCR Committee, and if there were conflicts of interest they were excused from the review.
Chair of the PCR review:	<i>No chair appointed</i>
Review dates:	2023-03-21 until 2023-04-03

3.2.5 VERSION 2.0.0

PCR review panel:	The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com . The review panel may be contacted via support@environdec.com . Members of the Technical Committee were requested to state any potential conflict of interest with the PCR Committee, and if there were conflicts of interest they were excused from the review.
Chair of the PCR review:	<i>To be added by the Secretariat</i>
Review dates:	<i>To be added by the Secretariat</i>

3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

This PCR, PCR 2019:14 Construction products, replaced the previous PCR 2012:01 Construction products and construction services in the International EPD System, which was based on the previous version of EN 15804 (EN 15804:2012+A1:2013) and ISO 21930:2007. PCR 2019:14 was the first known PCR globally on which an EPD could be developed to comply with both EN 15804:2012+A2:2019 (EN 15804:2012+A2:2019/AC:2021, as of version 1.2 of the PCR) and ISO 21930:2017. Existing PCRs with similar scope are available in other EPD programmes.

PCR 2012:01 and PCR 2019:14 were available in parallel during a transition period that ended 2022-02-28. The previous version of PCR 2019:14, version 1.3.4, expires 2025-06-20 – until this date an EPD can be verified using either version 1.3.4 or version 2.0.0 (or later version, if available) of PCR 2019:14.

3.4 REASONING FOR DEVELOPMENT OF PCR

This PCR was developed to enable publication of EPDs for construction products (goods or services) based on ISO 14025, ISO 14040/14044, ISO 21930, EN 15804, and other relevant standards to be used in different applications and target audiences.

This PCR can be used globally because the common method described results in an EPD that follows EN 15804 and ISO 21930 (if additional requirements specified in this document are fulfilled). Depending on market requirements where the EPD is intended to be used, this PCR allows the declaration of additional environmental impact indicators that are relevant for that market (see Section 4.9).

3.5 UNDERLYING STUDIES USED FOR PCR DEVELOPMENT

The methodological choices made during the development of this PCR (functional unit/declared unit, system boundary, allocation methods, impact categories, data quality rules, etc.) were primarily based on the following documents and standards:

- General LCA method of the International EPD System as described in Annex A of the General Programme Instructions version 5.0.0,
- ISO 21930:2017,
- EN 15804:2012+A2:2019/AC:2021,
- EN 15941:2024, and
- ECO Platform standards (versions available December 2024).

See Sections 1.3 and 1.4 for descriptions of how the rules in this PCR relates to those in the above listed standards.

4 LCA METHOD

This section provides rules for the LCA method used to develop an EPD for the product category as defined in Section 2.2.1.

Guidance and examples of applying the LCA method are also available on www.environdec.com/methodology.

4.1 MODELLING APPROACH

The LCA modelling approach of the International EPD System is attributional LCA (in contrast to consequential LCA), meaning that:

- specific or average data shall be used (i.e., not marginal data), and
- allocation problems that cannot be avoided by sub-dividing the unit process into two or more sub-processes, shall be solved via allocation (i.e., not via system expansion beyond the system boundaries set by the PCR; so-called “substitution” or “credits” for avoided environmental impact shall not be used to solve allocation problems).

The purpose of using this approach is to make information traceable, documented, and possible to verify, and to support the modular use of EPDs.

The declaration of consequences of recovered material or energy beyond the product system boundary in module D (see Section A.7.5) represents consequential LCA modelling and shall therefore be separately declared. Except module D, the LCA model shall not include any other processes or mechanisms beyond the product system boundary, including carbon offsetting or similar.

4.2 DECLARED/FUNCTIONAL UNIT

See Sections 6.3.2 and 6.3.3 in EN 15804.

EPDs based on this PCR without using a c-PCR shall use a declared unit. The declared unit shall relate to the typical applications of the product and should be expressed in SI units (kg, J, meters, etc.), but other units may be used if they are more relevant (e.g., kW for power and kWh for energy).

EPDs based on this PCR together with a c-PCR may use a functional unit if allowed by the c-PCR. For information about c-PCRs, see Sections 1.1 and 1.2.

If mass is not used as declared or functional unit, the EPD shall declare a conversion factor to mass (this is not applicable for EPDs of services). A c-PCR may require additional conversion factors, for example to volume. For more rules on conversion factors, see Section 4.9.1.

For definitions of the terms declared/functional unit, see Section A.2 of the GPI.

4.2.1 REFERENCE SERVICE LIFE (RSL)

See Section 6.3.4 and Annex A in EN 15804.

Note that the RSL of a product category is the reference time period to which the performance of a product may be related to in the functional unit (for a definition and description of RSL, see Section A.2.1 of the GPI). As such, the RSL can only be declared if defined as part of the FU according to a c-PCR, unless the PCR says otherwise (in some c-PCRs, the term RSL is defined differently than above).

4.3 SYSTEM BOUNDARY

The system boundary of the product life cycle determines the processes to be included or excluded in the LCA. The system boundary for an EPD depend on the type of EPD, see Section 2.2.2.

This section describes additional requirements compared to, and specifications of, EN 15804. For further information about requirements for the setting of system boundary, see Sections 6.2 and 6.3.5 in EN 15804.

4.3.1 ASSIGNING ENERGY CARRIERS

Each module shall include the generation of electricity and production of fuels, steam and other energy carriers used in the module.

4.3.2 ASSIGNING LOSSES

Each module shall include the waste processing of waste generated in the module up to the end-of-waste state or final disposal; except waste processing of the product itself, which is included in life-cycle stage C. Also, each module shall include the upstream production and transport of such waste, i.e., any environmental burden related to a loss shall be included in the module in which the loss occurs. This means that if there is a loss of material or product in, for example, module A3 or module A5, the production, transport, and waste processing (until the end-of-waste state) or final disposal of that loss shall be included in module A3 or module A5, respectively. Because of this, there may be upstream processes that occur in several modules – such processes shall be consistently modelled (e.g., in terms of use of primary/secondary data, allocation method applied, electricity modelling) irrespective of the module in which they occur. This principle of assigning losses and their production is illustrated in Figure 3. The principle is from EN 15804 and supports the modular use of data in an EPD, for example because it facilitates the use of data from A1-A3 as it is not influenced by downstream loss rates in A5.

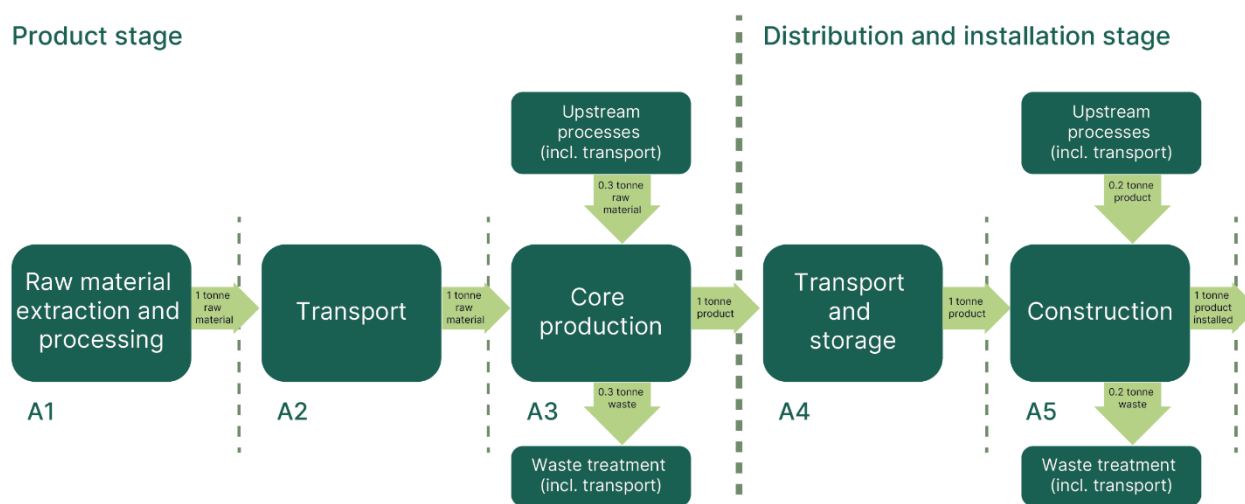


Figure 2. Illustration of the principle for assigning losses and their production.

4.3.3 SUPPORTING ACTIVITIES

Not only activities directly associated with the production at a site shall be included (e.g., the use of the production equipment), but also supporting activities such as heating of, and water use at, premises (including buildings for manufacturing, personnel, storage, etc.).

4.3.4 EPDS OF SERVICES

In the EPD of a service, the execution of the service shall be assigned to module A5, regardless of whether the service is carried out in module A5 (construction services), modules B2–B5 (maintenance, repair, replacement, refurbishment services), or module C1 (demolition services) in perspective of the life cycle of the construction works. This means that the transports to the site where the service is carried out shall be assigned to module A4.

4.3.5 EXCLUDED PERSONNEL PROCESSES

Business travel of personnel, travel to and from work by personnel, and research and development activities shall be excluded, unless the c-PCR says otherwise.

CONSTRUCTION PRODUCTS

Processes excluded based on the rules in this section shall not be considered when calculating the percentages for applying the cut-off rules of Section 4.4.

4.3.6 INFRASTRUCTURE AND CAPITAL GOODS

This section provides rules on how to model infrastructure and capital goods, which here is defined as products used in the studied product system that are not consumed (e.g., in the production or the product use) and retains their function for more than three years. Examples are the building in which the studied product or upstream materials or components are produced, machinery used in the manufacturing of the product or its materials or components, or vehicles used in transports in the product system.⁹

In general, the production and end-of-life processes of infrastructure and capital goods used in the product system shall not be included within the system boundaries. There are a few exceptions to this rule, as follows:

- For datasets on electricity or heat used in manufacturing processes in module A3 and processes under direct control of the EPD owner, as well as other processes using electricity/heat that are assessed to use more than 20% of the total electricity/heat use in the product system, at least the construction of the powerplant shall be included. This assessment can be based on plausibility considerations and expert judgement. Construction of the powerplant should be included also for other electricity/heat datasets. Other infrastructure involved in the generation and distribution of electricity/heat may also be included.¹⁰
- If infrastructure/capital goods are produced with the intention to be used one or a few times only, for example a manufacturing plant or machinery constructed to produce only one product unit. Note, however, that such plants/machinery will in general not be defined as infrastructure/capital goods according to above definition. If such infrastructure/capital goods are common in a specific product category, the PCR should provide rules for how to model such infrastructure/capital goods.
- Infrastructure/capital goods may be included if a generic LCI dataset includes infrastructure/capital goods, and it is not possible, within reasonable effort, to subtract the data on infrastructure/capital goods from this dataset.
- A c-PCR may require, recommend, or permit certain infrastructure/capital goods to be included. If this is done, the c-PCR should provide rules and guidance for how to model such infrastructure/capital goods.

If infrastructure/capital goods are included within the system boundaries, this shall be described in the EPD, unless they contribute less than 10% to the A1-A3 (A1-A5 for services) results of all the environmental impact indicators declared in the EPD (in such cases, it is still permitted to describe the inclusion of infrastructure/capital goods). The description shall include which life-cycle stages or processes that infrastructure/capital goods are included for. Furthermore, the description should¹¹ include the type of infrastructure/capital goods included (e.g., factory building, manufacturing machinery, transport vehicles, transport infrastructure, energy infrastructure). If infrastructure/capital goods are included in a generic LCI dataset used, the name of the dataset (including the database it has been derived from) shall be declared in the EPD if the full dataset (i.e., not just the infrastructure/capital goods) contributes more than 5% to the cradle-to-gate results of any of the environmental impact indicators.

The above rule to, in general, exclude infrastructure/capital goods is primarily because LCI data on infrastructure/capital goods included in generic datasets often are of inadequate and inconsistent quality, for example in terms of technical, geographical, and temporal representativeness, which may significantly increase the uncertainty of the results declared in the EPD.¹² The rule may change in the future if the quality of LCI data on infrastructure/capital goods improves.

Processes excluded based on the rules in this section shall not be considered when calculating the percentages for applying the cut-off rules of Section 4.4.

⁹ For example, if the EPD is on wind power, the power plant itself is considered the studied product and not infrastructure/capital goods. However, the buildings and machinery that make the wind turbine components are considered infrastructure/capital goods. Similarly, if the EPD is on a means of transport, the vehicle is considered the studied product and not infrastructure/capital goods.

¹⁰ These rules on modelling of infrastructure for electricity and heat production are adopted from GPI 5.0.0, and are based on several considerations, including the type of infrastructure that is included in common LCI databases and practicalities of including or excluding infrastructure in commonly used LCA software and LCI databases.

¹¹ A reason not to declare this information can, for example, be that this information is not available in the LCI dataset documentation.

¹² See, for example, Tokede & Rouwette (2023).

4.3.7 PRODUCTS USING ENERGY IN USE STAGE

EPDs of electrical and electronic equipment (EEE) shall include all B modules. Scenarios for module B6 shall represent normal (i.e., anticipated) use and be geographically representative and compliant with current regulations in the relevant geographic region. Key assumptions regarding the applied scenario in module B6 shall be documented in the EPD. Any c-PCR¹³ to this main PCR covering EEE products shall provide a specific use scenario for the product category it covers.

Module B6 shall be included also for non-EEE products that consumes energy in the use stage, directly or indirectly¹⁴.

4.3.8 OTHER RULES ON SETTING SYSTEM BOUNDARY

Boundary in time. The period for which inputs to and outputs from the product system is accounted for shall be 100 years from the year that the LCA model best represents, considering the representativeness of the inventory data. This year shall, as far as possible, represent the year of the publication of the EPD. For example, this means that leachates from landfills occurring more than 100 years into the future shall not be accounted for.

Boundary to nature and other product systems. Flows shall in general be traced so that the main inputs to the LCI are resources from nature and outputs are emissions to nature. Co-products, and waste that is processed until the end-of-waste state is reached, may enter/leave the product system from/to other product systems; see Section 4.4 for rules on how to set the boundary between product systems. Agriculture, forestry, aquaculture, and similar production systems are part of the technical system, i.e., elementary flows that originate from applied substances (e.g., fertilisers) and eventually leave to water, soil or air shall be accounted for.

Geographical boundary. The geographical boundary shall reflect the physical reality of the product under study, accounting for the representativeness of technology, input materials and input energy.

4.4 CUT-OFF RULES

See EN 15804, Section 6.3.6.

Criteria for excluding LCI data (cut-off rules) are intended to facilitate data collection and support efficient LCA modelling. All available data shall be used, and cut-offs should be avoided and shall not be done to "hide" data. Any application of the cut-off rules, including LCI data excluded based on cut-offs, shall be described in the EPD.

LCI data shall according to EN 15804 include a minimum of 95% of total inflows (mass and energy) per life-cycle stages A1-A3, A4-A5 and C1-C4, aggregated modules B1-B5 and B6-B7, and module D¹⁵. In addition, this PCR applies the expanded 5% cut-off rule of ISO 21930, which says that at least 95% of the environmental impact per such aggregated module shall be included as well.

The 5% cut-off does not include LCI data that are explicitly outside the system boundary according to the PCR, applicable c-PCR, or any normative reference standard referenced to in the PCR or the c-PCR (e.g., EN 15804 for construction products).

If less than 100% of the actual inputs or outputs are accounted for, proxy data (e.g., extrapolation of included data) should be used to achieve 100% completeness.

Exclusion of LCI data based on the cut-off rule shall be based on a sensitivity analysis and/or conservative assumptions in combination with plausibility considerations and expert judgement. This shall be documented in the LCA report in a way that makes it verifiable (it is the verifier that decides what information is necessary). As an example, plausibility of the completeness of included LCI data can be checked by comparing with LCI data on similar processes or national emissions databases.

Note: EN 15804 also specifies a cut-off criterion of 1% per unit process, which is a stricter criterion than a 5% cut-off per module (with no more than 1% cut-off per unit process, there will never be more than 1% cut-off at the module level). The implementation of the cut-off rules of EN 15804 in this PCR reflects that the 5% criterion is deemed to be sufficient, and thus the 1% criterion of EN 15804 does not apply.

¹³ This shall be understood as any c-PCR developed and published within the International EPD System, after this rule was added to this PCR.

¹⁴ "Indirectly" refers to products that store or transport energy, such as cables consuming energy through dissipation/losses, but not, e.g., windows or thermal insulation.

¹⁵ This is an interpretation and further specification of Section 6.3.6 of EN 15804, which says that cut-off criteria shall be 5% per module, specifying A1-A3, A4-A5, B1-B5, B6-B7, C1-C4 and D as examples of such modules.

4.5 ALLOCATION RULES

Sections 4.5.1 and 4.5.2 provide rules for the allocation of co-products and waste, respectively. A co-product is “any of two or more marketable materials, products or fuels from the same unit process, but which is not the object of assessment”¹⁶ and waste is a “substance or object which the holder discards or intends or is required to discard” and “a non-product” (definitions from EN 15804¹⁷). A further clarification is that waste, if eventually used for a specific purpose, requires processing to cease being waste and thus leave the product system. According to EN 15804, waste ceases being waste when all the criteria for the end-of-waste state are fulfilled, see Section 4.5.2. In other words, if any of the criteria is not fulfilled at some point, it is a waste and the waste allocation procedures of Section 4.5.2 shall be applied, and if all criteria are always fulfilled, it is a co-product and the co-product allocation procedures of Section 4.5.1 shall be applied. This is the general rule for how to distinguish between co-products and waste, and decide which allocation procedure to use. There is an exception to this general rule (as stated in EN 15804):

- All outputs from maintenance, repair, replacement, or refurbishing processes (or similar processes in life-cycle stage B), and from dismantling, deconstructing, or demolition of the product in life-cycle stage C, shall at first be considered being waste. In other words, such (post-consumer) outputs from life-cycle stages B or C shall be modelled as waste and be assumed to leave the product system when the end-of-waste criteria have been fulfilled, without an environmental burden (following the rules for waste allocation in Section 4.5.2).

Note that these allocation rules means that waste originating from life-cycle stage A1-A3 shall, just as waste originating from other life-cycle stages, be allocated according to the waste allocation procedures of Section 4.5.2. This reflects a change in the interpretation of EN 15804 compared to previous versions of this PCR, as is further described in Annex 4. The changed interpretation makes the allocation rules fully compliant with ISO 21930.

Irrespective of the allocation between product systems, the inherent properties of the product and the packaging, such as calorific content or biogenic or fossil carbon content, shall not be allocated away and shall always follow the physical downstream flow and the product system that finally uses it.

The applicable allocation rules should be followed for the entire product system, i.e., also for processes modelled with generic datasets from databases. Therefore, generic datasets may have to be modified before being used in the LCA model. Such modifications can include conservative assumptions; guidance on this is included in Section 4.5.1. Generic datasets that do not follow the applicable allocation rules, and cannot be modified or proved to be conservative, may only be used if this deviation is of minor importance for the LCA results. The deviation shall be clearly stated and justified in the LCA report, and the applied allocation method shall be in line with the allocation rules in ISO 14044.

Figure 3 illustrates when to apply co-product and waste allocation, respectively.

¹⁶ In industry vocabulary, the terms by-product, non-core products or sub-products are sometimes used to refer to co-products.

¹⁷ The definition of waste is originally from European Waste Directive 2008/98/EC (European Commission 2018).

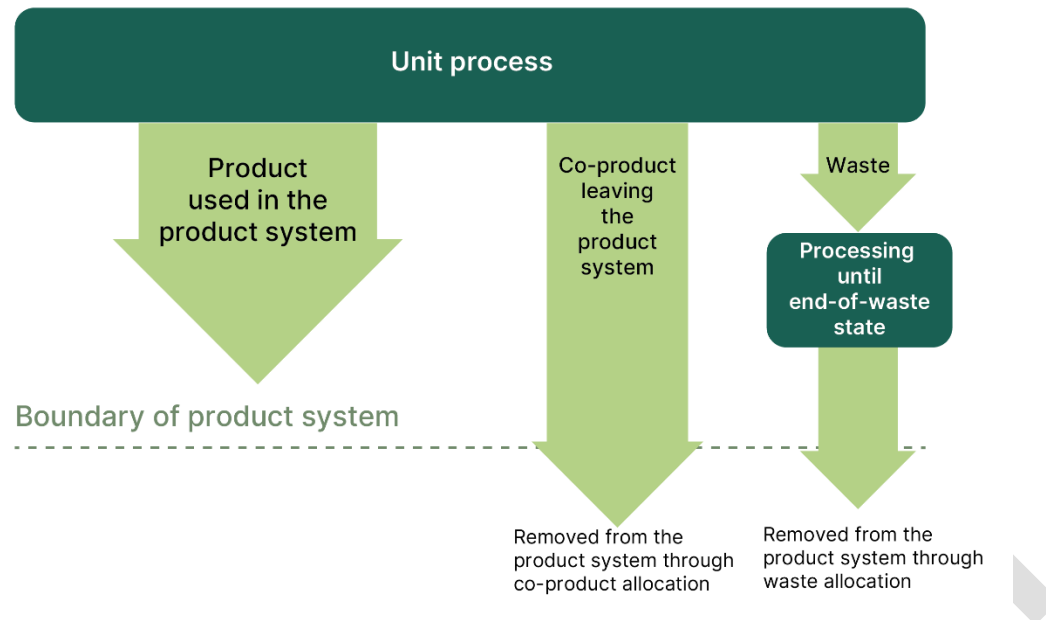


Figure 3. Illustration of when to use co-product or waste allocation. Figure adopted from the GPI.

