



ALEHOOP

Biorefineries for the valorisation of macroalgal residual biomass and legume processing by-products to obtain new protein value chains for high-value food and feed applications

Project number: 887259

D4.2 Draft PCR for protein isolates

Due date of deliverable: 31/07/2021

Actual submission date: 17/03/2022



PROJECT INFORMATION

Project full title: Biorefineries for the valorisation of macroalgal residual biomass and legume processing by-products to obtain new protein value chains for high-value food and feed applications

Acronym: ALEHOOP

Call: H2020-BBI-JTI-2019

Topic: BBI-2019-SO3-D3


Start date: June 1st 2020

Duration: 48 months

List of participants:

Partner no.	Type of partner	Name	Acronym	Country
1 (Coordinator)	SME	Contactica	CTA	Spain
2	SME	Isanatur	ISA	Spain
3	SME	Biozoon	BZN	Germany
4	SME	Biosurya	BIOYA	Spain
5	SME	Centiv	CENTIV	Germany
6	SME	Garlan	GARLAN	Spain
7	SME	Alginor	ALGI	Norway
8	LE	Nuscience	NUS	Belgium
9	LE	Indukern	IK	Spain
10	RTO	The Flanders Research Institute for agriculture, fisheries and food	EV-ILVO	Belgium
11	RTO	Anfaco	ANFACO	Spain
12	RTO	Tecnalía	TECNA	Spain
13	RTO	Technological University Dublin	TUDublin	Ireland
14	RTO	Universidad de Cádiz	UCA	Spain
15	RTO	Veterinary Research Institute	VRI	Czech Republic
16	RTO	Universidad de Vigo	UVIGO	Spain

DELIVERABLE DETAILS

Document Number:	D4.2
Document Title:	Draft PCR for protein isolates
Dissemination level	Public
Period:	PR1
WP:	WP4
Task:	Task 4.1. Methodology definition for ALEHOOP sustainability assessment and Product Category Rule
Author:	<p>Contactica</p> 
Abstract:	<p>D4.2 provides a draft Product Category Rule (PCR) which aims to set the rules to perform Life Cycle Assessments (LCAs) of protein isolates with UN CPC code 23999 other food products not elsewhere classified (n.e.c.). The draft is presented with the format used in Environdec for the development of PCRs given that it is intended to submit the PCR in the program to share the PCR and start the open consultation before setting the final PCRs to develop environmental product declarations (EPDs) of the products included. Main inputs are associated to the definition of function and functional unit and life cycle stages to be included. The PCR supports cradle-to-grave studies although cradle-to-gate are also accepted. The functional unit of the LCA must be 1 kg of protein isolate including its packaging and the protein content.</p>

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

PCR Registration number

VERSION NUMBER, PUBLICATION DATE

NOTE: THIS DOCUMENT IS A PCR TEMPLATE TO BE USED IN PCR DEVELOPMENT. IT IS NOT A PCR.

A cover image of the PCR will be added by the Secretariat.

The PCR Committee may propose a cover image by submitting it to the Secretariat. The image shall be representative for the scope of the PCR, be of high resolution, and its use as cover image shall be approved by the copyright holder.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

TABLE OF CONTENTS

1	Introduction	8
2	General information	9
2.1	Administrative information	9
2.2	Scope of PCR.....	10
3	PCR review and background information.....	11
3.1	Open consultation	11
3.2	PCR review	11
3.3	Existing PCRs for the product category	11
3.4	Reasoning for development of PCR.....	12
3.5	Underlying studies used for PCR development.....	12
4	Goal and scope, life cycle inventory and life cycle impact assessment	13
4.1	Declared/Functional unit.....	13
4.2	technical specification, lifespan and Reference service life (RSL)	14
4.3	System boundary	14
4.4	System diagram	17
4.5	Cut-off rules.....	17
4.6	Allocation rules.....	17
4.7	Data quality requirements and selection of data	19
4.8	Environmental performance indicators.....	23
4.9	including multiple products in the same EPD	23
5	Content and format of EPD.....	25
5.1	EPD languages	25
5.2	Units and quantities.....	25
5.3	Use of images in EPD	26
5.4	EPD reporting format.....	26
6	List of abbreviations.....	32
7	References.....	33
8	Version history of PCR	34

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

HOW TO USE THE PCR TEMPLATE

This section is intended as instructions for the PCR Moderator and PCR Committee and shall be deleted when preparing a PCR.

This document is a template for developing Product Category Rules (PCR) in the International EPD® System.

The text in this PCR template includes:

1. Headings and text which are common for all PCRs regardless of product category, e.g. the "General introduction" section. These should be kept as they are, but exceptions are possible, as is further described in this document and in the General Programme Instructions (GPI).
2. Instructions written *in italics*. They shall be decided upon during the PCR development and be replaced by specific requirements (or deleted as appropriate) in the PCR. When indicated, this is also used to indicate administrative information that will be added by the Secretariat before publication.

The GPI includes further requirements on and guidance for developing PCRs.

Previous GPI versions used PCR Basic Modules as the basis for PCR development, instead of this PCR template. In addition to the guidance in this template, the PCR Basic Modules included requirements which are common for all products that belong to the specified product group on UN CPC code two-digit level. As this PCR template is more generic, it has become even more important to carefully consider other PCRs of similar or related product categories in the development of the PCR. This consideration is essential to harmonize PCRs. If there is a lack of PCRs on similar or related product categories, the old PCR Basic Modules may still be used as a reference in the development process to facilitate harmonization – the PCR Moderator may contact the Secretariat to get a copy of the PCR Basic Module that corresponds to the product category of concern.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

VERSION HISTORY OF PCR TEMPLATE

This section shall be deleted when preparing a PCR.

VERSION 2021-03-29

Original version of this PCR template, compliant with Version 4.0 of the GPI.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

1 INTRODUCTION

This document constitutes Product Category Rules (PCR) developed in the framework of the International EPD® System: a programme for type III environmental declarations¹ according to ISO 14025:2006, ISO 14040:2006, ISO 14044:2006, and product-specific standards such as EN 15804 and ISO 21930 for construction products. Environmental Product Declarations (EPD) are voluntary documents for a company or organisation to present transparent, consistent and verifiable information about the environmental performance of their products (goods or services).

The rules for the overall administration and operation of the programme are the General Programme Instructions (GPI), publicly available at www.environdec.com. A PCR complements the GPI and the normative standards by providing specific rules, requirements and guidelines for developing an EPD for one or more specific product categories (see Figure 1). A PCR should enable different practitioners using the PCR to generate consistent results when assessing products of the same product category.

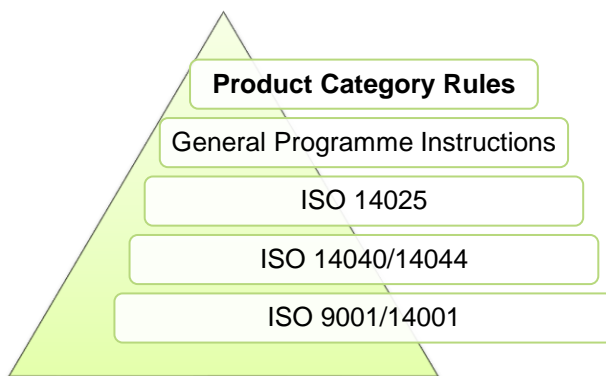


Figure 1 The hierarchy between PCRs, standards and other documents. EN 15804 and ISO 21930 are normative standards for construction products only.

Within the present PCR, the following terminology is adopted:

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

For definitions of further terms used in the document, see the normative standards.

A PCR is valid for a pre-determined period of time to ensure that it is updated at regular intervals. The latest version of the PCR is available at www.environdec.com. 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.

