# PASSENGER CARS

PRODUCT CATEGORY CLASSIFICATION: UN CPC 49113.

PCR REGISTRATION NUMBER TO BE ADDED UPON PUBLICATION
DRAFT VERSION 1.0.0 FOR 2ND OPEN CONSULTATION. DO NOT USE OR CITE.

VALID UNTIL 20XX-YY-ZZ

DRAFT PCR FOR 2nd OPEN CONSULTATION

# INTRODUCTION TO 2ND OPEN CONSULTATION

This draft PCR is available for a second open consultation from 2024-02-14 until 2024-03-12. Feel free to forward the draft to any other stakeholder you might think is relevant, including colleagues and other organisations.

In this second open consultation, we are specifically asking for comments on the default lifespans of passenger cars of outlined in Table 2, page 16, as these were not included in the draft that previously has been on open consultation. **Note:** The scope of the open consultation is limited to comments on Table 2, page 16, and related content of the PCR.

Comments may be sent directly to the PCR Moderator (contact details available in Section 1). There is a template for comments on www.environdec.com that may be used.

For questions about the PCR, please contact the PCR Moderator. For general questions about the International EPD System, EPD or PCR development, please contact the Secretariat via pcr@environdec.com.



 

# TABLE OF CONTENTS





 

# 1 INTRODUCTION

This document constitutes Product Category Rules (PCR) developed in the framework of the International EPD System: a programme for type III environmental declarations[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. Environmental Product Declarations (EPD) are voluntary documents for a company or organisation to present transparent, consistent and verifiable information about the environmental performance of their products (goods or services).

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

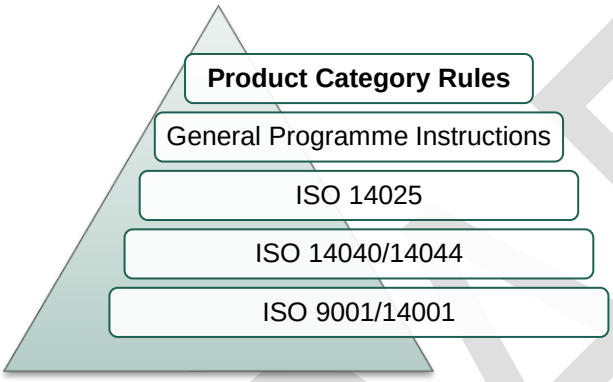


*Figure 1 The hierarchy between PCRs, standards and other documents.*

Within the present PCR, the following terminology is adopted:

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

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

A PCR is valid for a pre-determined period of time to ensure that it is updated at regular intervals. The latest version of the PCR is available at www.environdec.com. Stakeholder feedback on PCRs is very much encouraged. Any comments on this PCR may be sent directly to the PCR Moderator and/or the Secretariat during its development or during its period of validity.

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

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

[1] Type III environmental declarations in the International EPD® System are referred to as EPDs, Environmental Product Declarations.

 

# 2 GENERAL INFORMATION

## 2.1 ADMINISTRATIVE INFORMATION

| | |
|---|---|
| Name: | Passenger cars |
| Registration number and version: | *To be added by the Secretariat* |
| Programme: | The International EPD System |
| Programme operator: | EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden.<br>Website: www.environdec.com<br>E-mail: info@environdec.com |
| PCR Moderator: | Hailong Fan<br>China Merchants Testing Vehicle Technology Research Institute Ltd.<br>fanhailong@cmhk.com |
| PCR Committee: | IVL Swedish Environmental Research Institute<br>IVL Environmental Technology(Beijing) Co. Ltd<br>Geely Automobile Research Institute (Ningbo) Co., Ltd<br>Chongqing Changan Automobile Co., Ltd.RENAULT Group<br>NIO<br>BYD<br>BAIC Group<br>Li Auto |
| Date of publication and last revision: | *To be added by the Secretariat* |
| Valid until: | *To be added by the Secretariat* |
| Schedule for renewal: | A PCR is valid for a pre-determined time period to ensure that it is updated at regular intervals. When the PCR is about to expire, the PCR Moderator shall initiate a discussion with the Secretariat how to proceed with updating the PCR and renewing its validity.<br>A PCR may also be updated without prolonging its period of validity, provided significant and well-justified proposals for changes or amendments are presented.<br>See www.environdec.com for the latest version of the PCR.<br>When there has been an update of the PCR, the new version should be used to develop EPDs. The old version may however be used for 90 days after the publication date of the new version, as long as the old version has not expired. |
| Standards and documents conformance: | General Programme Instructions of the International EPD System, version 4.0, based on ISO 14025 and ISO 14040/14044 |
| 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 at 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 passenger cars and the declaration of this performance by an EPD. The product category corresponds to UN CPC 49113.

The passenger car types covered by this PCR include:

- internal combustion engine vehicles (ICEVs),
- battery electric vehicles (BEVs),
- fuel cell electric vehicles (FCEVs) including fuel cell hybrid electric vehicles (FCHEV)[2], pure fuel cell vehicles (PFCV),
- hybrid electric vehicles (HEVs) including off-vehicle-chargeable hybrid electric vehicles (OVC-HEV)[3], non-off-vehicle-chargeable hybrid electric vehicles (NOVC-HEV), range extended electric vehicles (REEV)[4].

## 2.2.2 GEOGRAPHICAL SCOPE

This PCR may be used globally.

## 2.2.3 EPD VALIDITY

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

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

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

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

[2] Fuel cell plug-in hybrid vehicles are included.

[3] Plug-in hybrid electric vehicles (PHEV) are included.

[4] Fuel cell range-extended electric vehicles are included.

# 3 PCR REVIEW AND BACKGROUND INFORMATION

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

## 3.1 OPEN CONSULTATION

### 3.1.1 VERSION 1.0

This PCR was available for a first open consultation from 2023-07-03 until 2023-09-10, and a second open consultation from 2024-02-14 until 2024-03-12, 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 at www.environdec.com.

