

PCR REGISTRATION NUMBER TO BE ADDED BY THE SECRETARIAT DRAFT VERSION 1.0.0 FOR OPEN CONSULTATION. DO NOT USE OR CITE.

VALID UNTIL 20XX-YY-ZZ (TO BE ADDED BY THE SECRETARIAT)

# DRAFT FOR OPEN CONSULTATION

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# INTRODUCTION TO OPEN CONSULTATION

This draft PCR document is available for open consultation from 2024-10-30 until 2024-12-30. 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 and industry-specific LCA standards, guidelines or similar.

- Scope of PCR
  - Product category definition and description
  - Classification of product category, e.g., using UN CPC codes
- Goal and scope, life cycle inventory and life cycle impact assessment
  - Functional /declared unit
  - System boundary
  - Allocation rules
  - Data quality requirements
  - Recommended databases for generic data
  - Impact categories and impact assessment methodology
- Additional information

Specific topics on which the PCR Committee want your input are highlighted in yellow boxes throughout the document.

Comments shall be sent directly to the PCR Moderator (contact details available in Section Error! Reference source not found.). There is a template for comments on <u>https://www.environdec.com/product-category-rules-pcr/get-involved-in-pcr-development#pcrsinopenconsultation</u> that should 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 <u>https://environdec.freshdesk.com/support/home</u>.

# 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, 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 <u>www.environdec.com</u>, 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. 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 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<sup>2</sup>. 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 <u>www.environdec.com</u>.



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.

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 food and beverage products, for example dairy products of preserved food. Such 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),

<sup>&</sup>lt;sup>1</sup> Termed type III environmental declarations in ISO 14025.

<sup>&</sup>lt;sup>2</sup> This does not apply when the EPD is re-verified during its validity, unless the validity period is extended.



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 <u>www.environdec.com</u> shall be used.

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



# 2 GENERAL INFORMATION

# 2.1 ADMINISTRATIVE INFORMATION

Name:	Food and beverage products
Registration number and version:	To be added by the Secretariat
Programme:	<b>EPD</b> <sup>®</sup>
	The International EPD System
Programme	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden.
operator:	Website: <u>www.environdec.com</u>
	E-mail: <u>support@environdec.com</u>
PCR Moderator:	Gustav Sandin, Secretariat of EPD International AB, gustav.sandin@environdec.com
	Gustav is the temporarily appointed PCR Moderator. If you're interested in the position, please contact the Secretariat at pcr@environdec.com.
PCR Committee:	All China Environment Federation, China Agricultural University Company Ltd., Chinese Association of Standardization, China Power Complete Equipment Co. Ltd., Contactica, EPD International AB, Greenticket, IVL Swedish Environmental Research Institute, MAPPING LCA, Siwaliya Environmental Technologies (Beijing), INDACO2 Srl, Life Cycle Engineering Spa, Technological University Dublin, Universidad Tecnológica Nacional
Publication date:	<i>To be added by the Secretariat</i> See Section 9 for a version history of the PCR.
Valid until:	To be added by the Secretariat
	The validity may change. See <u>www.environdec.com</u> for the latest version of the PCR and the latest information on its validity and transition periods between versions.
Development and updates:	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.
	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.
	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 <u>www.environdec.com</u> 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 90 days, but not exceeding its previously set validity period.



	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.
Standards and documents conformance:	General Programme Instructions of the International EPD System, version 5.0.0, based on ISO 14025 and ISO 14040/14044. <sup>3</sup>
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 <u>www.environdec.com</u> . 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 food and beverage products, defined to include any edible and drinkable product, and the declaration of this performance by an EPD.

All food and beverages products, including upstream raw materials and intermediate products, are included in the scope. An available definition of food (and beverage), according to ISO 22000:2018, is: a substance (ingredient), whether processed, semi-processed or raw, which is intended for consumption, and includes drink, chewing gum and any substance which has been used in the manufacture, preparation or treatment of "food" but does not include cosmetics or tobacco or substances (ingredients) used only as drugs.

There is no exhaustive list of products and product categories are covered by the above definition. All products that are covered by a harmonised standard for edible or drinkable products according to the Codex Alimentarius should, however, be considered as food products.

The International EPD System uses the UN CPC system for classification for PCRs. The UN CPC codes listed in Table 1 are a non-exhaustive list of those included in the scope of this PCR and they correspond to Section 2 of the UN classification <a href="https://unstats.un.org/unsd/classifications/unsd/classifications/cpcv21.pdf">https://unstats.un.org/unsd/classifications/unsd/classifications/cpcv21.pdf</a>.

<sup>&</sup>lt;sup>3</sup> 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.

UN CPC code	UN CPC name
21	Meat, fish, fruits, vegetables, oils and fats
211	Meat and meat products
2111	Meat of mammals, fresh or chilled
2112	Meat of poultry, fresh or chilled
2113	Meat of mammals, frozen
2114	Meat of poultry, frozen
2115	Edible offal of mammals, fresh, chilled or frozen
2116	Edible offal of poultry, fresh, chilled or frozen
2117	Other meat and edible offal, fresh, chilled or frozen
212	Prepared and preserved fish, crustaceans, molluscs and other aquatic invertebrates
213	Prepared and preserved vegetables, pulses and potatoes
214	Prepared and preserved fruits and nuts
215	Animal fats
216	Vegetable oils
217	Margarine and similar preparations
22	Dairy products
221	Processed liquid milk, cream and whey
222	Other dairy products
223	Eggs, in shell, preserved or cooked
23	Grain mill products, starches and starch products; other food product
231	Grain mill products
232	Starches and starch products; sugars and sugar syrups n.e.c.
234	Bakery products
235	Sugar and molasses
236	Cocoa, chocolate and sugar confectionery
237	Macaroni, noodles, couscous and similar farinaceous product
239	Food products n.e.c (Coffee, tea, etc)
24	Beverages
241	Ethyl alcohol; spirits, liqueurs and other spirituous beverages
242	Wines
243	Malt liquors and malt
244	Soft drinks; bottled mineral waters

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

### 2.2.2 GEOGRAPHICAL SCOPE

This PCR may be used globally.

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### 2.2.3 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.

For rules on when an EPD shall be updated and re-verified during its validity, see Section 6.8.1 of the GPI. 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 main 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 1.0.0

This PCR is available for open consultation from 2024-10-02 until 2024.11-26, 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 <u>www.environdec.com</u>:

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

## 3.2 PCR REVIEW

### 3.2.1 VERSION 1.0.0

PCR review panel:	The Technical Committee of the International EPD System. A full list of members is available on <u>www.environdec.com</u> . The review panel may be contacted via <u>support@environdec.com</u> . 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:	To be added by the Secretariat
Review dates:	To be added by the Secretariat

# 3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

As part of the development of this PCR, existing PCRs and other internationally standardised 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, <u>www.environdec.com</u>
- The EPD programmes listed under ECO Platform, <u>https://www.eco-platform.org/the-eco-epd-programs.html</u>
- UL Solutions, <u>https://www.ul.com/resources/product-category-rules-pcrs</u>
- EU's Product Environmental Footprint (PEF) framework, <u>https://green-business.ec.europa.eu/environmental-footprint-methods\_en</u>

Table 2 lists the identified PCRs and other standardised methods.

Table 2. Existing PCRs and other internationally standardised methods that were considered to avoid overlap in scope and to ensure harmonisation with established methods.