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


The programme operator maintains the copyright of the document 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 Type III environmental declarations in the International EPD® System are referred to as EPDs, Environmental Product Declarations.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	<i>Other food products: protein concentrates</i> Name of the PCR
Registration number and version:	<i>Added by the Secretariat</i>
Programme:	 The International EPD® System
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com E-mail: info@environdec.com
PCR Moderator:	Ricardo Méndez, Contactica SL Ricardo.mendez@contatica.es <i>Name, organisation and e-mail address of the appointed PCR Moderator</i>
PCR Committee:	Contactica, Alginor, Anfacó, Tecnalia <i>Names of organisations participating in the preparation of the PCR</i>
Date of publication and last revision:	<i>Added by the Secretariat</i>
Valid until:	<i>Added by the Secretariat</i>
Schedule for renewal:	<p>A 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 how to proceed with updating the PCR and renewing its validity.</p> <p>A PCR may be also be updated without prolonging its period of validity, provided significant and well-justified proposals for changes or amendments are presented.</p> <p>See www.environdec.com for the latest version of the PCR.</p> <p>When there has been an update of the PCR, the new version should be used to develop EPDs. The old version may however be used for 90 days after the publication date of the new version, as long as the old version has not expired.</p>
Standards conformance:	<ul style="list-style-type: none"> ▪ General Programme Instructions of the International EPD® System, version 4.0, based on ISO 14025 and ISO 14040/14044 <i>List all other LCA-based claim standards with which the PCR is in conformance, e.g. EN 15804 and ISO 21930 for construction products.</i>
PCR language(s):	At the time of publication, this PCR was available in English <i>and (add other languages the PCR has been translated to)</i> . If the PCR is available in several languages, these are available at www.environdec.com . In case of translated versions, the English version takes precedence in case of any discrepancies.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

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 additives, extracts or functional ingredients for food products and the declaration of this performance by an EPD. The product category corresponds to UN CPC 23999 Other food products n.e.c.

This subclass includes:

- protein concentrates and textured protein substances

Provide a detailed description of the products included in the product category. Examples of products included and excluded from the scope of the PCR should be given. Synonyms to the name of the product category and its included products should be listed.

The UN CPC classification hierarchy shall be presented, as well as a link to <https://unstats.un.org/unsd/classifications/Family/Detail/1074> for additional information. Other relevant classification schemes may also be included.

The product category covered by a PCR shall, as far as possible, relate to the function of the product, i.e. that the same functional unit may be applied to products within its scope. If justified, a PCR may, however, allow different functional units for different products within the product category. The product category definition should be made so that the development of the PCR is practical and feasible accounting for existing PCRs, the market situation, industry structure, potential EPD applications, and the size of the stakeholder group affected. The scope should be decided during PCR development in a discussion between the PCR Moderator, the PCR Committee, the Secretariat, and the Technical Committee, with the aim to reach consensus, as far as possible. The scope of the product category of a PCR may be reconsidered during PCR development (e.g. as a response to comments made during the open consultation), when PCRs are updated, or when new PCRs are proposed, to adapt to market developments.

2.2.2 GEOGRAPHICAL SCOPE

This PCR may be used globally.

PCR documents developed in the International EPD® System should have a global scope, e.g. to be as applicable as possible and to avoid creating unnecessary trade barriers.

The geographical scope of the PCR may, however, be more limited when relevant. In such cases, the above sentence shall be replaced by a list of the geographical region(s) for which the PCR is valid. The geographical scope stated shall match the scope of the guidance given in the PCR, e.g., scenarios for the use phase and end-of-life, production processes, examples of databases to use for generic data, references to standards, impact categories, etc. Any other scope than a global one must be clearly justified in the PCR development process and is subject to approval by the Secretariat.

2.2.3 EPD VALIDITY

An EPD based on this PCR shall be valid for a 5-year period starting from the date of the verification report ("approval date"), or until the EPD has been de-registered from the International EPD® System.

An EPD shall be updated and re-verified during its validity if changes in technology or other circumstances have led to:

- an increase of 10% or more of any of the declared indicators of environmental impact,
- errors in the declared information, or
- significant changes to the declared product information, content declaration, or additional environmental, social or economic information.

If such changes have occurred, but the EPD is not updated, the EPD owner shall contact the Secretariat to de-register the EPD.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

3 PCR 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

This PCR was available for open consultation from *date* until *date*, during which any stakeholder was able to provide comments by contacting the PCR Moderator and/or the Secretariat.

Add information about any physical or web-based meetings held during the open consultation phase, if applicable.

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 at www.environdec.com.

- *List of stakeholder names and affiliation*

In case of multiple major revisions of the PCR (1.0, 2.0, etc.), information about each open consultation should be added as sub-sections (3.2.1, 3.2.2, etc.).

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 at www.environdec.com . The review panel may be contacted via info@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>Added by the Secretariat</i>
Review dates:	<i>Added by the Secretariat</i>

In case of multiple major revisions of the PCR (1.0, 2.0, etc.), information about each review should be added as sub-sections (3.1.1, 3.1.2, etc.).

3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

As part of the development of this PCR, existing PCRs and other internationally standardized methods that could potentially act as PCRs were considered to avoid unnecessary overlaps in scope and to ensure harmonisation with established methods of relevance for the product category. The existence of such documents was checked among the following EPD programmes and international standardisation bodies:

- International EPD® System. www.environdec.com.
- No existing PCRs were been identified.

List of other EPD programmes and international standardisation bodies that have potentially issued methods that could act as PCRs, including link to website. Guidance is available at www.environdec.com on where to search for existing PCRs.

No existing PCRs or other relevant internationally standardized methods with overlapping scope were identified. *Full references to existing PCRs shall be given in Section 7.*

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

The adoption of an existing PCR shall be preferred over developing a new PCR. If existing PCRs are identified but not used, this shall be justified. Existing PCRs that cover a part of the life cycle of the product in question, e.g. agricultural products for processed food items, should be referenced for harmonisation across product categories and in supply chains.

Existing PCRs available in other programmes shall also be considered, including PCRs that are under development. The International EPD® System may recognise and adopt PCRs prepared by other programme operators operating in accordance with ISO 14025 if they fulfil the requirements of the GPI. If a PCR with a relevant scope is identified in another programme, the Secretariat shall be contacted to plan the next step.

If other internationally standardized methods exist that act as PCRs or give guidance on PCR development for certain product categories, and the guidelines are widely accepted and used by the market, it may be possible to develop and certify EPDs according to such a standard or guideline even though it is not fully compliant with the International EPD® System. The decision to adopt such documents shall be made by the Secretariat.

If existing PCRs and/or relevant internationally standardized methods were identified but not adopted, the reason for why the present PCR was developed shall be described in Section 3.4. Also, any attempts made to harmonize or align this PCR with existing PCRs and/or internationally standardized methods shall be described.

If no existing PCRs or relevant internationally standardized methods were identified, the above table may be replaced by the statement: "No existing PCRs or other relevant internationally standardized methods with overlapping scope were identified."

3.4 REASONING FOR DEVELOPMENT OF PCR

This PCR was developed to enable publication of EPDs for this product category based on ISO 14025, ISO 14040/14044. *(add other relevant standards on which the PCR is based)* The PCR enables different practitioners to generate consistent results when assessing the environmental impact of products of the same product category, and thereby it supports comparability of products within a product category.

Add any other justification for development of the PCR, if relevant, and any limitations in the intended target audience of EPDs based on this PCR.

3.5 UNDERLYING STUDIES USED FOR PCR DEVELOPMENT

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

- List the underlying life cycle assessments (LCAs) conducted in accordance with ISO 14044, scientific papers and other relevant studies, including any supporting studies performed in parallel to the PCR development. Full references to the underlying studies shall also be given in Section 7. If the PCR is an update of a previously published PCR, the underlying studies of the previous versions of the PCR shall also be listed.*

Note that the GPI requires PCRs to be based on one or more LCAs representing the full product life cycle conducted in accordance with ISO 14044 and other relevant LCA-based footprint studies, including any supporting studies performed in parallel to the PCR development.

Name study	Author(s) and year
Life Cycle Assessment of Soy Protein Isolate	Berardy et al., 2015
Whey protein concentrate (WPC) production: Environmental impact assessment	Berardy et al., 2015
Rubisco protein production – LCA approach	Skunca et al., 2021

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

4 GOAL AND SCOPE, LIFE CYCLE INVENTORY AND LIFE CYCLE IMPACT ASSESSMENT

The goal of this section is to provide specific rules, requirements and guidelines for developing an EPD for the product category as defined in Section 2.2.1.