4.5.1 ALLOCATION OF CO-PRODUCTS

In co-product allocation, the sum of inputs and outputs allocated to the product and co-products shall be equal to the total inputs and outputs of the allocated unit process, and consistent allocation procedures shall be uniformly applied to similar inputs and outputs of the product system under consideration. This means that no double counting or omission of inputs or outputs through allocation is permitted (unless a conservative assumption is made, see below).

The following stepwise procedure shall be applied for allocation of co-products:

1. Allocation shall be avoided, if possible, by dividing the unit process into two or more sub-processes and collecting LCI data for each sub-process. This option shall not be used for *joint* co-production processes, which ISO 21930 describes as follows: "...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."
2. Allocation shall be based on physical properties (e.g., mass, volume) when (i) there is a relevant underlying physical relationship between the products and co-products, and (ii) the difference in revenue per mass (or per energy unit in case of electricity, heat or similar) from the product and co-products is low. A relevant underlying physical relationship exists when the amounts of inputs and outputs are changed by quantitative changes in the amounts of products or functions delivered by the system.
3. In all other cases, allocation shall be based on economic values of the product and co-products when they leave the unit process. Economic values may, for example, be the revenue generated by the product and 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). If economic allocation is used, a sensitivity analysis exploring the influence of the choice of economic value shall be included in the LCA report.

In co-product allocation, conservative assumptions may be made when the effort of allocation is disproportionate to any improvement in accuracy. For example, flows leaving the studied product system can be assumed to have no economic value and thereby allocated no environmental burden (which yields the same results as if cut-off were used, but the EPD shall still describe the applied allocation method as co-product allocation). Furthermore, if a co-product of a previous product system is an input to the product system under study, the conservative assumption is that it comes with an environmental burden. In

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the end, a conservative assumption shall always allocate more environmental burdens to the product that is the object of the EPD than would have been allocated with a strict application of the allocation procedure.¹⁸

An example of when a conservative assumption is reasonable is when it is unknown whether an input from a previous product system left that system as a co-product or as waste (that ceased to be waste at the system boundary). Then the conservative assumption is to assume the input is a co-product that is assigned an environmental burden. This may, for example, be the case when the input is an unknown mix of pre- and post-consumer scrap, where pre-consumer scrap shall most often be allocated as a co-product (e.g., if it has a positive economic value) while post-consumer scrap shall be allocated as waste.

Allocated co-products shall not be considered in the modelling of module D.

Note that heat generated in industrial installations or in the tertiary sector (often referred to as excess heat or waste heat), that is subsequently utilised (e.g., in a district heating/cooling system) shall be allocated as a co-product, normally using economic allocation at the point of sale. This means that for users of such heat, the heat comes with an environmental burden.

4.5.1.1 Allocation of co-products used in cement and concrete

Economic allocation shall be used for processes producing co-products for use in cement and concrete, for example:

- steel production and granulated blast-furnace slag or crystallised basic oxygen furnace slag;
- coal fired electricity generation, fly ash and artificial gypsum, and other processes producing artificial gypsum;
- silicon metal and ferro-silicon alloys and silica fume; and
- aluminium-oxide-containing sources arising from aluminium and alumina production.

Economic allocation should use market prices, averaged over a period in time as defined in ISO 14044 (Section D4.3).

When assessing the environmental burden of the high value co-products (e.g., steel, electricity, silicon), the environmental burden allocated to the low value co-products used in cement and concrete can be omitted as a conservative estimate. Other allocation methods, e.g., physical partitioning, system expansion or physical allocation, shall not be used to assign impacts to these low value co-products.

Above rules are adopted from the ECO Platform standards.

4.5.2 ALLOCATION OF WASTE

The allocation of waste shall follow the polluter-pays principle that is made operational according to the below described method. This method is sometimes called the cut-off method. A main justification for using it in EPDs is that it supports the modularity principle, i.e., it enables the modular use of EPDs in a product supply chain.

The system boundary to the subsequent product system is set where the waste (e.g., the discarded product) reaches the end-of-waste state, i.e., when it has become a usable flow (e.g., for reuse, recycling and/or energy recovery). The end-of-waste state is reached when all the following criteria are fulfilled (adopted from EN 15804):

- the recovered material, component or product is commonly used for specific purposes;
- a market or demand, identified, e.g., by a positive economic value, exists for such a recovered material, component, or product;
- the recovered material, component or product fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and
- the use of the recovered material, product or construction element will not lead to overall adverse environmental or human health impacts.

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

¹⁸ Allowing conservative assumptions in allocation is according to ISO 21930.

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If an actor collects the recovered material/component/product for free, but pays for the transport, the material/component/product shall be considered to have a positive economic value when being collected. In other words, the end-of-waste state is reached before the transport.

“Overall adverse environmental or human health impacts” above refers to the limit values for pollutants set in regulations. If hazardous substances in the waste exceeds these limits, or have one or more properties as listed in applicable legislation (e.g. EU’s waste framework directive; European Commission 2018), this prevents the waste from reaching the end-of-waste state.

At the system boundary, cut-off allocation shall be applied, i.e., all unit processes before the point of end-of-waste shall be assigned to the product system generating the waste and all unit processes after the point of end-of-waste shall be assigned to the subsequent product system.

If a waste flow does not fulfil all the end-of-waste criteria, and thus does not cross the system boundary, all waste treatment processes including those of disposal shall be assigned to the product system generating the waste.

Treatment of waste classified as hazardous, if not treated/upgraded and by legalisation reclassified as a product, will, based on the above criteria, always be allocated to the system generating this waste.

If it is unknown whether the end-of-waste criteria are fulfilled, a conservative assumption shall be made. This means that in case the product under study has generated the waste, the end-of-waste criteria shall be assumed not to be fulfilled and the further waste processing and waste incineration/disposal shall be assigned to the product.

As described in the introduction to Section 4.4, flows from life-cycle stages B and C leaving the product system shall at first be considered being waste and leave the product system when reaching the end-of-waste state. If such a flow never ceases to fulfil the end-of-waste criteria, the system boundary to the subsequent product system shall be set after the last joint unit process. For example, if a material/component after dismantling of the product in module C1 has a positive economic value (i.e., there is a market demand for the material/component without any further sorting, transports, or processing), the material/component leaves the product system directly after the dismantling. It leaves the product system without any environmental burden, and any environmental burden from subsequent sorting/transport/processing is allocated to the product system using the recycled/reused material/component.

Waste may have a negative economic market value, and then the end-of-waste stage is typically reached after (part of) the waste processing and further refinement, at the point at which the waste has a positive market value. This allocation method is in most cases in line with a waste generator’s juridical and financial responsibilities. The method is illustrated in Figure 4 for a case where the market value of the waste always is positive, in which the end-of-waste stage is reached when the waste has its lowest market value. Common cases of allocation of waste treatment processes are described below.

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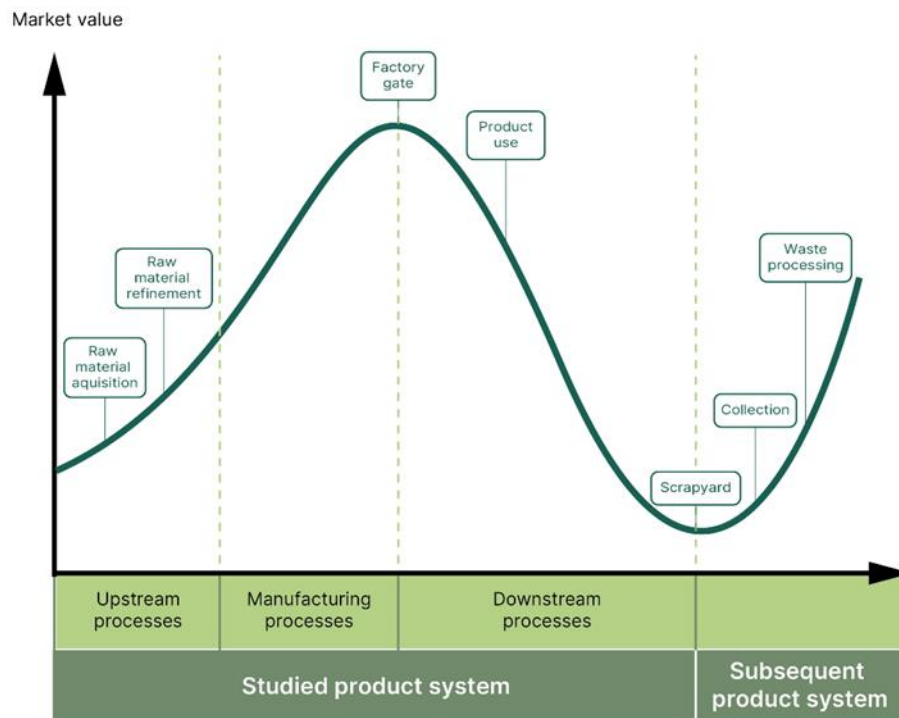


Figure 4. An example of where the system boundary between subsequent product systems involving reuse, recycling and recovery processes is set based on the allocation procedure described in the text. Figure adopted from the GPI.

For waste being recycled or reused, the environmental burden of processes until the end-of-waste state shall be assigned to the product system generating the waste, and processes after the end-of-waste state, if any, shall be assigned to the product system using the recycled/reused material flow (recycled materials are thereafter considered secondary materials). Internal scraps recycled in a manufacturing process shall not be considered an input of secondary material.

For waste incinerators that are paid for incinerating the material (i.e., the wasted material has a negative economic value), the end-of-waste state is reached after the incineration (regardless of energy efficiency). This means that all the environmental burden of collection, pre-processing and incineration of the waste shall be assigned to the product system generating the waste, and that all the environmental burden of processes after the end-of-waste has been reached, for example related to making use of the energy, shall be assigned to the product system using the energy. In contrast, if the end-of-waste state is reached before the incineration/combustion, the environmental burden of incineration/combustion (as well as processes occurring before incineration but after the end-of-waste has been reached, if any) shall be assigned to the product system using the energy. For example, this is the case if the waste incinerator pays for the material (i.e., the economic value of the material is positive) or receives it or picks it up for free, and all other criteria for the end-of-waste state are also fulfilled. For waste incineration without energy recovery, the environmental burden of collection, pre-processing and incineration of the waste shall be assigned to the product system generating the waste.

For landfilling of waste, the environmental burden of landfilling and capturing and combustion of landfill gas, if any, shall be assigned to the product system generating the waste. Burdens related to making use of the energy, if any, shall be attributed to the product system using the energy.

For waste that has not reached the end-of-waste state prior to being incinerated in life-cycle stage C, the energy efficiency of the incineration process determines whether it shall be assigned to modules C3 or C4.¹⁹ If the energy efficiency is equal to or higher than 60% for incineration installations in operation and permitted before 2009, and 65% for installations permitted after 2009, the incineration process is an energy recovery process and shall be assigned to C3. If the energy efficiency is

¹⁹ This rule has been adopted from EN 15804, where "energy efficiency" is erroneously referred to as "thermal energy efficiency" (although the calculation of energy efficiency shall consider both heat and electricity exported from the incineration installation). The rule in EN 15804 in turn refers to EU's waste framework directive (European Commission 2018), where incineration installations with energy efficiencies equal or higher than 60/65% are given the so-called "R1" status.

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below 60/65%, the incineration process is a disposal process and shall be assigned to C4. An exception is incineration of hazardous waste, which always shall be assigned to C4.

4.5.3 ALLOCATION OF MATERIALS FOR RECYCLING

Below is further guidance for how to interpret and apply the above allocation rules for the allocation of materials that are sent to recycling, such as scrap.

According to the above rules, how to allocate materials sent to recycling depend on its origin, as the allocation procedure of materials for pre-consumer recycling leaving the product system from modules A1-A5 depends on whether the material is waste or co-product (see the introduction to Section 4.4), whereas materials for post-consumer recycling from modules B and C shall always be allocated as waste.

More specific guidance on the allocation of materials for recycling is given in the following:

- If the pre-consumer material has an economic value, it will normally be classified as a co-product and shall then be allocated accordingly. However, for a flow to instead be classified as waste, and thus be allocated as accordingly, it is sufficient that one of the criteria of the end-of-waste state (see Section 4.5.2) has ceased to be fulfilled.
- Materials recycled internally in the same product system is a case of closed-loop recycling; thereby no co-products leave the product system, and no allocation shall be done. For other materials recycled internally, within a company and/or a manufacturing site in modules A1-A3, co-production allocation (specifically economic allocation) shall normally be used if the material has economic value (see the previous bullet point). Internal material value shall be used as a basis for this allocation, to account for different products produced in the same plant. If this value is zero, which shall be clearly justified in the LCA report, then the flow shall be allocated as waste.
- For externally sourced pre-consumer material originating from modules A1-A5 of another product system, economic allocation may be based on real data (if known), an estimate (if real data is unknown) or a combination thereof. For example, economic allocation may be based on how much the user of the material pays for it (real data), an estimate of the average value of the main product(s) being produced at the plant(s) from which it is sourced, and the unallocated environmental burden of such products(s) according to a generic dataset. In case the dataset has already been allocated correctly (e.g., an environmental burden has been assigned to the recycled material according to the co-production allocation rules), the dataset may instead be directly used.
- For externally sourced post-consumer material, the default assumption shall be that the end-of-waste state, where the value of the material is at its minimum, is reached when it is generated (e.g., upon the demolition of a building) and that it regains value as soon as it is collected and put in a waste container/skip. For example, for metal frames (or their offcuts) coming from a demolition site, it is from the point the steel is put in piles/skips that the material regains its value – any environmental burden from before this point is assigned to the previous product life cycle, and the environmental burdens of any subsequent transports or processing are assigned to the next product life cycle.
- If the shares of recycled materials originating from the product stage (A1-A3), construction stage (A4-A5), or use/end-of-life stages (B-C) are unknown, the average shares for recycled materials used in the sector can be assumed. If no data is available, it shall be assumed that all input recycled material is from the product stage (A1-A3), as a conservative assumption.

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We're working on providing more examples of allocation of scrap/recycled material on a new webpage: www.environdec.com/methodology.

In this work, we're considering providing default data for various materials (steel, aluminum, etc.) to use when the share of recycled material and its origin is unknown. Because of this, we're interested in collecting references to relevant data for various materials and markets, that we should consider in this work. Please E-mail pcr@environdec.com if you know about references we should consider.

We are also thinking on providing more guidance/rules on what data to use when modelling upstream inputs of materials, potentially in this PCR. One question concerns which generic data to use for upstream production of materials when primary data is not collected: can sector average data (e.g., 70% primary material, 30% recycled material) be used, or shall we require using conservative data (100% primary material). If we to allow sector averages, there'll be an incentive to use such data if the actual share of recycled material is lower than the sector average – i.e., the incentive to collect primary data is lost, and recycled materials may be double-counted. A drawback of instead requiring a conservative assumption is that many datasets available in commercial databases based on sector averages (among other with regard to shares of recycled materials) would be disqualified to be used in EPDs. Please provide input on this question in this open consultation.

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If sector-averages or conservative assumptions are used to estimate the environmental burden of inputs of recycled materials, the data cannot be qualified as primary data (see Section 4.6.1).

Some LCI databases include datasets that are described as being compliant with the allocation rules of EN 15804, but which have been modelled using cut-off allocation (i.e., waste allocation according to Section 4.5.2) for pre-consumer recycled materials (from A1-A3 processes) that are not waste. Such datasets can be used without adjustments, if the recycled material has negligible economic value so that waste allocation yields results that can be justified not to differ more than 5% compared to results using co-product allocation. Otherwise, such datasets shall be adjusted by manually adding an environmental burden in compliance with EN 15804 or as a conservative assumption. A conservative assumption may, for example, be to add an environmental burden that correspond to primary production of the same material. If such a dataset is provided in an unallocated version, the LCA practitioner can use that version and manually apply the correct allocation procedure. These data cannot be qualified as primary data (see Section 4.6.1).

If post-industrial and/or post-consumer scrap is a main input to, or output from, the product system, the allocation procedure applied shall be clearly described in the EPD. This includes information on whether the allocation has been based on real data and/or estimates, whether it is a conservative estimate, and the percentage of scrap that was assumed to come with, and without, an environmental burden. Furthermore, if the scrap inputs contribute more than 10% to the GWP-GHG results of modules A1-A3, the GWP-GHG intensity of that scrap (in kg CO₂ eq./tonne) shall be declared in the EPD.

More guidance and examples on the allocation of scrap and other flows may be found on www.environdec.com/methodology.

4.6 DATA AND DATA QUALITY RULES

The quality of the data used in the LCA model shall be addressed in the LCA report (termed “project report” in EN 15804). For further information see Sections 6.3.7, Section 6.3.8 and Annex E of EN 15804.

See Section A.5 of the GPI.

See Section 4.7 for further rules related to data and data quality per life-cycle stage and module D.

4.6.1 DATA CATEGORIES

Life cycle inventory (LCI) data are classified as primary data, representative secondary data, or proxy data, as defined below.

- Primary data²⁰ which include:
 - LCI data collected from the manufacturing plant where product-specific processes are carried out.
 - LCI data collected from other parts of the life cycle traced to the product under study, for example site-specific data on the production of materials provided by contracted suppliers.
 - LCI data from secondary data sources (e.g., databases, literature) on transportation or energyware (e.g., electricity²¹, fuels, and heat) that are combined with collected activity data on energy (quantity and type of electricity mix, fuels, heat, etc.) and transportation (means of transportations, fuels, distances, load factors, etc., of contracted transportation providers).²²
- Secondary data from, e.g., databases or literature, divided into:

²⁰ The definition of primary data is the same as the definition of “specific data” in version 4.0 of the GPI and in previous versions of this PCR, which however is different from “specific data” as defined in EN 15804 and EN 15941. As primary data here include some types of generic data, it is a broader data category than “specific data” as defined in said standards. The terms “primary data” and “secondary data” are used also in EU’s product environmental footprint (PEF) method, and in ISO 14050, but with other definitions.

²¹ Data on electricity modelled by contractual instruments or a residual grid mix shall be considered primary data. If there is no contractual instrument for demonstrating the origin of the electricity on the market, that fulfils the requirements in Section 4.7.2, data on the consumption mix of the market shall be considered primary data.

²² The reason to consider generic LCI data on transports and energyware as primary data, when combined with primary activity data, is that the representativeness of the LCI data is to a large extent defined by the activity data. Other generic LCI data (e.g., on material production) is not qualified as primary data, even if combined with primary activity data, as the representativeness to a lesser extent depends on the activity data.

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- Representative secondary data: LCI data that fulfil the data quality requirements in Section 4.6.3.
- Proxy data: LCI data that do not fulfil all the data quality requirements of representative secondary data in Section 4.6.3.

Primary data shall be used for (at least) the processes over which the product manufacturer (in EPDs of services: service provider) has operational control. Primary data shall be used also for other processes, when available, otherwise secondary data may be used. The c-PCR may set stricter rules for using primary data in selected processes outside the manufacturer's operational control. For EPDs owned by traders (e.g., retailers and wholesalers), there are stricter rule for using primary data, see Section 4.10.3.

Representative secondary data should be used in cases in which they are representative for the purpose of the EPD, for example for bulk and raw materials purchased on a spot market.

Data quality requirements of primary and secondary data are outlined in below Sections 4.6.2 and 4.6.3. In addition to these requirements, any data used (including proxy data) shall be based on attributional LCA modelling (e.g., not be based on marginal data and not include credits from system expansion).

If data that meets the requirements on primary or representative secondary data are not available, proxy data may be used. Proxy data shall not contribute to more than 10% of the A1-A3 (A1-A5 for services) results for any of the impact indicators.

4.6.2 DATA QUALITY REQUIREMENTS FOR PRIMARY DATA

For primary data, the following rules apply:

- Data should be averaged over at least one year of operations (this year does not need to be a calendar year); deviations shall be justified. A deviation may for example be justified if production under normal conditions only occurs during part of a year (e.g., only once, during a certain season each year, or as batch production a few days a year), or if the product is not yet, or recently, on the market, see Sections 4.10.4 and 4.10.5. Data for more than one year of production shall be used when year-to-year variations are large, so that, for example, five-year averaged data is more representative for the coming year.
- When data is averaged over several machines or manufacturing sites, the production volume per machine/site shall be accounted for (for other rules and guidance on modelling based on several manufacturing sites, see the last three paragraphs of Section 4.10.1).
- The period for data collection should be as recent as possible; deviations shall be justified. A possible justification for a deviation is when disruption in the recent year effects representativeness of the data.
- The reference year of the data shall not be more than five years old and shall be representative for the validity period of the EPD (if not, the EPD shall be updated, see Section 2.2.4). The reference year, which does not need to be a calendar year, is the latest year in which the data provider confirmed the data to be representative, i.e., the starting year for the most recently set validity period.²³ This means that primary LCI data can have been collected more than five years ago, but the representativeness shall have been reassessed and confirmed by the data provider (the manufacturer/service provider) within the past five years.²⁴
- Inputs to and outputs from the product system shall be accounted for over a period of 100 years.