Name of PCR/standard	Programme/ standardisation body	Registration number	Scope
Arable and vegetable crops	International EPD System	PCR 2020:07	CPC 011 Cereals, CPC 012, Vegetables, CPC 014 Oilseeds and oleaginous fruits, CPC 017 Pulses (dried leguminous vegetables), CPC 018 Sugar crops, CPC 0191 Forage products, fibres, living

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			plants, cut flowers and flower buds, unmanufactured tobacco, and natural rubber
Bakery products	International EPD System	PCR 2012:06	CPC 234 Bakery products
Birds' eggs in shell, fresh	International EPD System	PCR 2011:15	CPC 023 Eggs of hens or other birds in shell, fresh
Bottled waters, not sweetened or flavoured	International EPD System	PCR 2010:11	CPC 24410 Bottled waters, not sweetened or flavoured
Dairy products	International EPD System	PCR 2021:08	CPC 022 Raw milk, CPC 221 Processed liquid milk, cream and whey, CPC 222 Other Dairy products
Espresso coffee	International EPD System	PCR 2018:03	Espresso coffee, a sub-set of CPC 23912
Fish and fish products	International EPD System	PCR 2021:05	CPC 042 Fish live, fresh or chilled for human consumption; CPC 2121 Fish, frozen (excluding fish fillets and fish meat); CPC 2122 Fish fillets and meat; fish livers and roes; CPC 2123 Fish, dried, whether or not salted, or in brine; smoked incl. fillets; edible fishmeal
Fish, otherwise prepared or preserved; caviar and caviar substitutes	International EPD System	PCR 2019:09	CPC 2124 Fish, otherwise prepared or preserved; caviar and caviar substitutes
Fruits and nuts	International EPD System	PCR 2019:01	CPC 013 Fruits and nuts
Grain mill products	International EPD System	PCR 2013:04	CPC 231 Grain mill products
Meat of mammals	International EPD System	PCR 2012:11	CPC 2111 Meat of mammal: fresh or chilled; CPC 2113 Meat of mammal, frozen. As mammals meat is intended, but not limited to, the meat of: cattle, buffalo, pigs, rabbits, hares, sheep, goat, camels, horses and other equines.
Meat of poultry (fresh, frozen or chilled)	International EPD System	PCR 2010:13	All kind of poultry meat (fresh, chilled or frozen) are included in this product group, as defined by UN CPC 2112 and 2114, but not limited to: chicken, duck, emu, goose, ostrich, turkey, guinea fowl, pheasant.
Moka coffee	International EPD System	PCR 2019:08	CPC 23912 Moka coffee
Pasta, cooked, stuffed or otherwise prepared; couscous	International EPD System	PCR 2011:07	CPC 2372 Pasta, cooked, stuffed or otherwise prepared; couscous
Preparations used in animal feeding for food-producing animals	International EPD System	PCR 2016:03	CPC 233 Preparations used in animal feeding; lucerne (alfalfa) meal and pellets; CPC 0419 Other live fish, not for human consumption, including seeds and feeds for aquaculture; CPC 39120 Bran and other residues from the working of cereals or legumes; vegetable materials and vegetable waste, vegetable residues and by-products, whether or not in the form of pellets, of a kind used in animal feeding n.e.c. Pet food is not included in the scope of this PCR.
Prepared and preserved vegetable	International EPD System	PCR 2019:10	CPC 213 Prepared and preserved vegetables, pulses and potatoes; CPC 214 Prepared and preserved fruits and nuts



and fruit products, including juice			
Preserves and preparations of meat (including meat offal or blood)	International EPD System	PCR 2016:05	CPC 2118 Preserves and preparations of meat, meat offal or blood
Raw sugar, refined sugar, and molasses	International EPD System	PCR 2013:13	CPC 2351, 2352 and 2354 (Raw sugar, refined sugar, and molasses)
Sauces, mixed condiments and mustard	International EPD System	PCR 2010:19	CPC 23995 Sauces, mixed condiments, mustard flour and meal prepared mustard
Soft drinks	International EPD System	PCR 2022:07	CPC 24490 Other non-alcoholic caloric beverages
Теа	International EPD System	PCR 2019:02	CPC 23391 Green tea (not fermented), black tea (fermented) and partly fermented tea, in immediate packagings of a content not exceeding 3 kg, subset of CPC 23999 Other food products n.e.c.
Prepared and preserved vegetable and fruit products, including juice	International EPD System	PCR 2019:10	CPC 2132 Vegetable juices, 2139 Other prepared and preserved vegetables, pulses and potatoes
Wine	International EPD System	PCR 2020:06	CPC 2421 Wine of fresh grapes, whether or not flavoured; grape must
Virgin olive oils and its fractions	International EPD System	PCR 2010:07	CPC 21537 Virgin olive oil and its fractions
Bovine and ovine milk	EPD Italy	PCR EPDItaly 042, under development	Bovine and olive milk
PEFCR Beer	European Commission		Beer
PEFCR Pasta	European Commission	-	Pasta
PEFCR Marine fish	European Commission	-	Marine fish

## 3.4 REASONING FOR DEVELOPMENT OF PCR

This PCR was developed to enable publication of EPDs for the product category defined in Section Error! Reference source not found. based on ISO 14025 and ISO 14040/14044. 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. This main PCR will replace the stand-alone PCRs of the International EPD System listed in Table 2 – upon their expiration – but may over time be complemented by c-PCRs with similar scopes as stand-alone PCRs. For information about c-PCRs, see Sections 1.1 and 1.2.

# 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:

• To be added after the open consultation

# 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. The basic rules of the LCA method are set in Annex A of the GPI, and this section only includes additions, specifications and deviations to the rules set in the GPI. Guidance and examples of applying the LCA method are also available on www.environdec.com/methodology.

## 4.1 MODELLING APPROACH

See Section A.1 of the GPI.

# 4.2 DECLARED/FUNCTIONAL UNIT

EPDs based on this main PCR without using a complementary PCR (c-PCR) shall use a declared unit. For food products, the declared unit shall be defined as 1 kg of product and its packaging (the weight of the packaging is not included in this 1 kg) as presented to the consumer or, for upstream products, the customer. For beverage products, the declared unit shall be defined as 1 litre of product and its packaging as presented to the consumer or, for upstream products, the customer or, for upstream products, the customer.

This main PCR uses a declared unit instead of a functional unit as a single functional unit cannot capture all the relevant functional variations of products covered by the PCR. Functional aspects shall, however, be taken into consideration when comparing EPDs based on this PCR. Further, EPDs based on this PCR together with a c-PCR may, should or shall use a functional unit – instead of a declared unit – according to the specifications in the c-PCR. For information about c-PCRs, see Sections 1.1 and 1.2.

The reference flow in the LCA shall be defined at the shelf of the retailer or at the marketplace (e.g., 250 g, a pouch of 170 g, etc.) for end products, or at the delivery to the customer for upstream products.

The following information defines the product unit and shall be reported in the production information section of the EPD (see Section 6.4.4), if applicable:

- Ingredients.
- Nutritional facts (serving size, calories, macronutrients (such as carbohydrates, proteins, and fats), micronutrients (such as vitamins and minerals), and other important components like dietary fiber and sugar.
- Description of the sales unit (type of packaging, weight).
- Storage method and shelf-life of the product (e.g., freezer: 18 months, room temperature: 24 days).

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 shall be included in the EPD, if relevant, including specifications regarding the product performance during its use (see above bullet points).

### 4.2.1 TECHNICAL SPECIFICATION AND LIFESPAN

Not applicable for this product category.

# 4.3 SYSTEM BOUNDARY

EPDs based on this main PCR only shall be "cradle to grave" or "cradle to gate" (see below). If a c-PCR is used in addition to this main PCR, the system boundary is set by the c-PCR.

All environmentally relevant processes from "cradle to grave" or "cradle to gate" should be included, so that at minimum 95% of the total energy use, mass of product content, and environmental impact is accounted for (see Section 4.5).

In case of intermediate products like flour or other products for which further processing will be carried out, and these are 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 product is physically integrated with other products in subsequent life-cycle process (e.g., flour in dry pasta) so they cannot be physically separated from each other 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 (e.g., grapes in wine),
- the product or material does not contain biogenic carbon, and

PRODUCT CATEGORY RULES (PCR) - DRAFT PUBLICATION DATE 20YY-MM-DD (TO BE ADDED BY THE SECRETARIAT) **EPD**<sup>®</sup>

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• the EPD shall not be used for business-to-consumer communication.

Information to open consultation: The above rule on allowing cradle-to-gate for intermediate products is not consistent with the above criteria for excluding end-of-life. The example given (flour) is an example of a product not fulfilling the criteria for excluding end-of-life (as it contains biogenic carbon). Therefore, these rules will be revised after the open consultation. We welcome input on these rules in the open consultation.