4.1 DECLARED/FUNCTIONAL UNIT

The declared unit shall be defined as 1 kg of product, including its packaging (weight of packaging is not included in this 1 kg). The reference flow in the Life Cycle Assessment shall be defined at the customer gate, at the shelf or the retailer or at the market place. (CPC 23). The declared unit shall be stated in the EPD. The environmental impact shall be given per declared unit. A description of the function of the product should be included in the EPD®, if relevant, as well as protein content. The protein concentrate can be used for food or feed.

The functional/declared unit(s) and reference flow(s) to use in the EPD shall be specified in the PCR.

Example of text if a declared unit is required/recommended: "The 1 kg of product and its packaging (the weight of the packaging is not included in this 1 kg). The reference flow in the LCA shall be defined at the point where the product arrives at the customer gate, i.e. any losses occurring before then must be taken into account."

If a declared unit is required/recommended, the following text should be added: "This PCR uses a declared unit instead of a functional unit as all functional and qualitative aspects are not possible to capture in the same unit. These aspects should be taken into consideration when comparing EPDs based on this PCR."

The PCR may allow several declared/functional units, for different subcategories of products. The PCR may also allow the declaration of results for two different declared/functional units in the same EPD, although this is not recommended; this must be justified in the PCR development process.

Make sure to harmonise the guidance on declared/functional unit with other similar or related PCRs.

If a declared unit is used, any reference to functional unit should be removed from the document, and vice-versa.

The PCR may define qualitative or performance-related aspects to declare in the EPD that are outside of the declared/functional unit.

Further guidance to help define the declared/functional unit, taken from the GPI:

The declared or functional unit is the reference unit to which the environmental performance of the product is related. Functional unit is defined as a quantified performance of a product and a declared unit is defined as a quantity of a product. The declared/functional unit to use for a specific product category shall be specified in the PCR.

The declared/functional unit shall be clearly defined and measurable. In practice, the declared/functional unit consists of a qualitatively defined function or property (e.g. for paint, a surface covered with a certain level of brightness, or other quality) and its quantification via one or several units (e.g. 1 m² covered for 10 years). The declared/functional unit should be expressed in SI units (kg, J, meters, etc.), however, other units may be used if they are considered more relevant to address the information (e.g. kW for power and kWh for energy). Conversion factors shall be provided to convert from declared/functional unit to one unit of product, where relevant.

If the function of the product in the use phase is known and can be clearly defined, a functional unit shall be used. Examples of functional units are:

- for transportation modes or services: transportation of a given number of passengers over a given distance, e.g. transport of 1 passenger for 1 km,*
- for cleaning items or services: cleaning of a given item or area for a given time, e.g. 1 m² building area kept cleaned for a period of 1 year,*
- for products applied on surfaces: coverage of given surface area over a given time. e.g. 1 m² wall surface covered for 10 years, and*
- for energy products: provision of a certain type and quantity of energy, e.g. 1 kWh of electricity delivered to the customer.*

If the function of the product in the use phase is unknown, if the product can be used for several different functions, or if the function cannot be clearly defined, a declared unit may be used. A declared unit may, for example, be suitable for intermediate products which can be further processed, or combined with other products, into different end products. Although a declared unit is defined as a quantity of the product rather than its quantified performance, the definition of declared unit shall be relevant in relation to the typical applications the product. Examples of declared units are:

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

- *an item or an assemblage of items, e.g. 1 brick, 1 mobile phone,*
- *mass of a product, e.g. 1 kg of cement, and*
- *volume of a product, e.g. 1 litre of water, 1 m³ of ready-mixed concrete.*

Note that the use of a declared unit may reduce comparability between EPDs. To increase comparability between EPDs based on a declared unit, it is therefore important to specify technical properties of relevance for the application/use of the product.

4.2 TECHNICAL SPECIFICATION, LIFESPAN AND REFERENCE SERVICE LIFE (RSL)

Technical specifications of the product assessed must be included in the every EPD developed under this PCR. The RSL is not applicable for this product category, although changes on service life of food matrices where the ingredient is embedded must be specified (e.g. by using antioxidants).

If relevant, the PCR may require or recommend a technical specification of the product, for example in a separate section (this section) or as part of describing its function. The technical specification shall include sufficient information for a user of the EPD to assess the technical performance and usefulness of the product in a given context.

The technical specification may include a technical lifespan of the product, i.e. the average time for which the product has been designed or proven to last, and/or an actual lifespan, i.e. the average time for which the product has been shown to be in use. Lifespans shall be expressed in relevant units such as years, operating hours, or kilometres travelled. Note that the technical lifespan is not identical or related to guarantee time whether legally binding or offered voluntary. If relevant, the PCR may include requirements or guidance on how to estimate product life spans.

Note that a technical or actual lifespan of a product is not necessarily the same as the reference service life (RSL) of the product category to which the product belongs. The RSL of a product category is the reference time to which the performance of all products of a product category shall be related. As such, the RSL may be an integral part for relating the performance of a product to the functional unit. For example, a PCR may specify the RSL of a product category to be 10 years (e.g. because that is a typical technical lifespan for the product category) and then specify the functional unit to be the fulfilment of a certain function over that RSL. If a product then has a (proven) technical lifespan of 5 years, two such products (or a replacement product or refurbishment of the product, depending on product) are needed to fulfil the functional unit. Likewise, if a product has a (proven) technical lifespan of 20 years, only half such a product may be needed to fulfil the functional unit.

If relevant, the PCR may specify the RSL for a product category. The RSL shall refer to the declared technical and functional performance of the product, be specified under defined reference in-use conditions, and be justified and verifiable. For further guidance on RSL of construction products, see EN 15804.

4.3 SYSTEM BOUNDARY

The scope of this PCR and EPDs based on it is cradle-to-grave. Cradle-to-gate EPDs can be also be developed under the scope of this PCR, considering upstream and core processes. *insert the scope of the PCR (e.g. cradle-to-gate, cradle-to-gate plus end-of-life, cradle-to-grave, or several if several options are permitted).*

The system boundary of the product life cycle determines the processes to be included or excluded in the LCA. Which system boundary that shall, should or may be applied for a specific product category shall be set in the PCR. See the GPI for further guidance on setting system boundaries.

All environmentally relevant processes from "cradle to grave" should be included, so that at minimum 99% of the total energy use, mass of product content, and environmental impact is accounted for (see Section 4.5).

For intermediate products or other products for which further processing and/or the end use is unknown, the system boundary may be limited to "cradle to gate". If end-of-life treatment is excluded, the following criteria shall be fulfilled (the first three criteria are adapted from EN 15804, and the fourth criteria is adapted from ISO 14025):

- *the product is physically integrated with other products in subsequent life-cycle process (e.g. during installation in a building) 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.*

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

If deviations from a "cradle to grave" system boundary are allowed for a product category, and if deviations from the above criteria for excluding end-of-life treatment are made, these shall be described in the PCR and justified in the PCR development process.

4.3.1 LIFE-CYCLE STAGES

For the purpose of different data quality rules and for the presentation of results, the life cycle of products is divided into three different life cycle stages:

- Upstream processes (from cradle-to-gate);
- Core processes (from gate-to-gate)
- Downstream processes (from gate-to-grave)

In the EPD, the environmental performance associated with each of the three life-cycle stages above shall be reported separately. The processes included in the scope of the PCR and belonging to each life cycle stage are described in Sections 4.3.1.1-4.3.1.3

4.3.1.1. Upstream processes

The following attributional processes are part of the product system and classified as upstream processes: *(CPC 21)*

- Production of raw material
- Production processes delivering by-products used as raw material in core processes
- Production of other ingredients as spices, additives used in the product
- Production of auxiliary products used such as detergents for cleaning, etc.
- Impacts due to the production of electricity and fuels used in the agriculture at farm
- Manufacturing of primary and secondary packaging

Upstream processes not listed may also be included. All elementary flows at resource extraction shall be included, except for the flows that fall under the general cut-off rule in Section 4.5.