²³ This definition of "reference year" is a specification and merge of the definitions in EN 15804, EN 15941, ISO 21930 and in the ILCD format.

²⁴ This reassessment can, for example, be done based on collected metadata, which is also part of the primary data. That is, it can be that some data (LCI or meta data) has been collected within five years, but some of the primary data is older than five years but has been confirmed to still be representative by the more recently collected data. An example: the amount of electricity a machine uses and the emissions it emits was measured seven years ago; but within the past five years the producer has confirmed the same machine is still used and has provided updated data on how much the machine is used per product output and the type of electricity used to run the machine.

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- Data shall comply with the rules on system boundaries and the cut-off rule of this PCR.

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Here the definition of "reference year" has been clarified compared to GPI 5, EN 15804, EN 15941 and previous versions of this PCR. We're considering to also add that primary data can be conservative – at least when updating the EPD. For example, consider the following situation:

An EPD has been published. In the annual check, or when updating the EPD to prolong its validity, unexpected technical or practical issues have occurred that render it impossible to – at least temporarily – collect new primary LCI data for all included manufacturing plants, which means that some LCI data may be more than five years old and cannot be confirmed to be "representative" (in a strict sense). But based on collected metadata, the data can be confirmed to be conservative. The question is whether the EPD can be updated based on primary data that is proved to be conservative. In other words, can data be concluded to be "representative", and hence qualify as primary data, if it is conservative? If this is allowed, it could be connected to requirements that the reason for why data cannot be collected shall be included in the LCA report and that the use of conservative data shall be transparently declared in the EPD.

Note that other conservative modelling assumptions are allowed, for example with regard to allocation (see Section 4.5).

Feedback on this is welcome during the open consultation.

4.6.3 DATA QUALITY REQUIREMENTS FOR REPRESENTATIVE SECONDARY DATA

For representative secondary data used, the following rules apply:

- The reference year shall be as current as possible and not represent a reference year older than 10 years (if not, the EPD shall be updated, see Section 2.2.4), and should be representative for the validity period of the EPD. The reference year is defined as above for primary data, but for secondary data the provider of the data is often a commercial provider of generic datasets, which then often has set the reference year. Note that the reference year is not necessarily the year of data collection, modelling, calculation, or publication.
- The 5% cut-off rule (as described in Section 4.4) shall be met on the level of modules.
- The technological, geographical, and temporal coverage of the data shall as much as possible reflect the physical reality of the declared product/product group.
- The data shall be checked for plausibility (e.g., by mass or energy balance, or by comparisons with other relevant sources of information).
- Datasets from databases should be from the latest version of the database. If not, the database version shall not be older than two years counting from when the EPD was published with a new validity period.

Examples of data that do not fulfil the above requirements, and therefore are classified as proxy data, are extrapolated data (to reach 100% completeness, see Section 4.4), data whose reference year is more than 10 years old, data based on a different geographical scope, or data based on a different (but similar) chemical/material/fuel than what is actually used in the manufacturing.

A c-PCR may provide examples of datasets to be used, of specific relevance for the product category, if these are considered to fulfil the above requirements. Listing such databases in the c-PCR does not replace the need for data quality assessment during the LCA study.

4.6.4 DATA QUALITY ASSESSMENT AND DECLARATION

A data quality assessment that complies with EN 15941 shall be done and reported in the LCA report. This assessment shall cover data that together contribute to at least 80% of the results of each of the declared environmental impact indicators. The assessment shall cover at least the geographical, technical, and temporal representativeness of the data, and account for the precision, completeness, consistency, and sources of the data. The assessment shall be done using the data quality level and criteria schemes of UN Environment Global Guidance on LCA database development or the product environmental footprint (PEF) method (European Commission 2021).²⁵ The assessment shall also fulfil the other requirements in EN 15941. A summary of the assessment shall be included in the LCA section of the EPD.²⁶ C-PCRs may set further requirements on the assessment.

In addition, for all processes contributing with more than 10% to the GWP-GHG results of modules A1-A3 (for EPDs of services: modules A1-A5), the following shall be declared in the LCA information section of the EPD:

²⁵ Both these schemes are outlined in Annex E of EN 15804.

²⁶ Annex C in EN 15941 provides examples of good practice of the data quality reporting in EPDs.

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- Type of source: “database”, “collected data”, “EPD”, etc.
- Source: database and its version number, provider of collected data (e.g. “EPD owner”, “supplier”), EPD registration number (unless confidential²⁷), etc.
- Reference year.
- Data category: “primary data” or “secondary data” (optionally divided into “representative secondary data” and “proxy data”).
- Share of GWP-GHG results of modules A1-A3 (A1-A5 for services) coming from primary data.²⁸

Above information shall be reported also for other A1-A3 (A1-A5 for services) processes, but this does not have to be done per process. Furthermore, reference year(s) of the data of the manufacturing processes in A3 (for EPDs of services: service provision processes in A5) shall be declared even if they contribute with less than 10% to the GWP-GHG results of modules A1-A3 (A1-A5 for services). Databases (including version number) shall be reported also for processes in modules A4-C that contribute with more than 10% to the GWP-GHG results over all included life-cycle stages.

Also the total share of primary data contributing to the GWP-GHG results in modules A1-A3 (A1-A5 for services) shall be declared. If this share is more than 90%, “>90%” may be reported.

In connection to the reported shares of primary data, the EPD shall include the following statement: “The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.”

The share of representative secondary and proxy data for modules A1-A3 (A1-A5 for services) may also be reported in the EPD.

The calculations of the shares of primary data shall be clearly shown in the LCA report.

When the EPD uses another EPD as a data source, it may not be possible to calculate the share of primary data (for example if the other EPD has not reported this, or the underlying LCA data cannot be accessed). If this is the case, an assessment on the share of primary data may be made based on the information available in the EPD used as data source. If such a simplified approach is used, and the reported share of primary data is above 30%, the following statement shall be included in the EPD: “The reported share of primary data is associated with uncertainty, as one or several EPDs that are used as data source lack information on the share of primary data used.” Alternatively, the EPD used as a data source can conservatively be assumed to be based on 0% primary data.

See Table 3 for an example of how above information can be reported in the EPD.

²⁷ A reason for confidentiality can, for example, be that the EPD owner does not want to disclose its suppliers.

²⁸ The rationale behind this indicator is to incentivise the collection and use of primary data along product supply chains, and thus support a long-term development where EPDs increasingly are based on primary data.

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Table 3. Example for the declaration of sources and share of primary data.

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Manufacturing of product	Collected data	EPD owner	2023	Primary data	10%
Generation of electricity used in manufacturing of product	Database	Ecoinvent v3.10	2024	Primary data	15%
Transport of steel to manufacturing site	Database	Ecoinvent v3.10	2024	Primary data	10%
Production of steel	EPD	S-P-XXXXX	2021	75% primary data, 25% generic data	20%
Production of aluminium	Database	Ecoinvent v3.10	2024	Representative generic data	0%
Production of packaging	EPD	<i>Confidential</i>	2022	30% primary data, 70% generic data	3%
Other processes	Databases	Ecoinvent v3.10, Gabi v2022.2	2019-2024	Representative generic data, proxy data	0%
Total share of primary data, of GWP-GHG results for A1-A3					58%

4.7 OTHER LCA RULES

For specific LCA rules per life-cycle stage, see Section 4.8.

4.7.1 MASS BALANCE

Mass balance approaches (MBAs) are sometimes used in LCA contexts to claim biobased, renewable, recycled, or other types of product content. MBAs are based on organisations (e.g., integrated chemical production systems) and not on single product systems, and they apply calculations and mass balance criteria that are not based on the physical relationship between input resources and product content. With MBA, the content of the product may be claimed to be, for example, biobased, renewable, or recycled, even if biobased, renewable, or recycled raw materials are not physically present in the product. Because of this, the current position of the International EPD System is that MBAs do not follow EN 15804 and related standards and shall not be used in EPDs. If MBAs are further developed, exemptions may be done in specific PCRs unless it violates applicable standards (e.g., for construction products: EN 15804 or ECO Platform standards). Such exemptions shall be justified and approved in the PCR development process.

Note: The above rules on MBA concerns not only the content of the main product studied, but also the content of materials and products used in the product system. Biogas supplied through grids and used for energy purposes in the product system are exempted from these rules (see Section A.6.3).

Note: The “rolling average percentage method”, which is defined as a mass balance model in ISO 22095, is not considered an MBA in this PCR. When production is averaged over 1 year, which is the normal procedure in EPDs, this is an application of the rolling average percentage method. This is a mass balance model in the sense that individual products may not have the same biobased, renewable, or recycled content as the average product produced during the year.

4.7.2 ELECTRICITY MODELLING

Electricity used in the product system can be internally generated, from a directly connected supplier, or from a grid (this division of used electricity is adopted from ISO 14067).

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For the modelling of internally generated electricity, data for that electricity shall be used in case no contractual instrument demonstrating the origin of that electricity has been sold to a third party. If such contractual instruments have been sold to a third party, the electricity shall be modelled as it was from the grid.

For the modelling of electricity from a directly connected supplier, data for that electricity, obtained from the supplier, should be used, if there is a dedicated transmission line between the supplier and the facility using the electricity and no contractual instruments have been sold to a third party. If there is no dedicated transmission line or if contractual instruments have been sold to a third party, the electricity shall be modelled as it was from the grid (see below). If data cannot be obtained from the supplier, proxy data representing the same power source may be used.

For the modelling of electricity from the grid, market-based modelling shall be used (except for specific processes, see Section 4.8). In market-based modelling, contractual instruments (e.g., Guarantees of Origin) may be used to demonstrate the use of a specific electricity mix. The contractual instrument shall ensure reliability, traceability, and the avoidance of double counting. To ensure this, the contractual instrument shall:

- convey the information associated with the unit of energy delivered together with the characteristics of its generation of production,
- be assured with a unique claim,
- be tracked and redeemed, retired, or cancelled by or on behalf of the reporting entity,
- is produced as close as possible to the period to which the contractual instrument is applied and comprises a corresponding timespan, and
- be produced in the country, or within the market boundaries where electricity use occurs if the grid is interconnected.²⁹

When using contractual instruments in the LCA model, documentation on the purchase and cancellation of the contractual instruments shall be provided to the verifier. This documentation shall include the generator/provider of the electricity, type(s) and quantity of electricity, purchaser of the contractual instruments, period for issue and validity of the contractual instruments. Furthermore, the documentation should specify the addresses of the power plants, tracking numbers, and information on the existence of a certificate on direct coupling (yes/no)³⁰; if this information is not available, it shall be justified in the LCA report. If proof of cancellation is not available, the manufacturer shall, to the verifier, provide proof that they have asked the provider of the contractual instrument for confirmation of cancellation.

The amount of electricity represented by the purchased contractual instrument in one year, shall correspond to the amount of electricity (for which contractual instruments are claimed) used to produce the corresponding annual sales volume of the product. Also, the manufacturer shall make a commitment to buy contractual instruments for the full validity period of the EPD (that contractual instruments are continued to be purchased shall be checked in the follow-up procedure, see Section 6.4.2.3).

The EPD shall contain information on how electricity has been modelled for electricity used in A3 processes (A5 processes for services) and other processes under the control of the EPD owner, for example including whether a contractual instrument and/or the residual electricity mix has been used. For these processes, the EPD shall also declare the energy source behind the electricity used and its climate impact as kg CO₂ eq./kWh (using the GWP-GHG indicator³¹). The EPD should also contain information on how electricity has been modelled for other upstream and downstream processes, if relevant and the information is available.

After specific electricity backed up by a contractual instrument, the residual mix or the consumption mix on the market are the next options in the hierarchy for electricity modelling (see specific rules per life cycle stage in Section 4.8). The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total consumption mix. If the residual grid mix of the market is not publicly available, it can conservatively be assumed to be the consumption mix of the market minus the renewables of that mix. The market shall be defined as being the (residual or consumption) grid mix of the country where the electricity is used, with exceptions for specific countries for which a sub-national (residual or consumption) grid mix shall be used: Australia, Brazil, Canada, China, India, and USA.

²⁹ In Europe, the European Continental (UCTE), Nordic, United Kingdom, Ireland, and Baltic electricity grids shall be considered to be interconnected. Furthermore, if processes within the system under study are located in small island developing states (SIDS), the contractual instruments may be used for such processes, irrespective of grid interconnectivity. SIDS are defined by the United Nations (UN 2018).

³⁰ A certificate on direct coupling says that the contractual instrument is linked to the underlying electricity and that the electricity generator (the power plant) delivers it together with the electricity to the electricity provider.

³¹ For electricity, the GWP-GHG results are identical to the GWP-total results.

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If the electricity mix changes during the EPD validity (e.g., if the contractual instruments are no longer valid or if the electricity mixes they represent change) in a way that has an impact on the results or other contents of the EPD, the rules in Section 2.2.4 on when an update it mandatory shall be followed. Such updated may be done even if the change has not been in place for one year.

For an entity (e.g., a manufacturing site) producing more than one product, contractual instruments for electricity shall not be assigned to specific products unless a separate electricity supply³² and electricity contract is in place. Accordingly, if the contract for purchased electricity is done at a site level, any contractual instruments purchased shall be evenly assigned to all product produced at that site. If a site produces several products, the purchased contractual instruments in one year shall thus correspond to the electricity used to produce the corresponding annual sales volume of all the products.

Internally generated electricity that exits the product system shall not be deducted from inputs of electricity. In other words, it is not the net purchased electricity that shall be considered. Benefits from exported electricity shall instead be considered in module D.

Further electricity modelling guidance for specific markets may be added to future updates of the GPI or on www.environdec.com/methodology.

The above outlined market-based electricity modelling approach shall be used for the main environmental performance results. Additionally, results based on location-based electricity modelling (i.e., using the consumption mix on the market to model all electricity used in the product system and module D) may be declared in a subsection of the environmental performance section, see Section 6.4.7.

Above rules on contractual instruments and their use in EPDs merge the criteria of ISO 14067, EN 15941 and ECO Platform standards (Verification guidelines for ECO EPD programmes version 07 and LCA calculation rules and specifications for EPDs version 01).

Note: The contractual instrument of the EU, Guarantees of Origin, fulfil the above criteria if the required documentation is made available to the verifier.

Note: The composition of the residual grid mixes on the market are available for all EU countries and a few additional European countries through the Association for Issuing Bodies (AIB 2024).

Note: For electricity markets without contractual instruments fulfilling the above criteria, the residual mix will be identical to the consumption mix.

4.7.3 BIOGAS MODELLING

Biogas used in the product system can be internally generated, from a directly connected supplier, or from a grid.

The LCA model shall assume the use of biogas in case it is internally generated or is delivered by a dedicated supply (a pipeline or another form of transport) between the biogas plant and the process using the biogas, in case no contractual instruments (biogas certificates) have been sold to a third party. In case biogas certificates have been sold to a third-party, the residual gas mix shall be assumed.

For biogas supplied through a grid and used for energy purposes in the studied product system, market-based modelling shall be used (except for specific processes, see Section 4.8), following the below rules adopted from EN 15941:

- Biogas certificates can only be used if the gas is supplied from a grid and if the supplier can guarantee that the biogas meets the requirements for tracking and traceability (which are the same as for contractual instruments for electricity, see Section 4.7.2).
- Gas from a grid purchased without certificates shall be modelled using the residual mix (which most often will be 100% natural gas).
 - For gas grids without contractual instruments fulfilling the above criteria, the residual mix will be identical to the consumption mix (the average annual mix of biogas and natural gas supplied in the grid).

³² "Separate electricity supply" here refers to spatially separate supply. I.e., it is not sufficient that the electricity supply is separated in time. This means that the manufacturer cannot claim that electricity associated with contractual instruments is used during a certain time period of the year, and that the residual grid mix is used during the rest of the year.

CONSTRUCTION PRODUCTS

- As long as AIB (see Section 4.7.2) or an equivalent organisation does not provide datasets for residual gas mixes and this is not provided in generic LCI databases, the residual mix shall be calculated following the AIB guidance for green electricity as closely as possible or be conservatively assumed to consist of 100% natural gas.
- The EPD shall contain information on how biogas has been modelled for biogas used in A3 processes (A5 processes for services) and other processes under the control of the EPD owner, for example including whether biogas certificates and/or the residual gas mix has been used. For these processes, the EPD shall declare the climate impact of the gas used as kg CO₂ eq./MJ (using the GWP-GHG indicator).
- For an entity (e.g., a manufacturing site) producing more than one product, biogas certificates shall not be assigned to specific products unless a separate biogas supply³³ and biogas contract is in place. Accordingly, if the contract for purchased biogas is done at a site level, any biogas certificates purchased shall be evenly assigned to all product produced at that site. If a site produces several products, the biogas certificates purchased in one year shall, thus, correspond to the biogas used to produce the corresponding annual sales volumes of all the products.

For gas supplied in a grid and used as feedstock, location-based modelling shall be used; in other words, the consumption mix shall be assumed (i.e., the annual average mix of biogas and natural gas supplied in the grid).

The above outlined market-based modelling for biogas supplied in a grid and used for energy purposes, shall be used for the main environmental performance results. Results based on location-based biogas modelling (i.e., using the consumption mix) may be additionally declared in a subsection of the environmental performance section, see Section 6.4.7.

4.8 SPECIFIC RULES PER LIFE-CYCLE STAGE AND MODULE D

Below are further data quality requirements and other LCA rules per life-cycle stage, and for module D, of relevance for the product category. Rules in EN 15804 per life-cycle stage also apply.

4.8.1 PRODUCT STAGE, A1-A3

The product stage extends from the extraction of any energy or material resources from nature (see Section 4.3.8) upstream in the supply chain until the product leaves the final factory gate of the product stage.

For modelling of the product stage, the following rules apply:

- Primary data shall be used for:
 - processes under operational control of the EPD owner, and
 - manufacturing and assembly of the product (not applicable for services).

In EPDs of services, the execution of the service is under operational control of the EPD owner, and this primary data shall be used for the quantities of materials, chemicals, steam, heat, electricity, etc., used in the execution of the service in module A5. C-PCRs of services may set further rules on processes that require primary data.

- Primary data should be used for:
 - production of main parts, packaging, or main auxiliaries by suppliers, where relevant (e.g., if its contribution is more than 5% to the environmental performance results), activity data for transports (means of transportations, fuels, distances, load factors, etc.) of main parts and components along the supply chain, and of raw materials and chemicals to the manufacturing plant/place of service provision, and

If primary data is not used for these processes, this shall be justified in the LCA report.

- In case primary data is not available and not required according to above bullet points or applicable PCR, secondary data may be used (see Section 4.6.1).
- When consumer packaging shows the logo of the EPD owner, the LCA report should report to what extent the EPD owner has direct control of the production of this packaging.
- Electricity used in A1-A3 processes shall be modelled according to this priority:

³³ "Separate biogas supply" here refers to spatially separate supply. I.e., it is not sufficient that the biogas supply is separated in time.

CONSTRUCTION PRODUCTS

1. Market-based modelling, using:
 - specific electricity mix as generated, or purchased by an electricity supplier, demonstrated by a contractual instrument (e.g., Guarantees of Origin) as provided by the electricity supplier, or
 - the residual electricity mix on the market.³⁴
2. Location-based modelling, i.e., the electricity consumption mix on the market. This option shall not be used for electricity used in A1-A3 processes over which the manufacturer (often the EPD owner) has direct control. If location-based electricity modelling is used in upstream secondary datasets, this shall be justified and declared in the LCA report.

Note 1: According to EN 15804, A1 shall include raw material extraction and processing, and processing of secondary material input (e.g. recycling processes). Transportation between these processes shall also be included in A1.

Note 2: In a subsection of the environmental performance section, it is possible to additionally declare results based on location-based electricity modelling for all processes, also the manufacturing processes in A3 and processes under operational control of the EPD owner. See Section 6.4.7.

4.8.2 CONSTRUCTION PROCESS STAGE, MODULES A4-A5

The construction process stage extends from the moment the product leaves the final factory gate of the product stage (A1-A3) until the end user starts using the product.

For modelling of the construction process stage, the following rules apply:

- Primary data shall be used for processes under operational control of the EPD owner (e.g., this is often the case for EPDs of construction services).
- Data for the construction process stage are usually based on scenarios, but actual data should be used when available and relevant (e.g., for processes under operational control of the EPD owner, see the previous bullet point). Any scenarios used shall be clearly described in the EPD (e.g., including distances and means of transport in module A4).
- Transport of the product to the construction site shall be described in the EPD, if relevant, and be modelled according to this priority:
 1. Actual transportation modes and distances to a specific customer or market, representing the geographical scope of the EPD.
 2. A weighted average of transportation modes and distances, based on transportation to several customers or markets, representing the geographical scope of the EPD.
 3. A default transportation scenario of relevance to the product category and (for the product category) common markets, if specified in the c-PCR.
- Electricity used in transports or construction/installation shall be modelled using the electricity consumption mix on the market, except for processes under direct or indirect³⁵ operational control of the EPD owner, for which the electricity modelling hierarchy of Section A.7.1 shall be followed. The electricity mix used in these processes shall be documented in the EPD, if relevant (in line with Table 10 of EN 15804).
- End-of-life processes of the packaging of the product shall typically be included in module A5. The modelling of these and other end-of-life processes in modules A4-A5 shall follow the rules for defining end-of-life scenarios outlined in Section 4.8.4.

