ASPHALT MIXTURES
Product category classification: UN CPC 1533 & 3794

2017:01
VERSION 1.0

VALID UNTIL: 2022-06-11

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GENERAL INTRODUCTION TO PRODUCT CATEGORY RULES IN THE INTERNATIONAL EPD® SYSTEM

This document constitutes Product Category Rules (PCR) developed in the framework of the International EPD® System: a programme for type III environmental declarations according to ISO 14025:2006. Environmental Product Declarations (EPD®) are voluntary documents for a company or organisation to present transparent information about the life cycle environmental impact for their goods or services.

The rules for the overall administration and operation of the program are the General Programme Instructions, publically available at the website (www.environdec.com). In addition to ISO 14025, the International EPD® System adheres to the following international standards:

- ISO 9001, Quality management systems
- ISO 14001, Environmental management systems
- ISO 14040, LCA - Principles and procedures
- ISO 14044, LCA - Requirements and guidelines

For construction products, the International EPD® System also allows the use of EN 15804 (Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products) and ISO 21930 (Environmental declaration of building products) as the main underlying standards. The compliance with these and other standards shall be clearly stated in each PCR and EPD® where it is relevant.

A PCR is defined in ISO 14025 as a set of specific rules, requirements and guidelines for developing Type III environmental declarations for one or more product categories. The PCR document specifies the rules for the underlying life cycle assessment (LCA) and sets minimum requirements on EPDs for a specific product group that are more detailed than the standards and the General Programme Instructions.

PCRs in the International EPD® System are developed in English in accordance with the procedure described in the General Programme Instructions. All PCR documents have a maximum period of validity after which the document shall be revisited. The template used for this PCR is based on the PCR template provided by the Guidance for Product Category Rule Development (2013).

Within the present PCR, the following terminology is adopted, as defined by the Guidance for Product Category Rules Development v1.0:

- The term “shall” is used to indicate what is obligatory.
- The term “should” is used to indicate a recommendation, rather than a requirement.
- The term “may” or “can” is used to indicate an option that is permissible

EPDs are developed and registered based on a valid PCR. An EPD® shall be based on the latest version of the PCR, and refer to the version number and date of the PCR used. The production of new PCR versions does not affect the certification period of EPDs that are already published.

This PCR document is publically available at www.environdec.com. The PCR document is a living document. If relevant changes in the LCA methodology or in the technology for the product category occur, the document will be revised and the new version will be published on the website.

Stakeholder feedback on PCRs is very much encouraged. Any comments to this PCR document may be given on the PCR Forum on www.environdec.com or directly to the PCR moderator during its development or during the period of validity.

1 GENERAL INFORMATION

Name of PCR:	Asphalt mixtures
Registration number:	2018:04
Programme operator:	The International EPD® System operated by EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com E-mail: info@environdec.com
Appointed PCR moderator:	Francisco J. Campo Rámila, IK INGENIERIA, S.L., f.campo@ik-ingenieria.com
PCR Committee:	▪ CARTIF Technology Center ▪ Construcciones y Obras Llorente S.A. (COLLOSA) ▪ Plataforma Tecnológica Española de la Carretera (PTC) ▪ IK INGENIERIA S.L. With the financial contribution of LIFE Programme. LIFE BATTLE CO2 LIFE 14 CCM/ES/000404.
Date of publication:	2018-06-11
Date of update:	–
Date of expiration:	2022-06-11
Schedule for renewal:	When the validity time is about to expire the PCR moderator shall initiate a discussion with the programme operator how to proceed with updating the document and extending the period of validity. See General Programme Instructions, Section C.5.
Open consultation period:	2017-05-02 until 2017-07-02 (Version 1.0)
Standards conformance:	▪ General Programme Instruction of the International EPD® System, version 3.0, based on ISO 14025 and ISO 14040/14044 ▪ Alignment with ISO/TS 14027 ▪ EN 15804:2012+A1:2014 Sustainability of construction works. Environmental product declarations.
PCR language:	This PCR was developed and is available in English, as is mandated by the General Programme Instructions.
The PCR is valid within the following geographical region:	Europe
More information on this PCR's website:	https://www.environdec.com/PCR/Detail/?Pcr=12328

2 SCOPE OF THE PCR

2.1.1 PRODUCT CATEGORY DEFINITION

This PCR specifies the requirements for the LCA study and the format and content of the EPD, in accordance with EN 15804, concerning to CPC 1533 “Bitumen and asphalt, natural; asphaltites and asphaltic rock “and CPC 3794 “Bituminous mixtures based on natural and artificial stone materials and bitumen, natural asphalt or related substances as a binder “. The product category is defined under ISIC – CPC’s classification:

- Section: 1 – Ores and minerals; electricity, gas and water
  - Division: 15 – Stone, sand and clay
    - Group: 153 – Sands, pebbles, gravel, broken or crushed stone, natural bitumen and asphalt
      - **Class: 1533 – Bitumen and asphalt, natural; asphaltites and asphaltic rock**
- Section: 3 – Other transportable goods, except metal products, machinery and equipment
  - Division: 37 – Glass and glass products and other non-metallic products n.e.c.
    - Group: 379 – Other non-metallic mineral products n.e.c.
      - **Class: 3794 – Bituminous mixtures based on natural and artificial stone materials and bitumen, natural asphalt or related substances as a binder.**

For The United Nations Standard Products and Services Code® (UNSPSC®) is defined under classification Code 30111509: Asphalt Based Concrete.

According to the General Programme Instructions v 2.5, several products of the same type can be included in the same EPD. The following requirements must be met:

- Similar products with differences between the mandatory impact indicators lower than ±10% could be presented using the impacts of a representative product. A variation range description shall be presented in the declaration;
- Similar products with differences between the mandatory impact indicators higher than ±10% could be presented in the same declaration documents but using separate columns or tables.

For the purpose of these requirements “s*imilar products*” means products covered by the same PCR and produced by the same company with same core process.

2.1.2 GEOGRAPHICAL SCOPE

This PCR is valid for a European scope.

2.1.3 EPD VALIDITY

The maximum validity of EPDs based on this PCR shall be 5 years after which the declaration must necessarily be revised and reissued.

During the validity period of the EPD, surveillance follow up shall be agreed between the EPD owner and the verifier in order to evaluate if the content are still consistent with the current situation, or if the EPD must be updated. See the General Programme Instructions of the International EPD® System and his “Clarification regarding periodical surveillance of EPDs” for further information and requirements.

3 PCR REVIEW AND BACKGROUND INFORMATION

3.1 PCR REVIEW

PCR review panel:	The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com/TC. The PCR review panel may be contacted via info@environdec.com. Members of the Technical Committee were requested to state any potential conflict of interest with the PCR moderator or PCR committee, and were excused from the review.
Review dates:	2018-03-29 until 2018-04-27
Chair of the PCR review:	Claudia A. Peña

3.2 OPEN CONSULTATION

This PCR was available for open consultation from 2017-05-02 until 2017-07-02, during which any stakeholder was able to provide comments by posting on the PCR forum on www.environdec.com or by contacting the PCR moderator. Stakeholders were invited via e-mail or other means to take part in the open consultation, and were encouraged to forward the invitation to other relevant stakeholders. The following stakeholders provided comments during the open consultation, and agreed to be listed as contributors to the PCR and at www.environdec.com:

- Maggie Wildnauer. Thinkstep.
- Tony Parry. University of Nottingham.
- Carsten Karcher. European Asphalt Pavement Association.
- Rob Rouwette. Start2see.
- Helen Atkins. Tarmac.

3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

There is no current PCRs for this product category, except the PCR 2012:01 Construction products and construction services, valid for this and other construction product categories. The PCR for Asphalt v1 (January 2017) of the EPD Norge operator is in a draft version during the development of this document.

3.4 REASONING FOR DEVELOPMENT OF PCR

There is a need in the asphalt industry market for reference guidelines for developing LCA and declaring the environmental profile of asphalt mixtures, as asphalt industry's key customers are being interested in this type of environmental impact information. Increasing demand from road owners, operators and users for sustainability and environmental accountability as included in the Construction Products Regulations has raised the need for asphalt producers to make EPDs available[1].

Environmental impacts are being applied to pavement decision making[2], having an important role in sustainable building certification (as for example in the U.S. Green Building Council's LEED v4 rating system), and some national efforts have been made to stablish these references. For example, the US NAPA (National Asphalt Pavement Association) have developed their own North American scope PCR and EPD approach for asphalt mixtures, and the European Asphalt Pavement Association (EAPA) has developed a guidance document for preparing PCRs and EPDs.

In addition, sector competitors as cement and concrete industries have also developed their own PCR and EPD approaches for their products, so asphalt mixture manufacturers are in the need of a reference PCR also.