4.3.1.2. Core processes

The following attributional processes are part of the product system and classified as core processes: *(CPC 21)*

- External transportation to the core processes
- Preliminary production stages delivering by-products
- Drying process
- Isolation, concentration and purification processes
- Extraction processes
- Maintenance (e.g. of the machines)
- Waste treatment of waste generated during manufacturing
- Impacts due to the production of electricity and fuels used in the core module
- Packaging: production and transportation
- Storage at plant: energy consumed to store the product before its distribution
- External transportation to packing unit

Manufacturing processes not listed may also be included. The production of the raw materials used for production of all product parts shall be included. A minimum of 99% of the total weight of the declared product including packaging shall be included.

The technical system shall not include:

- Manufacturing of production equipment, buildings and other capital goods.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

- Business travel of personnel.
- Travel to and from work by personnel.
- Research and development activities.

4.3.1.3. Downstream processes

The following attributional processes are part of the product system and classified as downstream processes:

- Transportation from preparation to an average retailer/distribution platform
- Customer or consumer use of the product
- End-of-life processes of any wasted part of the product
- End-of-life processes of packaging waste
- Processing of the protein concentrate within the matrix if it is required to allow compatibility with the matrix.
- Cooking phase: this stage must be included if a cooking phase is required to consume the functional ingredient (not the matrix in which is included)

The end-of-life scenarios must be relevant for the geographical scope in which the EPD is valid.

4.3.2 OTHER BOUNDARY SETTING

Below subsections may need to be adjusted to the scope of the PCR, and additional boundary settings may be added, if relevant.

4.3.2.1. Boundary towards nature

Boundaries to nature are defined as where the flows of material and energy resources leaves nature and enters the technical system (i.e. the product system). Emissions cross the system boundary to nature when they are emitted to air, soil or water.

4.3.2.2. Boundary towards other technical systems

Boundaries towards other technical systems define the flow of materials and components to/from the product system under study and from/to other product systems. If there is an inflow of recycled material to the product system in the production/manufacturing stage, the transport from the scrapyards/collection site to the recycling plant, the recycling process, and the transportation from the recycling plant to the site where the material is being used shall be included. If there is an outflow of material or component to recycling, the transportation of the material to the scrapyards/collection site shall be included. The material or component going to recycling is then an outflow from the product system.

See Section 4.6.2 for further guidance.

4.3.2.3. Temporal boundary

The temporal boundary defines the time period for which the life cycle inventory data is recorded, e.g. for how long emissions from waste deposits are accounted. As default, the time period over 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.

4.3.2.4. Geographical boundary

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

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

4.4 SYSTEM DIAGRAM

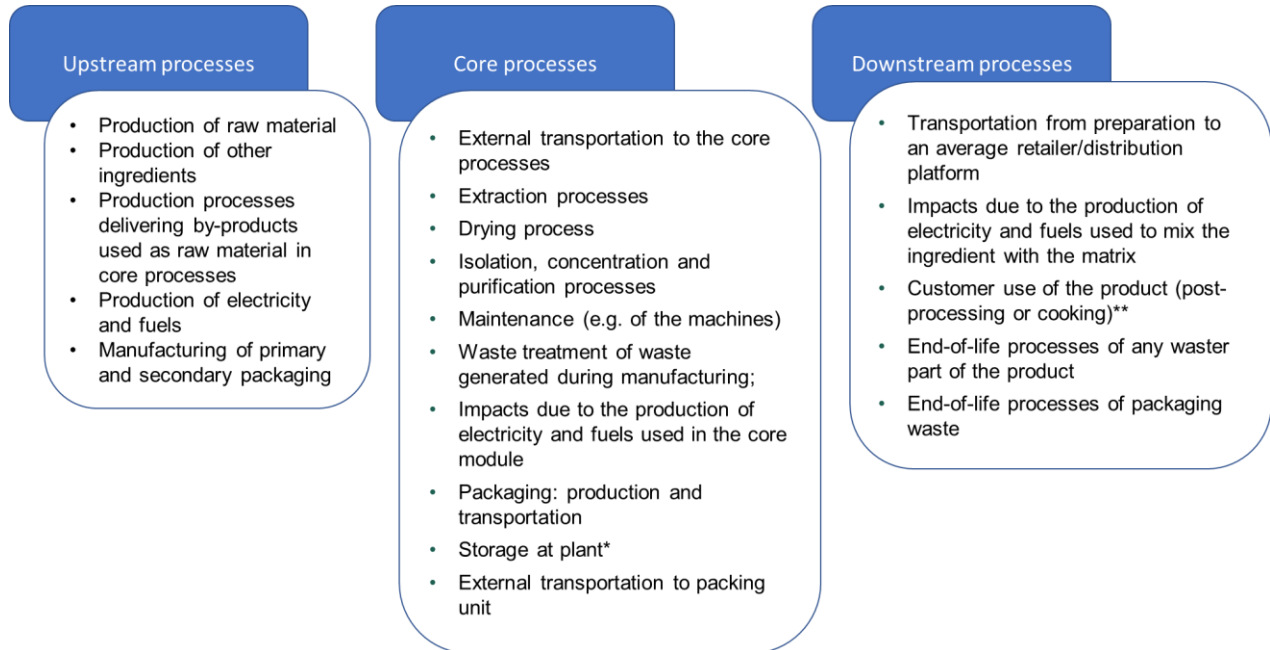


Figure 2 System diagram illustrating the processes that are included in the product system, divided into upstream, core and downstream processes.

* See section 4.3.1.2.

**See section 4.3.1.3.

The system diagram should indicate important omissions of life-cycle stages and processes. The division can be into other life-cycle stages than upstream, core and downstream; see guidance in Section 4.3.

4.5 CUT-OFF RULES

A cut-off rule of 1% shall be applied. In other words, the included inventory data (not including inventory data of processes that are explicitly outside the system boundary as described in Section 4.3) shall together give rise to at least 99% of the results of any of the environmental impact categories. Also, 99% of the mass of the product content and 99% of the energy use of the product life cycle shall be accounted for. The cut-off of inventory data should, however, be avoided, and all available inventory data shall be used.

Deviations to the cut-off rule of 1% may be set in the PCR and shall be justified in the PCR development process.

The cut-off of inventory data, based on the above cut-off rule, should be an output of a sensitivity analysis, alone or in combination with expert judgment based on experience of similar product systems. Further, the cut-off shall be possible to verify in the verification process, hence the exclusion of inventory data based on the cut-off rule shall be documented in the LCA report, and the EPD developer shall provide the information the verifier considers necessary to verify the cut-off.

4.6 ALLOCATION RULES

Allocation can be divided into allocation of co-products, i.e. allocation of unit processes that generate several products, and allocation of waste, i.e. allocation of unit processes that generate materials that are, for example, landfilled recovered, recycled or reused, and which require further processing to cease being waste and become products (see criteria for end-of-waste state in Section 4.6.2).

The principles for allocation of co-products and allocation of waste are described separately in the following subsections

4.6.1 CO-PRODUCT ALLOCATION

The following hierarchy of allocation methods shall be followed for co-product allocation:

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

1. Allocation shall be avoided, if possible, by dividing the process to be allocated into sub-processes and collecting the inventory data for each sub-process.
2. If allocation cannot be avoided, the inventory data should be partitioned between the different co-products in a way that reflects the underlying physical relationships between them, i.e. allocation should reflect the way in which the inventory data changes if the quantities of delivered co-products change.
3. If a physical relationship between the inventory data and the delivery of co-products cannot be established, the inventory data should be allocated between the co-products in a way that reflects other relationships between them. For example, inventory data might be allocated between co-products in proportion to their economic values. If economic allocation is used, a sensitivity analysis exploring the influence of the choice of the economic value shall be included in the LCA report.

provides specific allocation guidance.