#### 4.3.1 LIFE-CYCLE STAGES AND INFORMATION MODULES

Due to different data quality rules and the presentation of results, the product life cycle shall be divided into the following lifecycle stages and information modules:

- Product stage, modules A1-A3:
  - A1: Raw material extraction and processing (e.g., seeding and agricultural operations), production of intermediate materials and components (e.g., including transformation processes such as milling, fermentation or pressing), processing of secondary material input, production of distribution and consumer packaging, etc.
  - A2: Transports to the manufacturer of the product (when applicable) and waste processing of product losses.
  - A3: Manufacturing of the product<sup>4</sup> (when applicable) and waste processing of product losses.
- Distribution and storage stage, modules A4-A5:
  - A4: Transport of the product to the distribution centre, user or retail, and waste processing of product losses.
  - A5: Storage of product (e.g., retail operations) and waste processing of intermediate packaging and product losses.
- Consumption stage, modules B1-B7:
  - B1: Consumption of the product (e.g., including direct emissions)
  - B2: Maintenance of the product: does not apply
  - B3: Repair of the product: does not apply
  - B4: Replacement: does not apply
  - B5: Refurbishment: does not apply
  - B6: Energy use in consumption (e.g., cooking or refrigerating).
  - B7: Water use in consumption (e.g., diluting).
- End-of-life stage for packaging and product not consumed, modules C1-C4:
  - C1: De-construction/demolition/deinstallation: does not apply
  - C2: Transport to waste processing and/or disposal.
  - C3: Waste processing for recovery and/or recycling.
  - C4: Disposal
- In addition, consequences of recovered material/energy beyond the product cycle may be reported in module D.
- In the EPD, the environmental performance of each of the life-cycle stages and module D shall be reported separately, and in aggregated form for the life-cycle stages (modules A-C). Modules that do not apply for this product category (according to the above bullet points) shall be excluded.
- Section A.3.1 of the GPI outlines rules for how to assign generation of electricity and production of fuels, steam and other energy carriers used, and losses arising, in each information module.
- Sections Error! Reference source not found.-Error! Reference source not found. further describe the processes to include or exclude for each life-cycle stage.

<sup>&</sup>lt;sup>4</sup> In case of not being primary production, like fruits or vegetables, these are the processes under operational control of the EPD owner.

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#### 4.3.1.1 Modules A1-A3: Product stage

- Module A1:
  - Agriculture processes. This includes, e.g., air and water emissions and emissions from energy used in agriculture as well as emissions of nitrous gases. The cradle for agriculture is soil preparation and cultivation.
  - Production of materials used in agriculture (fertilisers, pesticides, seeds, seedling, cuttings, plants, livestock and fodder for the cultivation).
  - Operations for the transformation of land use, such as grazing on the grassland, if applicable.
  - Any activities that take place on the farms, if applicable.
  - Animal breeding (including feed production, enteric fermentation and manure management).
  - Fishing
  - Aquaculture, including feed production.
  - Production of auxiliary products used such as detergents for cleaning/washing, refrigerant for cooling, etc.
  - Production of raw material (and e.g., natural water (CPC 180) at the well or spring from the cradle).
  - Production of semi-products used in the core process, if applicable.
  - Production of materials for greenhouses, mulching, trays, and substrates (peat, vermiculite, etc) for vegetable product and ingredients as spices and additives for meat and dairy product.<sup>5</sup>
  - Generation of electricity and production of fuels, steam and other energy carriers used in upstream processes.
  - Manufacturing of primary and secondary packaging, if applicable.
- Module A2:
  - Transports from field to the semi production plants, if applicable
  - External transportation of materials and components to the manufacturing of the product under study (e.g. ingredients, packaging and auxiliary materials).
  - Other transportation within the processes.
- Module A3:
  - Manufacturing of the final product.
  - Product refrigeration or freezing, if applicable.
  - Packaging of the final product (e.g., stretch blow moulding of pre-forms, bottle flushing, filling, corking.

Processes not listed here 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.

The mix of electricity used in A1-A3 processes shall be documented in the EPD, where relevant.

#### 4.3.1.2 Modules A4-A5: Distribution and retail stage

- Module A4:
  - Transportation from manufacturing to an average retailer/distribution platform/user.
  - Refrigeration along the distribution chain, if applicable.
  - Waste processing of product losses occurring in transport processes in module A4.
- Module A5:
  - Storage of product (e.g., retail operations)

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<sup>&</sup>lt;sup>5</sup> For modelling of the production of other ingredients, spices, and additives used in the product, the applicable c-PCR (if any) available on <u>www.environdec.com</u> shall be considered.

- Waste processing of intermediate packaging and product losses occurring in storage processes (e.g., in retail) in module A4.

Processes not listed here 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.

4.3.1.3 Modules B1-B7: Use stage

- B1: Customer or consumer use of the product ((e.g., including direct emissions).
- B6: Energy use in consumption (e.g., cooking or refrigerating).
- B7: Water use in consumption (e.g., diluting).

Processes not listed here 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.

4.3.1.4 Modules C1-C4: End-of-life stage for packaging and product not consumed

- C2: Transport of any packaging or wasted part of the product to waste processing.
- C3: Waste processing for reuse, recover and/or recycling any packaging or wasted part of the product.
- C4: Disposal (e.g., incineration, composting, retting) of any packaging or wasted part of the product.

Processes not listed here 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.

4.3.1.5 Excluded processes

See Section A.3.1.1 of the GPI.

#### 4.3.2 OTHER BOUNDARY SETTING RULES

See Section A.3.2 of the GPI for rules on setting boundaries to nature as well as geographical and temporal boundaries. See Section A.4 of the GPI and Section 4.6 below for rules on setting boundaries to other product systems.

### 4.4 PROCESS FLOW DIAGRAM

A process flow diagram will be added after the open consultation.

The diagram shall illustrate the product life-cycle stages and, if applicable, information modules that the processes belong to. The diagram should also illustrate important omissions of life-cycle stages and processes.

Figure 2. Process flow diagram illustrating the processes that shall be included in the product system, divided into the lifecycle stages. The illustration of processes to include may not be exhaustive.

### 4.5 CUT-OFF RULES

See Section A.3.3 of the GPI.



# 4.6 ALLOCATION RULES

See Section A.4 of the GPI.

### 4.6.1 ALLOCATION OF CO-PRODUCTS

See Section A.4.1 of the GPI.

As a reminder, co-products are defined as "any of two or more marketable materials, products or fuels from the same unit process, but which is not the object of assessment#<sup>6</sup>.

Additionally, this PCR provides specific allocation rules for key processes in different product systems as follows:

- Grains, cereals, and vegetables production (Section 4.6.1.1)
- Fruits and nuts (Section 4.6.1.2)
- Dairy products (Section 4.6.1.3)
- Meat of mammals (Section 4.6.1.4)
- Fresh eggs in shell (Section 4.6.1.5 )
- Meat of poultry (Section 4.6.1.6)
- Fish product, including caviar and caviar substitutes (Section 4.6.1.7)
- Virgin olive oils (Section 4.6.1.8)
- Food processing and other food products (Section Error! Reference source not found.)
- Feed production (Section 4.6.1.10)
- Coffee (Section 4.6.1.11)
- Tea (Section 4.6.1.12)
- Other beverage products (Section 4.6.1.134.6.1.11)

#### 4.6.1.1 Grains, cereals, and vegetables production

If straw or a product comparable to straw is harvested and sold as a by-product, allocation between the main product and straw shall be done based on actual prices of the main product and straw on the market the products are intended for. The price of the main product and straw shall be specified and justified in the EPD. If prices are unknown, the allocation factors proposed in the Ecoinvent database<sup>7</sup>, shown in Table 3, may be used.

<sup>&</sup>lt;sup>6</sup> In industry vocabulary, the terms by-product, non-core products or sub-products are sometimes used to refer to coproducts.

<sup>&</sup>lt;sup>7</sup> Based on Nemecek & Kagi (2007).

Table 3. Allocation factors for grains cereals and vegetables pro	roduction in case actual prices for intended market are unknown.
---	--

Process	Main product and co-products	Allocation factors
Wheat production	Grains and straw	Extensive crop production system: 92.5% to grains and 7.5% to straw.
		Integrated production: 92.5% to grains and 7.5% to straw.
		Organic Crop Production system: 93.1% to grains and 6.9% to straw.
Rye production	Grains, straw	Extensive crop production system: 90.3% to grains and 9.7% to straw.
		Integrated production: 90.3% to grains and 9.7% to straw.
		Organic crop production system: 91.9% to grains and 8.1% to straw.
Barley production	Grains, straw	Extensive crop production system: 89.9% to grains and 10.1% to straw.
		Integrated production: 89.9% to grains and 10.1% to straw.
		Organic crop production system: 91.3% to grains and 8.7% to straw.