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1 Guidance document for preparing product category rules (pcr) and environmental product declarations (epd) for asphalt mixtures. EAPA. May 2017

[2] J. Harvey, Presentation to AI, Boston, Aug. 14, 2014

4 GOAL AND SCOPE OF THE PCR

4.1 DECLARED OR FUNCTIONAL UNIT

Functional unit is applicable for an EPD that covers a “cradle-to-gate with options” or “cradle-to-grave”. When the system boundary includes life cycle stages A1-A5, the functional unit shall be defined as follows:

- A paved surface of 1m2, which fulfils the specified quality criteria during the Reference Service Life (RSL asphalt). If this value is not available, the values of RSL asphalt explained in the document “Long-Life Asphalt Pavements – Technical version. June 2007” from EAPA (see Annex A.4) could be taken. The European average value will be taken in case the traffic level reference is not available.

When the system boundary includes one or more life cycle stages beyond A1-A5 and as minimum B1 and B4 in addition to A1-A5, the functional unit shall be defined as follows:

- A paved surface of 1m2, which fulfils the specified quality criteria during the Reference Service Life of the construction, RSL construction. For the RSL construction, in the case of roads a default value of 40 years shall be take and for other constructions types a value of 30 years.

The declared unit is used instead of the functional unit when the precise function of the product or scenarios at the construction level is not stated or unknown in the EPD. The declared unit is applicable for an EPD that covers a “cradle-to-gate”, when the system boundary includes life cycle stages A1-A3:

- The declared unit is 1 metric tonne of manufactured asphalt mixture. The reference flow in the LCA shall be defined at the gate of the asphalt mixture plant.

In the case of “cradle-to-gate with options”, when the system boundary includes life cycle stages A1-A4:

- The declared unit is 1 metric tonne of manufactured asphalt mixture delivered to the construction site.

The declared unit shall be stated in the EPD. The environmental impact shall be given per declared unit. A description of the function of the product should be included in the EPD®, if relevant.

4.2 SYSTEM BOUNDARIES

The International EPD® System has adopted an LCA calculations procedure, which is separated into three different life cycle stages:

- Upstream processes (from cradle-to-gate); producing input to the core processes (i.e. raw material acquisition and refinement, and production of intermediate components),
- Core processes (from gate-to-gate); including the processes managed by the organisation owning the EPD
- Downstream processes (from gate-to-grave) (optional); including the use stage and end-of-life stages/end-of-life treatment of the product. Downstream processes are “optional”. Read next for more information.

The scope of the LCA for asphalt mixture shall be as minimum “cradle-to-gate”.

The scopes of “cradle-to-gate with options” and “cradle-to-grave” (A1-C4, with D as a voluntary stage) are optional.

- A1: Raw Material Supply (mandatory)
- A2: Transport to asphalt plant (mandatory)
- A3: Manufacturing of the asphalt mixture (mandatory)
- A4:Transport to the construction site (optional)
- A5:Asphalt mixture application (optional)
- B1:Use (optional)
- B2:maintenance of asphalt surface (optional)
- B3:repair (optional)
- B4:replacement (optional)

- B5:refurbishment (information module not considered in this PCR)
- B6:operational energy use (information module not considered in this PCR)
- B7:operational water use (information modulo not considered in this PCR)
- C1:removal of asphalt (optional)
- C2: transport waste management plant (optional)
- C3:waste processing (optional)
- C4:disposal (optional)
- D:benefits and loads beyond the system boundary (optional)

Modules B5 refurbishment, B6 operational energy use and B7 operational water use are information modules not included in this PCR.

Module B5 is not relevant for asphalt mixture. The modules B2 Maintenance, B3 Repair and B4 Replacement completely cover the operations needed for the correct functional performance of the asphalt during its lifetime. B5 Refurbishment is more focused on other type of infrastructures and constructions (as buildings) but in the case of the asphalt mixtures (not only roads), it does not apply.

In the case of B6 and B7 modules, although it is known, for example, that the rugosity of the asphalt can significantly affect the energy consumption of vehicles, the state of the art is very imprecise and there are no forms to define this information clearly.

Therefore, these phases will not be considered within the scope of this PCR. In case the owner of the EPD is interested in supplying this information, it shall be report in the section 7.4.2 Other environmental information.