PROCESS	MAIN PRODUCT AND CO-PRODUCTS	ALLOCATION INSTRUCTION
Seaweed harvest	Brown, green and red seaweed	Mass allocation
Dairy farm	Cheese, whey, cream, butter, buttercream	Allocation of the environmental burden shall be done by mass allocation using the dry weight (i.e. dry matter content), as proposed by the International Dairy Federation (2015)
Olive oil production	Olive oil, vegetal water, essential oil and pulp	Economic allocation using bulk price
Nuts production	Nut, Nut-oil, nut shell, nut pomace	Economic allocation using bulk price
Wine	Wine, grape seeds	Economic allocation using bulk price
Cooking phase	Matrix and ingredients	Mass allocation
Post-treatment	Matrix and ingredients	Mass allocation

Table 1 Allocation method for key processes in the product system

Given the high variety of products classified within this PCR, the allocation procedure should be justified when possible, using updated specific PCRs or standards of the product within the system under study,

4.6.2 ALLOCATION OF WASTE TREATMENT PROCESSES

Allocation of waste shall follow the polluter pays principle and its interpretation 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.” In consequence, if a raw material is obtained from a waste stream of other process, it will be treated as a burden free raw material. The end-of-waste state is reached when all the following criteria for the end-of-waste state are fulfilled (adapted 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.

The above outlined principle means that the generator of the waste shall carry the full environmental impact until the point in the product life cycle in which the end-of-waste criteria are fulfilled. 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 no longer has a negative market value. This allocation method is (in most cases) in line with a waste generator’s juridical and financial responsibilities. See the GPI for further information and examples.

The PCR may provide further guidance on allocation of specific waste treatment processes of relevance for its scope, for example by adding examples listed in the GPI. This guidance should follow the above general rule of the International EPD® System; deviations shall be justified in the PCR development process.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

4.7 DATA QUALITY REQUIREMENTS AND SELECTION OF DATA

Life cycle inventory data are classified into specific data and generic data, where the latter can be selected generic data or proxy data. The data categories are defined as follows:

- specific data (also referred to as “primary data” or “site-specific data”):
 - data gathered from the actual manufacturing plant where product-specific processes are carried out;
 - actual data from other parts of the life cycle traced to the product under study, for example site-specific data on the production of materials or generation of electricity provided by contracted suppliers, and transportation data on distances, means of transportation, load factor, fuel consumption, etc., of contracted transportation providers; and
 - LCI data from databases on transportation and energyware that is combined with actual transportation and energy parameters as listed above.
- generic data (sometimes referred to as “secondary data”), divided into:
 - selected generic data: data (e.g. commercial databases and free databases) that fulfil prescribed data quality requirements for precision, completeness, and representativeness (see below Section 4.7.1),
 - proxy data: data (e.g. commercial databases and free databases) that do not fulfil all of the data quality requirements of “selected generic data”.

Specific data shall be used for the core processes. Specific data shall be used for upstream and downstream processes, when available, otherwise generic data may be used. Generic data should be used in cases in which they are representative for the purpose of the EPD, e.g. for bulk and raw materials on a spot market, if there is a lack of specific data on the final product or if a product consists of many components.

The PCR may set stricter rules for using specific data in selected upstream or downstream processes, e.g. for the production of consumer packaging. Such specifications may make it necessary to adjust above text.

4.7.1 RULES FOR USING GENERIC DATA

For generic data to be classified as “selected generic data”, the following requirements apply (*which may be further specified in the PCR*):

- datasets shall be based on attributional LCA modelling (e.g., not be based on marginal data and not include credits from system expansion),
- the reference year shall be as current as possible and should be representative for the validity period of the EPD,
- the 1% cut-off rule (as described in Section A.3.3) shall be met on the level of the product system,
- datasets shall represent average values for a specific reference year; however, how data are generated could vary, e.g. over time, and then they should have the form of a representative annual average value for a specified reference period (such deviations shall be justified and declared in the EPD), and
- the representativeness of the data shall be assessed to be better than $\pm 5\%$, in terms of the environmental impact calculated on the basis of the data, of data that is fully representative for the given temporal, technological and geographical context.

If selected generic data that meets the above data quality requirements are not available, proxy data may be used. The environmental impacts associated with proxy data shall not exceed 10% of the overall environmental impact of the product system.

The EPD may include a data quality declaration to demonstrate the share of specific data, selected generic data and proxy data contributing to the results of the environmental impact indicators.

Further rules for using generic data and declaring their quality may be provided in the PCR.

4.7.2 EXAMPLES OF DATABASES FOR GENERIC DATA

¡Error! No se encuentra el origen de la referencia. lists examples of databases and datasets to be used for generic data. Please note that a data quality assessment shall be performed also for data listed in the table, and that other data that fulfil the data quality requirements may also be used.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

The PCR may also list examples of certain databases or datasets to use as selected generic data for specific unit processes. Such data shall have been analysed during PCR development to meet the requirements of the International EPD® System for data quality, representativeness, review, scope of documentation, etc. Publicly available and free data of high quality should have priority in any listing of data. The geographical scope of the PCR should also be considered when listing data.

4.7.3 DATA QUALITY REQUIREMENTS AND OTHER MODELLING GUIDANCE PER LIFE-CYCLE STAGE

Below are the default data quality requirement per life-cycle stage. The text in this section may need to be adjusted to the scope of the PCR, e.g. if the product does not consist of main parts or if it does not include packaging. Major specifications or deviations to below rules may be done in the PCR; these shall be justified in the PCR development process. To harmonize across product categories, data quality requirements in PCRs of similar and/or related product categories PCRs shall be considered.

Below are further data quality requirement per life-cycle stage. Exceptions to the requirements may be accepted, if justified in the EPD; such exceptions are subject to the approval by the verifier on a case-to-case basis.

4.7.3.1. Upstream processes

- Data referring to processes and activities upstream in a supply chain over which an organisation has direct management control shall be specific and collected on site.
- Data referring to contractors that supply main parts, packaging, or main auxiliaries should be requested from the contractor as specific data, as well as infrastructure, where relevant.
- Data on transport of main parts and components along the supply chain to a distribution point (e.g. a stockroom or warehouse) where the final delivery to the manufacturer can take place, should be specific and based on the actual transportation mode, distance from the supplier, and vehicle load.
- In case specific data is lacking, selected generic data may be used. If this is also lacking, proxy data may be used (see Section 4.7).
- For upstream processes modelled with specific data, generation of electricity used shall be accounted for in this priority:
 1. Specific electricity mix as generated, or purchased from an electricity supplier, demonstrated by a Guarantee of Origin or similar as provided by the electricity supplier.
 2. Residual electricity mix of the electricity supplier on the market.
 3. Residual electricity mix on the market.
 4. Electricity consumption mix on the market.

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.

“The market” in the above hierarchy may correspond a national electricity market, if this can be justified.

The mix of electricity used in upstream processes shall be documented in the EPD, where relevant.

- Packaging: specific data shall be used for the consumer packaging production if it is under the direct control of the organization or if the environmental impact related to the consumer packaging production is more than 10% of the total product environmental indicators. In other cases, generic data may be used. When consumer packaging shows the organization's logo, the LCA report should report the exerted/non-exerted direct control on the production of consumer packaging by the organization.

If relevant, the PCR may list other key assumptions to be made for the modelling of the upstream processes. If a valid PCR already exists in the International EPD® System for part of the upstream processes, a reference to that specific PCR should be made for calculation rules.

4.7.3.2. Core processes

- Transport from the final delivery point of raw materials, chemicals, main parts, and components (see above regarding upstream processes) to the manufacturing plant/place of service provision should be based on the actual transportation mode, distance from the supplier, and vehicle load, if available.

NAME OF PRODUCT CATEGORY

PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

- Goods: Specific data shall be used for the assembly of the product and for the manufacture of main parts as well as for on-site generation of steam, heat, electricity, etc., where relevant.
- Services: Specific data shall be used for the consumption of materials, chemicals, steam, heat, electricity, etc., necessary for execution of the service
- For electricity used in the core processes, generation of electricity used shall be accounted for in this priority:
 1. Specific electricity mix as generated, or purchased from an electricity supplier, demonstrated by a Guarantee of Origin or similar as provided by the electricity supplier.
 2. Residual electricity mix of the electricity supplier on the market.
 3. Residual electricity mix on the market.
 4. Electricity consumption mix on the market. This option shall not be used for electricity used in processes over which the manufacturer (EPD owner) has direct control².