#### 4.6.1.2 Fruits and nuts

If allocation cannot be avoided through sub-division, the allocation method shown in Table 4 shall be used for fruits and nuts plantation and production.

Process	Main product and co-products	Allocation method
Polyculture plantation	Cultivation of more than one type of fruits or nuts in the same field/farm	Allocation based on mass
Production process	Processing of more than one type of fruits or nuts in the same plant/company	Allocation based on mass

#### 4.6.1.3 Dairy products

For the dairy farm system where the main focus is on production of milk, the meat generated from surplus calves and cull dairy cows is an important co-product. It is therefore necessary to determine total emissions and to allocate them between milk and meat.

The biophysical allocation method proposed by the International Dairy Federation shall be used. The allocation factor (AF) for milk shall be calculated as follows, accounting for the beef-to-milk ratio (BMR):

Equation 1. Allocation factor for milk:

$$AF_{milk} = 1 - 6.04 \, x \, BMR$$

where,

 $BMR = \frac{M_{meat}}{M_{milk}}$ 

M<sub>meat</sub> = the mass of live weight of all animals sold including bull calves and culled mature animals per year
 M<sub>milk</sub> = the mass of fat and protein corrected milk (FPCM) sold per year (corrected to 4% fat and 3.3% protein)

The fat and protein corrected milk (FPCM) which has a unit of kg per year is calculated as follows:

FCPM = annual milk production  $\times$  [0.1226  $\times$  fat% + 0.0776  $\times$  protein% + 0.2534]

Table 5 lists the mandatory allocation method also for other key processes related to dairy products.

Process	Main products and co-products	Allocation method
Dairy farming	Milk, meat	Biophysical allocation method according to the Equation 1
Dairy plant	Dairy products (e.g., milk, cream,	Allocation based on the dry weight (i.e., dry matter
	yoghurt, butter, cheese)	content) of the products, as proposed by the Internationa
		Dairy Federation (2015).

Table 5. Allocation methods for processes related to dairy products.

#### 4.6.1.4 Meat of mammals

Below is a definition of terms used in this section:

- Mammal: non-reproducing mammal destined to meat production (ex. calf in cow meat farming).
- Reproductive mammal: mammal of female gender that has reproduced and that at end of career (when no longer destined to reproduction and/or milk production) is destined to meat production (e.g., reproductive cow in cow meat farming).
- Economic value: product (or co-product) wholesale price that is object of the allocation.
- Biophysical allocation: allocation method aligned with ISO14044 that reflects the underlying use of feed energy by the (dairy) animals and the physiological feed requirements of the animal to produce milk and meat (IDF, Bulletin 479/2015, Section 6.3.3, Allocation – Production of milk and meat).

There are two types of key processes in the production of meat from mammals that requires co-products allocation:

- Production of meat from reproductive mammals (e.g., meat from dairy cows at end of career, etc.).
- Slaughterhouse activities.

Allocation methods for each type of key process are provided below.

Co-product allocation for production of meat from reproductive mammals

Meat chain co-products may vary in relation to the type of mammal considered; and may come in the form of food products or miscellaneous goods; Table 6 shows an indicative and non-comprehensive example:

Mammal typology	Co-products
	Meat
Cow	Milk
	Leather
	Meat
Sheep	Milk
	Wool
Pig	Meat
Goat	Meat
oout	Milk

Table 6. Typology of mammals and their co-products (non-comprehensive list).

Meat from dairy farm systems (e.g., meat from cull dairy cows at end of career)

For the dairy farm system where the focus is milk production, meat generated from surplus calves and cull dairy cows are important co-products.

When the object of the analysis is meat from cull dairy cow, the environmental burdens to consider are the following (see also Figure 3):

A share of the environmental burdens of the reproductive mammal's life cycle before entering in the reproduction phase; in this case, the environmental burden shall be allocated on the biophysical basis to all the products (i.e., the reproductive mammal's meat at the end of career, milk, surplus calves) generated during the entire life cycle of the reproductive mammal.

• Environmental burdens of the reproductive mammal's lifecycle starting from the last breeding phase up to its slaughter house.

When the object of the analysis is meat from veal calves, the environmental burdens to consider are the following (see also Figure 3):

- Environmental burdens of the reproductive mammal's life cycle before entering in the reproduction phase; in this case, the environmental burden shall be allocated on the biophysical basis to all the products (i.e., the reproductive mammal's meat at the end of career, milk, surplus calves) generated during the entire life cycle of the reproductive mammal.
- Environmental burdens of the mammal (e.g., surplus calf) life cycle.

For products from dairy farm systems, the environmental burden shall be allocated between milk and meat in line with Equation 1 shown in Section 4.6.1.3. After having calculated the allocation factor for milk, the allocation factor for meat is calculated as follows:



Equation 2. Allocation factor for meat from dairy farm:  $AF_{meat} = 1 - AF_{milk}$ 

Figure 3. The life cycle of a reproductive mammal.

Meat from mammals from systems devoted to meat production only (e.g., cattle meat)

In this case, the mammal is the object of meat transformation processing and the environmental burdens to considered are as follows (see also Figure 3):

- Environmental burdens of the reproductive mammal's lifecycle before entering in the reproduction phase; in this case, the environmental burdens shall be allocated on the biophysical basis to the meat products generated during the entire life cycle of the reproductive mammal products (i.e., generated mammals' meat and reproductive mammal's meat).
- Environmental burdens of the reproductive mammal life cycle phase dedicated to the reproduction and nurturing of mammals, considering the total amount of produced meat (from the generated mammals and the reproductive mammal itself) following the biophysical allocation approach.

See Appendix I for a calculation example for co-products allocation of reproductive mammals.

Co-product allocation for slaughterhouse activities

The possible co-products of slaughterhouse activities are quite different in meat production systems (e.g., meat, leather, fat, etc.) and may vary from one species to another. Mass allocation is problematic as the outputs (in terms of mass) are not linearly related to the mass of inputs. Therefore, the allocation method to apply under this PCR is economic allocation.<sup>8</sup>

The environmental burden for each meat product and co-product that exit the slaughterhouse shall be evaluated considering their average economic value, considering the economic values over the last three years, with annual verification of updates; these values shall be reported in the LCA report, along with a description of sources and main hypotheses done for the calculation. Data on slaughterhouse activities shall be specific for the animal species under study. Key assumptions shall be documented.

The following are the main products and co-products exiting the slaughterhouse plant that shall be allocated with co-product allocation (economic allocation according to the above paragraph):

- Fresh meat and products suitable for human consumption
- Hides and skins, sold to leather industry
- Products sold for rendering (e.g., fat)

In addition, the following by-products exits the slaughterhouse and shall be allocated as waste (see Section 4.6.2).

- Specified risk material (e.g., skull, spinal cord, etc. considered category I by-products, sent to incineration)
- Products not suitable for human consumption (category II by-products, sent to recovery/energy plants)
- Products for animal feed applications, such as pet food or feed or to compost (category III by-products, sent to recovery)

#### 4.6.1.5 Fresh eggs in shell

Following the LEAP guidelines (FAO 2014), allocation method based on economic value shall be used for eggs production where spent birds for slaughter and manure are produced as co-products. Note that manure is considered as a co-product if it is a valuable output from the farm, e.g., it can be sold as fertiliser or as fuel in a nearby power plant. For each product, an average economic value over the last three years shall be used, with annual verification of updates. The prices and the description of the sources of price shall be provided for the EPD verification along with any assumptions made.

For manure that is considered as residual or waste, see allocation rules in Section 4.6.2.

#### Table 7. Allocation method for fresh eggs in shell.

Process	Main product and co-products	Allocation method
Egg production	Eggs, spent birds for slaughter and manure	Economic allocation based on average prices of the products over three years period.