- Iñigo Aizpuru, Basque Ecodesign Center in collaboration with CIE Automotive and BATZ Group
- Stefan Kupferschmid and Michael Baumann, Sphera Solutions GmbH
- Julia Lindholm and Fredrik Tegstedt, IVL Swedish Environmental Research Institute
- *More stakeholders may be added following the second open consultation*

## 3.2 PCR REVIEW

### 3.2.1 VERSION 1.0

| | |
|---|---|
| PCR review panel: | The Technical Committee of the International EPD System. A full list of members is available at www.environdec.com. The review panel may be contacted via info@environdec.com.<br><br>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: | Maurizio Fieschi |
| Review dates: | 2023-10-11 until 2023-11-24 |

## 3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

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

- International EPD System. www.environdec.com.
- EPD-Norge. www.epd-norge.no
- EPD Italy. www.epditaly.it
- PEP Ecopassport. www.pep-ecopassport.org
- Other EPD programmes within ECO Platform: https://www.eco-platform.org/the-eco-epd-programs.html
- European Commission PEF. https://eplca.jrc.ec.europa.eu/EnvironmentalFootprint.html

Table 1 lists the identified PCRs and other standardized methods.

*Table 1 Existing PCRs and other internationally standardized 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, VERSION NUMBER/DATE OF PUBLICATION | SCOPE |
|---|---|---|---|
| PCR 2016:04 Public and private buses and coaches | International EPD System | PCR 2016:04, Version 2.0.2<br>Valid until 2024-12-04 | UN CPC 49112 & 49113<br>public and private passenger buses and coaches |
| PCR FOR NEW ENERGY PASSENGER VEHICLE | EPD Promotion Center | EPDCN-PCR-202202, version 4.0<br>Publication date 2022-07-25 | New energy passenger vehicle. |

## 3.4 REASONING FOR DEVELOPMENT OF PCR

This PCR was developed to enable publication of EPDs for this product category based on ISO 14025, ISO 14040/14044 and other relevant standards to be used in different applications and target audiences. 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. The reason to develop the PCR is to facilitate the LCA and EPD development for passenger car producers and other stakeholders all around the world.

## 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:

- Bieker G (2021) A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars. The International Council of Clean Transportation.
- Chen Y, Hu X, Liu J (2019) Life Cycle Assessment of Fuel Cell Vehicles Considering the Detailed Vehicle Components: Comparison and Scenario Analysis in China Based on Different Hydrogen Production Schemes. Energies 12(15), 3031.
- De Souza LLP, Lora EES, Palacio JCE, Rocha MH, Renó MLG (2016) Life cycle assessment for conventional vehicle, electric vehicle and plug-in electric vehicle for Brazilian conditions. Proceedings of 16th Brazilian Congress of Thermal Sciences and Engineering.
- IVL Swedish Environmental Research Institute (2023) Life cycle assessment for Geely Group and Changan Group conducted in parallel to the PCR development.
- Messagie M, Boureima F-S, Coosemans T, Macharis C, Van Mierlo J (2014) A Range-Based Vehicle Life Cycle Assessment Incorporating Variability in the Environmental Assessment of Different Vehicle Technologies and Fuels. Energies 7(3), 1467-1482.
- Polestar (2021) Life cycle assessment 2021 Carbon footprint of Polestar 2 variants.
- Polestar (2020) Life cycle assessment 2021 Carbon footprint of Polestar 2.
- Sjöqvist N, Ibrahem A (2021) Life Cycle Assessment in the Automotive Industry: Considerations for First-Tier Suppliers. Master's thesis, KTH Royal Institute of Technology.
- Volvo Cars and IVL Swedish Environmental Research Institute (2020) Carbon Footprint Report of Volvo C40 Recharge.
- Volvo Cars and IVL Swedish Environmental Research Institute (2021) Carbon footprint report Battery electric XC40 Recharge and the XC40 ICE.
- Zackrisson M, Avellán L, Orlenius J (2010) Life cycle assessment of lithium-ion batteries for plug-in hybrid electric vehicles - Critical issues. Journal of Cleaner Production, 18(15), 1519-1529.

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

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

## 4.1 FUNCTIONAL UNIT

The functional unit is defined as: transport of 1 passenger for 1 km.

The numbers of passengers per car is set as 1 as default. Other numbers of passengers can be explored in a sensitivity analysis. However, only one set of results shall be declared in the EPD.

## 4.2 TECHNICAL SPECIFICATION AND LIFESPAN

The following technical specification of the passenger car shall be presented in the LCA report and in the EPD.

- Vehicle classification (vehicle commercial name)[5]
- Propulsion and fuel type
- Variation of the car (e.g. for ICEVs for different engine types, and for EVs with different battery options)
- Maximum passenger capacity of the vehicle
- Fuel/energy consumption according to the test standards listed in Section 4.7.3.3
- Curb weight[5]
- Emission standards
- Technical lifespan(both in years and the kilometres travelled)[6], which is the assumed lifespan in the LCA calculations
- Battery type to the level that can reflect the battery chemistry (e.g. Li-ion; NMC 622, Li-ion LFP, etc.)etc) and its energy density, if applicable
- Battery gross capacity in kWh, if applicable
- Loss in efficiency of the fuel cell over the vehicle's lifetime, if applicable
- Hydrogen storage capacity (kg $H_2$) and type, if applicable

## 4.3 SYSTEM BOUNDARY

### 4.3.1 LIFE-CYCLE STAGES

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

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

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

[5] Some of the standards could be referred to, such as ISO 3833-1977, UNECE standards, Euro NCAP, GB9417-89, etc.

[6] See Section 4.7.3.3 for more details.

#### 4.3.1.1. Upstream processes

The following unit processes are part of the product system and shall be classified as upstream processes:

- Extraction, production and transportation of raw and basic materials (e.g. aluminium, stainless steel, polyethylene, etc.) for all parts and components. This shall include all the associated processes like mining, transportation, electricity, heat, steam and fuel. The waste generated from the included processes and its treatment shall also be included. All this information is often incorporated in a cradle-to-gate process/dataset for material production, e.g. steel production.
- Production and transportation of components such as battery, tires, and auxiliary materials for passenger car assembly/manufacturing, significant spare equipment provided with the vehicle (e.g. spare tyre, charging cables for plug-in electric vehicles, where relevant) shall be included.
- Generation of electricity and production of fuels, steam and other energy carriers used in upstream processes.

