PRODUCT CATEGORY RULES (PCR)
PUBLICATION DATE 2026-04-15

EPD
INTERNATIONAL EPD SYSTEM

MACHINES FOR FILLING AND PACKAGING OF LIQUID FOOD

PRODUCT CATEGORY CLASSIFICATION: UN CPC 43921

PCR 2012:18
VERSION 3.0.0
VALID UNTIL 2030-04-15

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1 INTRODUCTION

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 www.environdec.com, includes the rules for the overall administration and operation of the programme and the basic rules for developing EPDs registered in the programme. A PCR complements the GPI and the normative standards by providing specific rules, and guidelines for developing an EPD for one or more specific product categories (see Figure 1), thereby enabling the generation of consistent EPDs within a product category. 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.

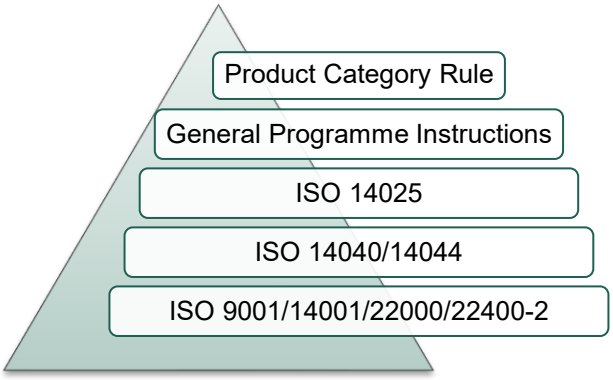

Figure 1. The hierarchy between PCRs, standards, and other documents.

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] Termed type III environmental declarations in ISO 14025.

2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	Machines for filling and packaging of liquid food
Registration number and version:	2012:18, Version 3.0.0
Programme:	INTERNATIONAL EPD SYSTEM
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com E-mail: support@environdec.com
PCR Moderator:	Markus Berggren, Ecolean, markus.berggren@ecolean.se
PCR Committee:	Ecolean AB, Carbonzero AB
Publication date:	2026-04-15 See Section 9 for a version history of the PCR.
Valid until:	2030-04-15 The validity may change. See www.environdec.com for the latest version of the PCR and the latest information on its validity and transition periods between versions.
Development and updates:	The PCR has been developed following ISO/TS 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 www.environdec.com and there is no transition period. For medium updates (change of second-digit version number), the previous version of the PCR is valid in parallel during a transition period of at least 90 days, but not exceeding its previously set validity period. For large updates (change of first-digit version number), the previous version is valid in parallel during a transition period of at least 180 days, but not exceeding its previously set validity period. 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 5.0.1, based on ISO 14025 and ISO 14040/14044. ISO (2014), ISO 22400-2, Automation systems and integration — Key performance indicators (KPIs) for manufacturing operations management — Part 2: Definitions and descriptions
PCR language(s):	At the time of publication, this PCR was available in English. If the PCR is available in several languages, these are available on www.environdec.com. In case of translated versions, the English version takes precedence in case of any discrepancies.

2.2 SCOPE OF PCR

2.2.1 PRODUCT CATEGORY DEFINITION AND DESCRIPTION

This document provides Product Category Rules (PCR) for the assessment of the environmental performance of 'Machines for filling and packaging of liquid food' and the declaration of this performance by an EPD.

The product category corresponds to a sub-set of UN CPC 43921:

- Division: 43 - General-purpose machinery
  - Group: 439 - Other general-purpose machinery and parts thereof
    - Class: 4392 - Machinery for cleaning bottles, packing, and weighing; spraying machinery
      - Subclass: 43921 - Machinery for cleaning or drying bottles or other containers; machinery for filling, closing, sealing, capsuling or labelling bottles, cans, boxes, bags or other containers; machinery for aerating beverages; other packing or wrapping machinery

More information is available at: https://unstats.un.org/unsd/classifications/Family/Detail/1074

UN CPC 43921 includes many different types of machinery. The scope of this PCR is limited to machinery related to packaging of liquid food products since requirements on hygiene and functionality are very specific for filling and packaging machines handling liquid food.