#### 4.6.1.6 Meat of poultry

Mass-based allocation shall be used for poultry meat processing.9

In commercial processing of poultry, edible products have different functions and markets compared to the co-products not edible by humans. If any rendering treatment happens within the slaughterhouse, it shall be considered.

It is recommended to use primary, product-specific data to calculate the mass allocation factors. If this is not feasible, the default values in Table 8 may be used.

<sup>&</sup>lt;sup>8</sup> Economic allocation is also suggested by the CMWG Guidelines, Appendix 8 Meat Processing.

<sup>&</sup>lt;sup>9</sup> This was chosen instead of economic allocation, as economic values of products and co-products of poultry meat processing plants may change significantly as a function of time or due to circumstantial market events (e.g., avian influenza).

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Table 8. Default allocation factors for poultry meat processing (edible and inedible).

Main products and co-produts	Allocation factors
Meat	61.2%
Skin with fat	9.9%
Feet	2.8%
Head	1.6%
Liver	1.0%
Heart	0.5%
Gizzard	0.7%
Bones	10.7%
Gastrointestinal tract (abdominal fat, lungs, trachea, kidneys)	3.2%
Feathers	2.9%
Blood	3.5%
Loss (body weight loss during post slaughter processing and dissection)	2.2%

#### 4.6.1.7 Fish products, including caviar and caviar substitutes

If allocation cannot be avoided through sub-division, the environmental burden of preparation of fish products shall follow the allocation method in Table 9.

Process	Main product and co-products	Allocation method
Preparation, all steps of preparation between live fish and consumption	Main product: Live fish; Fish, fish fillets and fish meat (including minced): fresh, chilled, or frozen; or Fish, fish fillet and fish meat, smoked or salted: fresh, chilled or frozen or caviar or caviar substitute Co-products: liver and other by- products not intended for human consumption, e.g., head and gutted used like ingredients for pet food or feed for other food producing animals	Economic allocation based on market prices of the different fractions. If data on prices are not available, environmental burdens shall be fully allocated to the main product.

Table 9. Allocation method for preparation of fish products, including caviar and caviar substitutes.

#### 4.6.1.8 Virgin olive oils

If allocation cannot be avoided through sub-division, the allocation method shown in Table 10 shall be used for virgin olive oil production.

Process	Main product and co-products	Allocation method
Cultivation of olive trees	Olives and wood produced by pruning, tree renovation or end of trees life	Allocation based on product volume or mass
Production of olive and olive oil	Olive and different grades or qualities of virgin olive oil (such as organic/non-organic, or virgin olive oil/extra virgin oil/estrissimo virgin oil)	Allocation based on product volume or mass
Production of olive oil	Olive oil, pomace	Allocation based on economic value

Table 10. Allocation method for virgin olive oils.

#### 4.6.1.9 Other food production processes

Table 11 shows allocation methods for food production processes not covered in above subsections.

Table TT. Allocation method	for tood processing and other	
Process	Main product and co- products	Allocation method
Grain mill production	Grain mill products, co- product(s)	Allocation based on mass
Sauce production	Sauce product, co- product(s)	Allocation based on mass
Refined sugar production	Refined sugar, pulp, molasses, bagasses, and other co-products	Allocation based on the percentage of sucrose content in the products
Bakery production	Bakery products, co- products	Allocation based on mass
Pasta production	Pasta products, co- products	Allocation based on mass
Food processing for prepared and preserved vegetable and fruit	Food product, co-products	Allocation based on mass

#### Table 11 Allocation method for food processing and other food products

#### 4.6.1.10 Feed production

Animal feeding are relevant process for food such as dairy, eggs and meat products. Feed products are normally co-products from grains and vegetable crops, or co-products from food processing process. Allocation of feed product is therefore presented separately in this section. See Table 12 for the allocation method that shall be applied.

Tahla 1	2 1	llocation	method	fort	food	produ	iction
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Process	Main product and co-products	Allocation method
Feed as co- products from a crop	Crop itself and its co-products	If primary data are collected for feed ingredients, economic allocation shall be done according to the procedure described in Section 4.6.1.1.
Feed mill operations, i.e., compound feed production	For example, flour and middlings	If average feed mill data available, mass allocation shall be used (average consumption per kg of feed produced).
Processing of feed ingredients	For example, oil and oilseed cake	If primary data are collected for feed ingredients, economic allocation shall be done according to LEAP feed guidelines (FAO 2016).

#### 4.6.1.11 Coffee

In coffee production, the cultivation of green coffee<sup>10</sup> can produce several co-products. In this section, allocation for inputs and outputs including emissions are provided.

For polyculture plantation where coffee and other cash crop are involved, the following allocation hierarchy shall be followed:

- 1. Divide the process into sub-processes by obtaining the primary data on, e.g., fertilisers used for coffee and for the other cash crop. In the case of manure, "production" is allocated 100% to the animal with transport, storage and on farm handling all to be allocated to the coffee production.
- 2. If it is not possible to collect data on the quantities of fertilisers for all crops in the studied product system, the farmers should be encouraged to estimate the data on coffee at least. They will know how many coffee trees they

<sup>&</sup>lt;sup>10</sup> Green coffee refers to the raw beans of the coffee plant.



have and should also be aware of roughly how much fertiliser they use for each tree, as these fertilisers are applied manually in a ring around the tree stem.

- 3. If the above are not feasible, the default value tables for nitrogen uptake shown in Appendix II and the example in Appendix III shall be used. However, if practitioners have other literature sources which are of higher quality or have more representative data for the individual coffee involved than the default value tables provided, these data sources should be used.
- 4. Use economic allocation.

Where the cash crop is not included in the table or there is more than one cash crop, 100% shall be allocated to the coffee.

#### 4.6.1.12 Tea

Tea is generally grown in monoculture plantations, sometimes with other plants around the perimeter of the fields to reduce erosion. There are no valuable co-products created monoculture tea plantations or processing. Ingredients used to flavour tea, or for herbal and fruit infusions, may be grown in either monoculture or polyculture. In the case of a monoculture plantations, the problem of allocation does not occur and consequently all consumption and emissions of the plantation are related to a single product. For polycultures, the allocation method in Table 13 shall be used.

Table 13. Allocation method for tea.

Process	Main product and co-products	Allocation method
Polyculture tea plantations	Tea leaves, herbs and fruit grown for use in tea and HFI <sup>11</sup> or other products	<ol> <li>Crops specific data for all inputs and outputs shall be used to avoid allocation.</li> <li>If crop specific data is not available, published uptake values for fertiliser, irrigation, pesticides, and herbicides shall be used for each crop type. Example of published values are those from USDA's crop nutrient tool<sup>12</sup>.</li> <li>If published values are not available for relevant to the geographical location of the plantations, allocation based on economic values averaged over the previous three-year period shall be used.</li> </ol>
Process of HFI ingredients – when no subdivision or physical allocation is possible	Processed herbs and fruit ready for tea or HFI, co-products	Allocation based on economic value of the products in the intended market, averaged over three years.

#### 4.6.1.13 Other beverage products

If allocation cannot be avoided through sub-division, the environmental burden of production processes for other beverage products shall follow the allocation methods in Table 14.

Table 14. Allocation method for beverage product other than coffee and tea.

Process	Main product and co-products	Allocation method
Food processing for juice, plant-based milk	Juice/plant-based milk	Allocation based on mass
Wine, grape production	Must, pomace and stems	Allocation based on mass.
Wine making	Wine and lees	Allocation based on mass.
Wine production, when the weight of	Wine, pomace, stems and lees	Apply typical allocation factors of 80% for wine, 15% for pomace, 4% for stems and 1% for lees

<sup>&</sup>lt;sup>11</sup> Herbal and fruit infusions

<sup>&</sup>lt;sup>12</sup> United States Department of Agriculture (2018)

co-products is unknown.		
Soft drink	Soft drink, co-products	Allocation based on volume

### 4.6.2 ALLOCATION OF WASTE

See Section A.4.2 of the GPI.

As a reminder, waste is a "substance or object which the holder discards or intends or is required to discard" (definition from EN 15804). 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.