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.

“The market” in the above hierarchy may correspond a national electricity market, if this can be justified.

The mix of electricity used in the core processes shall be documented in the EPD, where relevant.

- Waste treatment processes of manufacturing waste should be based on specific data, if available.

If relevant, the PCR may list other key assumptions to be made for the modelling of the core processes, such as agricultural modelling for PCRs of food products and guidance on creation of usage scenarios for consumer products. In case of extensive modelling guidance, the division into sections may need to be adjusted to increase readability.

4.7.3.3. Downstream processes

- Data for the use stage are usually based on scenarios, but specific data should be used when available and relevant.
- Data on the emissions from the use stage 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 use of electricity in the region/country where the product is used (as specified in the geographical scope of the EPD) shall be accounted for in the following priority:
 1. Residual electricity mix on the market.
 2. Electricity consumption mix on the market.

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 production mix.

“The market” in the above hierarchy may correspond a national electricity market, if this can be justified.

The mix of electricity used in the downstream processes shall be documented in the EPD, where relevant.

- The transport of the product to the customer shall be described in the EPD, where relevant, and be accounted for in this priority:
 1. Actual transportation modes and distances to specific a 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. Transport from the final delivery point of raw materials, chemicals, main parts, and components (see above regarding upstream processes) to the manufacturing plant/place of service provision should be based on the actual transportation

² For electricity markets without trade of Guarantees of Origin (or similar), the residual mix will, however, be identical to the consumption mix.

NAME OF PRODUCT CATEGORY

PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

mode, distance from the supplier, and vehicle load, if available. If specific data is not available, default scenarios found in (Zampori & Pant, 2019) should be used:

- a. From suppliers to factory (within Europe):
 - i. Other products:
 1. 130 km by truck (>32t, EURO 4)
 2. 240 km by train (average freight train)
 3. 270 km by ship (barge)
 - b. From suppliers to factory (outside Europe)
 1. 1,000 km by truck (>32t, EURO 4)
 2. 18,000 km by ship (transoceanic container) or 10,000 km by plane (cargo)
 - c. Transport for distribution of final product
 - i. From factory to final client:
 1. Local supply chain: 1,200 km by truck (<32t, EURO 4)
 2. Intracontinental supply chain: 3,500 km by truck (>32t, EURO 4)
 3. International supply chain: 1,000 km by truck (>32t, EURO 4) and 18,000 km by ship (transoceanic container)
 - ii. From factory to retail or DC:
 1. Local supply chain: 1,200 km by truck (<32t, EURO 4)
 2. Intracontinental supply chain: 3,500 km by truck (>32t, EURO 4)
 3. International supply chain: 1,000 km by truck (>32t, EURO 4) and 18,000 km by ship (transoceanic container)
 - iii. From DC to final client:
 1. 250 km round trip by van (lorry <7.5t, EURO 3 with utilisation ratio of 20%)
 - iv. From retail to final client
 1. 62%: 5 km by passenger car (average)
 2. 5%: 5 km round trip, by van (lorry <7.5t, EURO 3 with utilisation ratio of 20%)
 3. 33%: no impacts modelled
4. *A default transportation scenario of relevance to the product category and (for the product category) common markets, as specified in the PCR.*
 - Scenarios for the end-of-life stage shall be technically and economically practicable and compliant with current regulations in the relevant geographical region based on the geographical scope of the EPD. Key assumptions regarding the end-of-life stage scenario shall be documented in the LCA report.

If relevant, the PCR may list other key assumptions to be made for the modelling of the downstream processes.

4.7.4 DATA QUALITY DECLARATION

EPDs may include a declaration of the quality of data used in the LCA calculations.

The PCR may set requirements on such a declaration.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

4.8 ENVIRONMENTAL PERFORMANCE INDICATORS

The EPD shall declare the default environmental performance indicators and their methods as described at the website (www.environdec.com/indicators), which includes both inventory indicators and indicators of potential environmental impact. The source and version of the impact assessment methods and characterisation factors used shall be reported in the EPD. Alternative regional impact assessment methods and characterisation factors may be calculated and displayed in addition to the default list. If so, the EPD shall contain an explanation of the difference between the different sets of indicators, as they may appear to the reader to display duplicate information.

If the default list of environmental performance indicators and methods at the website is updated, the previous version of the list is valid in parallel to the new version during a transition period of 90 days, as described at the website.

Apart from the required inventory indicators, other inventory data may also be declared in the EPD, if relevant and useful for EPD users. Such data shall not be declared in the main body of the EPD, but in an annex.

To better characterise the environmental performance of a product category, the PCR may require or recommend the declaration of environmental performance indicators not included in the default list; such additions shall be justified in the PCR development process. Likewise, the PCR may allow or recommend the exclusion of indicators in the default list, if they are considered irrelevant for the product category; such deviations shall be justified in the PCR development process. To harmonize across product categories, recommendations and requirements on indicators in PCRs of similar and/or related product categories PCRs shall be considered. In the end, all environmentally relevant indicators for the product category shall be included. If adjustments or amendments are done to the default list, above text and Section 5.4.5 must be adjusted and expanded accordingly.

The inclusion of additional environmental performance indicators, or exclusion of indicators in the default list, should be based on:

- the results and interpretation of the supporting LCA studies, including the use of normalisation and weighting of results to determine the most relevant impact categories,*
- a literature review (LCA and non-LCA) of relevant impacts for the product category,*
- a review of key environmental concerns regarding the product category, e.g. from NGOs, civil society, customers, and other stakeholders, for the geographical applicability of the PCR, and*
- a review of requirements in other standards or methodological guidelines of relevance for the product category, to which harmonisation is desirable, such as EN 15804 for construction products.*

The selection of indicators shall focus on their environmental relevance for the product category. The selection shall also take into consideration the scope of the EPD, regional aspects or requirements, and the maturity of the methods to ensure that they are not misleading. In addition, they shall only apply to those life-cycle stages in which the information is appropriate. If a PCR requires or recommends other indicators than those in the default list, it shall list the inventory and/or impact assessment methods to use, including references to the original source and specification of the version of methods and characterisation factors. Such indicators should be based on international standards or similar documents developed in a transparent procedure.

If the selection of indicators is based on an effort to harmonize with international standards or other external documents outlining product category rules, the PCR shall include a statement saying that the alignment/adoption of indicators from the external product category rules does not imply that the EPDs can be claimed to be aligned or compliant with the external product category rules. Alignment/compliant with external product category rules requires alignment/compliant of the entire method applied, and not just the selection of indicators.

The PCR may also indicate and justify issues that need to be addressed in more detail in future updates of the PCR.

4.9 INCLUDING MULTIPLE PRODUCTS IN THE SAME EPD

4.9.1 PRODUCTS FROM THE SAME COMPANY

Similar products from a single or several manufacturing sites covered by the same PCR and manufactured by the same company with the same major steps in the core processes may be included in the same EPD if none of the declared environmental performance indicators differ by more than 10% between any of the included products. The results for the environmental performance indicators of one representative product shall be declared according to Section 5.4.5. The choice of representative product shall be justified in the EPD, using, where applicable, statistical parameters.

Further guidance may be given in the PCR.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

4.9.2 SECTOR EPDS

The International EPD® System allows for an industry association to develop an EPD in the form of a Sector EPD. A Sector EPD declares the average product of multiple companies in a clearly defined sector in a clearly defined geographical area. Products covered in a sector EPD shall follow the same PCR and the same declared/functional unit shall be applied.

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.

The following information shall also be included a Sector EPD:

- 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 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.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

5 CONTENT AND FORMAT OF EPD

In addition to below requirements on the content and reporting format of EPDs, the PCR may specify further requirement of relevant for its product category, e.g. reflecting certain applications of the EPD information. For example, for EPDs of construction products compliant with EN 15804, the communication format of the EPD shall be in accordance with EN 15942 (Sustainability of construction works — Environmental product declarations — Communication formats: business to business). Further, it is important to harmonize with the requirements on content and format in PCRs of similar or related product categories.