This PCR covers the following types of machines which are part of CPC 43921[2]:

- machinery for filling, closing, sealing, capsuling or labelling bottles, cans, boxes, bags or other containers for liquid food;
- Other packing or wrapping machinery used in liquid food filling lines.
- Equipment needed in addition to the filling machine to fulfil the functional unit (e.g. packaging machines which also pre-applies caps on packages before forming)

Optional equipment such as conveyer belts, packaging robots etc are excluded from the PCR scope.

2.2.2 GEOGRAPHICAL SCOPE

This PCR may be used globally.

[2] UN CPC Division 43921 also includes 'machinery for cleaning or drying bottles or other containers' and 'machinery for aerating beverages'. These product groups are not covered by this PCR since they are considered to be significantly different from filling and packaging machines for liquid food.

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 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

Version 1.0 was available for open consultation from 2011-12-27 until 2012-02-15 (Version 1.0) and 2015-01-23 until 2015-02-08 (Version 1.1).

3.1.2 VERSION 2.0.0

This PCR was available for open consultation from 2018-09-05 until 2018-11-05, during which any stakeholder was 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. No stakeholders that provided comments during the open consultation agreed to be listed as contributors in the PCR and on www.environdec.com.

3.1.3 VERSION 3.0.0

This PCR was available for open consultation from 2025-06-17 until 2025-08-12, during which any stakeholder was able to provide comments by contacting the PCR Moderator and/or the Secretariat.

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

- Eva Martínez Herrero, Fundación CTME

3.2 PCR REVIEW

3.2.1 VERSION 1.0.0

Version 1.0 was reviewed by the Technical Committee of the International EPD system.

3.2.2 VERSION 2.0.0

PCR review panel:	The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com. The review panel may be contacted via support@environdec.com. Members of the Technical Committee were requested to state any potential conflict of interest with the PCR Committee, and if there were conflicts of interest they were excused from the review.
Chair of the PCR review:	Adriana del Borghi
Review dates:	2019-01-31 until 2019-03-25

3.2.3 VERSION 3.0.0

PCR review panel:	The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com. The review panel may be contacted via support@environdec.com. Members of the Technical Committee were requested to state any potential conflict of interest with the PCR Committee, and if there were conflicts of interest they were excused from the review.
Chair of the PCR review:	Bárbara M Civit
Review dates:	2025-11-05 until 2026-01-26

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. www.environdec.com.
- Environment and Development Foundation (EDF). http://pcr-library.edf.org.tw/product_country/taiwan.asp.
- PEP ecopassport®. http://www.pep-ecopassport.org/create-a-pep/produce-a-lca/
- Japan Environmental Management Association for Industry (JEMAI). http://www.ecoleaf-jemai.jp/eng/pcr.html
- UL Environment. https://industries.ul.com/environment/transparency/product-category-rules-pcrs#uledev

No existing PCRs on filling machines of liquid food products were identified, however PCR 2010:08 (Other special- and general-purpose machinery and parts thereof) is existing and is covering a broad range of machines. The scope of this PCR (2012:18) is limited to machinery related to packaging of liquid food products since requirements on hygiene and functionality are very specific for filling and packaging machines handling liquid food.

3.4 REASONING FOR DEVELOPMENT OF PCR

This PCR was developed to enable publication of EPDs for the product category defined in Section 2.2.1 based on ISO 14025 and ISO 14040/14044 and ISO (2014), ISO 22400-2, Automation systems and integration — Key performance indicators (KPIs) for manufacturing operations management — Part 2: Definitions and descriptions. 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.

3.5 UNDERLYING STUDIES USED FOR PCR DEVELOPMENT

The first version of this PCR was published in 2012. At this point in time Tetra Pak International was responsible for the preparation of the PCR. Later Ecolean took over as PCR moderator and adapted the PCR according to the regulations in ISO 22400-2. The listed underlying studies are the LCA studies performed by Ecolean according to a previous version of this PCR.