³⁴ If the composition of the residual grid mix has not been publicly disclosed, it can conservatively be assumed to be the consumption mix on the market minus the renewable electricity of that mix.

³⁵ Indirect operational control refers to when the EPD owner enters into an agreement with the company in direct control of the downstream process, that guarantees the use of a specific electricity mix backed up by a contractual instrument. In such a situation, requirements on the documentation on the purchase of contractual instrument is the same as if the process was under direct operational control of the EPD owner.

4.8.3 USE STAGE, MODULES B1-B7

The use stage extends from the moment the end user starts using the product (after, e.g., construction/installation) until it leaves its place of use and enters the next process (e.g., an end-of-life process or a transport to end-of-life). Note that this stage includes the production of consumables, replacement parts, etc., used in the use stage, as well as end-of-life processes of any waste that is generated in this stage (see Section 6.2.4 of EN 15804).

To ensure consistency between EPDs for the same product category, c-PCR developed within the International EPD System shall:

- clearly indicate if the use stage shall, should or may be included,
- define which use-stage processes that shall be included or excluded (any exclusion shall be justified),
- clearly indicate if the use stage shall be modelled with scenarios or not, and if scenarios are to be used:
- provide default data/scenarios.

For modelling the use stage, the following rules apply:

- Primary data shall be used for processes under operational control of the EPD owner.
- Data for the use stage are usually based on scenarios, but actual data should be used when available and relevant; for example, it may be relevant for EPDs of certain services. Any scenarios used shall be clearly described in the EPD.
- Data on direct emissions in module B1 should be based on documented tests, verified studies in conjunction with average or typical product use, or recommendations concerning suitable product use. Whenever applicable, test methods shall be internationally recognised.
- The electricity use for the use/operation of the product shall be modelled using the electricity consumption mix on the market, except for processes under direct or indirect³⁶ operational control of the EPD owner, for which the electricity modelling hierarchy of Section 4.8.1 shall be followed.³⁷ The electricity mix of the use/operation shall be declared in the EPD, if relevant.
- The modelling of any end-of-life processes in modules B1-B7 shall follow the rules for defining end-of-life scenarios outlined in Section 4.8.4.

See Sections 6.3.5.4 of EN 15804 for further rules on the modelling of the end-of-life stage.

4.8.4 END-OF-LIFE STAGE, MODULES C1-C4

End-of-life treatment processes of the product may depend on the destination of the product and on the end-of-life treatment alternatives available where the product is expected to be disposed. For these reasons, the end-of-life may be evaluated using one or several scenarios. If several scenarios are used, the results of the most probable scenario shall be declared in the main results of the environmental performance section and the other scenarios shall be declared in a separate subsection (see Section 6.4.7). If any of the declared scenarios is a mix of end-of-life alternatives (reuse, recycling, incineration with energy recovery, landfill, etc.), also the corresponding 100% scenarios (100% reuse, 100% recycling, 100% incineration with energy recovery, 100% landfill, etc.) shall be declared. In other words, the 100% scenarios of relevance for the intended market shall be declared.³⁸ Note that a 100% scenario of, for example, recycling, means that a product is to 100% sent to recycling; but as there may be losses in the recycling process or parts of the product cannot be recycled, the share that is actually recycled may be lower than 100%.

The following general rules (adapted from EN 15804) shall be considered when defining end-of-life scenarios:

³⁶ Indirect operational control refers to when the EPD owner enters into an agreement with the company in direct control of the use/operation of the product, that guarantees the use of a specific electricity mix backed up by a contractual instrument. In such a situation, requirements on the documentation on the purchase of contractual instrument is the same as if the process was under direct operational control of the EPD owner.

³⁷ For example, this may be the case for EPDs of certain services.

³⁸ This is to facilitate modular use of EPDs, so that a downstream EPD or building-level assessment can create their own end-of-life scenario based on the 100% scenarios from EPDs of input products.

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- Scenarios shall be realistic and representative for the most probable end-of-life treatment alternatives considering the geographical scope of the EPD, with the exception that relevant 100% scenarios shall be declared (see above) even if they are not realistic.
- Scenarios shall not include processes or procedures that are not in current use, or which have not been demonstrated to be practical.
- The assumed scenarios shall be described in the EPD, in a way that makes it clear that they reflect possible and realistic end-of-life treatment alternatives in specific markets. The description shall include distances and means of transports in module C2.

Additionally, the following rules apply when modelling the end-of-life stage:

- Primary data shall be used for processes under operational control of the EPD owner.
- Electricity use shall be modelled using the electricity consumption mix on the market, except for processes under direct operational control of the EPD owner, for which the electricity modelling hierarchy of Section 4.8.1 shall be followed. The electricity mix of the end-of-life stage shall be documented in the EPD, if relevant.

See Section 6.3.5.5 of EN 15804 for further rules on the modelling of the end-of-life stage.

If data specific for the intended market is missing for modelling module C1, and the product is intended to be part of a building as built, the default data in Table 4 shall be used.

Table 4. Default data for modelling module C1. Reference: Erlandsson et al. (2015).³⁹

Process in C1	Energy carrier	Quantity [kWh/tonne]
Demolition/deconstruction of concrete	Diesel	10
Demolition/deconstruction of masonry, tiles and paver blocks	Diesel	5
Demolition/deconstruction of steel	Diesel	1.1
Demolition/deconstruction of wood and other materials	Diesel	1.1

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The above default values have been added in this version of the PCR. The problem the default values are intended to avoid is that some EPDs owners assume zero impact from C1 without justification.

The values in the table are now according to the given reference, but we're considering to instead provide conservative values, for example adding 20% or 50% to the values. This would create a stronger incentive to collect data for the specific market.

Feedback on this is welcome during the open consultation, including input on changing to conservative values or suggestions of other relevant references to use.

4.8.5 CONSEQUENCES FOR RECOVERED MATERIAL/ENERGY BEYOND THE PRODUCT LIFE CYCLE (MODULE D)

Module D declares the environmental consequences of the net flows of recovered materials (for reuse, recycling, or energy recovery) or exported energy (recovered energy from, e.g., waste incineration with energy recovery) that have fulfilled the end-of-waste criteria and leave the product life cycle (modules A-C). The modelling of these potential consequences outside the product life cycle is conceptually different from the approach used to model modules A-C. The results of module D shall therefore be declared and considered separately from the results of modules A-C, and not be included in any declaration of aggregated results.

The following modelling rules apply for module D (see also Section 6.3.5.6 of EN 15804):

³⁹ The data reflects the mass-dependent part of the energy used in demolition of buildings according to Erlandsson et al. (2015), but ignores the building-dependent parts of the energy used in demolition, which by Erlandsson and colleagues are stated per m² gross floor area (GFA) and per tonne material for joists more than 6 m above the ground. As such the default data in Table 4 is a simplification of the data in Erlandsson et al. (2015).

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- Each scenario for life-cycle stage C shall have a corresponding scenario in module D.
- Assumptions in the modelling of module D, including information on the net flow entering module D, shall be transparently declared in the LCA report and in the EPD.
- Net output flows of recovered material/energy from modules A-C shall be considered in module D, i.e., the outputs minus the inputs of the same flow in the LCI. This flow can be positive or negative. Outputs from modules A-C that have been allocated as co-products shall not be considered in module D (see Section 4.5.1).
- Module D shall include the benefits from avoiding the production (including the upstream environmental burdens) of materials/energy substituted by the recovered materials/energy. The substituted material/energy, and its production, shall be assumed to be the average on the market as defined by the geographical scope of the EPD. The substituted material/energy, and its production, shall not be modelled using marginal LCI data (as often done in consequential LCA modelling).
- Module D shall include the environmental burdens of further processing of the recovered energy/material until it is functionally equivalent to the assumed substituted material/energy. The yield of these processing steps shall be accounted for.
- If the recovered energy/material is of lower quality than the substituted energy/material and thus not functionally equivalent, a quality adjustment factor (0-100%) shall be applied, e.g., based on the price ratio. For example, if the quality adjustment factor is 50%, 1 tonne of the recovered material shall be assumed to replace 0.5 tonne of the substituted material.
- The terms used in the previous three bullet points ("benefits from avoiding the production", "substituted material/energy", etc.) reflect the case when the net flow of recovered materials/energy is positive. When the net flow is negative, module D will instead reflect the drawbacks of compensating a net loss of recoverable materials/energy. The rules in the previous three bullet points apply also for such cases.
- Module D is based on a scenario and the results are highly dependent on the assumptions made. The net results for module D can be negative (an environmental benefit) or positive (an environmental burden).
- Module D is outside the product system/life cycle (modules A-C).
- Uptake and emissions of biogenic carbon dioxide shall be balanced out within module D, i.e., its contribution to GWP-biogenic shall be zero.⁴⁰

Using the variables of Annex D of EN 15804, as well as the material yield (Y), the net flow to account for in module D can be described by the difference between $M_{MR\ in}$ and $M_{MR\ out}$, where:

- $M_{MR\ in}$ = amount of input material to the product system that has been recovered (recycled or reused) from a previous system (determined at the system boundary).
- $M_{MR\ out}$ = amount of material exiting the system that will be recovered (recycled and reused) in a subsequent system. This amount is determined at the end-of-waste point and is therefore equal to the sum of output flows of "materials to recycling" and "components for reuse" reported for modules A-C.⁴¹
- Y = the material yield, between point of end-of-waste (M-EoW) in modules A-C and point of substitution (M-DoS) in module D (when the material has been upgraded).

The following correction of equation D.6 in Annex D of EN 15804 is made: " $\Sigma (M_{MR\ out} - M_{MR\ in}) \dots$ " is replaced with " $\Sigma Y \cdot (M_{MR\ out} - M_{MR\ in}) \dots$ ".

When determining the scenario for $M_{MR\ out}$, the factor/ratio R2 from the PEF method can be used as default⁴² to calculate the amount, unless the value of $M_{MR\ out}$ is given in an applicable c-PCR. If factors from a c-PCR or the PEF method are not used,

⁴⁰ In other words: when the credit for avoiding production of a material/product is calculated in module D, and the production of that material/product involves an uptake of biogenic CO₂, the calculation shall consider a corresponding emission of biogenic carbon dioxide, or the characterisation factor for the biogenic CO₂ uptake shall be set to zero.

⁴¹ As described in a note in Section 4.9, this definition of $M_{MR\ out}$ differs from Annex D.

⁴² The latest version of R2 values available within the PEF Guidance document and supporting documentation shall be used. These are currently (August 2024) available in a file called "Annex_C_V2.1_May2020" available on <https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>.

The source and version number used shall be included in the references of the EPD.

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this choice shall be justified in the EPD and the default c-PCR or PEF R2 values shall be reported in the EPD together with the used value.

The quality of the outgoing recovered (recycled or reused) material ($Q_{R\text{Out}}/Q_{\text{Sub}}$ in equation D.6 of Annex D of EN 15804), i.e., the quality of the recovered material at the point of substitution, can be based on its economic value if no other procedure to determine the quality is recommended or mandated by an applicable c-PCR. In many cases the ratio $Q_{R\text{Out}}/Q_{\text{Sub}}$ can be set to 1.

Note 1: If the energy efficiency of the combustion in module D is the same for the combusted discarded product as for the substituted energyware, the results for the exported energy indicator shall be reported as a net zero.

Note 2: As Figure 5 clarifies, a flow leaving the product system cannot be declared both as a material for energy recovery and as exported energy. If the combustion/incineration takes place beyond the system boundary – which it does if the end-of-waste criteria are fulfilled before the combustion/incineration – the material leaves the product system as a material for energy recovery. If the incineration takes place within the system boundaries, the useful energy leaves the product system as exported energy.

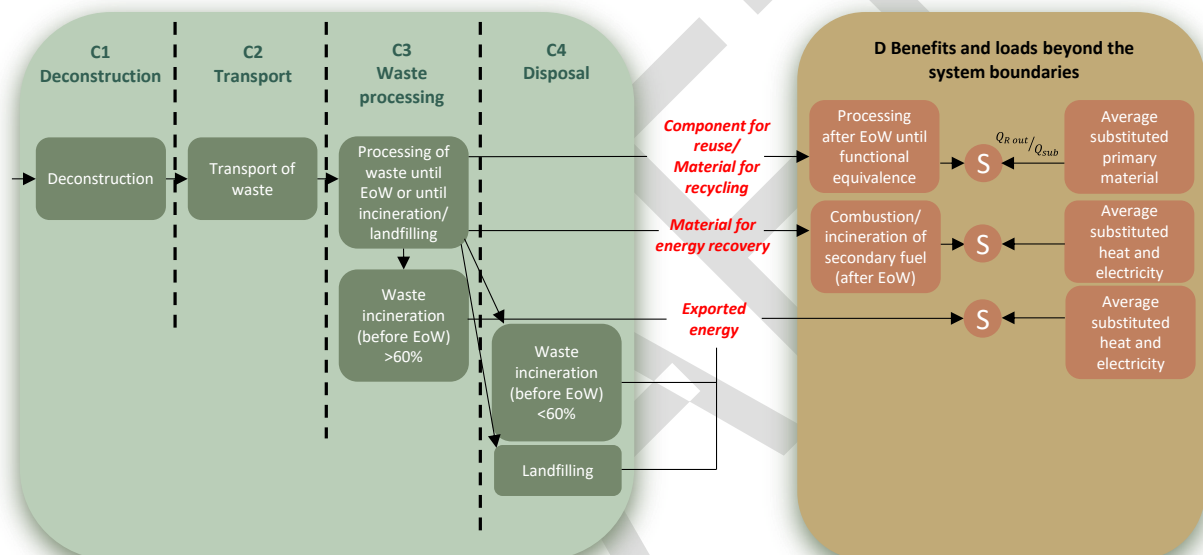


Figure 5. Illustration of the processes and flows of modules C and D.

4.9 ENVIRONMENTAL PERFORMANCE INDICATORS

The section on environmental performance results shall declare the results of the indicators, and the corresponding disclaimers, of EN 15804:2012+A2:2019/AC:2021.⁴³ In addition, the results of a supplementary indicator for climate impact shall be declared: GWP-GHG.⁴⁴

The GWP-GHG indicator is identical to GWP-total except that the characterisation factor (CF) for biogenic CO₂ is set to zero.⁴⁵ This means that the uptake and emissions of biogenic CO₂ are “balanced out” already in modules A1 and A3, instead of in modules A5 (for packaging) or modules C3 and/or C4 (for the product). The results over the entire product life cycle,

⁴³ This is slightly different from the default indicators for non-construction products in the International EPD System, for which the indicators listed at www.environdec.com/indicators shall be used (as of version 2 of the default list, the difference is that some the inventory indicators are optional instead of mandatory).

⁴⁴ Note that the GWP-GHG indicator is termed GWP-IOBC/GHG in the ILCD+EPD+ data format.

⁴⁵ In previous versions of this PCR (version 1.0 and 1.1), the GWP-GHG indicator instead used the CFs of version 3.01 of the GPI, which created comparability with EPDs based on GPI 3.01 and the old version of EN 15804 (EN 15804:2012+A1:2013). As such, GWP-GHG results in EPDs based on this PCR shall not be compared with GWP-GHG results in EPDs based on the previous version of this PCR or PCR 2012:01 based on EN 15804+A1.

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from module A to C, are thus identical for GWP-GHG and GWP-total unless some of the uptake of biogenic CO₂ is released as another greenhouse gas (e.g., CH₄).

For modules A1-A3, the GWP-GHG results can alternatively be calculated as the GWP-total results plus the biogenic carbon content of the product and its packaging multiplied with 44/12 (i.e., this calculation balances out the uptake of biogenic CO₂ that ends up in the product or packaging with an emission of this carbon, in the form of biogenic CO₂).

The GWP-GHG indicator creates comparability with how climate declarations are calculated in various regulative contexts (e.g., national regulations on climate declarations).⁴⁶ In particular, the GWP-GHG indicator allows direct comparison of the climate impact of modules A1-A3 of comparable products in different EPDs, without having to consider the biogenic content of the products. As such, the GWP-GHG indicator supports the modular principle. The GWP-GHG indicator shall, in EPDs based on this PCR, also be used for data quality calculations and for determining which products to include in the same EPD (see Section 4.6). See Annex 1 for CFs of the GWP-GHG indicator, and other climate impact indicators, for some of the most common greenhouse gases.

In addition to the mandatory indicators and characterisation methods described in EN 15804 and above, results of other indicators and characterisation methods may be reported in the EPD, if they are relevant for the product category, their inclusion is justified in the EPD, appropriate methods are used, and the results are verifiable. The additional indicators shall be separately declared from the mandatory indicators. If the additional indicators appear to the reader to display duplicate information, the EPD shall contain an explanation of the differences between the declared indicators. For example, results for the default international or North American characterisation methods listed in ISO 21930 may be declared (e.g., so that compliance with ISO 21930 can be claimed). If the indicators of ISO 21930 are reported:

- climate impact should be characterised using the method of the GWP-GHG indicator as described above, and
- formation of ground level of ozone should be characterised based on POFP from LOTOS-EUROS as applied in ReCiPe 2008.

Another example of indicators and characterisation methods that may be declared in addition to the mandatory ones, are those from EN 15804:2012+A1:2013. If declared, it shall be clear in the EPD that the indicators and characterisation methods are from EN 15804:2012+A1:2013, but other LCA rules (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019/AC:2021; i.e., the results of the “A1 indicators” shall not be claimed to be compliant with EN 15804:2012+A1:2013.

For the CFs to be used, EN 15804 refers to the “EN 15804 reference package” available at the JRC webpage⁴⁷. In February 2023, this reference package was updated to be based on the EF 3.1 package for CFs to be used in the PEF method.⁴⁸ As of 2024-09-01, CFs based on EF 3.1 (or a later version, if available) shall be used. Any information about updated versions of the reference package and associated transition periods will be published on www.environdec.com. The EPD shall report which version of the EN 15804 reference package that has been used.

EN 15804 specifies “IPCC (2013)” (AR5) as the reference for the GWP indicators. However, note that JRC’s latest update of the EN 15804 reference package (EF 3.1) entails that the CFs for the GWP indicators are based on IPCC (2021) (AR6). Moreover, note that the CFs in EF 3.0 includes *indirect* radiative forcing, as explained by Fazio et al. (2018)⁴⁹, which results in higher numerical values than the CFs in IPCC (2013) or IPCC (2021). Therefore, GWP results based on EF 3.0 may not be comparable to GWP results based on CFs from IPCC (2021) (AR6), IPCC (2013) (AR5) or the earlier IPCC report AR4 (IPCC 2007) (the difference in practice between using AR4, AR5 and AR6 is often a few percentages, unless significant amounts of methane are emitted).

EN 15804 specifies additional environmental indicators that shall be declared in the LCA report and may be declared in the EPD. If not declared in the EPD, it is recommended that they are declared in a separate public report published by the EPD owner, to facilitate the modularity of the EPD system where an EPD may be used as input data for the creation of another

⁴⁶ The method for accounting for biogenic CO₂ in the GWP-GHG indicator is equal to the method for accounting for biogenic CO₂ in the GWP-total indicator in the PEF method. However, other aspects of the PEF method differ from EN 15804, e.g. characterisation factor for methane and allocation rules, and therefore GWP-GHG results based on this PCR are not directly comparable to GWP-total results of a PEF study.

⁴⁷ <https://eplca.jrc.ec.europa.eu/LCDN/EN15804.html>

⁴⁸ Note that the reference packages named “EF 3.0” and “EF 3.1” are not identical to EN 15804 reference packages “based on EF 3.0” and “based on EF 3.1”, respectively. In particular, the CFs on biogenic carbon in the EN 15804 reference packages differ from the CFs in the “EF 3.0” and “EF 3.1” reference packages. These differences are illustrated in Annex 1, which lists some of the CFs of the GWP-GHG indicator of this PCR along with the GWP indicators of EN 15804:A1, EN 15804+A2 (based on EF 3.0), EN 15804 (based on EF 3.1), EF 3.0, and EF 3.1.

⁴⁹ https://eplca.jrc.ec.europa.eu/permalink/TR_SupportingCF_FINAL.pdf

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EPD downstream in the value chain. If declared in a separate public report, this report should include the appropriate disclaimers of Table 5 in EN 15804. Such reports may be referred to in the EPD.

Note that the indicator “exported energy” of EN 15804 corresponds to the indicator “recovered energy” in ISO 21930, with the difference that the results of the former indicator shall be expressed per energy carrier (heat and electricity, respectively) whereas this is not a requirement in ISO 21930. It is, however, not in violation to ISO 21930 to separate the results of this indicator per energy carrier, and as such the declaration of this indicator according to EN 15804 is compliant with the requirements in ISO 21930.