Upstream processes not listed may also be included. A minimum of 99% of the total weight[7] of the declared product shall 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 material utilisation rate (MUD, the degree of utilised material of the total amount needed for producing a part) shall be considered and included in the calculation.

The following upstream processes shall be excluded:

- Production of packaging.

For modelling of other infrastructure and capital goods, see Section 4.3.2.

#### 4.3.1.2. Core processes

The following unit processes are part of the product system and shall be classified as core processes:

- Transportation from tier 1 (direct) suppliers to the manufacture plant of the passenger car.
- Manufacturing process of the passenger car under study, including all activities that take place inside the final assembly plant like stamping, body-in-white, painting, assembling, etc. (the emissions to air and water of these processes shall be considered).
- Production and transportation of auxiliary materials (welding, materials for air/water treatment, etc.) which are not included in upstream module, used for the passenger car assembly.
- End-of-life treatment of manufacturing waste, even if carried out by third parties, including transportation.
- Generation of electricity and production of fuels, steam and other energy carriers used in core processes.

Core processes not listed may also be included. Manufacturing of a minimum of 99% of the total weight of the declared product shall be included.

The following processes shall not be included:

- Business travel of personnel.
- Travel to and from work by personnel.
- Waste and wastewater from office and living area that are not related to the production.
- Research and development activities.

For modelling of other infrastructure and capital goods, see Section 4.3.2.

#### 4.3.1.3. Downstream processes

The following unit processes are part of the product system and shall be classified as downstream processes:

- Transportation of the product to consumers.

[7] The weight of the vehicle in this PCR refers to curb weight (American English) or kerb weight (English), which is the total mass of a vehicle with standard equipment and all necessary operating consumables such as motor oil, transmission oil, brake fluid, coolant, air conditioning refrigerant, and sometimes a full tank of fuel, while not loaded with either passengers or cargo.

- Production, consumption and leakage (if any) of electricity and/or fuel for passenger car operation, including Well-to-Tank (WTT) and Tank-to-Wheel (TTW).
- Combustion of the fuel used for operation of the passenger car including all relevant regulated emissions, such as $CO_2$, $N_2O$, $CH_4$, CO, VOC, particulates, $SO_2$, $NH_3$, fugitive emissions of hydrogen where relevant, and others.
- Maintenance activities including spare parts changes, such as batteries changes, tyres, wipers, engine oil, oil filter, refrigerant and leakage, brake pads and discs, selective catalytic reduction during lifetime of the passenger car according to the car manual for the customers and/or components producers' instructions.
- Tyre Road Wear Particle Emissions (TRWP).
- End-of-life of the used passenger car, including transportation, depollution, dismantling, shredding, sorting, and disposal.
- Generation of electricity and production of fuels, steam and other energy carriers used in downstream processes.

The following processes shall not be included:

- Operation of the dealership and automobile sales service shop and storage of the vehicles here in the dealership facilities.
- Production and use of water and cleaning agents used during passenger car operation.
- Maintenance of roads or electricity grids.
- Use of brake pads.
- Treatment and disposal of waste generated from passenger.
- Fuelling infrastructure, such as charging infrastructure, fuelling station, etc.

For modelling of other infrastructure and capital goods, see Section 4.3.2.

### 4.3.2 INFRASTRUCTURE AND CAPITAL GOODS

In general, the production and end-of-life processes of infrastructure or capital goods[8] used in the product system should not be included within the system boundaries. They may be included when infrastructure and capital goods are known to be relevant in terms of their environmental impact, or when a generic LCI dataset includes infrastructure/capital goods, and it is not possible, within reasonable effort, to subtract the data on infrastructure/capital goods from this dataset. If an infrastructure/capital good is produced with the intention to be used one or a few times only (e.g., a manufacturing plant or machinery constructed to produce only one product), this infrastructure/capital good shall be included.

The inclusion or exclusion of infrastructure/capital goods shall be transparently described for upstream, core and downstream processes in the LCA report and in the EPD.

If infrastructure/capital goods are included, the following disclaimer shall be included in the results sections of the LCA report and in the EPD (land use and toxicity indicators shall only be mentioned if declared in the EPD):

*The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, non-cancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.*

[8] Examples of infrastructure and capital goods are the building in which the studied product or upstream materials or components are produced, machinery used in the manufacturing of the product or its materials or components, or vehicles used in transports in the product system. For example, if the EPD is on wind power, the power plant itself is considered the studied product and not infrastructure/capital goods. However, the buildings and machinery that make the wind turbine components are considered infrastructure/capital goods. Similarly, if the EPD is on a means of transport, the vehicle is considered the studied product and not infrastructure/capital goods.

### 4.3.3 OTHER BOUNDARY SETTING

#### 4.3.3.1. Boundary towards nature

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

#### 4.3.3.2. Boundary towards other technical systems

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

See Section 4.6 for further guidance.

#### 4.3.3.3. Temporal boundary

The temporal boundary defines the time period for which the life cycle inventory data is recorded, e.g. for how long emissions from waste deposits are accounted. As default, the time period over which inputs to and outputs from the product system is accounted for shall be 100 years from the year that the LCA model best represents, considering the representativeness of the inventory data. This year shall, as far as possible, represent the year of the publication of the EPD.