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

- LCA Report Ecolean Machine EPD 170926 (internal report)
- Add-on LCA Report Ecolean Machine EPD 210831 (internal report)
- EPD for Ecolean filling machines EL3+, EL4+ and EL6 (Registration number: S-P-01056)
- EPD for Ecolean filling machines EL1+ and EL2+ (Registration number: S-P-01057)

There are other methodologies available than the one used in this PCR. The following article presents such an example: Kellens, K., Dewulf, W., Overcash, M. *et al.* Methodology for systematic analysis and improvement of manufacturing unit process life-cycle inventory (UPLCI)—CO_2PE! initiative (cooperative effort on process emissions in manufacturing). Part 1: Methodology description. *Int J Life Cycle Assess* **17**, 69–78 (2012). https://doi.org/10.1007/s11367-011-0340-4 as a reference.

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 FUNCTIONAL UNIT

The Functional Unit (FU) is defined as 1000 filled approved packages (regardless of their size and format) delivered by the machinery. The functional unit shall be declared in the EPD, including package type and size as used in the defined standard cycle.

The total expected lifetime production of the machine, following the defined standard production cycle, shall be used when calculating the upstream impact per functional unit. The lifetime of the machine used for calculations shall be stated in the EPD.

4.3 SYSTEM BOUNDARY

The scope of this PCR and EPDs based on it is cradle-to-grave, including the environmental performance of the use phase of the machine. In addition, the EPD shall include information on best practices for recycling, dismantling and handling of different machine parts at the end-of-life.

4.3.1 LIFE-CYCLE STAGES AND INFORMATION MODULES

Because of different data quality rules and the presentation of results, the product life cycle shall be divided into the following 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 or information 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 to 4.3.1.3

4.3.1.1 Upstream processes

The upstream processes include:

- Extraction and production of raw materials for the production of machine components.
- Intermediate processes to manufacture and assembly machine components.

Intermediate processes to manufacture and assembly machine components can in some cases be included in core processes, if the filling machine producer has internal production of components.

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 core process shall include all relevant unit processes that take place within the organisation of the product for which the EPD is issued with particular regard to:

- Transportation of machine components to the core process
- Final assembly of machine components at the machine producer (incl. testing)

Core 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 Downstream processes

The downstream module shall include the transportation of the machine from final assembly to the final user (an average customer), including transportation packaging.

Furthermore, the downstream module refers to the use phase of the machine including:

- Energy use
- Water use
- Production and use of any ancillary materials in the process such as detergents, chemicals, lubricant oil, etc.
  Production of used spare parts

The downstream module shall also include the end-of-life treatment of the filling machine meaning both transport to waste management and waste treatmet of the different parts. More guidance is given in Section 4.9.3.

Downstream 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.

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.