An additional requirement in this PCR, compared to EN 15804, is that the results of modules A1-A3 shall be declared in aggregated form.⁵⁰ This solves the problem that EN 15804 and ISO 21930 assign some processes (e.g., generation of electricity) to different modules. By declaring modules A1-A3 in aggregated form, the EPD can comply with both EN 15804 and ISO 21930. Apart from this, the environmental performance results of individual information modules shall not be added up into any combination into a total or sub-total of the life-cycle stages A, B, C or D (see Section 7.5 of EN 15804).

If life-cycle stage C is included in the EPD, the EPD shall include a disclaimer discouraging the use of the results of modules A1-A3 (A1-A5 for services) without considering the results of life-cycle stage C.

In connection to the results for the environmental impact indicators, the EPD shall include the following statement: “The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.”

The environmental performance section of the EPD shall only include one set of results (this change was implemented in version 4.0 of the GPI to improve machine-readability of EPDs and thereby facilitate digitalisation of the EPD system), except for results that can be declared in a separate subsection (see below). For EPDs of multiple products, however, the EPD may declare conversion factors for converting the results to individual products within the product group, see Section 6.4.7.

Apart from the inventory indicators listed at the website or otherwise required by the PCR, other inventory data may also be declared in the EPD, if relevant and useful for EPD users. Such data shall, however, not be declared in the main body of the EPD, but in an annex.

See Annex 2 and Annex 3 for clarifications and examples for assessing GWP-biogenic and the primary energy use indicators. See also www.environdec.com/indicators for further guidance per indicator. Examples of how to calculate some indicators may in the future also be found on www.environdec.com/methodology.

Note: Annex D in EN 15804 defines a parameter $M_{MR\ out}$ as ‘amount of material exiting the system that will be recovered (recycled and reused) in a subsequent system. This amount is determined at end-of-waste point as is therefore equal to the output flow of “materials to recycling [kg]” reported for modules A4, A5, B and C.’ Two things are incorrect with this definition: (i) the parameter covers materials that will be recycled or reused, so it equals the output flows of “materials for recycling” and “components for reuse”; and (ii) such flows can exit also modules A1-A3, according to the interpretation of EN 15804 outlined in Section 4.5 and further explained in Annex 4.

4.9.1 CONVERSION FACTORS

If mass is not used as declared or functional unit, the EPD shall declare a factor for converting the declared environmental performance results to results per mass. This rule is not applicable for EPDs of services. A c-PCR may require additional conversion factors to be declared, for example conversion factors to volume.

Conversion factors may also be included in an EPD for the purposes of:

- converting the declared results of a product group to results for specific products within the group, or
- converting the declared results to results for another declared/functional unit.

For the first of the above two purposes, the declared conversion factors can be applicable for the results of all declared modules or for a subset of modules (e.g., A1-A3), and for all declared indicators or for a subset of indicators (e.g., GWP-GHG or GWP-fossil). Such limitations in the applicability of the conversion factors shall be clearly stated in the EPD. For the modules and indicators to which the conversion factors are applicable, the results shall scale linearly with the conversion factor.

⁵⁰ But it is recommended to declare all modules (A1, A2, A3, etc.) separately in the LCA report.

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The conversion factors shall be expressed as multiplying factors. In other words, the declared results can be multiplied with the conversion to calculate the results per specific product or another declared/functional unit.

The conversion factors shall be verifiable, i.e., the underlying data for the conversion factors shall be provided in the LCA report.

Conversion factors to mass shall be included in the LCA information section (see Section 6.4.6) while other conversion factors shall be included in the section with additional environmental information (see Section 6.4.8), although they may be referred to in the environmental performance section.

Conversion factors can, however, not be included for the purpose of converting the declared results into results for products not covered by the EPD. The EPD is for a specific product or product group, and only the EPD content of that product/product group has been verified and may be considered EPD information.

4.10 SPECIFIC RULES PER EPD TYPE

4.10.1 EPD OF MULTIPLE PRODUCTS FROM THE SAME COMPANY

Several sets of results, reflecting different products, shall not be declared in the same EPD. However, similar products may be grouped and thereby included in the same EPD under one set of results. Similar products are defined as products covered by the same PCR, with identical or similar functions, manufactured by a single company at one or several manufacturing sites, with the same major steps in the A3/core processes. For such an EPD, there are three options:

- For each indicator, declare the average (mean) results of the included products. The calculation of this average shall consider the production volumes of the included products, if relevant. In this option, the average (mean) content shall be declared in the content declaration.
- Declare the results of one of the included products or the average of a subset of the included products, i.e., one or several representative products. The choice of the representative product(s) shall be justified in the EPD, for example based on production volumes. In this option, the content of the representative product, or the average of the representative products, shall be declared in the content declaration.
- For each indicator and module A-C, declare the highest result of the included products, and for module D, declare the lowest benefit of avoided processes (or highest drawback of compensating processes, see Section 4.8.5) and the highest load of included processes. This option thus corresponds to the results of a "worst-case product", which may consist of results from one or several of the included products. In this option, the content declaration shall include the lowest amounts of recycled and biogenic content of the included products and their packaging, respectively, and the information on environmental and hazardous properties of substances shall reflect the highest share and most hazardous such substances contained in any of the included products.

For all options, the range of the content of the included products should be included in the content declaration, in addition to the average/representative/worst-case content as specified above.

For EPDs claiming compliance with ISO 21930, the above options are only possible if none of the declared environmental impact indicator results, aggregated over all included modules (from A to C), differ by more than 10% between any of the included products.

If the EPD does not claim compliance with ISO 21930, variations above 10% are allowed. In such cases, the LCA report shall include an explanation of the variation and a justification of the grouping of products, and the EPD shall (in the LCA information section) declare the variation of each impact indicator results for which the variation is above 10% and include an explanation of the variation. EPDs based on worst-case results, that do not claim compliance with ISO 21930, are exempted from the requirement to declare the variation if above 10%.

The option chosen shall be clearly described at the cover page of the EPD, as "EPD of multiple products, based on the average results of the product group", "EPD of multiple products, based on a representative product", "EPD of multiple products, based on several representative products", or "EPD of multiple products, based on worst-case results".

In an EPD of multiple products, the difference (in %) between the declared GWP-GHG result, and the product with GWP-GHG results furthest away from the declared results, for modules A1-A3 (A1-A5 for services), shall be reported in the EPD. If this difference is below 10%, "<10%" can be reported. Optionally, this variation can instead be declared as the difference between the declared result and lowest and highest result, respectively (e.g., as "+8/-12%").

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In an EPD of multiple products, the GWP-total or GWP-GHG results of the “best-case product” and/or “worst-case product”, defined as the product with lowest/highest GWP-total/GWP-GHG result of the included products, may be optionally reported in a subsection of the environmental performance section, and the content declaration of this product may be optionally reported in a subsection of the content declaration section.

Note that above paragraphs concern grouping of similar products, but not grouping of identical products (e.g., produced at different manufacturing sites or at different production lines at one site). Identical products here refer to products which are not marketed as different products and/or are in no other way distinguishable by a downstream customer.⁵¹ For identical products, variations due to, for example, manufacturing at several sites shall be treated as any other variation in production, by averaging over (normally) one year of production (and in such cases, variations above 10% are allowed also when claiming compliance with ISO 21930). However, if the EPD is based on multiple manufacturing sites, the difference in GWP-GHG results for modules A1-A3 (A1-A5 for services) between the reported result and the results for the underlying sites shall be reported in percentage, if the difference is above 10%. If the difference is below 10%, the actual difference or “<10%” shall be reported.

Although a variation above 10% is allowed in EPDs of identical products manufactured at several sites, it is recommended to separate the EPDs per site so that a variation below 10% is met, as certain national regulation considers an EPD to be “product-specific” only when the variation between sites is below 10%.

If an EPD covers several manufacturing sites in A3, the manufacturing sites shall be listed in the product information section of the EPD (see Section 6.4.4).

4.10.2 SECTOR EPD

An industry association or any other group of companies may develop an EPD in the form of a sector EPD⁵². A sector EPD declares the average (mean) or highest (worst-case) results of similar products of multiple companies in a clearly defined sector and geographical area. Similar products are defined as products covered by the same PCR, with identical or similar functions (applying the same declared/functional unit), with the same major steps in the A3/core processes.

For each indicator, results reflecting an average or a “worst-case” product shall be declared.

If an average product is declared, it may be calculated based on data collected from all or a sample of the manufacturing sites represented by the EPD. If a sample is used, see requirements in Section 8.4.3 of the GPI. The calculation of this average shall consider the production volumes of the included products, if relevant. The average content shall be declared in the content declaration.

If a worst-case product is declared, for each indicator and module A-C, the highest result of the included products shall be declared, and for module D, the lowest benefit of avoided processes (or highest drawback of compensating processes, see Section 4.8.5) and the highest load of included processes shall be declared. Thus, this option may consist of results from one or several of the included products. In this option, the content declaration shall include the lowest amounts of recycled and biogenic content of the included products and their packaging, respectively, and the information on environmental and hazardous properties of substances shall reflect the highest share and most hazardous such substances contained in any of the included products.

Sector EPDs shall describe the products and companies that are covered by the EPD, the relative production volume covered by the data collection compared to the production represented by the EPD, and how the declared results and content have been calculated. Sector EPDs shall include, on the cover page, a statement that the EPD is a sector EPD and whether it reflects an average or worst-case product. If the declared GWP-GHG result of a sector EPD, and the GWP-GHG results of the represented sectors and sites or between the products and sites of the sample (if applicable), differ by more than 10% for modules A1-A3 (A1-A5 for services), these variations shall be reported in the EPD and the reason for the variations shall be qualitatively described. If the variation is below 10%, the actual variation or “<10%” shall be declared. Optionally, this variation can instead be declared as the difference between the declared result and lowest and highest result of the included products and sites (e.g., as “+8/-12%” for average results, or “+0%/-25%” for worst-case results). If the declared variation is for a sample of products/sites, this shall be stated in the EPD. Any communication of the results from a sector EPD should contain the information that the results are based on averages obtained from the sector as defined in the EPD. The communication shall not claim that the sector EPD results are representative for a certain manufacturer or its product.

⁵¹ This means that product variations that are different with regard to colour, content, size, configurations, or similar, normally shall be considered to be similar, and not identical, products.

⁵² Termed “collective EPD” in EN 15941.

4.10.3 EPD OWNED BY A TRADER

Traders (e.g., retailers, wholesalers) whose products are produced by one or several other organisations (the manufacturer(s)) may publish an EPD under their own name. The EPD can be based on one or several valid EPD owned by the manufacturer(s) of the product or based on primary data obtained from the manufacturer(s). The EPD shall follow the same data quality requirements and other rules as EPDs published by a manufacturer under the same PCR.

In addition, the transportation from the manufacturer(s) to a central warehouse or to the border of the market of the EPD scope shall be included and be based on primary data. In case of retailer/wholesaler, also the transportation to the store of the retailer/wholesaler shall be included and based on primary data. Transportation from central warehouse/ the border of the market/retail store to an average customer may also be included. If the trader uses its own packaging, the production of the packaging shall be included and be based on primary data.

If the product is produced by several manufacturers, the difference (in %) between the declared GWP-GHG result, and the manufacturer with GWP-GHG results furthest away from the declared results, for modules A1-A3 (A1-A5 for services), shall be reported in the EPD. If this difference is below 10%, "<10%" can be reported. Optionally, this variation can instead be declared as the difference between the declared result and lowest and highest result, respectively (e.g., as "+8/-12%").

If the EPD owned by a trader is based on EPD(s) of manufacturer(s), the verification shall be done based on the same PCR with the same version number in terms of the first digit (e.g., an EPD based on version 1.0.0 of a PCR can be used as input to an EPD based on version 1.1.0 of the same PCR). The manufacturer EPDs shall be referred to in the trader's EPD; the reference shall include registration number of the EPD and the EPD programme in which it is published. As all EPD content shall be verified, the verifier needs access to the manufacturer's EPD and most often also its LCA report (there may be cases when this is not necessary; it's up to the verifier to decide on a case-to-case basis).⁵³ Furthermore, the validity of the trader's EPD shall not be longer than the validity of the manufacturer's EPD. In case the manufacturer's EPD is updated and re-verified (i.e., not just an editorial change), the trader's EPD shall also be updated and re-verified. This is to prevent liability issues that may occur.

4.10.4 EPD OF PRODUCT NOT YET ON THE MARKET

EPDs may be published for products designed and planned but not yet launched on the market (forthcoming products) provided that the EPD owner has a published and valid EPD for a similar product (as defined in Section 4.10.1), using the same PCR (i.e., the same first-digit version number). The EPD on the similar product shall be published and valid the moment the EPD of the product not yet on the market becomes published and valid. This means that the two EPDs may become published and valid at the same time. The similar product and the product not yet on the market may be included in the same EPD, as an EPD of multiple products (see Section 4.10.1). In this case, the below disclaimer shall be adjusted so it is clear which product (within the product group) that is not yet on the market.

The LCA model of the forthcoming product shall be based on the LCA model of the similar product. An EPD on a similar product is defined as a *sibling EPD* when its LCA model only differs from the LCA model of the forthcoming product in terms of the activity data (e.g., different shares of materials, energy use in the manufacturing process, or distribution distance). If the LCA model of a valid sibling EPD is used when modelling the forthcoming product, the data quality requirements in Annex A and applicable PCR can be assumed to be fulfilled.

When differences between products are not limited to activity data but involve larger changes in the LCA model, for example use of different materials in product assembly or the use of a different manufacturing technology (e.g., as change in an existing manufacturing process or as an additional manufacturing process), the EPD of the similar product is defined as a *non-sibling EPD*. If the LCA model of the forthcoming product is based on a non-sibling EPD, the EPD owner shall prove that the data quality requirements are met. In such case, the EPD owner may use available inventory data for comparable technologies existing on the market (e.g., data from other manufacturers) or forecast/design data of a manufacturing plant to complement the lack of primary data.

EPDs for forthcoming products shall include, at the cover page and in the product information section, one of the following disclaimers:

- Product not yet on the market – Results of this EPD shall be used with care as the LCI data is not yet based on 1 year of production which may result in increased uncertainty.

⁵³ The verification process of a trader's EPD can be facilitated by using the same verifier as was used for the manufacturer's EPD.

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- *<Product name>* is not yet on the market – Results of this EPD shall be used with care as the LCI data for this product is not yet based on 1 year of production which may result in increased uncertainty.
- *<Product name 1>*, *<Product name 2>*, and *<Product name 3>* are not yet on the market – Results of this EPD shall be used with care as the LCI data for these products are not yet based on 1 year of production which may result in increased uncertainty.

The verification of forthcoming products shall be done according to the principles and procedures in Section 8 of the GPI.

An EPD of a product not yet on the market shall have the same validity period as regular EPDs (see Section 2.2.4), but shall be updated and re-verified when there is data available from one year of production^{54, 55}. Once such data is available, an update and re-verification shall be done within six months, otherwise the EPD shall be depublished. The contract with the verifier shall ensure the verifier takes part in the follow-up activities during the EPD validity period (see the second option in Section 8.4.8 of the GPI).

If it is known that the product will not be produced, the EPD owner shall depublish the EPD in the EPD Portal.

4.10.5 EPD OF PRODUCT RECENTLY ON THE MARKET

LCI data should be based on data from at least one year of production (see Section 4.6.2). If such data is not available because the product has not yet been produced for one year, the LCI data may be based on data from a shorter time period provided that the data can be proven to be conservative compared to one-year data, accounting for effects of seasonal variations and incidences influencing productivity (e.g., manufacturing downtime due to equipment failure or maintenance). If this is the case, the EPD shall include, at the cover page and in the product information section, one of the following disclaimers:

- Product recently on the market – Results of this EPD shall be used with care as the LCI data is not yet based on 1 year of production which may result in increased uncertainty.
- *<Product name>* is recently on the market – Results of this EPD shall be used with care as the LCI data for this product is not yet based on 1 year of production which may result in increased uncertainty.
- *<Product name 1>*, *<Product name 2>*, and *<Product name 3>* are recently on the market – Results of this EPD shall be used with care as the LCI data for these products are not yet based on 1 year of production which may result in increased uncertainty.

If a product recently on the market products is included in an EPD of multiple products from the same company (see Section 4.10.1), the above disclaimer shall be adjusted so it is clear which products (within the product group) that were recently introduced to the market.

An EPD of a product recently on the market shall have the same validity period as regular EPDs (see Section 2.2.4), but shall be updated and re-verified when there is production data for one year of production available.⁵⁶ Once such data is available, updating and re-verification shall be done within six months, otherwise the EPD shall be depublished. The contract with the verifier shall ensure that the verifier takes parts in the follow-up activities during the EPD validity period (see the second option in Section 8.4.8 of the GPI).

⁵⁴ This does not refer to the first full calendar year (1st January to 31st December), but can be any 1-year period (e.g., 16th February to 15th February).

⁵⁵ This time period is not related to the version date of the EPD, as production may start months, or even years, after the EPD was approved.

⁵⁶ This does not refer to the first full calendar year (1st January to 31st December), but can be any one-year period (e.g., 16th February to 15th February).

5 CONTENT OF LCA REPORT

Data for verification shall be presented in the form of an LCA report⁵⁷ – a systematic and comprehensive summary of the project documentation that supports the verification of an EPD. The LCA report is not part of the public communication.

Below rules have been adopted from Section 8.3.1 of the GPI. Note that there are other applicable rules on the content of the LCA report elsewhere in this PCR and in EN 15804 (in particular, Section 8).

In the presentation of data for verification, references shall be made to the PCR, the GPI, as well as other documents used. In the event the verifier finds the LCA modelling, the LCA report or the EPD not in conformance with the requirements, the verifier may ask for additional information or further refinement of the underlying data. This dialogue shall be documented.

The presentation of the environmental performance results and other EPD content shall be sufficiently comprehensive to facilitate the examination by the verifier. Some guidance for the organisation providing data and information to the verifier is given below with regard to:

- layout of the presentation, and
- description of the LCA modelling and other background documentation for information declared in the EPD.

5.1 LAYOUT OF THE PRESENTATION

The presentation of data from the LCA modelling shall be done in a consistent way to cover the most important aspects related to the accuracy and relevance of the data. Data on unit processes, modules and life-cycle stages shall be described in a transparent way, including references to any data used. The same rules apply regardless of the type of data, i.e., for primary and secondary data (see Section 4.6.1 for definitions of these data categories), for data from databases and literature sources, from questionnaires, or derived from personal communication.

5.2 DESCRIPTION OF THE LCA MODELLING

Presentation of data, data quality assurance and data handling are central parts of the LCA model and the LCA report. Primary data collected from manufacturing processes shall be documented on the process or site level. Information on secondary data shall be reported on the level of aggregation available for use in the calculation, but more detailed data can be reported, if relevant.

Data and meta data relevant for the EPD shall be documented, as specified below per LCA phase.

Goal and scope definition: the following information shall be included in the LCA report, where relevant:

- definition of declared or functional unit, including technical specifications, product lifespan and reference service life, when relevant,
- description of key methodological elements, including documentation and justification of procedures for allocation, averaging data, and cut-off,
- the technical system (type of system, geographical location, system boundary, and description of modules including omissions of modules).

Inventory analysis: the following information shall be included in the LCA report, where relevant:

- the technical system (qualitative/quantitative description of unit processes, accounting for data confidentiality),
- data collection (primary/secondary data, collection procedures, time period for data collection, identification and handling of missing data and assessment of their influence on results, checks of data collection being performed, references, and other administrative information),
- assessment of data (internal quality assurance procedures; routines for identification, follow-up, and treatment of missing data; references to external critical reviews of data already assessed),
- presentation of LCI data and how they relate to the reference flow and the declared/functional unit, and

⁵⁷ Termed "project report" in EN 15804.

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- other key assumptions made.

Impact assessment: the following information shall be included in the LCA report:

- results of the impact assessment,
- references to all characterisation methods and factors used, and
- a statement that “the environmental performance results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks”.

Interpretation: the following information shall be included in the LCA report:

- identification of environmentally important aspects of the product system (e.g., inventory data, life-cycle stages and processes contributing substantially to the results),
- evaluation of impact assessment results (e.g., completeness check, sensitivity analysis/check, consistency check, uncertainty analysis)
- data quality assessment which cover data that together contribute to at least 80% of the results of each of the declared environmental impact indicators; the assessment shall cover at least the geographical, technical and temporal representativeness of the data (in line with requirements in Section 4.6.4, based on EN 15941),
- limitations of the LCA results identified by the data quality assessment and sensitivity analysis, and
- conclusions and recommendations to specific decision makers based on the findings of the LCA study, for example related to reducing the environmental impact of the product system.

All parts of the interpretation shall be done in accordance with the goal and scope definition.

As a supplement to verifying the LCA modelling based on the LCA report, the verifier may verify aspects of the LCA modelling based on direct access to the LCA/EPD tool, the LCA software or underlying documentation (e.g., documentation of LCI datasets).