In addition, when manure from farming system is considered as waste, it results in a clean separation of the system where all post-farm emissions from use of the manure are assigned to that use, while all on-farm management is assigned to the animal product(s) from the farm (birds, eggs, etc.). Thus, when manure is disposed to a landfill or to incineration without energy recovery, or sent to another waste treatment facility, all the emissions associated with on-farm manure management are assigned to product from the farm at farm gate. Emissions associated with the final disposition of litter are considered within the system boundary too and shall be accounted and assigned to the animal product(s).

Note that according to the LEAP guidance, manure should, as the default approach, be considered as residual at the farmgate. However, in this PCR, the allocation method will depend on whether manure is a co-product or waste.

## 4.7 DATA AND DATA QUALITY RULES

See Section A.5 of the GPI.

See Section 4.8 for further rules related to data and data quality per life-cycle stage and module D.

### 4.7.1 DATA CATEGORIES

See Section A.5.1 of the GPI.

### 4.7.2 DATA QUALITY REQUIREMENTS FOR PRIMARY DATA

See Section A.5.2 of the GPI.

### 4.7.3 DATA QUALITY REQUIREMENTS FOR REPRESENTATIVE SECONDARY DATA

See Section A.5.3 of the GPI.

### 4.7.4 DATA QUALITY ASSESSMENT AND DECLARATION

See Section A.5.4 of the GPI.

### 4.7.5 EXAMPLES OF DATABASES FOR SECONDARY DATA

This PCR does not list any examples of databases to be used for secondary data.

## 4.8 OTHER LCA RULES

See Section A.6 of the GPI.

For specific LCA rules per life-cycle stage, see Section 4.9.

#### 4.8.1 MASS BALANCE

See Section A.6.1 of the GPI.



### 4.8.2 ELECTRICITY MODELLING

See Section A.6.2 of the GPI.

#### 4.8.3 BIOGAS MODELLING

See Section A.6.3 of the GPI.

# 4.9 SPECIFIC RULES PER LIFE-CYCLE STAGE AND MODULE D

See Section A.7 of the GPI.

Additionally, for accounting of emissions from use of fertilisers and pesticides, site-specific or region-specific data shall be used. If there are no site or region-specific data available, emissions due to fertilisers and pesticides use shall be calculated according to the rules presented in Section 4.9.1 to 4.9.6. The emissions and references for their emission factors are summarised in Table 15.

Table 15. Emissions for use of fertilisers and pesticides, sections in which the emission factors can be found, and the ources of the emission factors.

	Emission	Section	Reference
Emissions to air	NH <sub>3</sub> , NO emission	4.9.1	IPCC (2019) <sup>13</sup>
	N <sub>2</sub> O (direct and indirect emissions)	4.9.2	Zampori and Pant (2019) <sup>14</sup>
	CH4 (direct emissions)	4.9.3	IPCC (2019) <sup>15</sup>
Emissions to water	Nitrates	4.9.4	IPCC (2019) <sup>13</sup>
	Phosphorus	4.9.5	Zampori and Pant (2019) <sup>12</sup>
Emissions to soil	Pesticides	4.9.6	

#### 4.9.1 NH<sub>3</sub> AND NO EMISSIONS

If no site or region-specific data are available, ammonia volatilized shall be estimated using the emission factors from IPCC (2019), see Table 16.

Table 16. Total  $NH_3$  emissions from cultures due to fertiliser volatilization: values are kg  $NH_3$ -N volatilized per kg of N in fertilisers applied, Total NO emissions from cultures due to fertiliser volatilization: values are kg NO-N volatilized per kg of N in fertilisers applied.

Fertilisers type	Emission factor for NH <sub>3</sub>	Emission factor for NO
Ammonium nitrate (AN)	0.030	0.029
Anhydrous ammonia (AA)	0.029	0.001
Diammonium phosphate (DAP)	0.091	0.007
Monoammonium phosphate (MAP)	0.053	0.007
Ammonium sulphate (AS)	0.095	0.007
Calcium ammonium nitrate (CAN)	0.016	0.016
Sodium nitrate	0.002	0.001

<sup>&</sup>lt;sup>13</sup> IPCC (2019) Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories; N2O emissions from managed soils, and CO2 emissions from lime and urea application table A7-3 (updated).

<sup>&</sup>lt;sup>14</sup> Zampori L, Pant R, 2019. Suggestions for updating the Product Environmental Footprint (PEF) method. Luxembourg, Publications Office of the European Union. JRC115959 / EUR 29682 EN. DOI: 10.2760/424613. https://ec.europa.eu/jrc/en/publication/suggestions-updating-product-environmental-footprint-pef-method.

<sup>&</sup>lt;sup>15</sup> IPCC (2019) Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 5.5.



Urea	0.142	0.011
Animal manure <sup>16</sup>	0.210	0.005

For fertilisers not covered in Table 16, the mix in Table 17 shall be used unless primary data is available.<sup>17</sup>

Table 17.	Default assum	ntion for the	mix of different	fertilisers p	products not	covered in	Table 16
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Fertiliser product	Fertiliser mix
Nitrogen solutions	Urea (50%), AN (25%), CAN (25%)
Other N straight	AN (50%), CAN (50%)
Other NP (N)	AN (50%), CAN (50%)
AP	MAP (50%), DAP (50%)
N K compound (N)	Sodium Nitrate
N P K compound (N)	AN (50%), CAN (50%)

Where AN = Ammonium nitrate, CAN = calcium ammonium nitrate AS = ammonium sulphate, AP = ammonium phosphate, MAP = monoammonium phosphate and DAP = diammonium phosphate.

### 4.9.2 DIRECT AND INDIRECT EMISSIONS OF N<sub>2</sub>O

If no site- or region-specific data are available, direct and indirect N<sub>2</sub>O emissions shall be estimated using the emission factor reported in Table B.16 of Zampori and Pant (2019): 0.022 kg of N2O emitted to air per kg of N synthetic fertilizer and manure applied.

### 4.9.3 DIRECT EMISSIONS OF CH4 FROM PADDY WATER

If no primary data on direct emissions from paddy water are available, the emission shall be estimated using the IPCC (2019).<sup>18</sup>

### 4.9.4 EMISSION OF NITRATES

If no site- or region-specific data are available, emissions from nitrates leaching and runoff shall be estimated using the emission factor from IPCC (2019): the total  $NO_3$ - emissions due to leaching and runoff is 0.24 kg  $NO_3$ --N per kg of N in fertilisers applied.

### 4.9.5 EMISSION OF PHOSPHORUS

If no site- or region-specific data are available, phosphorus emissions shall be estimated using the emission factor reported in Table B.16 of Zampori and Pant (2019): 0.05 kg of P emitted to water per each kg of P based fertilisers applied.

Information to open consultation: The emission factor for phosphorus proposed above is taken from the PCR 2020:07 Arable and vegetable crops, which is considered to be the most updated source for phosphorus emission among existing PCRs in the International EPD System. However, there is another method proposed in PCR 2019:01 Fruits and nuts, which may be of interest although the method comes from an older source (Prahsun 2006). This alternative method is outlined below. Please provide us with your input on which of these two methods that is preferable, or if you have any proposals on another method.

Alternative method for phosphorus emissions (see above information to open consultation)

Three different kinds of phosphorus emission to water are distinguished:

<sup>&</sup>lt;sup>16</sup> IPCC (2019) Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories 11.3 (updated).

<sup>&</sup>lt;sup>17</sup> IPCC (2019) Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories A7-2 (updated).

<sup>&</sup>lt;sup>18</sup> IPCC (2019) Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 5.5.

- leaching of soluble phosphate to ground water (inventoried as "phosphate, to ground water"), see Equation 3,
- run-off of soluble phosphate to surface water (inventoried as "phosphate, to river"), see Equation 4, and
- erosion of soil particles containing phosphorus (inventoried as "phosphorus, to river").
- Phosphorus leaching to the ground water shall be estimated as an average leaching, corrected by phosphorus fertilization:

Equation 3. Calculation of phosphorus leached to ground water: Pgw = Pgwl \* Fgw

where:

- Pg = quantity of phosphorus leached to ground water (kg/ha)
- Pgwl = average quantity of P leached to ground water for a land use category (0.07 kg P/ha assumed equivalent to the factor for arable land)
- Fgw = correction factor for fertilization with slurry.