4.3.1.4 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

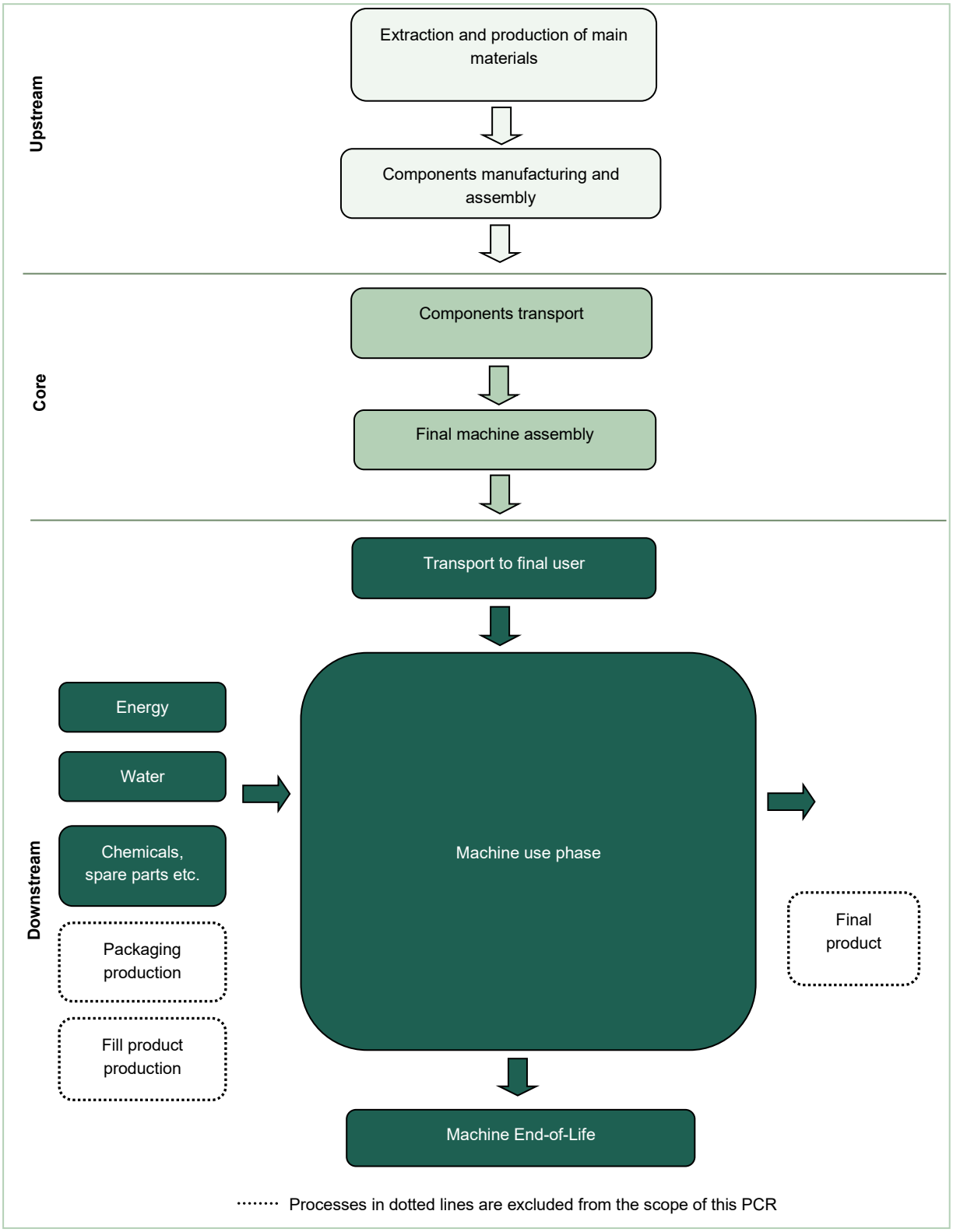

Figure 1. Process flow diagram illustrating the processes that shall be included in the product system, divided into the life-cycle stages. The illustration of processes to include may not be exhaustive.

4.5 CUT-OFF RULES

See Section A.3.3 of the GPI.

Since the product life cycle in this PCR is not divided into the product life cycle-stages A-C and the underlying information modules, the cut-off rule applies per upstream, core and downstream stage.

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.

4.6.2 ALLOCATION OF WASTE

See Section A.4.2 of the GPI.

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.

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.

4.8 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

See Section A.7 of the GPI.

Below are further data quality requirements and other LCA rules per life-cycle stage of relevance for the product category.

4.9.1 UPSTREAM PROCESSES

The upstream processes shall include:

- Extraction and production of raw materials for the production of machine components
- Intermediate processes to manufacture and assembly machine components

The aim of the assessment should be to cover all the components in the machine. The bill of materials (BOM) or similar information can be used to identify type and weight of components used in the machine.

By aggregating the components into material type, the environmental impact can be calculated based on literature data for the production of each material type.

The sum of all components identified and quantified shall add up to at least 95% of the total machine weight. The environmental burden from the “unidentified” 5% shall however be approximated by using proxy data, assuming that the “unidentified” raw material mass is composed of the same material mixture as the rest of the machine.

The underlying LCA shall include a sensitivity analyses, investigating the impact of using such proxy data.

If information is available from previous studies, looking at the upstream processes for machinery of similar design and composition, this information can be used as the basis for the assessment. However, the specific weight of the machinery, , shall be used as the basis for the assessment.

The total expected lifetime production of the machine, following the defined standard production cycle, should be used when allocating the upstream impacts per functional unit.

The following requirements apply to the upstream processes:

- Primary data shall be used for actual product weights, amounts of raw materials used and amounts of waste.
- Representative secondary data should be used for the extraction and production of raw materials used for the production of the equipment under study Representative secondary data can for example be sourced from commercial or free databases.