The system boundaries of this PCR are illustrated in Figure 1:

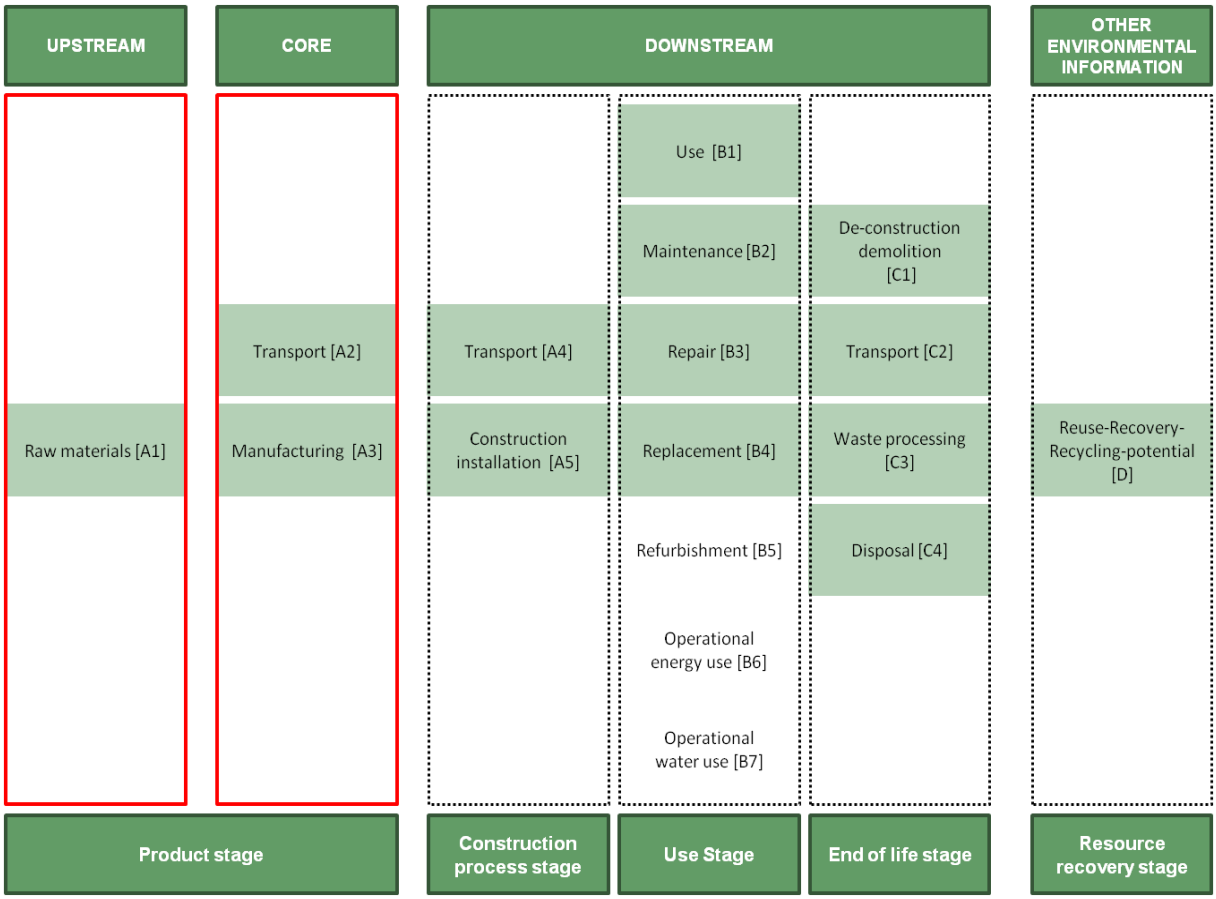

Figure 1. System diagram illustrating the processes that are included in the product system, divided into upstream, core and downstream processes. Squares with outlined in red line indicate processes that shall be included.

The EPD shall specify which EPD-type is declared and data requirements must be specified separately in the EPD for each life cycle stage, to ensure comparability and to avoid wrong interpretation.

Boundaries to nature are defined as flows of material and energy resources from nature into the system. Emissions to air, water and soil cross the system boundary when they are emitted from or leaving the product system.

The following system boundaries are excluded:

- Environmental impact from infrastructure for general management, e.g. office, laboratory and headquarter operations.
- The production of machinery and equipment to produce asphalt, aggregates or reclaimed asphalt pavement (RAP).
- Personnel-related impacts, e.g. transportation to and from work, inspections by authorities.
- Parts not related directly to the application of the asphalt layer in the construction stage, such as ground movements or base and sub-base application.