The c-PCR may include specifications, additions, and deviations to the general rules for the content of the LCA report set above, if of specific relevance for the product category. Additional rules on the content of the LCA report may concern aspects of the LCA model that are particularly relevant to provide transparency on for the product category (e.g., to facilitate for verifiers) but which are not suitable to report in the EPD (e.g., to not overload the EPD with information or because of confidentiality reasons).

6 CONTENT AND FORMAT OF EPD

General rules on content and format of EPDs published in the International EPD System are listed below. A generic template for EPDs is available on www.environdec.com, but other layouts are allowed.

The EPD content shall:

- be in line with the rules and guidelines in ISO 14020 (Environmental labels and declarations – General principles),
- be verifiable, accurate, relevant, not misleading, and unlikely to result in misinterpretation, and
- not include rating, judgements, or direct comparisons with other products or companies.^{58, 59, 60}

The communication format of the EPD shall be in accordance with EN 15942.

An EPD can be published in one or several formats, for example as a pdf and/or a machine-readable format. EPDs based on this PCR shall be made digitally available in the machine-readable ILCD+EPD format. The EPD can also be made digitally available in other machine-readable formats, such as the ILCD+EPD+, OpenEPD or ISO 22057 formats, to meet the market's expectations and demands on applicability and usefulness. When published only in a machine-readable format, all mandatory information according to the GPI and PCR, that is missing in the data entries in the specific machine-readable format, shall be added to the EPD Portal to complement the machine-readable format. The content of EPDs published in different formats shall be consistent with each other.

An EPD in pdf format should be made with a reasonable number of pages for the intended audience and use.

Product information declared at the landing page in the EPD Portal shall not include information not present in the EPD.

6.1 EPD LANGUAGES

EPDs shall as a minimum be published in English to ensure global applicability and usefulness, but may also be published in other languages. EPDs in other languages shall have identical content as the version in English, use the same registration number, and also be uploaded on www.environdec.com. EPDs in other languages may be in the form of a verified EPD or a so-called "self-declaration" (see additional requirement for self-declaration in Section 7.1 of the GPI). If it is a verified EPD, all content of it shall be verified and it becomes a binding document between parties. The verifier may initiate the verification process according to Section 8 of the GPI with one version and use it as a reference for cross-checking the others.

6.2 UNITS AND QUANTITIES

The following requirements apply for units and quantities:

- The International System of Units (SI units) shall be used where available, e.g., kilograms (kg), Joules (J), and metres (m). Reasonable multiples of SI units may be decided in the PCR to improve readability, e.g., grams (g) or megajoules (MJ). The following exceptions apply:
 - Resources used for energy input (primary energy) should be expressed as kilowatt-hours (kWh) or megajoules (MJ), including renewable energy sources, e.g., hydropower, wind power, and geothermal power.
 - Water use should be expressed in cubic metres (m³).
 - Temperature should be expressed in degrees Celsius (°C).
- Time should be expressed in the unit most practical, e.g., seconds, minutes, hours, days, or years.

⁵⁸ Therefore, results of normalisation or weighting are not allowed to be reported in the EPD.

⁵⁹ "Other products" include previous or alternative versions of the studied product, i.e., the EPD shall not display changes in the environmental performance results of a product over time, or differences with regard to a hypothetical version of the product using, e.g., alternative production processes or input materials.

⁶⁰ The reference to "other companies" means that the EPD shall not in any way imply that the EPD owner is, for example, "a market leader" or "more sustainable" (or similar) compared to its competitors.

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- Results of the environmental performance indicators shall be expressed in the units prescribed by the impact assessment methods, e.g., kg CO₂ equivalents.
 - Two significant digits⁶¹ should be adopted for all results and the content declaration. The number of significant digits shall be appropriate.
 - Scientific notation may be used, e.g., 1.2E+2 for 120, or 1.2E-2 for 0.012.
 - The thousand separator and decimal mark in the EPD shall follow one of the following styles (a number with six significant digits shown for illustration):
 - SI style (French version): 1 234,56
 - SI style (English version): 1 234.56
- In the event of potential confusion or intended use of the EPD in markets where different symbols are used, the EPD shall state which symbols are used for thousand separator and decimal mark.
- Variations, in percentage, between two numbers shall be calculated by dividing the absolute value of the difference between the numbers by the average of the numbers, and then multiplying by 100. See example in footnote.⁶² When the rules ask for the declaration of variation between more than two numbers, the maximum variation shall be declared.
 - Dates and times presented in the EPD should follow the format in ISO 8601. For dates, the prescribed format is YYYY-MM-DD, e.g., 2024-03-26 for March 26th, 2024.
 - The result tables shall:
 - only contain values or the letters “ND” (Not Declared). It is not possible to specify ND for mandatory environmental performance indicators. ND shall only be used for optional indicators that are not quantified because no data is available.⁶³
 - contain no blank cells, hyphens, less than or greater than signs, or letters (except “ND”).
 - use the value “0” only for parameters that have been calculated to be zero.
 - use footnotes to explain any limitation to the result value.

6.3 USE OF IMAGES IN EPD

Any image used in the EPD should be relevant to the declared product. Images may in themselves be interpreted as an environmental claim (such as trees, mountains, and wildlife that are not related to the declared product) and shall, therefore, be used with caution and in compliance with national legislation and best practices in the markets in which the EPD is intended to be used. In case of disagreements with regards to the correct application and interpretation of the rules on the use of images in the EPD, the Secretariat decides.

EPDs claiming compliance with ISO 14026 shall fulfil the requirements on footprint graphics in ISO 14026.

6.4 SECTIONS OF THE EPD

The EPD shall include the following sections. Other sections shall not be included, and other headings shall not be used, unless an applicable PCR says otherwise:

- Cover page (see Section 6.4.1)

⁶¹ Significant digits are those that carry meaning contributing to its precision. For example, with two significant digits, the result of 123.45 shall be displayed as 120, and 0.12345 shall be displayed as 0.12. In scientific notation, these two examples would be displayed as 1.2E+2 and 1.2E-2.

⁶² For example, if the variation between the values 9 and 10 is calculated, the following calculation shall be made: $1/9.5 \times 100 = 10.526\% \approx 11\%$ (with two decimals).

⁶³ This requirement does not intend to give guidance on which indicators are mandatory or optional.

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- General information (see Section 6.4.2)
 - Programme information
 - PCR and verification
 - Ownership and limitations on use of EPD
- Information about EPD owner (see Section 6.4.3)
- Product information (see Section 6.4.4)
- Content declaration (see Section 6.4.5)
- LCA information (see Section 6.4.6)
- Environmental performance (see Section 6.4.7)
- Abbreviations (see Section 6.4.12)
- References (see Section 6.4.13)
- Version history (see Section 6.4.11)

The following sections may be included:

- Additional environmental information (see Section 6.4.8)
- Additional social and economic information (see Section 6.4.9)

The following sections shall be included, if applicable:

- Information related to sector EPDs (see Section 6.4.10)

6.4.1 COVER PAGE

The EPD shall be limited to include below information on the cover page.

The following shall be included on the cover page:

- Product name: <name of the product>
- EPD owner: <name of EPD owner>
- Logotype of EPD owner.
- The text “Environmental Product Declaration” and/or “EPD”.
- Programme: The International EPD System, www.environdec.com
- Programme operator: EPD International AB
- Logotype of the International EPD System, the national/regional licensee or CLC.EPD registration number as issued by the programme operator.⁶⁴
- Version date: 20YY-MM-DD
- Validity date: 20YY-MM-DD
- Statement: “An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com.”
- A statement of conformity with ISO 14025.
- A statement of conformity with EN 15804:2012+A2:2019/AC:2021.
- A statement of conformity with ISO 21930:2017, when applicable.

⁶⁴ The EPD shall not include a “registration number” or “certification number” if such is provided by the certification body, as this may be confused with the registration number issued by the programme operator.

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- ECO EPD logotype as approved by the ECO Platform.

The following may be included on the cover page:

- Visual representation (e.g., an image) of the product.
- One brand/product logotype of the EPD owner, when relevant

If the EPD is registered through a regional or national licensee (see Section 5.7 in the GPI), the cover page shall in addition to above information include the following:

- Licensee: *<name of licensee>*

Where applicable, the cover page shall also include the following:

- For EPDs of multiple products from the same company (see Section 4.10.1): a statement that the EPD covers multiple products and a list of all products covered by the EPD (if the EPD covers more than 10 products, the list of products may instead be included in the product information section of the EPD; then this list shall be referred to on the cover page) and information on the type of EPD: "EPD of multiple products, based on the average results of the product group", "EPD of multiple products, based on a representative product", "EPD of multiple products, based on several representative products", or "EPD of multiple products, based on worst-case results".
- For sector EPDs (see Section 4.10.2): a statement that the EPD is a sector EPD and whether it reflects an average or a worst-case product.
- For EPDs of products not yet on the market (see Section 4.10.4): a disclaimer saying "Product not yet on the market – Results of this EPD shall be used with care as the LCI data is not yet based on 1 year of production which may result in increased uncertainty".
- For EPDs of products recently on the market (see Section 4.10.5): the following disclaimer: "Product recently on the market – Results of this EPD shall be used with care as the LCI data is not yet based on 1 year of production which may result in increased uncertainty".
- When relevant, information about dual registration of EPD in another programme, such as registration number and logotype.
- When relevant, a statement of conformity with other standards (e.g., ISO 14067, ISO 14026) and methodological guidelines.

See the brand book for layout examples for the cover page (EPD International 2024b).

In case an EPD is published in an additional language as a self-declaration (see Section 7.1 of the GPI), it shall contain the following disclaimer on the cover page (translated to the language of the self-declaration): "This is a self-declared translation of an EPD *[add registration number of the verified and valid EPD]* that can be accessed at *[add link/reference to the verified EPD]* and is published for convenience purposes. Only the original EPD is valid and binding between parties."

6.4.2 GENERAL INFORMATION

6.4.2.1 Programme information

The EPD shall include the following in the subsection on programme information:

- The address of the programme operator: EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: support@environdec.com

6.4.2.2 Product category rules

The EPD shall include information about the PCR (and c-PCR, if applicable) used according to Table 5. Any text displayed in grey is solely for guidance and shall not be included in the EPD.

CONSTRUCTION PRODUCTS

Table 5. Information on Product Category Rules (PCR).

Product Category Rules (PCR)
CEN standard EN 15804 serves as the core Product Category Rules (PCR) <i>If the EPD complies with ISO 21930, "ISO standard ISO 21930" shall be added to the above text.</i>
Product Category Rules (PCR): <name, registration number, version and UN CPC code(s)> <i>If applicable, the corresponding information about c-PCR shall also be included.</i>
PCR review was conducted by: <name and organisations of the review chair, and information on how to contact the chair through the programme operator> <i>If applicable, the corresponding information about c-PCR shall also be included.</i>

6.4.2.3 Verification

The EPD shall include information about verification according to Table 6. Any text displayed in grey is solely for guidance and shall not be included in the EPD.

Table 6. Information on verification.

Verification
External and independent ('third-party') verification of the declaration and data, according to ISO 14025:2006, via: <input type="checkbox"/> EPD verification through an individual EPD verification <input type="checkbox"/> EPD verification through an EPD Process Certification* <input type="checkbox"/> EPD verification through a pre-verified LCA/EPD tool In case of individual EPD verification: Third-party verifier: <Name, and organisation of the individual verifier> or <Name of certification body (incl. address.)> Approved by: The International EPD System or Accredited by: < Name of accreditation body & accreditation number, where applicable> In case of EPD Process Certification: Third-party verifier, accountable for the certification: <Name of certification body (incl. address.)> Accredited by: <Name of accreditation body & accreditation number, where applicable> In case of pre-verified LCA/EPD tool and a verifier Third-party verifier, accountable for the EPD verification: <Name, and organisation of the individual verifier> or <Name of certification body (incl. address.)> Approved by: The International EPD System or Accredited by: < Name of accreditation body & accreditation number, where applicable> Pre-verified LCA tool or Pre-verified EPD tool <Name and version> Third-party verifier, accountable for the tool verification: <Name, and organisation of the individual verifier> or <Name of certification body (incl. address.)> Approved by: The International EPD System or Accredited by: < Name of accreditation body & accreditation number, where applicable> Include disclaimer in all cases.

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*EPD Process Certification involves an accredited certification body certifying and periodically auditing the EPD process and conducting external and independent verification of EPDs that are regularly published. More information can be found in the General Programme Instructions on www.envrondec.com.

Procedure for follow-up of data during EPD validity involves third-party verifier.⁶⁵

☐ Yes ☐ No

Note that procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period (see Sections 8.3.2 and 8.4.8 of the GPI). The follow-up can be organised entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update (see Section 2.2.4) is identified, the EPD shall be re-verified by a verifier.

6.4.2.4 Ownership and limitations on use of EPD

The EPD shall include the following information about ownership and limitations on use of EPD:

- A statement that: “The EPD owner has the sole ownership, liability, and responsibility for the EPD.”
- A statement, adapted from ISO 14025 and ISO 14020, that: “EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.”

6.4.3 INFORMATION ABOUT EPD OWNER

The EPD shall include the following information about the EPD owner:

- Address and contact information of the EPD owner.
- Description of the organisation of the EPD owner. This may include information on product-related or management system-related certifications (e.g. ISO 14024 Type I environmental labels, ISO 9001- and 14001-certificates and EMAS-registrations) and other relevant work the organisation wants to communicate (e.g. SA 8000, supply chain management and social responsibility). Any information related to environmental, economic, or social sustainability shall follow the rules in Sections 6.4.8 and 6.4.9.
- Address and contact information of the LCA practitioner commissioned by the EPD owner, if applicable.

This section may also include:

- Visual representation (e.g., an image) of the EPD owner as an organisation.

6.4.4 PRODUCT INFORMATION

The EPD shall include the following information about the product:

- Product identification by name, and an unambiguous identification of the product by standards, concessions, or other means.
- Visual representation (e.g., an image) of the product.

⁶⁵ Procedure for follow-up the validity of the EPD is required at minimum once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period (see the GPI). The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update (see the GPI) is identified, the EPD shall be re-verified by a verifier.

CONSTRUCTION PRODUCTS

- Identification of the product (name and code) according to the UN CPC product classification system, if there is an applicable UN CPC code. Other relevant codes for product classification may also be included, for example:
 - Common Procurement Vocabulary (CPV),
 - UN Standard Products and Services Code (UNSPSC),
 - Classification of Products by Activity (NACE/CPA),
 - Australian and New Zealand Standard Industrial Classification (ANZSIC), or
 - Global Trade Item Number (GTIN).^{66, 67} If the GTIN used when ordering a product is different from the GTIN used when delivering a product, the GTIN used in the ordering system is preferable in an EPD.
- Description of the product in accordance with the product classification system(s) used (see above), and description of the technical performance of the product, including its application/intended use and key functionalities, and expected influence on the operational aspects and impact of the building or other construction work. Restrictions to a type of construction or building shall also be described.
- Brief description of main processes of manufacturing (for EPDs of goods) or service provision (for EPDs of services).
- Technical or actual lifespan, if applicable.
- Location of the production site(s), including, as a minimum, the city (or municipality, if not located in a city).
- References to any relevant websites for more information or explanatory materials.

This section may also include:

- List of products (see Section 6.4.1).
- Name of manufacturer(s) and site(s).
- Description of the material properties of the product with a declaration of relevant physical or chemical product properties, such as density, etc.

6.4.5 CONTENT DECLARATION

The EPD shall include a section on content declaration according to the below rules (see also examples below). The content declaration may be excluded or left empty for EPDs of intangible products, such as some services. If it is left empty, an explanation shall be provided in the EPD. If, however, the service involves leasing of a physical product (rental service) used in the construction, maintenance, repair, replacement, refurbishment, or demolition of several construction works, the content of that product shall be declared in the content declaration.

- The mass (weight) of one unit of a product, as purchased or per declared unit, shall be declared.
- Information about the content of the product in the form of a list of materials and substances, and their mass, shall be declared.
 - Proprietary materials and substances of confidential nature are exempted from the above requirement (see Section 8.2.3 of the GPI). If not declared, these shall be replaced by a generic term/description of the material/substance and/or a range⁶⁸ of values (instead of specific values), provided that the applicable rules for declaration of hazardous are followed (see below).
- The mass and the content of distribution and/or consumer packaging shall be declared, when applicable.
- The gross mass of material in the content declaration shall cover 100% of one unit of product and its packaging.
- If there is more than 5% biogenic content in the product, this share (in mass-%) shall be declared along with the mass of biogenic carbon content in kg C per product or declared unit. If below 5%, this may be declared.

⁶⁶ GTINs need to be verified and accessible here: <https://www.gs1.org/services/verified-by-gs1/results>.

⁶⁷ If a Global Model Number (GMN) is established on the market, which groups several producer-specific GTINs to a common product type, GMN may be used instead of GTIN, or as a complement.

⁶⁸ The declared range shall be reasonable (e.g., not be a very broad range, such as 20-80% of the mass of the product).

CONSTRUCTION PRODUCTS

- If there is more than 5% post-consumer recycled content in the product, this share shall be declared. If below 5%, this may be declared. The share of pre-consumer recycled content of the product may also be declared, and shall then be declared separately from the share of post-consumer content.⁶⁹ The share of pre-consumer recycled content may further be divided into content originating from within, or from outside, the manufacturing site/company.
- If there is more than 5% biogenic content in the packaging, this share shall be declared. If below 5%, this may be declared. Also the share of recycled content of the packaging material may be declared; if the share of pre-consumer recycled content is declared, it shall be declared separately from the share of post-consumer content.
- If the share of biogenic/recycled material is unknown, this part of the content declaration can be left out or be declared as 0% (a conservative estimate) or unknown.
- EPDs of multiple products or sector EPDs shall include a description what the content declaration represents.
- Information on the environmental and hazardous/toxic properties of a substances contained in the product shall be declared if the substance is in the candidate list of Substances of Very High Concern (SVHCs) which exceeds the limits for registration with the European Chemicals Agency (i.e., if the substance constitutes more than 0.1% of the weight of the product). The candidate list of SVHCs is available via the European Chemicals Agency⁷⁰.
- The content declaration shall also include other information on substances with hazardous and toxic properties that can be of concern for human health and/or the environment, if required by normative standards or regulation applicable in the market for which the EPD is valid. Note that declaration of toxic/hazardous substances shall be done irrespective of whether the substances have been included or excluded from the LCA model based on, for example, the cut-off rules.
- Information on the environmental and hazardous properties of substances should follow the requirements given in the latest revision of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)⁷¹ issued by the UN or national or regional applications of the GHS.

The declared share of biogenic/recycled materials shall be based on the actual share of biogenic/recycled material in the product (in average over the studied time period, normally one year of production). In other words, the share of biogenic/recycled materials of, for example, global average production of the constituent materials, for example as stated in generic LCI datasets, shall not be used as the basis for the declaration of biobased/recycled content. As such, the declared content information may be different from the product content as stated in the LCA model (as this may partly be based on generic LCI data).

Claims that a product is “free” of a specific hazardous material or substance should be done with caution and only when relevant, following the rules in ISO 14021 on self-declared environmental claims. For example, such a claim shall not be done for a material/substance that has never been associated with the product category, is not included in the product category, or if the product category is legally required not to include the material/substance in the market(s) covered by the geographical scope of by the EPD.

The content declaration shall be consistent with the product's technical data sheet (if any). The product's safety data sheet (if any) shall be made available to the verifier, for example to enable confirmation of presence/absence of SVHC in the product.

Additional rules for the content declaration may be set by the c-PCR. For example, for complex products consisting of very large numbers of materials/substances, it may make sense to allow the presence of hazardous substances to be presented as a reference to the corresponding notification number in the SCIP (Substances of Concern In articles as such or in complex objects (Products)) database⁷². Furthermore, for some product categories (e.g., chemicals) it may be suitable to declare the water content.

⁶⁹ Together, pre- and post-consumer recycled content corresponds to recycled content as defined in ISO 14021. Pre-consumer recycled content consists of pre-consumer material, and post-consumer recycled content consists of post-consumer material, as defined in ISO 14021. Note that the indicator *secondary material*, included among the environmental performance indicators (see www.environdec.com/indicators), considers all “material recovered from previous use or from waste which substitutes primary materials” (from EN 15804) that enter the product system from another product system, and not just the material contained in the product, and is therefore a complementary indicator.

⁷⁰ http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp

⁷¹ The GHS document is available on www.unece.org.

⁷² See <https://echa.europa.eu/scip>.

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Table 7. Example of content declaration of a product.

Product content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material ¹ , mass-% of product	Biogenic material ⁷³ , kg C/product or declared unit
Filler	15	10	0	0
Pigment	15	0	0	0
Polymer	10	20	10	5
Other	10	5	0	0
Total	50	35	10	5

Table 8. Example of content declaration of packaging.

Packaging materials	Mass, kg	Mass-% (versus the product)	Biogenic material ⁷⁴ , kg C/product or declared unit
Steel	2	4	0
Total	2	4	0

Table 9. Example on content declaration of hazardous substances.