4.9.2 CORE PROCESSES

The processes listed below shall be included:

- Transportation of components
- Final manufacturer assembly of machine components at the machine producer

The following requirements apply to the core processes:

For the final machine assembly process, latest available primary data from the machine producer should be collected. Since machine producers often assemble several different types of machines at one location, average production facility data from the relevant production location(s) can be used.For the electricity used in the core processes, the hierarchy presented in Section A.7.1 of the GPI shall be followed.

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

4.9.3 DOWNSTREAM PROCESSES

The processes listed below shall be included:

- Transportation of the machine from final assembly to an average customer
- Assembly of the machine at client site (if relevant)
- Energy use of machine during use phase
- Water use of machine during use phase
- Production of any ancillary materials used in the process such as detergents, chemicals, lubricant oil
- Production of used spare parts
- End-of-life treatment (transport to waste management and waste treatment)

For the transportation of the machine from final manufacturer assembly to an average customer, data from the machine producer shall be used. The transport distance and transport mode should be representative of the geographic scope of the EPD. Life cycle inventory data for the transportation step itself (for example data for road transport) can be taken from representative secondary data sources.

The impact of food or packaging production shall not be included in the assessment. However, the amount of food and packaging waste generated in the equipment is relevant and should be declared in the EPD for the definition of the standard production cycle.

The data for the downstream module shall be representative of the relevant site/region of the use phase. The EPD shall clearly state the geographic reference and underlying electricity mix used, as well as the GWP-GHG intensity (in kg CO2 eq/kWh and the amount of kWh required to fulfil the functional unit (kWh per 1000 filled packages)

Data on the pollutant 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.

For spare parts, information on planned maintenance over the lifetime of the machine should be used as the basis.

Guidance about End of Life:

At its end of life, a filling machine is not disposed of as a single unit but is instead dismantled into its constituent parts. This approach, known as design for disassembly, is a key part of modern recycling and EoL management.

1. **Dismantling into sub-modules**: A filling machine is designed with a **modular structure** to simplify maintenance and, at the EOL, disassembly. Technicians separate the machine into its main sub-modules, such as the filling nozzles, conveyor system, control panel, and frame. (Manual process)
2. **Segregation of Materials**: Once dismantled, the components are separated into different material streams to be processed. The goal is to maximize recycling and minimize landfill waste. The primary categories are:
    - **Metals**: The machine's frame, pumps, and other structural components are typically made of metals like stainless steel. These are highly valuable for recycling.

- **Plastics**: Plastic components, such as casings or certain hoses, can be sorted for recycling, depending on local conditions.
- **Electronic Components**: The control panel, sensors, and wiring are considered **electronic waste (e-waste)**. This is a critical step, as these components contain both valuable and hazardous materials.

3. **Treatment of materials**
   - **Hazardous Materials**: Any hazardous waste, such as lubricants, hydraulic fluids, or specific chemicals, must be segregated and handled separately. These should be disposed of by licensed hazardous waste management services according to strict regulations.
   - **E-waste**: Electronic components contain both valuable materials (like copper, gold, and silver) and toxic substances (like lead, mercury, and cadmium). They must be sent to a specialized e-waste recycling facility.
   - **Metals**: Are sent for recycling
   - **Plastics**: Are sent for recycling or incineration depending on the local conditions

The **end-of-life scenario** shall be technically and economically practical and compliant with current regulations in the relevant geographical region based on the geographical scope of the EPD. The EPD shall include the scenario applied for end-of-life.

STANDARD PRODUCTION CYCLE DEFINITION

The use of water, energy and chemicals by the machine during the use phase shall be calculated based on the standard production cycle definition as described below. The standard production cycle shall be declared in the EPD.

If identified as relevant the EPD can include additional production cycle scenarios.