EPDs based on this PCR shall contain the information described in this section. Flexibility is allowed in the formatting and layout provided that the EPD still includes the prescribed information. A generic template for EPDs is available at www.environdec.com.

The EPD content shall:

- be in line with the requirements and guidelines in ISO 14020 (Environmental labels and declarations – General principles),
- be verifiable, accurate, relevant and not misleading, and
- not include rating, judgements or direct comparison with other products³.

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

The content of EPDs published in machine-readable format shall correspond with the content of the underlying EPD.

5.1 EPD LANGUAGES

EPDs should be published in English but may also be published in additional languages. If the EPD is not available in English, it shall contain an executive summary in English including the main content of the EPD. This summary is part of the EPD and, thus, also subject to the verification process.

5.2 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 units most practical, e.g., seconds, minutes, hours, days or years.
 - Results of the environmental performance indicators shall be expressed in the units prescribed by the impact assessment methods, e.g. kg CO₂ equivalents.
- Three significant figures⁴ should be adopted for all results. The number of significant digits shall be appropriate and consistent.
- 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 figures shown for illustration):
 - SI style (French version): 1 234,56
 - SI style (English version): 1 234.56

³ Therefore, results of normalization are not allowed to be reported in the EPD.

⁴ Significant figures are those digits 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 1.2*10² and 1.2*10⁻².

NAME OF PRODUCT CATEGORY

PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

In case of potential confusion or intended use of the EPD in markets where different symbols are used, the EPD shall state what symbols are used for thousand separator and decimal mark.

- Dates and times presented in the EPD should follow the format in ISO 8601. For years, the prescribed format is YYYY-MM-DD, e.g., 2017-03-26 for March 26th, 2017.
- The result tables shall:
 - Only contain values or the letters “ND” (Not Declared). It is not possible to specify ND for mandatory indicators. ND shall only be used for voluntary parameters that are not quantified because no data is available.⁵
 - 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.
 - Footnotes shall be used to explain any limitation to the result value.

5.3 USE OF IMAGES IN EPD

Images used in the EPD, especially pictures featured on the cover page, may in themselves be interpreted as an environmental claim. Images such as trees, mountains, wildlife that are not related to the declared product shall therefore be used with caution and in compliance with national legislation and best available practices in the markets in which the EPD is intended to be used.

5.4 EPD REPORTING FORMAT

The reporting format of the EPD shall include the following sections:

- Cover page (see Section 5.4.1)
- Programme information (see Section 5.4.2)
- Product information (see Section 5.4.3)
- Content declaration (see Section □)
- Environmental performance (see Section 5.4.5)
- Additional environmental information (see Section 5.4.6)
- Additional social and economic information (see Section 5.4.7)
- References (see Section 5.4.9)

The following sections shall be included, if relevant:

- Differences versus previous versions (see Section 5.4.8)
- Executive summary in English (see Section 5.4.10)

5.4.1 COVER PAGE

The cover page shall include:

- Product name and image
- Name and 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

⁵ This requirement does not intend to give guidance on what indicators are mandated (“shall”) or voluntary.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

- EPD registration number as issued by the programme operator⁶
- Date of publication (issue): 20XX-YY-ZZ
- Date of revision: 20XX-YY-ZZ, when applicable
- Date of validity; 20XX-YY-ZZ
- A note that “An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.”
- A statement of conformity with ISO 14025.
- For EPDs covering multiple products: a statement that the EPD covers multiple products and a list of all products covered by the EPD.
- For Sector EPDs: a statement that the EPD is a Sector EPD.
- For construction product EPDs:

In the case of EPDs registered through a regional hub (a regional or national programme based on and fully aligned with the International EPD[®] System through an agreement with the programme operator), “Programme”, “Programme operator”, and “Logotype” shall be expanded to include a reference to the regional programme and the organisation responsible for it.

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

- Information about dual registration of EPD in another programme, such as registration number and logotype.
- A statement of conformity with other standards and methodological guides.

5.4.2 PROGRAMME INFORMATION

The programme information section of the EPD shall include:

- Address of programme operator: *EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com*
- The following statement on the requirements for comparability of EPDs, adapted from ISO 14025: “EPDs within the same product category but from different programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same 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 equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.”
- A statement that the EPD owner has the sole ownership, liability and responsibility of the EPD
- Information about verification⁷ and the PCR in a table with the following format and contents:

Product category rules (PCR): <name, registration number, version and UN CPC code(s)>
PCR review was conducted by: <name and organisation of the review chair, and information on how to contact the chair through the programme operator>
Independent third-party verification of the declaration and data, according to ISO 14025:2006: <input type="checkbox"/> EPD process certification <input type="checkbox"/> EPD verification <input type="checkbox"/> Pre-verified tool

⁶ The EPD shall not include a “registration number” if such is provided by the certification body, as this may be confused with the registration number issued by the programme operator.

⁷ If the EPD has been verified by an approved individual verifier who has received contractual assistance from a certification body that is not accredited, this certification body shall not be included in this table.

NAME OF PRODUCT CATEGORY

PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

<p><i>In case of certification bodies:</i> Accredited by: <name of the accreditation body and accreditation number, if applicable>.</p> <p><i>In case of individual verifiers:</i> <Name, and organisation of the individual verifier. The signature may also be included> Approved by: The International EPD® System</p>
<p>The procedure for follow-up during EPD validity, as defined in the GPI, involves third-party verifier:</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>

5.4.3 PRODUCT INFORMATION

The product information section of the EPD shall include:

- address and contact information to EPD owner,
- description of the organisation. This may include information on products- 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),
- name and location of production site,
- product identification by name, and an unambiguous identification of the product by standards, concessions or other means,
- identification of the product according to the UN CPC scheme system. Other relevant codes for product classification may also be included, e.g.
 - Common Procurement Vocabulary (CPV),
 - United Nations 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).
- a description of the product,
- a description of the technical purpose of the product, including its application/intended use,
- a description of the background system, including the main technological aspects,
- for EPDs covering multiple products: a description of the selection of products/sites, a list of contributing manufacturers (if Sector EPD), etc. (see Section 4.9),
- geographical scope of the EPD, i.e., for which geographical location(s) of use and end-of-life the product's performance has been calculated,
- declared/functional unit,
- reference service life (RSL) and/or technical/actual lifespan, if relevant,
- declaration of the year(s) covered by the data used for the LCA calculation and other relevant reference years,
- reference to the main database(s) for generic data and LCA software used, if relevant,
- system diagram of the processes included in the LCA, divided into the life cycle stages,
- description if the EPD system boundary is "cradle-to-gate", "cradle-to-gate with options" or "cradle-to-grave",
- information on which life-cycle stages are not considered (if any), with a justification of the omission, and
- references to any relevant websites for more information or explanatory materials.

This section may also include:

- name and contact information of organisation carrying out the underlying LCA study,

NAME OF PRODUCT CATEGORY

PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

- any additional information about the underlying LCA-based information, such as cut-off rules, data quality, allocation methods, and other methodological choices and assumptions,
- a description of the material properties of the product with a declaration of relevant physical or chemical product properties, such as density, etc., and
- if end-of-life treatment is not included, the EPD shall contain a statement that it shall not be used for communicating environmental information to consumers/end users of the product.

5.4.4 CONTENT DECLARATION

More product category-specific guidance on this section should be provided in the PCR. For example, additional requirements for the content declaration may be set by the PCR, e.g. which materials and substances to declare. Further, for construction products, requirements on content declaration shall follow EN 15804. Deviations from below requirement in the PCR may be done but shall be justified in the PCR development process. For example, a content declaration may not be appropriate for EPDs for intangible products, such as services, which should be specified in the PCRs of such product categories.

The content declaration section shall declare the weight of one unit of product, as purchased, and contain information about the content of the product in the form of a list of materials and chemical substances including information on their environmental and hazardous properties. The gross weight of each material/substance shall be declared, including a minimum of 99% of the materials/substances in one unit of product.