#### 4.3.3.4. Geographical boundary

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

## 4.4 SYSTEM DIAGRAM

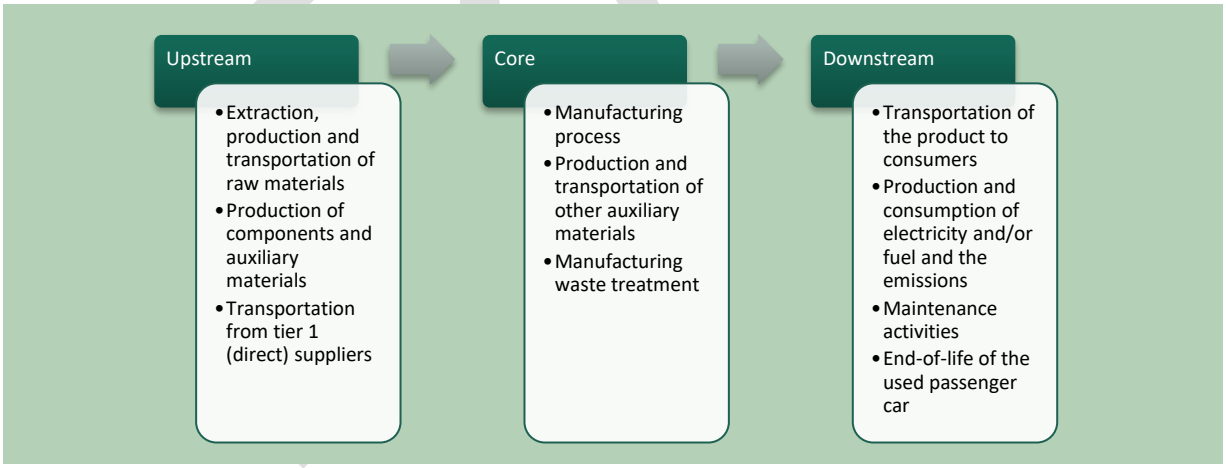


Figure 2 *System diagram illustrating the processes that shall be included in the product system, divided into upstream, core and downstream processes. The illustration of processes to include is not exhaustive.*

## 4.5 CUT-OFF RULES

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

 

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

Activities and materials not included in the LCA shall be documented and justified in the LCA report.

## 4.6 ALLOCATION RULES

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

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

### 4.6.1 CO-PRODUCT ALLOCATION

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

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

### 4.6.2 ALLOCATION OF WASTE TREATMENT PROCESSES

Allocation of waste shall follow the polluter pays principle and its interpretation in EN 15804: “processes of waste processing shall be assigned to the product system that generates the waste until the end-of-waste state is reached.” The end-of-waste state is reached when all the following criteria for the end-of-waste state are fulfilled (adapted from EN 15804):

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

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

## 4.7 DATA QUALITY REQUIREMENTS AND SELECTION OF DATA

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

- specific data (also referred to as “primary data” or “site-specific data”):
  - data gathered from the actual manufacturing plant where product-specific processes are carried out;

 

- actual data from other parts of the life cycle traced to the product under study, for example site-specific data on the production of materials or generation of electricity provided by contracted suppliers, and transportation data on distances, means of transportation, load factor, fuel consumption, etc., of contracted transportation providers; and
- LCI data from databases on transportation and energyware that is combined with actual transportation and energy parameters as listed above.

- generic data (sometimes referred to as “secondary data”), divided into:
  - selected generic data: data (e.g. commercial databases and free databases) that fulfil prescribed data quality requirements for precision, completeness, and representativeness (see below Section 4.7.1),
  - proxy data: data (e.g. commercial databases and free databases) that do not fulfil all of the data quality requirements of “selected generic data”.

### 4.7.1 RULES FOR USING GENERIC DATA

For generic data to be classified as “selected generic data”, the following requirements apply:

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

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

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

### 4.7.2 EXAMPLES OF DATABASES FOR GENERIC DATA

All commercial or publicly available databases that meet the data quality requirements maybe used. The specifications and the version of the database shall be reported in the EPD.

Some examples of databases to use are Ecoinvent database (www.ecoinvent.com), and Sphera's Managed LCA Content (MLC) (formerly Gabi) database (https://sphera.com/life-cycle-assessment-lca-database/).

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

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

#### 4.7.3.1. Upstream processes

- Data referring to processes and activities upstream in a supply chain over which the EPD owner has direct management control shall be specific and collected on site.
- Data referring to contractors that supply main parts, components such as battery, tyres and main auxiliaries, should be requested from the contractor as specific data, where relevant.
- Data on transport of main parts and components along the supply chain to a distribution point (e.g. a stockroom or warehouse) where the final delivery to the manufacturer can take place, should be specific and based on the actual transportation mode,

distance from the supplier, and vehicle load. If no specific data for transportation are available, the following generic default values can be used for developing scenarios:

- International transport: 19,000 km by boat plus 1,000 km by lorry,
- Intracontinental transport: 3,500 km by lorry,
- Domestic transport: 1,500 km by lorry,
- Local transport: 50 km by lorry.

- In case specific data is lacking, selected generic data may be used. If this is also lacking, proxy data may be used (see Section 4.7).
- For upstream processes modelled with specific data, generation of electricity used shall be accounted for in this priority:
    1. Specific electricity mix as generated, or purchased from an electricity supplier, demonstrated by a Guarantee of Origin or similar as provided by the electricity supplier[9].
    2. Residual electricity mix of the electricity supplier on the market.
    3. Residual electricity mix on the market[10].
    4. Electricity consumption mix on the market[11].

  The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total consumption mix.

  "The market" in the above hierarchy shall be defined as being the (residual or consumption) grid mix of the country where the electricity is used, with exceptions for specified countries for which a sub-national electricity grid mix shall be used: Australia, Brazil, Canada, China, India, and USA. The mix of electricity used in upstream processes shall be documented in the EPD, where relevant.

4.7.3.2. Core processes

- Specific data shall be used for the assembly of the product and for the manufacture of the parts/components by the passenger car manufacturer as well as for on-site generation of steam, heat, electricity, etc.
- For electricity used in the core processes, generation of electricity used shall be accounted for in this priority:
    1. Specific electricity mix as generated, or purchased from an electricity supplier, demonstrated by a Guarantee of Origin or similar as provided by the electricity supplier[12].
    2. Residual electricity mix of the electricity supplier on the market.
    3. Residual electricity mix on the market[13].

[9] The production and use of the electricity shall have physical connection and the Guarantee of Origin or similar shall be certified by an international consolidating agency. See the GPI for more criteria for a contractual instrument to be accepted.

[10] The composition of the residual grid mixes on the market are available for all EU countries and a few additional European countries through the Association for Issuing Bodies (AIB) at https://www.aib-net.org/facts/european-residual-mix.

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

[12] The production and use of the electricity shall have physical connection and the Guarantee of Origin or similar shall be certified by an international consolidating agency. See the GPI for more criteria for a contractual instrument to be accepted.