DEFINITIONS

The following definitions are used in the description of the standard cycle:

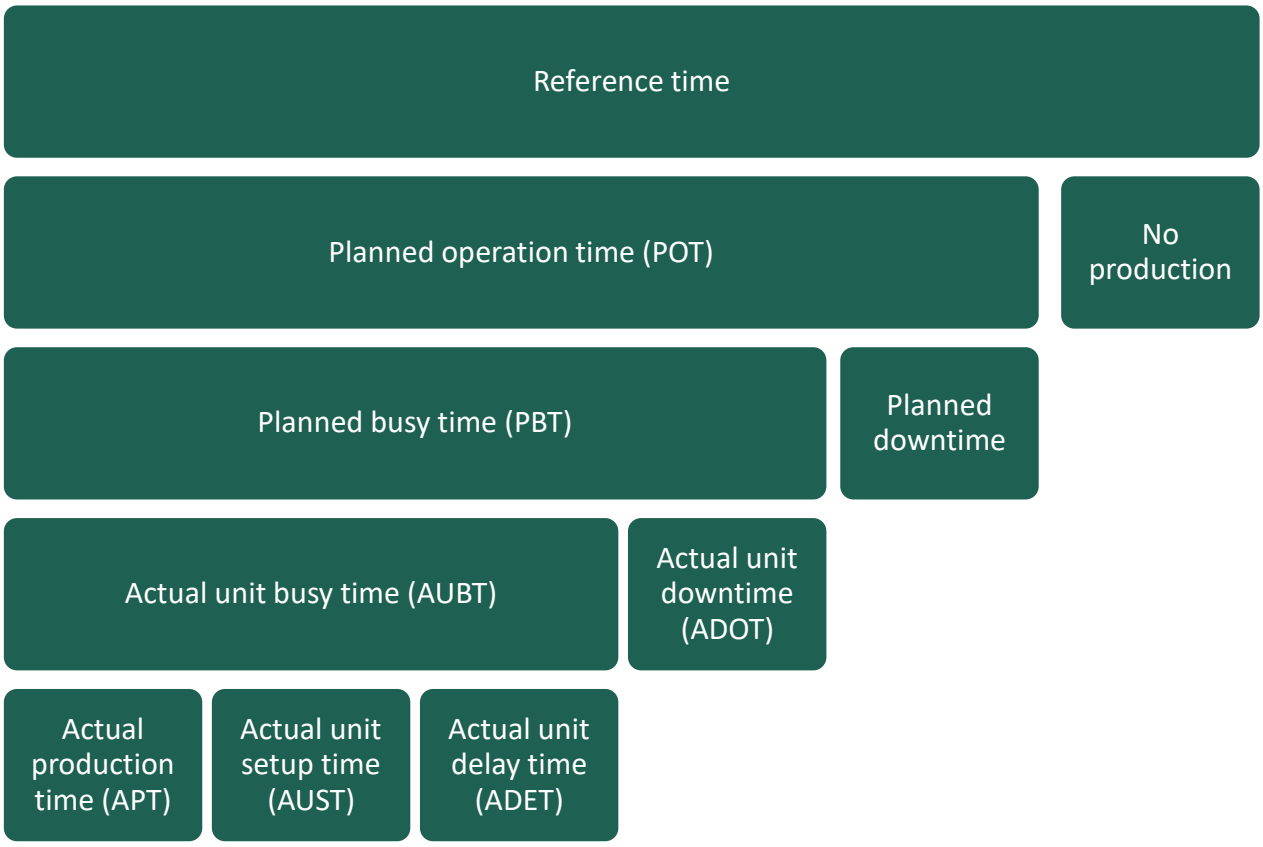

Figure 2 Accumulated time diagram based on the terminology in ISO 22400-2:2014

Definitions of the time elements in Figure 2 are available in the ISO 22400-2:2014.

In addition, the technical efficiency and quality ratio shall be defined in the EPD.

Definitions of technical efficiency and quality ratio are also available in ISO 22400-2:2014.

"Produced quantity" is used in quality ratio and is the number of packages produced during AUBT.

STANDARD SETTINGS

All inputs and outputs to the machine during the use phase need to be calculated for the functional unit. The settings as defined in

Table 1 shall be declared in the EPD for the standard production cycle.

Table 1 List of parameters to be included in the EPD in order to define the settings for the standard production cycle.

PARAMETER	VALUE	UNIT (EXAMPLE)
Lifetime of the machine		Hours production time
Planned operation time (POT)		Hours per day
Planned downtime	May be excluded	Hours per day

Actual unit downtime (ADOT)		Hours per day
Actual unit busy time (AUBT)		Hours per day
Actual unit delay time (ADET)		Hours per day
Actual unit setup time (AUST)	Includes preparation, change of product, after production (such as daily cleaning) and sterilization (if applicable).	Hours per day
Actual production time (APT)		Hours per day
Technical efficiency	Calculated	%
Quality ratio	Calculated	-

The specific use of energy, water and chemicals shall be considered for the production (APT) and preparation and after production respectively (AUST).