The content declaration does not apply to proprietary materials and substances covered by exclusive legal rights including patent and trademarks. In general, an indication 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.

Information on the hazardous properties of materials and chemical substances should follow the requirements given in the latest revision of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS),⁸ issued by the United Nations or national or regional applications of the GHS. As an example, the following regulations should be used for EPDs intended to be used in the European Union:

- Regulation (EC) No 1907/2006 of the European parliament and of the council of 18 December 2006 concerning the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH); and
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling, and packaging of substances and mixtures.

5.4.4.1. Information about recycled materials

This section may be removed in the PCR if irrelevant for the product category.

When a product is made in whole or in part with recycled materials, the provenience of the materials (pre-consumer or post-consumer) shall be presented in the EPD as part of the content declaration.

To avoid any misunderstanding about which material that may be considered "recycled material", the guidance given in ISO 14021 shall be considered. In brief, the standard states that:

- only pre-consumer or post-consumer materials (scraps) shall be considered in the accounting of the recycled materials, and
- materials coming from scrap reutilisation (such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it) shall not be considered as recycled content.

5.4.4.2. Information about packaging

This section may be removed in the PCR if irrelevant for the product category.

As packaging is strongly connected with the product, the producer shall provide information about packaging in the EPD, when applicable. Packaging may be classified as:

⁸ The GHS document is available at www.unece.org.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

- Distribution Packaging: packaging designed to contain one or more articles or packages, or bulk materials, for the purposes of transport, handling and/or distribution (ISO 21067-1:2016, Section 2.2.6)
- Consumer Packaging: packaging constituting, with its content, a sales unit for the final user or consumer at the point of retail (ISO 21067-1:2016, Section 2.2.7).

Consumer packaging is generally the outcome of eco-design processes, or other activities, under direct control of the organisation. Many critical categories with strict legal requirements belong to consumer packaging category like food contact packaging and pharmaceutical packaging.

The weight of the packaging per product, and the type and function of the packaging, shall be reported in the EPD.

A statement of the source of the materials (pre-consumer or post-consumer) shall be presented in the EPD when the packaging is made in whole or in part by recycled materials.

5.4.5 ENVIRONMENTAL PERFORMANCE

The PCR may adjust or amend the default list of environmental indicators referred to in the below subsections (see guidance to Section 4.8 and in the GPI). If this is done, below subsections shall be adjusted accordingly. Likewise, below subsections shall be adjusted if results are to be declared per information module instead of per life-cycle stage or if certain life-cycle stages shall, should or may be separately declared (see Section 4.3.1).

5.4.5.1. Environmental impacts

The EPD shall declare the environmental impact indicators, per **functional** unit, per life-cycle stage and in aggregated form, using the default impact categories, impact assessments methods and characterisation factors available at www.environdec.com/indicators. The source and version of the impact assessment methods and characterisation factors used shall be reported in the EPD.

Alternative regional life cycle impact assessment methods and characterisation factors may be calculated and displayed in addition to the default list. If so, the EPD shall contain an explanation of the difference between the different sets of indicators, as they may appear to the reader to display duplicate information.

5.4.5.2. Use of resources

The EPD shall declare the indicators for resource use listed at www.environdec.com/indicators per **declared/functional** unit, per life-cycle stage and in aggregated form.

5.4.5.3. Waste production and output flows

Waste generated along the whole life cycle production chains shall be treated following the technical specifications described in the GPI. The EPD shall declare the indicators for waste production and output flows as listed at www.environdec.com/indicators per **declared/functional** unit, per life-cycle stage and in aggregated form.

5.4.6 ADDITIONAL ENVIRONMENTAL INFORMATION

An EPD may declare additional environmentally relevant information not derived from the LCA-based calculations, such as:

- 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,

NAME OF PRODUCT CATEGORY

PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

- 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 under Section 5.4.3, such as:
 - the existence of any type of organised environmental activity, and
 - information on where interested parties may find more details about the organisation's environmental work.

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.

The PCR may specify which additional environmental information that may, should or shall be declared in the EPD, and adjust and amend the above guidance accordingly. Methods used to report such information shall be specified or referenced. A justification for the choice of additional environmental information shall be included in the PCR. Further, it is recommended to add information enabling the possibility to make comparisons with sector benchmarks (outside of the EPD) or, if not available, with benchmarks of common products and services preferably based on the concept of declared/functional unit, which is useful for scaling the environmental impacts of different activities, products, and services. Such comparisons shall, however, never be done in the EPD.

5.4.7 ADDITIONAL SOCIAL AND ECONOMIC INFORMATION

The EPD may also include other relevant social and economic information as additional and voluntary 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 responsibility.

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.

The PCR may specify requirements or recommendations on additional social or economic information to declare, and adjust and amend the above guidance accordingly. Methods used to report such information shall be specified or referenced. A justification for the choice of additional social and economic information shall be included in the PCR. Further information on which indicators that could be used can be obtained by the Global Reporting Initiative documents available at www.globalreporting.org.

5.4.8 DIFFERENCES VERSUS PREVIOUS VERSIONS

For EPDs that have been updated, the following information shall be included:

- a description of the differences versus previously published versions, and
- a revision date on the cover page.

5.4.9 REFERENCES

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

Additional requirements may be added in the PCR, e.g. for databases used.

5.4.10 EXECUTIVE SUMMARY IN ENGLISH

The executive summary, if included (see Section 5.1), shall contain relevant summarised information related to the programme, product, environmental performance, information related to pre-certified EPDs, and information related to sector EPDs. Besides this, further information may be added such as additional environmental, social or economic information, references as well as differences versus previous EPD versions.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

6 LIST OF ABBREVIATIONS

ANZSIC	Australian and New Zealand Standard Industrial Classification
CPC	Central product classification
CPV	Common procurement vocabulary
EPD	Environmental product declaration
GPI	General Programme Instructions
GTIN	Global trade item number
ISO	International Organization for Standardization
LCA	Life cycle assessment
LCI	Life cycle inventory
NACE/CPA	Classification of products by activity
ND	Not declared
PCR	Product category rules
PEF	Product Environmental Footprint
REACH	Restriction of chemicals
RSL	Reference service life
SI	The International System of Units
UN	United Nations
UNSPSC	United Nations standard products and services code

Adjust and amend list according to the PCR. The abbreviations shall be provided in alphabetical order.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

7 REFERENCES

CEN (2013) EN 15804:2012+A1:2013, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

CEN (2019) EN 15804:2012+A2:2019, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

Skunca, D., Romdhana, H., & Brouwers, R. (2021, January 15). Rubisco protein production – LCA approach. (Z. Cekerevac, Ed.) MEST Journal, 9(1), 175-183. doi:10.12709/mest.09.09.01.20

EPD International (2021) General Programme Instructions for the International EPD® System. Version 4.0, dated 2021-03-29. www.environdec.com.

ISO (2000) ISO 14020:2000, Environmental labels and declarations – General principles.

ISO (2004) ISO 8601:2004 Data elements and interchange formats – Information interchange – Representation of dates and times.

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 (2006c) ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines.

ISO (2013) ISO/TS 14067:2013, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication.

ISO (2014) ISO 14046:2014, Environmental management – Water footprint – Principles, 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 (2016a) ISO 21067-1:2016, Packaging – Vocabulary – Part 1: General terms.

ISO (2016b) ISO 14021:2016, Environmental labels and declarations - Self-declared environmental claim (Type II environmental labelling).

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

ISO (2018) ISO 14024:2018, Environmental labels and declaration – Type I environmental labelling – Principles and procedures.

Adjust and amend list according to the PCR.

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

8 VERSION HISTORY OF PCR

This section shall include a version history and the main differences compared to earlier versions of the PCR document.

VERSION 1.0, 20ZZ-XX-YY

Add description of the PCR version, e.g. "Original version of the PCR".

NAME OF PRODUCT CATEGORY
PRODUCT CATEGORY CLASSIFICATION: UN CPC XX, YY, ETC.

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COVER IMAGE © *ADDED BY THE SECRETARIAT IN THE PCR*