[13] The composition of the residual grid mixes on the market are available for all EU countries and a few additional European countries through the Association for Issuing Bodies (AIB) at https://www.aib-net.org/facts/european-residual-mix. If the residual grid mix of the market is not publicly available, it can conservatively be assumed be the consumption mix of the market minus the renewable electricity of that mix.

4. Electricity consumption mix on the market[14]. This option shall not be used for electricity used in processes over which the manufacturer (EPD owner) has direct control.

The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total consumption mix.

"The market" in the above hierarchy shall be defined as being the (residual or consumption) grid mix of the country where the electricity is used, with exceptions for specified countries for which a sub-national electricity grid mix shall be used: Australia, Brazil, Canada, China, India, and USA.

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

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

4.7.3.3. Downstream processes

- Data for the use stage are usually based on scenarios, but specific data should be used when available and relevant. Key assumptions for the use stage shall be presented in the EPD for transparency.
- Data on consumption of electricity and/or fuel for passenger car operation, Tank-to-Wheel (TTW), and the emissions from the fuel consumption and leakage shall be specific and based on the official test standards such as WLTP from Europe, EPA from US, CLTC from CN, JC08 from JP standards, etc. The standard shall be chosen according to where the product will be used (i.e., the geographical scope of the EPD). For example, if the passenger car is to be used in Europe, European standard WLTP shall be used. The test standard shall be documented in the EPD.
- The technical lifespan of the passenger car should be defined based on the car segments defined by the European Commission (1999) and the lifespans defined by PFA (2022; with interpretations for segments J, S and M), see Table 2. If the EPD owner choose lifespans based on other guidelines or standards, it shall be justified in the EPD.

*Table 2 Reference technical lifespans of different segments of passenger cars.*

| **Segment[15]** | **ACEA classification** | **Description** | **Lifespan (km)** | **Lifespan (years)** |
|---|---|---|---|---|
| A-segment | Small | City cars | 150 000 | 15 |
| B-segment | Small | Small cars | 150 000 | |
| C-segment | Lower Medium | Medium cars | 225 000 | |
| D-segment | Upper Medium | Large cars | 225 000 | |
| E-segment | Luxury | Executive cars | 270 000 | |
| F-segment | Luxury | Luxury cars | 270 000 | |
| S-segment | - | Sport coupes | 300 000 | |
| J-segment | SUV | Sport utility cars | 300 000 | |
| M-segment | MPV | Multi-purpose cars | 300 000 | |

- The use of electricity in the use stage, in the region/country where the product is used according to the geographical scope of the EPD, shall be based on the electricity consumption mix on the market.
- The use of fuels (such as petrol, hydrogen, biofuels or other fuels) in the use stage, in the region/country where the product is used according to the geographical scope of the EPD, shall be based on the market average consumption.
- The mix of electricity and fuels used in the downstream processes shall be documented in the EPD, where relevant. The latest available data on electricity mix and fuel mix, in the year when the EPD is published, shall be used. Sensitivity analysis could

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

[15] Source: https://alternative-fuels-observatory.ec.europa.eu/general-information/vehicle-types

 

be added based on scenarios for future fuel mix, or a different fuel mix in other regions, using official data, for example from the International Energy Agency.

- Data on maintenance activities such as tyres replacement and, engine oil replacement, during the lifespan of the passenger car should be specific based on the manual/instruction provided by the manufacturer to the customers.
- Tyre Road Wear Particle Emissions (TRWP) can be modelled using method from PCR for tires (PCR UL-10006 Tires (UL Environment) adopted by the International EPD System).
- The transport of the product to the customer shall be described in the EPD and be accounted for in this priority:

1. Actual transportation modes and distances to specific a customer or market, representing the geographical scope of the EPD.
2. A weighted average of transportation modes and distances, based on transportation to several customers or markets, representing the geographical scope of the EPD.
3. If no specific data are available, the following generic default values can be used for developing scenarios at the product level[16]:
    a. International transport: 19,000 km by boat plus 1,000 km by lorry,
    b. Intracontinental transport: 3,500 km by lorry,
    c. Local/domestic transport: 1,500 km by lorry.

- Scenarios for the end-of-life stage shall be technically and economically practicable and compliant with current regulations in the relevant geographical region based on the geographical scope of the EPD. The modelling of end-of-life shall follow the rules in Section 4.6. The processes for the end-of-life treatment of the product may include disassembly, pre-treatment, shredding, material recycling, disposal (incineration and landfill). Key assumptions regarding the end-of-life stage scenario shall be documented in the LCA report and the EPD.
- If no specific data are available on transportation, the following generic default value can be used:
    - Transportation from client to the end-of-life treatment plant (including processing, recycling facilities and final disposal site): 1,000 km by lorry.

### 4.7.4 DATA QUALITY DECLARATION

EPDs shall include a declaration of the quality of data used in the LCA calculations. A data quality table to analyse how the share of specific data, selected generic data and proxy data are contributing to the results of the environmental impact indicators shall be included.

## 4.8 ENVIRONMENTAL PERFORMANCE INDICATORS

The EPD shall declare the default environmental performance indicators and their methods as described at the website (www.environdec.com/indicators), which includes both inventory indicators and indicators of potential environmental impact. In addition, an indicator for the impact of particulate matter emissions shall be declared, using the RiskPoll model, where CFs for "Emissions to non-urban air or from high stacks" are calculated as emission-weighted averages between high-stack urban, transportation rural, low-stack rural, high-stack rural, transportation remote, low-stack remote, and high-stack remote (Humbert, 2009).

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

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

[16] Source: PEP ecopassport® PROGRAM PCR, PCR-ed4-EN-2021 09 06

Apart from inventory indicators (such as the required and optional inventory indicators listed at www.environdec.com/indicators), other inventory data may also be declared in the EPD, if relevant and useful for EPD users. Such data shall not be declared in the main body of the EPD, but in an annex.