If no specific data on energy and consumables is available for the preparation and after production (AUST), the same input data as in the production phase shall be used as an approximation.

For equipment stop time (i.e. the accumulated time interval from when a stop caused by a failure in the equipment itself) (ADET) it can be assumed that the machine is consuming electricity, water, compressed air etc. as standing still in standby mode.

The impact of planned downtime can be excluded from the assessment, but the consumption of raw materials for spare parts shall be included under downstream processes (see Section 4.9.3)

Overall result for the use phase:

The overall use of energy, water, and chemicals of the machine during the use phase shall be calculated following:

Total use = ∑Consumables during APT + ADET + AUST

Assumptions regarding package waste during ADET and AUST shall be included in the EPD.

The following requirements apply to the downstream processes:

Ancillary materials (excluding spare parts) entering the machine with a total mass of less than 1% of the total input[3] to the machine during its lifetime (based on standard production cycle settings) can be excluded from the assessment. Ancillary materials not included in the LCA shall be documented in the EPD.

For inputs and outputs to the machine over its lifetime, primary technical data from the machine producer is required. The technical data used shall refer to the considered configuration of the machine and it should be verifiable by providing technical documentation.

Representative secondary data could be used to determine the impact of any inputs to the use phase, such as the generation of electricity or production of chemicals. Such data can be sourced from commercial or free databases.

For the electricity used in the downstream processes, electricity production impacts shall be modelled using the electricity consumption mix on the market, except for processes under direct or indirect control of the EPD owner, for which the hierarchy of Section A.7.1 in GPI 5 shall be followed.

The data for the downstream module shall be representative of the relevant site/region of the use phase. The EPD shall clearly state the geographic reference and underlying electricity mix used.

[3] Total input means here input of materials excluding fill product and packaging materials as those are excluded from the scope of the PCR.

RECONDITIONING AND END-OF-LIFE

Recommendations for separation and recycling shall be given, as well as recommendations for other waste treatment of product parts if relevant.

If information about the waste treatment procedure for a specific filling or packaging machine is available, the end-of-life treatment can be included in the calculation of the environmental performance related information.

4.10 ENVIRONMENTAL PERFORMANCE INDICATORS

See Section A.8 of the GPI.

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.

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 7.4.4 of the GPI.

The following information shall in addition be included in the product information section of the EPD:

- Description of the machine, including but not limited to:
  - Packaging information: type(s), shape(s) and size(s) handled by the machine
  - Relevant distribution system: chilled or ambient
  - Size and dimensions: Length, width, height

  - Weight of the machine (excluding spare parts)
- Description of the machine performance, including but not limited to:
  - Capacity: on time base (e.g. type and number of product units/hour)
  - Utilities (production phase): Electric power (kW), compressed air (litres/minute), water supply (litres/minute), steam (kg/hour), hydrogen peroxide (litres/hour), lubricants (litres/hour), etc
  - Quality ratio: Defined in Section 4.9.3
  - Spare parts (weight)
- Specification of electricity mix used for the downstream processes
- Define the Standard production cycle

6.4.5 CONTENT DECLARATION

See Section 7.4.5 of the GPI.

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 functional unit, per life cycle stage upstream, core and downstream.

6.4.8 ADDITIONAL ENVIRONMENTAL INFORMATION

See Section 7.4.8 of the GPI.

The following additional environmental information shall be reported in the EPD:

- The amount of food and packaging waste generated in the equipment during the defined standard cycle. This waste shall not be included in the environmental impact assessment since the impact of this waste depends on many parameters and is highly variable[4]
- Information about which parts or materials of the machine are suitable for certain waste treatment options.

Other environmental information relevant for the machine can be added.

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.

[4] The impact of product waste depends for example on the type of fill product and on the type of packaging material worked by the machine. It is recommended that fillers use the “no. of wasted packages” to calculate the impact from production of this waste for their specific packages and fill product.