Hazardous substances from the candidate list of SVHC	EC No.	CAS No.	Mass-% per functional or declared unit
Isobutyl 4-hydroxybenzoate	224-208-8	4247-02-3	0.5
1,4-dioxane	204-661-8	123-91-1	0.2

6.4.6 LCA INFORMATION

The EPD shall include a section on LCA information including the following:

- Geographical scope of the EPD per module, i.e., which countries or regions have the processes in modules A1-A5 been modelled to represent, and which countries/regions have life-cycle stages B and C been modelled to represent.
- The geographical scope can be “global”, for example for module A1 if the raw materials are produced in several continents or for modules B or C if the EPD represents a product sold on the global market.
- If the environmental performance section (see Section 6.4.7) declares results for additional scenarios for modules A4-D that represent different geographical scopes, the declared geographical scope shall reflect the main scenario.
- Declared/functional unit, and conversion factor to mass if mass is not used as functional/declared unit (not applicable for services). In addition, physical material properties of the product shall be declared to allow converting the declared/functional unit into other units of relevance for downstream modelling, such as:
 - If the declared unit is given in an area unit, area density (kg/m²) and thickness (m) shall be declared.
 - If the declared unit is given in a volume unit, volumetric mass density (kg/m³) shall be declared.
 - If the declared unit is given in a length unit, linear mass density (kg/m) shall be declared.
- Reference service life (RSL) and its relationship with the technical/actual lifespan, if applicable.
- Description of the EPD system boundary as “cradle-to-gate,” “cradle-to-gate with options,” “cradle-to-grave” or any other type of system boundary defined in and permitted by the PCR/c-PCR.
- Information on which life-cycle stages are not considered (if any), with a justification for the omission.

⁷³ 1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO₂.

⁷⁴ 1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO₂.

CONSTRUCTION PRODUCTS

- Process flow diagram of the product system, divided into the life-cycle stages and modules (or other division of the product life cycle, if defined in the PCR), showing the main processes includes and the system boundary of the LCA. The diagram shall make it clear when the end-of-waste state is reached for main input flows of reused/recycled materials and recovered energy, and for output flows of reused/recycled materials and recovered energy exiting the end-of-life stage.
- Name and version of the LCA software, if applicable.
- A summary of the data quality assessment, in line with requirements in Section 4.6.4.
- Declaration of data sources, reference years, and share of primary data, in line with requirements in Section 4.6.4.
- Information on the modelling of infrastructure/capital goods, if relevant, in line with requirements in Section 4.3.6.
- Description of scenario(s) used in the modelling of downstream stages and module D, if applicable, see Sections 4.8.2 to 4.8.5.
- Reference(s) to, or a list of, the characterisation methods for all declared environmental performance indicators, including a description of the version number (e.g., EF 3.1) of the EN 15804 reference package used. An example: "GWP100, EN 15804. Version: EF 3.1, February 2023".

This section should also include:

- Additional relevant information about the LCA, such as cut-off rules, data quality, allocation methods, other methodological choices and assumptions, and results from the interpretation (see Section 5.2). EPDs claiming compliance with ISO 14026 shall include quantitative or qualitative information about the uncertainties of the LCA results.

Table 10 provides an example of how modules declared and geographical scopes may be declared. If reported in a table, the following rules apply:

- Modules/processes/life-cycle stages declared shall be noted with "X".
- Modules/processes/life-cycle stages not declared shall be marked as "ND".
- Geographical scope shall be reported by the country code(s) (e.g. UK, FR, DE) and/or name of the region(s) (e.g. EU 27, Global).

Table 10. Example for the reporting of modules declared and geographical scope.

	Product stage			Distribution/ installation stage		Use stage							End-of-life stage				Beyond product life cycle
	Raw material supply	Transport	Manufacturing	Transport	Distribution/Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared																	
Geography																	

6.4.7 ENVIRONMENTAL PERFORMANCE

The EPD shall include a section on environmental performance including the following:

- LCA results of the product. See Section 4.9 for rules on this declaration, including the indicators and impact assessment methods to use and associated disclaimers.

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- Declaration of the variation in results between products and sites in line with requirements in Section 4.10, if applicable, and any other declaration of variation in results (e.g., as required by the applicable c-PCR).
- If the EPD covers the end-of-life stage, a statement that recommends the user of the EPD to always consider the results of the end-of-life stage. For example, "The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3)."

In addition to the main environmental performance results, the environmental performance section may declare the following additional LCA results in a separate subsection:

- Results for additional scenarios for modules A4-D. If this is done, the most representative scenario (for the geographical scope of the EPD) shall be declared as the main environmental performance results, and the other scenarios shall be declared in the separate subsection.
- Results of an alternative modelling approach, if such an alternative modelling approach is explicitly allowed by the applicable c-PCR or this PCR (this PCR allows two alternative results, see the next bullet points).
- Alternative GWP-biogenic results, using a method that allows consideration of permanent (more than 100 years) storage of biogenic carbon, either in the product, in a landfill, or as a consequence of applying carbon capture and storage (CCS) to the incineration of biogenic carbon. Note that the current method of EN 15804 does not allow consideration of permanent storage (in case of such storage, a virtual emission of biogenic CO₂ shall be added, see Annex 2).
- Alternative environmental performance results based on location-based electricity and/or biogas modelling, which means that the consumption mix on the market is used to model all electricity/gas used in the product system (also the manufacturing processes in A3 and processes under operational control of the EPD owner).

The subsection with additional LCA results shall clearly describe the scenario/method used to calculate the results, including how it differs from the scenario/method of the main environmental performance results.

6.4.8 ADDITIONAL ENVIRONMENTAL INFORMATION

An EPD may declare additional environmentally relevant information not derived from the LCA. Any additional environmental information declared shall be substantiated and verifiable, and be derived using appropriate methods and be specific, accurate, not misleading, and relevant to the specific product. Quantitative information is preferred over qualitative information.

Examples of additional environmental information that may be relevant to declare:

- conversion factors (see Section 4.9.1),
- the release of dangerous substances into indoor air, soil, and water during the use stage,
- instructions for proper use of the product, e.g., to minimise energy or water consumption or to improve the durability of the product,
- instructions for proper maintenance and service of the product, e.g., to minimise energy or water consumption or to improve the durability of the product,
- information on key parts of the product that determine its durability,
- information on recycling including, e.g., suitable procedures for recycling the entire product or selected parts and the potential environmental benefits gained,
- information on a suitable method of reuse of the product (or parts of the products) and procedures for disposal as waste at the end of its life cycle,
- information regarding disposal of the product, or inherent materials, and any other information considered necessary to minimise the product's end-of-life impacts, and
- a more detailed description of an organisation's overall environmental work, in addition to the information listed in the information about the EPD owner (see Section 6.4.3), such as:
 - the existence of any type of organised environmental activity,
 - information on where interested parties may find more details about the organisation's environmental work, and

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The c-PCR may specify rules on additional environmental information to be declared in the EPD.

The additional environmental information section shall not include any claims (e.g., including certificates), related to the environmental performance indicators, or other LCA indicators, that do not comply with the LCA rules of this GPI or applicable PCR. For example, carbon-neutrality claims are not allowed, neither are claims on the reductions of GHG emissions, or reporting of certificates, based on a mass balance approach (MBA; see Section 4.7.1).

6.4.9 ADDITIONAL SOCIAL AND ECONOMIC INFORMATION

An EPD may include relevant social and economic information as additional information. This may be product information or a description of an organisation's overall work on social or economic sustainability, such as activities related to supply chain management or social responsibility⁷⁵.

Any additional social and economic information declared shall be substantiated and verifiable, and be derived using appropriate methods and be specific, accurate, not misleading, and relevant to the specific product. Quantitative information is preferred over qualitative information.

Further information on which indicators that could be used can be obtained by the Global Reporting Initiative documents available on www.globalreporting.org.

6.4.10 INFORMATION RELATED TO SECTOR EPDS

For sector EPDs (see Section 4.10.2), the following information shall be included:

- a list of the contributing manufacturers that the sector EPD covers,
- a description of how the selection of the sites/products has been done and how the average has been determined, and
- a statement that the document covers the average values for an entire or partial product category (specifying the percentage of representativeness) and, hence, the declared product is an average that is not available for purchase on the market.

6.4.11 VERSION HISTORY

A section shall be included describing the current and previous versions of the EPD, including the version dates. The first version shall be described as the "original version of the EPD". For each subsequent version, a description of the differences versus the previously published version shall be included.

6.4.12 ABBREVIATIONS

A section shall be included describing all abbreviations used in the EPD.

6.4.13 REFERENCES

A reference section shall be included, including a list of all sources referred to in the EPD and in the LCA report, including the GPI (including version number) and PCR (registration number, name, and version) used to develop the LCA and the EPD.

⁷⁵ For more information about social responsibility, see ISO 26000:2010 Social responsibility.

7 LIST OF ABBREVIATIONS

AIB	Association for Issuing Bodies
ANZSIC	Australian and New Zealand standard industrial classification
CEN	European Committee for Standardization
CPC	Central product classification
CPV	Common procurement vocabulary
c-PCR	Complementary product category rules
EPD	Environmental product declaration
GFA	Gross floor area
GHG	Greenhouse gas
GHS	Globally harmonized system of classification and labelling of chemicals
GPI	General Programme Instructions
GTIN	Global trade item number
GWP	Global warming potential
ISO	International Organization for Standardization
LCA	Life cycle assessment
LCI	Life cycle inventory
NACE/CPA	Classification of products by activity
PCR	Product category rules
RSL	Reference service life
SCIP	Substances of concern in articles
SI	The international system of units
SIDS	Small island developing states
SVHC	Substance of very high concern
UN	United Nations

8 REFERENCES

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ISO, 2006a. ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

ISO, 2006b. ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework.

ISO, 2020. ISO 14044: 2006/Amd 2:2020, Environmental management – Life cycle assessment – Requirements and guidelines.

ISO, 2015a. ISO 14001:2015, Environmental management systems – Requirements with guidance for use.

ISO, 2015b. ISO 9001:2015, Quality management systems – Requirements.

ISO, 2017a. ISO 21930:2017, Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.

ISO, 2017b. ISO 14026:2017, Environmental labels and declarations – Principles, requirements and guidelines for communication of footprint information.

ISO, 2018b. ISO/TS 14067:2018, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication.

Tokede O, Rouwette R, 2023. Problematic consequences of the inclusion of capital goods inventory data in Environmental Product Declarations. International Journal of Life Cycle Assessment 29, 1–24.

9 VERSION HISTORY OF PCR

Note that references to figures, tables and sections below may not be correct in relation to the present version of the PCR.

VERSION 1.0, 2019-12-20

Original version, replacing PCR 2012:01, complying with version 3.01 of the General Programme Instructions and EN 15804:2012+A2:2019.

VERSION 1.1, 2020-09-14

Changes in this update relate to the following:

- Clarification of Figure 2 and the allowed scopes
- Corrected error in Table 2: Module D is mandatory for an EPD with the scope "Cradle to grave and module D"
- Clarification regarding modelling of module D
- Averaging products in modules A1-A3
- Averaging manufacturing sites from the same company in modules A1-A3
- Sector EPD in modules A1-A3
- Recommendation that a Guarantee of Origin is valid at least for the upcoming used to be used as basis for the electricity mix
- Clarification regarding unit and declaration of eutrophication (aquatic freshwater)
- Clarification regarding the GWP-GHG indicator (including the addition of Annex 1)
- Recommendation to include additional environmental impact indicators from EN 15804 in a public annex to facilitate modularity
- Editorial changes for language and clarification

VERSION 1.11, 2021-02-05

Changes in this update concern:

- Clarification in Section 4.5.4 on what to include in modules C and D, respectively.
- Clarifications and adjustments in Section 4.8.1, regarding the selection of dataset for electricity, to be more aligned with the GPI. The hierarchy now allows, and encourages, the use of site-specific data in the modelling of all parts of the product life cycle.
- Clarification in Section 5.4.3, regarding the definition of specific data.
- Clarification in Section 5.4.4, regarding the declaration of SVHC.
- Clarification in Section 5.4.5 on what method to use to obtain eutrophication results in PO_4^{3-} eq.

VERSION 1.2, 2022-06-22

Changes in this update concern:

- Updates to comply with version 4.0 of the GPI, including the following changes:
 - Clarified rules on co-product and waste allocation in Section 4.5. Among others, this includes: guidance on when each set of allocation rules shall be applied; the allocation of waste in Section 4.5.2 now includes the interpretation of EN 15804 in version 4.0 of the GPI, regarding allocation when the waste incinerator gets paid for incinerating the material (this interpretation influences reporting in module D, why Section 4.5.4 has been revised); and clarification of the difference between EN 15804 and ISO 21930 regarding allocation rules for

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- modules A1-A3. Related, Figure 4 has been added to illustrate the processes and flows of modules C and D, and Section 4.5.3 has been added to clarify how the thermal efficiency of incineration/combustion processes influences the modelling.
- Changed and clarified rules on EPDs of multiple products, including clarifications on the three options (representative product or that average or highest results are declared), that the 10% rule is only applicable if representative product or average results are declared, and that only one set of results can be included in the section on environmental performance results. See Section 2.2.2.1 for more information. Related, it has been clarified that products produced at different sites may be *identical* products, and thus not subject to the rules of EPDs of multiple *similar* products, see Section 2.2.2.1; rules for converting results between products in a product group, or between declared/functional units, have been added, see Section 5.4.6.1; and it has been clarified that if several scenarios are declared these shall be included as additional environmental information, see Section 5.4.3.
 - Updated rules on the reporting on Guarantees of Origin (or similar), see Section 4.8.1.
 - Clarification related to mass balance approaches (MBA), see Section 4.8.2.
 - Clarifications on the procedure for follow-up the validity of the EPD and the type of procedure to be declared in the EPD, see Section 5.4.2.
 - Mentioning of GTIN, and/or GMN when this is established, as an additional system to use for product classification in the EPD, see Section 5.4.3.
 - Clarification and example how content declaration can include the mandatory information as given in EN 15804, see Section 5.4.4.
- Update to the latest version of EN 15804: EN 15804:2012+A2:2019/AC:2021 issued 18 August 2021, which corrects the unit for the impact category eutrophication aquatic freshwater. The result of eutrophication aquatic freshwater now only has to be given in kg P eq.
 - Clarified and added additional requirements compared to EN 15804 and alignment with ISO 21930, see Sections 1.4 and 1.5.
 - Clarified scope of the PCR, particularly that it is applicable for products that may, among others, be used in the construction Sector, see Section 2.2.
 - Specifications for when a trader is the EPD owner, see Section 2.2.2.3.
 - Changed requirement on declaring GWP-GHG results (per kWh) for electricity purchased for use in manufacturing process of module A3, if these results are more than 30% of the GWP-GHG results of modules A1-A3 (in the previous version, the requirement was to declare this if electricity use in module A3 was more than 30% of the *energy/electricity use* of modules A1-A3). See Section 4.8.1.
 - Requirements that a variation of 0% shall be reported in EPDs of one product or site, see Section 5.4.3.
 - Clarified rules on declaration of geographical scope, see Section 5.4.3.
 - Clarification that the guidance for filling in Table 3 shall be followed also if the table is not used as a template, see Section 5.4.3.
 - Clarification that the declared share of biobased or recycled materials shall be based on the actual share of biobased/recycled material in the product, and not the share of biobased/recycled materials of stated in generic LCI datasets, see Section 5.4.4.
 - Updated CFs for the GWP-GHG indicator, see Section 5.4.5.
 - Clarified that the additional environmental information may include information on permanent storage of biogenic carbon, and how this would influence GWP-biogenic results. see Section 5.4.6.
 - Annex 2 added to describe and exemplify how GWP-biogenic results can be calculated and reported.

VERSION 1.2.1, 2022-07-04

Changes in this update are editorial, concerning the format of the document.

VERSION 1.2.2, 2022-07-05

Changes in this update are editorial.

VERSION 1.2.3, 2022-07-08

Changes in this update are editorial.

VERSION 1.2.4, 2022-09-07

Correction made in Section 5.4.3 on the definitions of specific and proxy data. Before it was stated that the definitions of specific data in this PCR and the GPI differ, but this was incorrect – only the definitions of proxy data differ.

VERSION 1.2.5, 2022-11-01

- Editorial changes.
- More specific rules on the definition of the electricity market, see Section 4.8.1.
- The characterisation factors of EF 3.1, released in July 2022, were added to Table 11 of Annex 1.
- Added footnote to Annex 2, clarifying that the sub-indicators for GWP-biogenic shall not be declared in the EPD.

VERSION 1.3.0, 2023-06-20

Among others, this version includes the following changes and additions:

- Editorial changes.
- Clarification in Section 1.2 that several c-PCRs can be used, unless they have conflicting requirements.
- Added Section 1.5, with additional requirement for complying with ISO 21930.
- Clarifications on the scope of the PCR, see Section 2.2.
- Sections on EPDs of multiple products, sector EPDs and EPDs developed by traders have been moved to Section 2.2.2.
- Changed rules for EPDs of multiple products (e.g., more relaxed regarding the 10% rule) and been further specified, see Section 2.2.2.1.
- Changes rules for EPDs of traders, see Section 2.2.2.3.
- Changed and clarified rules regarding RSL, see Section 4.2.
- Added clarifications and requirements on the modelling of infrastructure/capital goods and personnel activities, see Section 4.3.2.
- Clarified cut-off rules, see Section 4.4.
- Clarifications and further specifications in Section 4.5, on allocation rules, for example regarding the allocation of material for recycling, such as scrap.
- Added requirement regarding transparency of the modelling of material for recycling, see Section 4.5.5.
- Added requirements for EEE products, see Section 4.3.3.
- Clarified rules on electricity modelling, see Section 4.8.1.
- Changed requirement for declaring the GWG-results for electricity used in A3, see Section 4.8.1.
- Clarifications on mass balance approaches, see Section 4.8.2.
- Modified Section 5.4.3.
- Modified Section 5.4.4.
- Moved the declaration of any LCA-based information to the environmental performance section, see Section 5.4.5.

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- Section on conversion factors moved to Section 5.4.6.1.
- Clarifications done in Annex 1 and Annex 2.
- Added Annex 3 to clarify and illustrate the modelling of the primary energy use indicators.

VERSION 1.3.1, 2023-07-08

Editorial change in Section 5.4.3, to correct unit to use in the declaration of the GWP-GHG results of scrap, from CO₂ eq./kWh to CO₂ eq./tonne.

VERSION 1.3.2, 2023-12-08

- Editorial changes.
- Clarifications made in the rules for EPDs of multiple products in Section 2.2.2.1, regarding the more relaxed 10% rule (that was introduced as of version 1.3.0) and the rule to declare the variation of the GWP-GHG result for modules A1-A3, or A1-A5 for services (this rule is also stated in Section 5.4.3).
- The option for EPDs of multiple products, to also present the GWP-GHG results of the “best-case product”, has been expanded to enable declaration of the GWP-GHG results for the “worst-case product”, see Section 2.2.2.1.
- Clarification that the requirement in Section 4.3.7 for c-PCRs of EEE products to provide a specific use scenario, is valid for any c-PCR developed and published in the International EPD System after the rule was added in this PCR.
- The following change in requirements were done in Section 4.8.1 to comply with ECO Platform rules:
 - The permitted exception to the requirement to use specific electricity or residual mix for processes under the control of the EPD owner – for markets without a publicly available residual mix – has been removed. Instead, when the composition of the residual grid mix on the market has not been publicly disclosed, it may conservatively be estimated by subtracting renewables from the consumption mix on the market.
 - Free assignment of contractual instruments for electricity within a manufacturing site is no longer allowed. ECO Platform has decided that this shall be seen as a clarification of an already existing ECO Platform rule.
- Clarification in Section 5 that the EPD shall be published in machine-readable format (this requirement was already in place, although not stated in the PCR).
- Correction made in Section 5.4.5, that results over the entire product life cycle, from module A to C, are not always identical for GWP-GHG and GWP-total.
- Changed requirement for declaration of biogenic carbon content in product and packaging in Section 5.4.4, to be expressed per product or declared unit, rather than per kg. Related, added requirement for EPDs claiming compliance with ISO 21930, to also declare the biogenic carbon content in terms of kg CO₂ eq.

VERSION 1.3.3, 2024-03-01

Editorial changes:

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- Paragraph added in Section 4.8.1 on the assignment of contractual instruments for electricity within an entity. This was referred to in the version history as of Version 1.3.2 (see above) but was missing in the section referred to.
- Updated examples for content declaration, see Tables 4 and 5 in Section 5.4.4.
- Added mentioning of the sunset date for CFs based on EF 3.0, which has previously been announced on www.environdec.com. See Section 5.4.5.

VERSION 1.3.4, 2024-04-30

- Prolonged validity period with six months, until 2025-06-20, as an updating process has been initiated. The updated PCR (version 2.0.0) is expected to be published late 2024 or early 2025, which means there will be a transition period until 2025-06-20 under which this both versions are applicable.
- Implemented more flexibility to declare additional environmental performance results based on location-based electricity modelling, in a subsection of the environmental performance section, see Section 6.4.6. This was done to answer a market need for comparability of EPDs following different electricity modelling approaches.