## 4.9 INCLUDING MULTIPLE PRODUCTS IN THE SAME EPD

### 4.9.1 MULTIPLE PRODUCTS FROM THE SAME COMPANY

Several sets of results, reflecting different products, are not allowed to be declared in the same EPD. However, similar products from a single or several manufacturing sites covered by the same PCR and manufactured by the same company with the same major steps in the core processes may be grouped and thereby included in the same EPD. For such an EPD, there are three options:

- For each indicator, declare the average results of the included products. This average shall be weighted according to the production volumes of the included products, if relevant. In this option, the average content shall be declared in the content declaration.
- Declare the results of one of the included products – a representative product. The choice of the representative product shall be justified in the EPD, using, where applicable, statistical parameters. For example, the choice may be based on production volumes. In this option, the content of the representative product shall be declared in the content declaration.
- For each indicator and module, declare the highest result of the included products (i.e., the results of a "worst-case product", which may be the results of one or several of the included products). In this option, the content declaration shall include the lowest amounts of recycled and biogenic content of the included products, , and the information on environmental and hazardous properties of substances shall reflect the highest share and most hazardous such substances contained in the any of the included products.

The first two options are only possible if none of the declared environmental impact indicator results differ by more than 10% between any of the included products. The third option is possible also if variations are larger than 10%.

The option chosen shall be clearly described in the EPD.

### 4.9.2 SECTOR EPDS

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

Any communication of the results from a Sector EPD should contain the information that the results are based on averages obtained from the sector as defined in the EPD. The communication shall not claim that the sector EPD results are representative for a certain manufacturer or its product.

The following information shall also be included in a Sector EPD:

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

# 5 CONTENT AND FORMAT OF EPD

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

The EPD content shall:

- be in line with the requirements and guidelines in ISO 14020 (Environmental labels and declarations – General principles),
- be verifiable, accurate, relevant and not misleading, and

- not include rating, judgements or direct comparison with other products[17].

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

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

## 5.1 EPD LANGUAGES

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

## 5.2 UNITS AND QUANTITIES

The following requirements apply for units and quantities:

- The International System of Units (SI units) shall be used where available, e.g., kilograms (kg), Joules (J) and metres (m). Reasonable multiples of SI units may be decided in the PCR to improve readability, e.g., grams (g) or megajoules (MJ). The following exceptions apply:
  - Resources used for energy input (primary energy) should be expressed as kilowatt-hours (kWh) or megajoules (MJ), including renewable energy sources, e.g., hydropower, wind power and geothermal power.
  - Water use should be expressed in cubic metres ($m^3$)
  - Temperature should be expressed in degrees Celsius (°C),
  - Time should be expressed in the units most practical, e.g., seconds, minutes, hours, days or years.
  - Results of the environmental performance indicators shall be expressed in the units prescribed by the impact assessment methods, e.g. kg $CO_2$ equivalents.
- Three significant figures[18] should be adopted for all results. The number of significant digits shall be appropriate and consistent.
- Scientific notation may be used, e.g. 1.2E+2 for 120, or 1.2E-2 for 0.012.
- The thousand separator and decimal mark in the EPD shall follow one of the following styles (a number with six significant figures shown for illustration):
  - SI style (French version): 1 234,56
  - SI style (English version): 1 234.56

  In case of potential confusion or intended use of the EPD in markets where different symbols are used, the EPD shall state what symbols are used for thousand separator and decimal mark.
- Dates and times presented in the EPD should follow the format in ISO 8601. For years, the prescribed format is YYYY-MM-DD, e.g., 2017-03-26 for March 26th, 2017.
- The result tables shall:
  - Only contain values or the letters “ND” (Not Declared). It is not possible to specify ND for mandatory indicators. ND shall only be used for voluntary parameters that are not quantified because no data is available.[19]
  - Contain no blank cells, hyphens, less than or greater than signs or letters (except “ND”).
  - Use the value “0” only for parameters that have been calculated to be zero.
  - Footnotes shall be used to explain any limitation to the result value.

[17] Therefore, results of normalization are not allowed to be reported in the EPD.

[18] Significant figures are those digits that carry meaning contributing to its precision. For example with two significant digits, the result of 123.45 shall be displayed as 120, and 0.12345 shall be displayed as 0.12. In scientific notation, these two examples would be displayed as $1.2*10^2$ and $1.2*10^{-2}$.

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

 

## 5.3 USE OF IMAGES IN EPD

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

## 5.4 EPD REPORTING FORMAT

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

- Cover page (see Section 5.4.1)
- Programme information (see Section 5.4.2)
- Product information (see Section 5.4.3)
- Content declaration (see Section □)
- Environmental performance (see Section 5.4.5)
- References (see Section 5.4.9)

The following sections may be included:

- Additional environmental information (see Section 5.4.6)
- Additional social and economic information (see Section 5.4.7)

The following sections shall be included, if relevant:

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

### 5.4.1 COVER PAGE

The cover page shall include:

- Product name and image
- Name and logotype of EPD owner
- The text “Environmental Product Declaration” and/or “EPD”
- Programme: The International EPD System, www.environdec.com
- Programme operator: EPD International AB
- Logotype of the International EPD System
- EPD registration number as issued by the programme operator[20]
- Date of publication (issue): 20XX-YY-ZZ
- Date of revision: 20XX-YY-ZZ, when applicable
- Date of validity; 20XX-YY-ZZ
- A note that *“An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.”*
- A statement of conformity with ISO 14025.
- For EPDs covering multiple products: a statement that the EPD covers multiple products and a list of all products covered by the EPD.

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

- For Sector EPDs: a statement that the EPD is a Sector EPD.

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

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

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

### 5.4.2 PROGRAMME INFORMATION

The programme information section of the EPD shall include:

- Address of programme operator: *EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com*
- The following statement on the requirements for comparability of EPDs, adapted from ISO 14025: *"EPDs within the same product category but from different programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison."*
- A statement that the EPD owner has the sole ownership, liability and responsibility of the EPD
- Information about verification[21] and the PCR in a table with the following format and contents:

| |
|---|
| **Accountabilities for PCR, LCA and independent, third-party verification** |
| **Product Category Rules (PCR)** |
| PCR: *<name, registration number, version and UN CPC code(s)>* |
| PCR review was conducted by: *<name and organisation of the review chair, and information on how to contact the chair through the programme operator>* |
| **Life cycle assessment (LCA)** |
| LCA accountability: *<name, organization>* |
| **Third-party verification** |
| Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:<br><br>☐ EPD verification by individual verifier<br><br>Third-party verifier: *<name, organisation, and signature of the third-party verifier>*<br><br>Approved by: The International EPD System |
| **OR** |