 $Fgw = 1 + 0.2/80 * P_2O_{5sl}$ 

 $P_2O_5sl$  = quantity of  $P_2O_5$  applied

Run-off to surface waters shall be calculated in a similar way to leaching to ground water:

Equation 4. Calculation of phousphorus lost though run-off: Pro = Prol \* Fro

where:

- Pro = quantity of phosphorus lost through run-off to rivers (kg/ha)
- Prol = average quantity of P lost through run-off to rivers for a land use category (0.175 kg P/ha assumed equivalent to the factor for arable land)
- Fro = correction factor for fertilization with phosphorus.

The correction factor for fertilization with phosphorus (Fro) is calculated as:

$$Fro = 1 + 0.2/80 * P_2O_{5min} + 0.7/80 * P_2O_{5sl} + 0.4/80 * P_2O_{5man}$$

where:

P<sub>2</sub>O<sub>5min</sub> = quantity of P<sub>2</sub>O<sub>5</sub> applied with mineral fertilisers (kg/ha)

 $P_2O_{5sl}$  = quantity of  $P_2O_5$  applied with slurry (kg/ha)

 $P_2O_{5man}$  = quantity of  $P_2O_5$  applied with solid manure (kg/ha)

Phosphorus emissions through erosion to surface waters, if there is no more accurate information available, could be estimated using the default value 0.53 kg P/ha, derived from an elaboration made using the SALCA-P model (considering 1.5  $t^{+}h^{-1*}yr^{-1}$  of eroded soil).

#### 4.9.6 ACTIVE SUBSTANCE OF PESTICIDES

To calculate the impact of pesticides production, the content in active substance of the specific products shall be considered.

As default approach, if no site- or region-specific data are available, the pesticides applied on the field shall be modelled as 90% emitted to the agricultural soil compartment, 9% emitted to air and 1% emitted to water. However, if no primary data on the active ingredient in the pesticide is available, it is not possible to know its volatile components. In this case, since the emissions to air cannot be modelled, it shall be assumed that all pesticides applied are 100% emitted to agricultural soil.

### 4.10 ENVIRONMENTAL PERFORMANCE INDICATORS

See Section A.8 of the GPI.

The mandatory indicators do not address all potentially relevant environmental impact and resource use issues of food and beverage products. For example, there are no mandatory indicators of land use or land use change and the associated environmental impact (e.g., biodiversity loss) or of impacts specifically associated with fisheries (e.g., overfishing or seabed



degradation). The intention is to add such indicators in a future update of this PCR. Moreover, a c-PCR may add additional mandatory indicators for impacts of specific relevance for a product category.

Information to open consultation: We welcome your input if you have any suggestions on required or recommended indicators and/or impact assessment methods for land use or land use change and the associated environmental impact (e.g., biodiversity loss) or of impacts specifically associated with fisheries (e.g., overfishing or seabed degradation). Note that availability of corresponding LCI data and LCIA methods, for example in commonly used databases and software, is critical in case an indicator is required.

# 4.11 SPECIFIC RULES PER EPD TYPE

### 4.11.1 MULTIPLE PRODUCTS FROM THE SAME COMPANY

See Section A.9.1 of the GPI.

#### 4.11.2 SECTOR EPD

See Section A.9.2 of the GPI.

#### 4.11.3 EPD OWNED BY A TRADER

See Section A.9.3 of the GPI.

#### 4.11.4 EPD OF PRODUCT NOT YET ON THE MARKET

See Section A.9.4 of the GPI.

#### 4.11.5 EPD OF PRODUCT RECENTLY ON THE MARKET

See Section A.9.5 of the GPI.

**EPD** 

FOOD AND BEVERAGE PRODUCTS

# 5 CONTENT OF LCA REPORT

Data for verification shall be presented in the form of an LCA report – 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.

See Section 8.3.1 of the GPI for rules on the content of the LCA report.

Note that there may be rules on the content of the LCA report elsewhere in the GPI or in this PCR.



# 6 CONTENT AND FORMAT OF EPD

See Section 7 of the GPI.

## 6.1 EPD LANGUAGES

See Section 7.1 of the GPI.

# 6.2 UNITS AND QUANTITIES

See Section 7.2 of the GPI.

### 6.3 USE OF IMAGES IN EPD

See Section 7.3 of the GPI.

### 6.4 SECTIONS OF THE EPD

See Section 7.4 of the GPI.

#### 6.4.1 COVER PAGE

See Section 7.4.1 of the GPI.

### 6.4.2 GENERAL INFORMATION

See Section 7.4.2 of the GPI.

#### 6.4.3 INFORMATION ABOUT EPD OWNER

See Section 7.4.3 of the GPI.

### 6.4.4 PRODUCT INFORMATION

See Section 4.2 of this PCR and Section 7.4.4 of the GPI.

### 6.4.5 CONTENT DECLARATION

See Section 7.4.5 of the GPI. Note that information about recycled materials in the product is not applicable for this product category.

### 6.4.6 LCA INFORMATION

See Section 7.4.6 of the GPI.

### 6.4.7 ENVIRONMENTAL PERFORMANCE

See Section 7.4.7 of the GPI.

The EPD shall declare the environmental performance indicators listed or referred to in Section 4.10, per declared unit (or per functional unit if permitted, recommended, or required by an applicable c-PCR), per life-cycle stage and optionally for module D.

As this PCR does not mandate the declaration of indicators of land use or land use change, or of impacts specifically associated with fisheries (see Section 4.10), the following mandatory statements shall be included in the environmental performance section of the EPD for products that include agriculture or fishery processes within their system boundaries, unless additional indicators are declared that address such impacts:



- For product systems with agriculture processes: "This EPD does not declare all potentially relevant environmental impacts of land-use activities, such as the effects on biodiversity. For informed decision-making, the EPD should be supplemented with additional studies that address such impacts."
- For product systems with fishery processes: "This EPD does not declare all potentially relevant environmental impacts of fishery, such as the effects of overfishing or seabed degradation. For informed decision-making, the EPD should be supplemented with additional studies that address such impacts."

#### 6.4.8 ADDITIONAL ENVIRONMENTAL INFORMATION

#### See Section 7.4.8 of the GPI.

Additionally, peer-reviewed studies that highlight the environmental impact of the product system on biodiversity may be declared as additional environmental information.

#### 6.4.9 ADDITIONAL SOCIAL AND ECONOMIC INFORMATION

See Section 7.4.9 of the GPI.

#### 6.4.10 INFORMATION RELATED TO SECTOR EPDS

See Section 7.4.10 of the GPI.

#### 6.4.11 VERSION HISTORY

See Section 7.4.11 of the GPI.

#### 6.4.12 ABBREVIATIONS

See Section 7.4.12 of the GPI.

#### 6.4.13 REFERENCES

See Section 7.4.13 of the GPI.



# 7 LIST OF ABBREVIATIONS

CPC	Central product classification
EPD	Environmental product declaration
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life cycle assessment
PCR	Product category rules
RSL	Reference service life
UN	United Nations

PCR-specific abbreviations will be added after the open consultation.

# 8 REFERENCES

CEN (2021) EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

EPD International (2024) General Programme Instructions for the International EPD System. Version 5.0.0, dated 2024-06-19. Available on <u>www.environdec.com</u>.

FAO (2014) Greenhouse gas emissions and fossil energy demand from poultry supply chains, http://www.fao.org/3/a-mj752e.pdf, pp. 42-44

FAO (2016) Environmental performance of animal feeds supply chains: Guidelines for assessment. Livestock Environmental Assessment and Performance Partnership.

International Dairy Federation (2015) A common carbon footprint approach for dairy. The IDF guide to standard lifecycle and assessment methodology for the dairy sector.

IPCC (2019) Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

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 (2015a) ISO 14001:2015, Environmental management systems - Requirements with guidance for use.