VERSION 2.0.0, 20YY-MM-DD

PCR updated to version 5.0.0 of the GPI and the latest ECO Platform standards, to prolong the validity of the PCR with another 5 years. The changes include a restructuring of the sections of the PCR, which make some of the references to tables, figures, and sections in the above version history invalid.

ANNEX 1: COMPARISON OF GWP CHARACTERISATION FACTORS IN DIFFERENT FRAMEWORKS

Table 11. Characterisation factors, in kg CO₂ equivalents per kg, for some of the emissions contributing to some of the GWP indicators in this PCR and EN 15804+A2 (based on EF 3.0 or EF 3.1, respectively), EF 3.0 (PEF), EF 3.1 (PEF), and EN 15804:A1. The characterisation factors for EF 3.0 and EF 3.1 are from the JRC website (<https://epca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>).

	PCR 2019:14 and EN 15804+A2 (based on EF 3.0)			PCR 2019:14 and EN 15804+A2 (based on EF 3.1)			EF 3.0 (PEF)		EF 3.1 (PEF)		EN 15804+A1 (IPCC AR4)
	GWP-fossil	GWP-biogenic	GWP-GHG	GWP-fossil	GWP-biogenic	GWP-GHG	GWP-fossil	GWP-biogenic	GWP-fossil	GWP-biogenic	
CO ₂ fossil	1	0	1	1	0	1	1	0	1	0	1
CO ₂ biogenic	0	1	0	0	1	0	0	0	0	0	0/1 ⁷⁶
CH ₄ fossil	36.8	0	36.8	29.8	0	29.8	36.8	0	29.8	0	25
CH ₄ biogenic	0	36.8	36.8	0	29.8	29.8	0	34	0	27	25
N ₂ O	298	0	298	273	0	273	298	0	273	0	298

Note 1: As described in Section 4.9, the GWP-GHG indicator is identical to GWP-total except that the characterisation factor (CF) for biogenic CO₂ is set to zero. Otherwise, the same versions of CFs shall be used for GWP-GHG as used for the other GWP indicators declared in the EPD. If characterisations factors (CFs) for GWP-GHG are not found in the LCA software used, it is recommended to take a copy of the GWP-total CFs and then manually edit and set the CF for biogenic CO₂ biogenic emissions and uptake to zero (check that CFs are in line with the table above).

Note 2: CFs of biogenic CH₄ for the GWP indicators used in PCR 2019:14 and EN 15804+A2 include the effect of its decay product, biogenic CO₂. If not, the CF would have been 34 (as in EF 3.0) or 27 (as in EF 3.1) instead of 36.8 (in EN 15804+A2 based on EF 3.0) or 29.8 (in EN 15804+A2 based on EF 3.1) kg CO₂ eq./kg.

⁷⁶ The European standard EN 16485, with product category rules for round and sawn timber, introduced an approach that made it possible to also report biogenic emission and uptake of carbon dioxide. This was however never addressed as an amendment to EN 15804+A1 that only refers to IPCC (2007), why different reporting approaches are applied in EPDs following EN 15804+A1.

ANNEX 2: GUIDANCE TO CALCULATING GWP-BIOGENIC

This annex explains and illustrates the basic principles of collecting, reporting, and balancing the mass of biogenic carbon and calculating the GWP-biogenic results. The principles are based on EN 15804:2012+2019:A2/AC:2021.

Generally, the LCI shall separate between fossil and biogenic carbon (typically as biogenic CO₂, biogenic CH₄, etc). Furthermore, the LCI shall report GHG emissions that arise from land use or land-use change separately, which are neither included in the GWP-fossil or GWP-biogenic results, but in the GWP-luluc results, to avoid double accounting.

The amount of biogenic carbon is an inherent material property, which sometimes is not included, or correctly accounted for, in generic datasets available in LCA software. Therefore, the amount of biogenic carbon in the product or the packaging – which is needed to correctly calculate the GWP-biogenic results and account for the content declaration – may have to be checked and added manually.

If there is a biogenic CO₂ emission that is not from the burning or degradation of the product or its packaging, the initial uptake of this biogenic carbon shall be reported in the module where the emission occurs. This means that such emissions and uptakes will be balanced out in each individual module. When calculating the GWP-biogenic results, an emission of biogenic CO₂ and its uptake can therefore be set to zero for all flows that do not end up as content of the product or the packaging. Note that this concerns when the biogenic carbon is emitted as CO₂; if the biogenic carbon uptake is instead, for example, released as CH₄, the GWP-biogenic results will not be zero in each individual module.

In case the biogenic carbon ends up as product or packaging content, the biogenic CO₂ emissions of incinerating or degrading this carbon will then appear in life-cycle stage C (for product content) or in module A5 (for packaging content)⁷⁷. If the biogenic carbon content of the product is not incinerated at end-of-life, for example because the carbon is permanently stored in the product (for more than 100 years) or because the carbon leaves the product system for reuse or recycling into a new product, a virtual emission of biogenic CO₂ shall be added to the module from which the carbon leaves the studied product system, which most often is life-cycle stage C (similarly an uptake of biogenic CO₂ shall be added in, e.g., module A1 if recycled/reused biogenic carbon is used as an input). Thus EN 15804 and this PCR do not allow credits due to delayed emissions or permanent storage of biogenic carbon when calculating the main results (see Section 5.4.2 of EN 15804).⁷⁸ The biogenic carbon of packaging material is most often emitted as biogenic CO₂ emissions in module A5, and therefore the biogenic carbon stored in the packaging material can most often be balanced out within module A (summed over A1-A5; thus A5 needs to be reported in such cases). In the end, the sum of the sequestered biogenic carbon and the biogenic carbon emitted or leaving the product system in any other way during the product life cycle shall always be zero.⁷⁹ Related, note that biogenic carbon that ends up in product or packaging shall be separately declared in the content declaration, unless it is less than 5% of the mass of the product or the packaging, respectively (see Section 6.4.5 of this PCR and Section 6.4.4 of EN 15804).

If the packaging contains more than 5% biogenic carbon, the uptake of this biogenic carbon, as biogenic CO₂, in module A1 shall be balanced out by an equal amount of emission of biogenic CO₂ in module A5. Then module A5 shall, also in EPDs which otherwise have an A1-A3 scope, be included for this “balancing-out reporting”. Unless module A5 is fully included, this “balancing-out reporting” for module A5 shall be included in the declared A1-A3 results; if this is done, the EPD shall describe that the A1-A3 results includes the “balancing-out reporting” of the biogenic CO₂ of packaging released in module A5. If the packaging contains less than 5% biogenic carbon, this “balancing-out” of biogenic carbon may be done directly in module A1 instead.

Table 12 gives an example of how to account for biogenic carbon and calculate the GWP-biogenic results. First, it illustrates how the LCA practitioner needs to sum up the results of respective module. Note that the uptake and emitted biogenic CO₂ stored in the product or packaging shall be reported separately from other greenhouse gases (CH₄ etc.) that contribute to

⁷⁷ According to Section 6.3.5.4.2 of EN 15804, there may also be end-of-life processes in life-cycle stage B, for example due to replacement of the product of part of the product, which may also give rise to biogenic CO₂ emissions. However, such emissions are balanced out by an equal amount of biogenic CO₂ uptake within the same module and can therefore be disregarded.

⁷⁸ In previous versions of the GPI (e.g., version 3.01), biogenic carbon stored for more than 100 years was assumed to create a carbon sink and thus lead to negative GWP-biogenic results. This is not allowed according to EN 15804+A2 and the present PCR. The results of such alternative modelling may, however, be declared in a separate subsection of the environmental performance section, see Section 6.4.7.

⁷⁹ Similarly, the sum of the inputs and outputs of biogenic carbon to module D, and thus the contribution of biogenic CO₂ uptake and emissions to the GWP-results, shall be zero. That is, if module D includes avoided production due to material reuse or recycling, or energy recovery, the avoided uptake of biogenic carbon in such production shall be assumed to be offset by a corresponding emission of biogenic CO₂ within module D.

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the GWP-biogenic results (see row 3 in Table 12). The LCA practitioner will now notice that, in this case, the LCI data on biogenic CO₂ provided by the LCA software are not balanced out in each module – there are net biogenic CO₂ emissions of 200 kg in life-cycle stage A and 5 kg in life-cycle stage C – since the software and the database were not designed for this kind of calculation. This could be corrected by adding an uptake of biogenic CO₂ in the LCI within the same module, i.e., 200 kg in life-cycle stage A (presumably modules A1-A2) and 5 kg in life-cycle stage C, or by “neglecting” these emissions by setting their CFs to zero (see strikethrough in row 3 and the zeros added to each cell, since these flows are not stored as product or packaging content). Both alternatives follow the modular approach where the biogenic CO₂ emissions are balanced out in each module. In Table 12, the latter approach has been chosen, as described below.

Next step is to correctly account for the biogenic carbon in the product and its packaging. In the example, the total sequestration of biogenic carbon in the product amounts to 715 kg biogenic CO₂ (and no biogenic carbon in the packaging material). This amount of biogenic carbon will, if the product is incinerated at end of life, be emitted as biogenic CO₂ in life-cycle stage C and thus be balanced out over the product life cycle. Depending on the scenario, this amount may be divided into different C modules, but the sum shall always be the same as the uptake reported in modules A1-A3.

In the example of Table 12, it is now possible to calculate the GWP-biogenic results. The CF for the emissions of biogenic CO₂ is set to zero (blue added figures in the table, row 2). The biogenic carbon stored in the product and potentially in packaging is added to the LCI and a check is made that the total amount is zero over the full product life cycle. This biogenic mass balance, divided into the sub-indicators of Table 12, should be documented in the LCA report.

Table 12. Example for illustrating the calculation of GWP-biogenic results (unit is CO₂ equivalents).

		A1-A2	A3	C1-C2	C3	Sum A-C	Comment
Row 1	GWP-biogenic (CO, CH ₄ etc.)	2	1	0.5	2	5.5	Result from LCA tool
Row 2	GWP-biogenic (CO ₂ for non-product/packaging content)	0	0 200	0 5	0	0 205	Result from LCA tool
Row 3	GWP-biogenic (product or packaging content as CO ₂)	-715			715		Manually added
Row 4	GWP-biogenic (as reported in the EPD) ⁸⁰	-713	1	0.5	717	5.5	Calculated

It is recommended to use the dry matter of any biogenic material that is reported in the LCI. It is also recommended to check that the combustion figures in the LCI are correct. An example for wood: the lower heat value for dry matter of a certain wood species is 19.2 MJ/kg and the carbon content can be set to 50%. It can now be calculated that 95 g CO₂/MJ is emitted when this wood is completely burned ($1/19.2 \cdot 0.5 \cdot 44/12 = 0.095$ kg CO₂/MJ). Moreover, the dry matter for this wood species is 390 kg/m³, which is equal to a sequestration of 715 kg CO₂/m³ ($390 \cdot 0.5 \cdot 44/12$) dry matter of wood.

⁸⁰ This is the indicator that is mandatory to declare in the environmental performance section of the EPD. The sub-indicators of row 1-3 shall not be declared in the EPD but are recommended to declare in the LCA report. Table 12 provides an example of how the GWP-biogenic results can be calculated, and this can be facilitated by calculating the three sub-indicators separately and then adding them up.

ANNEX 3: GUIDANCE TO CALCULATING THE PRIMARY ENERGY USE INDICATORS

Among the indicators describing resource use, there are six indicators on the use of primary energy resources (in MJ, net calorific value). Three of the indicators are on the use of *renewable* energy resource, separated into energy used as raw materials (PERM), energy used as energy carriers (PERE), and the total renewable energy used as raw materials and energy carriers (PERT). The other three indicators are on the use of *non-renewable* energy use, separated into energy used as raw materials (PENRM), energy used as energy carriers (PENRE), and the total non-renewable energy used as raw materials and energy carriers (PENRT).

The energy used as raw materials is limited to the inherent energy of the product and the packaging. All other input of primary energy resources shall be considered as energy used as energy carrier.

If a material is first used as raw material in, for example, the packaging, and its energy content is later used as an energy carrier in the product system, it shall be classified as energy used as energy carrier, to avoid double counting of this energy.

The energy used as raw materials shall be calculated by multiplying the mass (kg) of each material of the product and packaging content, with the lower calorific value (MJ/kg) of this material.

As for the biogenic content (see Annex 2), inherent energy in the product or packaging (net calorific value) often needs to be checked and added manually when using LCA software, to ensure that the primary energy use is correctly separated into energy used as raw material and energy used as energy carrier and that no energy is unaccounted for. This also means that the inherent energy of input flows of reused or recycled material, or recovered energy, shall be considered. In other words, even if waste allocation (i.e., cut-off) has been used to allocate such input flows (i.e., they come without environmental burden), the energy that is in the flow shall be considered as an input of primary energy into the studied product system, following the rule in EN 15804 that inherent properties shall not be allocated away. Similarly, if materials leave the product system to reuse or recycling, or if energy leaves the product system (e.g., the useful energy from incineration or landfill with energy recovery), these flows shall be subtracted from the indicators of energy used as raw materials and energy carriers, respectively.

Based on different interpretations of EN 15804, there are three options for how to separate the use of primary energy into energy used as raw material and energy used as energy carrier: options A, B and C, as described below. Either option may be used. The option chosen shall be described in direct connection to the declaration of the results of the primary energy use indicators in the EPD.

In option A, the energy used as raw material shall be declared as an input to the module where it enters the product system (in module A1-A3) and as an equally large output from the product system where it exits the product system (i.e., module A5 for packaging content and module C3 and/or C4 for product content) for use in another product system or as waste. Outputs in the form of waste shall, in the module where the loss occurs, be reported as an input in the indicator for energy used as energy carriers (even if the energy is not used in the product system). The rationale behind this option is that the indicator for energy used as raw materials shall reflect the input of energy that becomes part of the product and packaging, and the output of this energy from the product system regardless of when and how it exits the product system. That is, this indicator shows how much energy that is stored in the product or packaging at any given time. At the end of life-cycle stage C, energy is no longer stored in the product, and the energy used as raw materials will therefore be zero over the product life cycle.

In option B, the energy used as raw material shall be declared as an input to the module where it enters the product system (often in module A1) and as an output from the product system if it exits the product system as useful energy (often from modules A5 or C3). Energy content that is wasted (e.g. in landfill or in incineration), remains as part of the indicator for energy used for raw materials, and shall *not* (in contrast to option A) be reported as an input of energy used for energy carriers. The rationale behind this option is that the indicator for energy used as raw materials shall reflect the energy used for the purpose of being raw material in the product or packaging, that is not subsequently transferred in useable form to another product system. In this option, energy used as raw material will often *not* be zero over the product life cycle.

In option C, the energy used as raw material shall be declared as an input to the module where it enters the product system (often module A1) and as an output from the product system if it exits the product system as useful energy (often from modules A5 or C3). Energy content that is wasted in a landfill (but only in landfill, in contrast to option B) remains as part of the indicator for energy used for raw materials and shall *not* (in contrast to option A) be reported as an input of energy used for energy carriers. The rationale behind this option is that the indicator for energy used as raw materials shall reflect the input of energy that becomes part of the product and packaging, that is not subsequently transferred in useable form to

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another product system, which here includes energy that is landfilled, as this is potentially available for future extraction and use in a product system. The rationale is close to the rationale of option A, but as in option B, energy used as raw material will often *not* be zero over the product life cycle.

An example is used to illustrate options A, B and C, see Tables 12-14. In this example, only renewable primary energy use is considered, life-cycle stage B is disregarded, and the following applies:

- 30 MJ of renewable energy is in the product and 10 MJ is in the product packaging.
- 60 MJ of renewable energy is used for energy purposes in A1-A3, 5 MJ in A4-A5, and 5 MJ in C1-C2.
- Packaging is incinerated without energy recovery in A5.
- The energy content of the product (30 MJ) is to one third material-recycled in C3 (with 100% recovery of material), to one third incinerated with energy recovery in C3 (with 90% recovery of energy), and to one third landfilled in C4 (without energy recovery). So, the energy that leaves the system in useful form are the two outputs from module C3: the energy content of the material for recycling (10 MJ) and the exported (thermal and/or electric) energy (9 MJ).

Note 1: The example was designed to illustrate different situations, and not to be as realistic as possible. For example, packaging is most often incinerated *with* energy recovery (in A5), which results in exported energy that would be modelled in the same way as the exported energy from incineration of the product in C3. So, even if not shown in the example, there is no difference – neither in option A nor B – in how the energy content of packaging and product are accounted for when calculating the primary energy use,

Note 2: The total primary energy use indicators are not affected by the choice between options A, B and C, but only the division of this into energy used as raw materials and energy used as energy carriers.

Table 13 Illustration of option A for modelling the primary energy use indicators.

Indicator	A1-A3	A4A5	C1-C2	C3	C4	A-C
PERE	60 MJ	5 + 10 (input from PERM) = 15 MJ	5 MJ	1 MJ (input from PERM)	10 MJ (input from PERM)	91 MJ
PERM	40 MJ (input for product and packaging)	- 10 (loss in incineration of packaging, also reported as input to PERE) = -10 MJ	0 MJ	- 10 (output as material to recycling) – 9 (output as exported energy) – 1 (loss in incineration of product, also reported as input to PERE) = -20 MJ	- 10 (loss in landfill, also reported as input to PERE) = -10 MJ	0 MJ <i>This will always be zero over the product life cycle.</i>
PERT	100 MJ	5 MJ	5 MJ	-19 MJ	0 MJ	91 MJ

Table 14 Illustration of option B for modelling the primary energy use indicators.

Indicator	A1-A3	A4-A5	C1-C2	C3	C4	A-C
PERE	60 MJ	5 MJ	5 MJ	0 MJ	0 MJ	70 MJ
PERM	40 MJ (input for product and packaging)	0 MJ <i>Here there is a loss of 10 MJ in the incineration of the packaging, which is reported where this energy enters the system (in A1-A3)</i>	0 MJ	- 10 (output as material to recycling) – 9 (output as exported energy) = -19 MJ <i>Here there is a loss of 1 MJ in the incineration of the product, which is reported where the energy enters the system (in A1-A3)</i>	0 MJ <i>Here there is a loss of 10 MJ in the landfilling of the product, which is reported where the energy enters the system (in A1-A3)</i>	21 MJ <i>This is the energy used as raw material in product and packaging, minus the useable energy that has left the product system. It corresponds to the losses in A4-A5, C3 and C4.</i>
PERT	100 MJ	5 MJ	5 MJ	-19 MJ	0 MJ	91 MJ

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Table 15 Illustration of option C for modelling the primary energy use indicators.

Indicator	A1-A3	A4-A5	C1-C2	C3	C4	A-C
PERE	60 MJ	5 + 10 (input from PERM) = 15 MJ	5 MJ	1 MJ (input from PERM)	0 MJ	81 MJ
PERM	40 MJ (input for product and packaging)	- 10 (loss in incineration of packaging, also reported as input to PERE) = -10 MJ	0 MJ	- 10 (output as material to recycling) - 9 (output as exported energy) - 1 (loss in incineration of product, also reported as input to PERE) = -20 MJ	0 MJ <i>The 10 MJ that here ends up in landfill, is not transferred to PERE (as in option A), as it is can potentially be extracted, for use in another product system, in the future</i>	10 MJ <i>This is the energy that remains in the landfill, for potential future extraction</i>
PERT	100 MJ	5 MJ	5 MJ	-19 MJ	0 MJ	91 MJ

ANNEX 4: INTERPRETATION OF ALLOCATION RULES IN EN 15804

EN 15804 says that *"flows that reach the end-of-waste state in modules A1-A3 shall be allocated as co-products"*, which could be interpreted to mean that co-product allocation shall always be used for flows leaving the product system from A1-A3 for use in a subsequent product system. For a flow that is or has been waste, this interpretation would mean that (part or the full) waste processing would be allocated to the subsequent product system, which violates the polluter pays principle (PPP) as expressed in EN 15804: *"Processes of waste processing shall be assigned to the product system that generates the waste until the end-of-waste state is reached"*. However, after the first sentence from EN 15804 quoted above, the standard says: *"If such co-product allocation is not possible, other methods may be chosen and shall be justified."*

Based on the above, in the development of this PCR it has been concluded that co-product allocation *is not possible* when the flow is waste, in order not to violate the PPP of EN 15804. As such, the procedure for allocating waste (as outlined in Section 4.5.2) shall be applied also for waste generated in modules A1-A3 that leaves the product system for use in a subsequent product system.

This interpretation of EN 15804 is different from previous versions of this PCR. The previous versions did, however, say that if the flow leaving modules A1-A3 has no or negative economic value (which is the case for waste flows), it will not be allocated any environmental burden. This yields the same result as applying the waste allocation procedure. Thereby, the modelling of the life-cycle stages A-C does not change due to this change in interpretation. The changed interpretation still has two consequences:

- the allocation of waste from modules A1-A3 shall be described as waste allocation and not as co-product allocation, and
- waste that leaves the product system from modules A1-A3 for use in a subsequent product system, shall be accounted for when calculating the net flow to consider in module D.

The changed interpretation of the allocation rules in EN 15804 makes the allocation rules fully compliant with ISO 21930, which was not the case for the previous versions of the PCR.

DRAFT

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