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

 

| |
|---|
| Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:<br><br>☐ EPD verification by accredited certification body<br><br>Third-party verification: <*name, organisation*> is an approved certification body accountable for the third-party verification<br><br>The certification body is accredited by: <*name of accreditation body & accreditation number, where applicable*> |
| **OR** |
| Independent third-party verification of the declaration and data, according to ISO 14025:2006 via:<br><br>☐ EPD verification by EPD Process Certification*<br><br>Internal auditor: <*name, organisation*><br><br>Third-party verification: <*name, organisation*> is an approved certification body accountable for third-party verification<br><br>Third-party verifier is accredited by: <*name of accreditation body & accreditation number, where applicable*><br><br>*For EPD Process Certification, an accredited certification body certifies and reviews the management process and verifies EPDs published on a regular basis. For details about third-party verification procedure of the EPDs, see GPI v4, Section 7.5. |
| Procedure for follow-up of data during EPD validity involves third-party verifier[22]:<br><br>☐ Yes ☐ No |

## 5.4.3 PRODUCT INFORMATION

The product information section of the EPD shall include:

- address and contact information to EPD owner,
- description of the organisation. This may include information on products- or management system-related certifications (e.g. ISO 14024 Type I environmental labels, ISO 9001- and 14001-certificates and EMAS-registrations) and other relevant work the organisation wants to communicate (e.g. SA 8000, supply-chain management and social responsibility),
- name and location of production site,
- product identification by name, and an unambiguous identification of the product by standards, concessions or other means,
- identification of the product according to the UN CPC scheme system. Other relevant codes for product classification may also be included, e.g.
  - Common Procurement Vocabulary (CPV),
  - United Nations Standard Products and Services Code® (UNSPSC),
  - Classification of Products by Activity (NACE/CPA),
  - Australian and New Zealand Standard Industrial Classification (ANZSIC), or

[22] Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period (see Sections 7.3.2 and 7.4.9 of the GPI). The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update (see Section 6.5 of the GPI) is identified, the EPD shall be re-verified by a verifier.

 

- Global Trade Item Number (GTIN).

- a description of the product,
- a description of the technical purpose of the product, including its application/intended use,
- a description of the background system, including the main technological aspects,
- for EPDs covering multiple products: a description of the selection of products/sites, a list of contributing manufacturers (if Sector EPD), etc. (see Section 4.9),
- geographical scope of the EPD, i.e., for which geographical location(s) of use and end-of-life the product's performance has been calculated, The LCA shall clearly define the geographical region(s) by life-cycle stage, and additionally for the production stage(s) the region of production for battery cells (at least) should be specified.
- declared/functional unit,
- technical lifespan,
- declaration of the year(s) covered by the data used for the LCA calculation and other relevant reference years,
- reference to the main database(s) for generic data and LCA software used, if relevant,
- system diagram of the processes included in the LCA, divided into the life cycle stages,
- description if the EPD system boundary is "cradle-to-gate", "cradle-to-gate with options" or "cradle-to-grave",
- information on which life-cycle stages are not considered (if any), with a justification of the omission, and
- references to any relevant websites for more information or explanatory materials.

This section may also include:

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

### 5.4.4 CONTENT DECLARATION

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

The content declaration does not apply to proprietary materials and substances covered by exclusive legal rights including patent and trademarks. In general, an indication that a product is "free" of a specific hazardous material or substance should be done with caution and only when relevant, following the rules in ISO 14021 on self-declared environmental claims.

Information on the hazardous properties of materials and chemical substances should follow the requirements given in the latest revision of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS),[23] issued by the United Nations or national or regional applications of the GHS. As an example, the following regulations should be used for EPDs intended to be used in the European Union:

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

[23] The GHS document is available at www.unece.org.

 

The content declaration can, for example, be divided into the following material/substance categories:

- Steel and iron
- Aluminium
- Magnesium
- Platinum-Group Metals (PGM)
- Copper
- Zinc
- Lead, battery
- Magnet
- Polymers
- Natural materials
- Glass
- Electronics
- Fluids
- Other material

#### 5.4.4.1. Information about recycled materials

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

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

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

#### 5.4.4.2. Information about packaging

As packaging is not strongly connected with the vehicle distribution, the producer could avoid information about packaging if not relevant.

### 5.4.5 ENVIRONMENTAL PERFORMANCE

Below subsections list the mandatory environmental performance indicators to declare in the EPD. LCA results based on additional indicators may be declared, if they are relevant for the product category, their inclusion is justified in the EPD, appropriate methods are used, and the results are verifiable. If the additional indicators appear to the reader to display duplicate information, the EPD shall contain an explanation of the differences between the declared indicators.

#### 5.4.5.1. Environmental impacts

The EPD shall declare the environmental impact indicators, per functional unit, per life-cycle stage and in aggregated form, using the default impact categories, impact assessments methods and characterisation factors available at www.environdec.com/indicators[24] . The source and version of the impact assessment methods and characterisation factors used shall be reported in the EPD.

[24] The website also includes guidance on inventory and impact assessment methods, e.g. including guidance on how to model biogenic carbon.

 

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

#### 5.4.5.2. Use of resources

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

#### 5.4.5.3. Waste production and output flows

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

### 5.4.6 ADDITIONAL ENVIRONMENTAL INFORMATION

An EPD may declare additional environmentally, in addition to the LCA results of the section on environmental performance results. The additional environmental information may cover various aspects of specific relevance for the product, for example:

- the release of dangerous substances into indoor air, soil, and water during the use stage,
- instructions for proper use of the product, e.g. to minimise energy or water consumption or to improve the durability of the product,
- instructions for proper maintenance and service of the product, e.g. to minimise energy or water consumption or to improve the durability of the product,
- information on key parts of the product that determine its durability,
- information on recycling including, e.g. suitable procedures for recycling the entire product or selected parts and the potential environmental benefits gained,
- information on a suitable method of reuse of the product (or parts of the products) and procedures for disposal as waste at the end of its life cycle,
- information regarding disposal of the product, or inherent materials, and any other information considered necessary to minimise the product's end-of-life impacts, and
- a more detailed description of an organisation's overall environmental work, in addition to the information listed under Section 5.4.3, such as:
  - the existence of any type of organised environmental activity, and
  - information on where interested parties may find more details about the organisation's environmental work.