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

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

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

Nemecek T., Kagi T., 2007. Life Cycle Inventories of Agricultural Production Systems. Ecoinvent report No.15

Prahsun V., 2006. Erfassung der PO4-Austrage fur die Okobilanzierung SALCA Phosphor. Agroscope Reckenholz – Tanikon ART, 20p

United States Department of Agriculture. (2018). Crop Nutrient Tool. Retrieved from USDA Natural Resources Conservation Service - Nutrient Content of Crops: <u>https://plants.usda.gov/npk/main</u>

Zampori L, Pant R, 2019. Suggestions for updating the Product Environmental Footprint (PEF) method. Luxembourg, Publications Office of the European Union. JRC115959 / EUR 29682 EN. DOI: 10.2760/424613. https://ec.europa.eu/jrc/en/publication/suggestions-updating-product-environmental-footprint-pef-method.

More of the references will be added after the open consultation.

# 9 VERSION HISTORY OF PCR

# VERSION 1.0.0, 20YY-MM-DD

Original version of the PCR.

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# APPENDIX I: CALCULATION EXAMPLE FOR ALLOCATION OF MEAT FROM REPRODUCTIVE MAMMALS

As a support to the allocation rules described in Section 4.6.1.4, this section provides a sample calculation using estimates intended to support the illustration of calculation method in Figure 3. Note that numbers used in this section are purely indicative.

Before going into details of calculation, base hypotheses are made regarding the overall impacts associated with the life of the animal (data per head and for entire life), as well as the number of useful products in terms of bulk.

The two calculation examples respectively regard:

- the production of meat from the cull dairy cow (reproductive mammal)
- the production of veal meat from surplus calves (mammal)

Impact for entire life cycle data per head)	Type of mammal		Acronym	kg CO₂ equivalents per head
	Cow (mammal)		ML	1 350
	Milk and reproduction cow (reproductive animal)	Impact since birth → start reproduction phase	RL1	2 000
		Impact of Reproduction Phase (5 parts)	RL2	15 000
		Impact End of Reproduction phase → Slaughter	RL3	1 000

Table 18. Calculation example - impact of a mammal (per head) for its entire life cycle.

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	production	guarnery po	noud o	, manning.

Production quantity (data per head)	Type of mammal	Product	Acronym	Mass value
	Milk cow that produces calves (reproductive mammals)	No. calves born	NB	3 calves during reproduction period (1 calf per cycle)
		Veal sold	RB	50 kg live weight (as new born calves)
		Meat from slaughter of end-of-life dairy cow	RMM	650 kg live weight
		Milk produced	RMK	25 000 litres/cow life cycle

The environmental impact shall be evaluated using the IDF methodology described above and calculating factors  $AF_{milk}$  and  $AF_{meat}$  reported in the table below.

Table 20. Calculation example - allocation factors for products from reproductive mammals.

Calculation of allocation factor $AF_{milk 1}$ and $AF_{meat 1}$ for the phase RL1 (impact since birth $\rightarrow$ start reproduction phase)	Calculation of allocation factor $AF_{milk 2}$ and $AF_{meat 2}$ for the phase RL2 (impact of reproduction phase)
$M_{milk} = 24\ 997\ liters$	$M_{milk} = 24997liters$
$M_{meat 1} = 650 + 50 \times 4 = 850 \ kg$ (dairy cow + calves)	$M_{meat 2} = 50 \times 4 = 200  kg$ (calves)

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#### FOOD AND BEVERAGE PRODUCTS

$AF_{milk\ 1} = 1 - 6.04 \times \frac{M_{meat}}{M_{milk}} = 1 - 6.04 \times \frac{350}{24,997} = 80\%$	$AF_{milk\ 2} = 1 - 6.04 \times \frac{M_{meat\ 2}}{M_{milk\ 2}} = 1 - 6.04 \times \frac{200}{24,997} = 95\%$
$AF_{meat 1} = 1 - 0.8 = 20\%$	$AF_{meat 2} = 1 - 0,95 = 5\%$

Culled dairy cow meat:

 $RL1 * AF_{meat 1} + RL3 = 2000 \times 0.2 + 1000 = 1400 \text{ kg CO}_2 \text{ eq.}$ 

Total impact (1 400 kg  $CO_2$  eq.) shall be divided by total weight of meat produced from the slaughtering of cull dairy cow (290 kg carcass weight): 4.8 kg  $CO_2$  eq.

Surplus calf (veal) meat:

 $ML + RL1 \times AF_{meat 1} + \frac{RL2 \times AF_{meat 2}}{NB} = 1 350 + 2 000 \times 0,2 + (15 000 \times 0,05) / 3 = 2 000 \text{ kg CO}_2 \text{ eq.}$ 

Total impact (2 000 kg  $CO_2$  eq.) shall be divided by weight of meat produced from one calf (150 kg carcass weight): 13,3 kg  $CO_2$  eq.



# APPENDIX II: ALLOCATION FACTORS FOR GREEN COFFEE

The default values of Table 21 and Table 22 are intended to be used when applying the third option in the allocation-method hierarchy of Section 4.6.1.11, for nitrogen uptake as allocation parameters for Arabica coffee and Robusta coffee, respectively, in intercropping systems.

Table 21. The default values for nitrogen uptake as allocation parameters for Arabica coffee in intercropping systems.

	1	11 3 7
Intercropping system	Coffee (kg N / kg coffee cherry)	Other cash crop (kg N / kg crop)
Arabica Coffee - Avocado*	0.023±0.006	0.003
Arabica Coffee - Banana	0.023±0.006	0.006
Arabica Coffee - Bean (green)	0.023±0.006	0.008
Arabica Coffee - Citrus*	0.023±0.006	0.002
Arabica Coffee - Durian**	0.023±0.006	0.001
Arabica Coffee - Maize	0.023±0.006	0.024
Arabica Coffee - Mango	0.023±0.006	0.007
Arabica Coffee - Papaya*	0.023±0.006	0.002
Arabica Coffee - Pepper	0.023±0.006	0.018
Arabica Coffee - Plantain	0.023±0.006	0.006

Table 22. The default values for nitrogen uptake as allocation parameters for Robusta coffee in intercropping systems.

Intercropping system	Coffee (kg N / kg coffee cherry)	Other cash crop (kg N / kg crop)
Robusta Coffee - Avocado*	0.012±0.005	0.003
Robusta Coffee - Banana	0.012±0.005	0.006
Robusta Coffee - Bean (green)	0.012±0.005	0.008
Robusta Coffee - Citrus*	0.012±0.005	0.002
Robusta Coffee - Durian**	0.012±0.005	0.001
Robusta Coffee – Maize	0.012±0.005	0.024
Robusta Coffee – Mango	0.012±0.005	0.007
Robusta Coffee - Papaya*	0.012±0.005	0.002
Robusta Coffee – Pepper	0.012±0.005	0.018
Robusta Coffee – Plantain	0.012±0.005	0.006



# APPENDIX III: ALLOCATION EXAMPLE FOR GREEN COFFEE

This is an example which uses the tables in Appendix II to calculate the allocation ratio in a coffee-banana intercropping system.

Primary data (also called specific data) from the survey on the farm contains the following information (Note: numbers below are purely fictional):

Farm A only knows that it purchases 1,000 kg of total nitrogen fertilisers per year for its Arabica coffee and banana intercropping system.

The average yield of coffee cherries is 800kg/acre (2,000 kg/ha); the average yield of banana is 500 kg/acre (1,250 kg/ha).

The EPD practitioners can use the above data and default values listed in the CFP-PCR to easily calculate the allocation ratios as follows:

The individual nitrogen requirement of coffee and banana per year can be calculated based on the amount of crops needed (default value see Table 6 in Appendix II) and the specific yield of the crops from the primary data:

Banana: 
$$\frac{0.006 kg N}{kg Banana} x \, 500 \frac{kg}{a} = 3kg N/a$$

The results show that coffee needs 18.4 kg of nitrogen fertiliser per year to harvest 800kg coffee cherries, and banana needs 3 kg to harvest 500 kg banana.

The second step is to calculate the percentage of allocation ratios assigned between coffee and banana.

Percentage of Arabic coffee:  $\frac{18.4}{(18.4+3)} = 86\%$ 

Percentage of banana:  $\frac{3}{(18.4+3)} = 14\%$ 

That means that of 1,000 kg of total nitrogen fertiliser applied on this farm, 860kg will be assigned to coffee (86%) and 140kg to banana (14%) per year.

Note: The calculated amount of fertiliser might not be equal to the actual amount applied on the farm. This might, for example, be based on the fact that the farmer applied additional organic compost or manure.



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