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

8 REFERENCES

Add-on LCA Report Ecolean Machine EPD 210831 (internal report)

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 5.0.1, dated 2025-04-07. Available on www.environdec.com.

EPD for Ecolean filling machines EL3+, EL4+ and EL6 (Registration number: S-P-01056)

EPD for Ecolean filling machines EL1+ and EL2+ (Registration number: S-P-01057)

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 (2014), ISO 22400-2, Automation systems and integration — Key performance indicators (KPIs) for manufacturing operations management — Part 2: Definitions and descriptions

LCA Report Ecolean Machine EPD 170926 (internal report)

9 VERSION HISTORY OF PCR

VERSION 1.0 2012-12-10

Original version

VERSION 1.1 2015-02-09

- Compliance with General Programme Instructions v2.01:
  - Introduction
  - General information
  - Content of the EPD
  - Validity of the EPD
  - Environmental indicators
- Editorial changes

VERSION 2.0, 2020-05-18

- Compliance with General Programme Instructions v3.01
- Update of functional unit
- Update of system boundaries (e.g., the classification into upstream, core, and downstream processes)
- Update of standard cycle definitions to be in line with ISO 22400-2:2014

VERSION 2.01, 2020-08-31

- Editorial changes

VERSION 2.02, 2020-09-04

- Editorial changes

VERSION 2.0.3, 2024-05-10

- Extended validity for one year because of the initiation of an updating process.
- Change of PCR Moderator.

VERSION 3.0.0, 2026-04-09

- Compliance with General Programme Instructions v. 5.0.1
- “Final machine transport” was rephrased to “Transport to final user” and moved from core to downstream to align with the cradle to gate description
- Spare parts are now included under downstream processes
- End-of-life is now included under downstream processes and guidance is given
- Inserted into new PCR template
- Change of PCR Moderator
- Editorial changes

ANNEX A: EXAMPLE ELECTRICITY CONSUMPTION

In this annex, an example is provided showing how to calculate the amount of electricity used per functional unit, for a defined standard production cycle. This example is based on Tetra Pak's filling machine 'A3 Flex'.

PARAMETER	VALUE	UNIT (EXAMPLE)
Lifetime of the machine	30000	Hours production time
Planned operation time (POT)	24	Hours per day
Planned downtime	May be excluded	Hours per day
Actual unit downtime (ADOT)	0 Comment: Work unit is assumed to only execute order production	Hours per day
Actual unit busy time (AUBT)	1.3	Hours per day
Actual unit setup time (AUST)	Includes preparation, change of product, after production (such as daily cleaning). Preparation time: 0.65 After production time: 1	Hours per day
Actual production time (APT)	21	Hours per day
Technical efficiency	94 Comment: Calculated	%
Quality ratio	0.994 Comment: Calculated	-
Capacity	8000 Comment: Based on technical data	Packages per hour

To calculate the electricity consumption for the A3 Flex per functional unit, the information in the table above is needed, in addition to technical data regarding the performance of the filling machine:

Capacity: 8000 1-litre packages per hour

Electricity consumption production phase: 32 kWh per hour

Electricity consumption per functional unit:

Production phase:

21 hours/production cycle * 32 kWh/h = 670 kWh/production cycle

AUST:

(0.65+1) hours/production cycle * 32 kWh/hour = 53 kWh/production cycle

Note: As stated in the PCR: 'If no specific data on energy and consumables is available for the preparation, after production or extended cleaning, the same input data as in the production phase shall be used as an approximation.' Here the electricity use is identical to the production phase.

ADET:

1.3 hours/production cycle * 0.5 * 32 kWh/hour = 21 kWh/production cycle

Note: As stated in the PCR: 'For equipment stop time and other stop time it can be assumed that the machine during half of the time is consuming electricity, water, compressed air etc. as under normal production conditions, and for the rest of the time the machine is standing still in standby or off mode.'

Functional unit (FU): 1000 1-litre packages

Packages filled during the production cycle:

8000 packages/hour * 21 hours/production cycle = 168000 packages/production cycle

Electricity consumption per functional unit:

(670+53+21) kWh/production cycle / 168000 packages/production cycle = 4.4 kWh / 1000 packages = **4.4 kWh / FU.**