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

The additional environmental information shall not include LCA results, with some exceptions:

- If the EPD owner wants to display results of several scenarios for use or end-of-life stages, the most representative scenario (for the geographical scope of the EPD) shall be declared in the section on environmental performance results, and the other scenarios shall be declared in the section on additional environmental information.
- The LCA results of an alternative modelling approach may be declared as additional environmental information, if such an alternative modelling approach is explicitly allowed by the applicable PCR or the GPI. According to this PCR, alternative GWP-biogenic results may be declared, which considers the effect of long-term storage of biogenic carbon (see next bullet point).
- The additional environmental information may include information on permanent (more than 100 years) storage of biogenic carbon, either in the product, in a landfill, or as a consequence of applying carbon capture and storage (CCS) to the incineration of biogenic carbon, and how this would influence GWP-biogenic results if the GWP-biogenic indicator would allow consideration of such storage.

### 5.4.7 ADDITIONAL SOCIAL AND ECONOMIC INFORMATION

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

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

### 5.4.8 DIFFERENCES VERSUS PREVIOUS VERSIONS

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

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

### 5.4.9 REFERENCES

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

### 5.4.10 EXECUTIVE SUMMARY IN ENGLISH

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



 

# 6 LIST OF ABBREVIATIONS

| | |
|---|---|
| ANZSIC | Australian and New Zealand Standard Industrial Classification |
| BEVs | Battery Electric Vehicles |
| CPC | Central product classification |
| CPV | Common procurement vocabulary |
| EPD | Environmental product declaration |
| FCEVs | Fuel Cell Electric Vehicles |
| FCHEV | Fuel Cell Hybrid Electric Vehicle |
| HEVs | Hybrid Electric Vehicles |
| GPI | General Programme Instructions |
| GTIN | Global trade item number |
| ICEVs | Internal Combustion Engine Vehicles |
| ISO | International Organization for Standardization |
| LCA | Life cycle assessment |
| LCI | Life cycle inventory |
| MUD | The degree of utilised material of the total amount needed for producing a part |
| NACE/CPA | Classification of products by activity |
| ND | Not declared |
| NOVC-HEV | Non-Off-Vehicle-Chargeable Hybrid Electric Vehicle |
| OVC-HEV | Off-Vehicle-Chargeable Hybrid Electric Vehicle |
| PCR | Product category rules |
| PFCV | Pure Fuel Cell Vehicle |
| PGM | Platinum Group of Metals |
| REACH | Restriction of chemicals |
| REEV | Range Extended Electric Vehicle |
| RSI | The International System of Units |
| TRWP | Tyre Road Wear Particle Emissions |
| UN | United Nations |
| UNSPSC | United Nations standard products and services code |



 

# 7 REFERENCES

Bieker G (2021) A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars. The International Council of Clean Transportation.

Chen Y, Hu X, Liu J (2019) Life Cycle Assessment of Fuel Cell Vehicles Considering the Detailed Vehicle Components: Comparison and Scenario Analysis in China Based on Different Hydrogen Production Schemes. Energies 12(15), 3031.

De Souza LLP, Lora EES, Palacio JCE, Rocha MH, Renó MLG (2016) Life cycle assessment for conventional vehicle, electric vehicle and plug-in electric vehicle for Brazilian conditions. Proceedings of 16th Brazilian Congress of Thermal Sciences and Engineering.

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

EPD International (2023) PCR 2016:04 Public and private buses and couches. www.environdec.com.

European Commission (1999) Regulation (EEC) No 4064/89 merger procedure. Article 6(1)(b) non-opposition. Date 17/03/1999. https://ec.europa.eu/competition/mergers/cases/decisions/m1406_en.pdf

Humbert S (2009) Geographically Differentiated Life-cycle Impact Assessment of Human Health. Doctoral dissertation, University of California, Berkeley, California, USA.

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

ISO (2002) ISO 22628 Road vehicles – Recyclability and recoverability – Calculation method.

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

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

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

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

ISO (2014) ISO 14046:2014, Environmental management – Water footprint – Principles, requirements and guidelines.

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

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

ISO (2016a) ISO 21067-1:2016, Packaging – Vocabulary – Part 1: General terms.

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

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

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

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

IVL Swedish Environmental Research Institute (2023) Life cycle assessment for Geely Group and Changan Group conducted in parallel to the PCR development.

Messagie M, Boureima F-S, Coosemans T, Macharis C, Van Mierlo J (2014) A Range-Based Vehicle Life Cycle Assessment Incorporating Variability in the Environmental Assessment of Different Vehicle Technologies and Fuels. Energies 7(3), 1467-1482.

PEP Ecopassport (2022), PCR-ed4-EN-2021 09 06.

PFA (2022) Life cycle assessment applied to a vehicle or a vehicle equipment – methodological recommendations.

Polestar (2021) Life cycle assessment 2021 Carbon footprint of Polestar 2 variants.

Polestar (2020) Life cycle assessment 2021 Carbon footprint of Polestar 2.

Sjöqvist N, Ibrahem A (2021) Life Cycle Assessment in the Automotive Industry: Considerations for First-Tier Suppliers. Master's thesis, KTH Royal Institute of Technology.

UL Environment (2017) PCR UL-10006 Tires.

Volvo Cars and IVL Swedish Environmental Research Institute (2020) Carbon Footprint Report of Volvo C40 Recharge.

Volvo Cars and IVL Swedish Environmental Research Institute (2021) Carbon footprint report Battery electric XC40 Recharge and the XC40 ICE.

Zackrisson M, Avellán L, Orlenius J (2010) Life cycle assessment of lithium-ion batteries for plug-in hybrid electric vehicles - Critical issues. Journal of Cleaner Production, 18(15), 1519-1529.

# 8 VERSION HISTORY OF PCR

## VERSION 1.0, 20ZZ-XX-YY

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

PASSENGER CAR
PRODUCT CATEGORY CLASSIFICATION: UN CPC 49113.