4.2.1 UPSTREAM PROCESSES

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

- A1) Raw material supply:
  - Extraction and processing of raw materials (e.g. mining processes of aggregates) and recycling processes of secondary materials from a previous product system (e.g. reclaimed asphalt pavement RAP, out of use tyres, recycled asphalt shingles RAS), but not including those processes that are part of the waste processing in the previous product system, referring to the polluter pays principle.
  - Impacts of all co-products of crude oil refining including extraction, transport, refining, and storage. The co-products of interest to this PCR guidance include gasoline, diesel, bituminous binder, bitumen additives and polymers.
  - Generation of electricity, steam and heat from primary energy resources, also including their extraction, refining and transport. This also includes energy needed for raw material supply and energy for manufacturing in core process.
  - Energy recovery and other recovery processes from secondary fuels, but not including those processes that are part of waste processing in the previous product system.
  - Extraction of raw material and processing of asphalt additives.
  - Processing up to the end-of-waste state or disposal of final residues including any packaging not leaving the factory gate with the product.

4.2.2 CORE PROCESSES

The following attributional processes are part of the asphalt production and classified as core processes:

- A2) Transportation: External transportation (e.g. bituminous binders, aggregates, fuels, additives) to the asphalt production plant.
- A3) Manufacturing:
  - Manufacturing of the asphalt mixture and co-products (e.g. heating, mixing)
  - Water use
  - Emissions of the plant (e.g. fuel burning, stack)
  - Packing materials used (if relevant).
  - Material used for maintenance (e.g. lubricants, filters)
  - Treatment of waste generated from the manufacturing processes. Processing up to the end-of-waste state or disposal of final residues including any packaging not leaving the factory gate with the product.

- Allocation of transport of the production plant in the case of production with mobile asphalt production plants. The emissions from this transport shall be distributed over the whole production of the mobile plant as long as it is in a specific location.

4.2.3 DOWNSTREAM PROCESSES

In the case that any downstream process is used and part of the underlying LCA it shall be reported in the EPD in brief what precise activities are included. The following attributional processes are part of the product system and classified as downstream processes:

- A4) Transport: transportation of the asphalt mixture to the construction site.
- A5) Asphalt mixture Laying and compacting process, including preparation works:
  - Any energy or water or material required for the application of the asphalt mixture (e.g. paving, rolling) or operation of the construction site (e.g. cleaning of equipment).
  - Emissions of the machinery or equipment use for the application of the asphalt mixture
  - In the EPD, the life cycle module scenario description should clarify whether module A5 covers a replacement layer scenario or a new road scenario.

When the use stage is included (“cradle-to-gate with options” or “cradle-to-grave” EPD), asphalt related processes that take place during the service life of the construction shall be included.

- B1) Use: The module “use of the asphalt mixture” covers environmental aspects and impacts arising from the asphalt in a normal use over its service life. It covers emissions of substances air, soil or water, in particular particulate emissions if relevant. The method used to calculate or estimate the emissions of particles in this stage shall be explained in the EPD.
- B2) Maintenance: Includes all activities necessaries during the service life of the asphalt in order to maintain all technical and functional performance of the asphalt mixture lost by environmental factor, traffic, etc. These activities are typically planned activities and include preventative maintenance. The impact of the construction/infrastructure maintenance (e.g. in roads the removing snow, applying salt) are no included.
- B3) Repair: Includes all activities necessaries during the service life of the asphalt in order to maintain all technical and functional performance of the asphalt mixture (e.g. crack sealing, surface dressing, patching). These activities are typically not planned activities. Includes:
  - Materials used in the repair
  - Transport of the materials
  - Energy and water use
  - Transportation of waste to the management plant and its treatment.

  If the repair is not attributable to the asphalt, it shall not be included in the EPD.
- B4) Replacement: It happens when the service life of the asphalt ends. This module involves the replacement of whole asphalt and includes not only laying the new surfacing layer but also preparation work (e.g. removing parts of the old surface, equipment used to cut off traffic). It includes:
  - Materials used in the replacement
  - Transport of the materials
  - Energy and water use
  - Transportation of waste to the management plant and its treatment.
- C1) Deconstruction, demolition: Deconstruction includes dismantling or demolition of the asphalt mixture from the construction after the service life of the construction (e.g. road, airport) is over.
- C2) Transport: Transportation of the removed asphalt to waste processing plant, except in cases where repaving occurs.
- C3) Waste processing: Includes all necessary treatments for the reuse, recycling or incineration of the asphalt waste.

- C4) Disposal: Waste disposal including physical pre-treatment and management to a landfill site or returned to nature. Emissions from waste disposal are considered part of the product system under study and therefore part of this module, according to the “polluter pays principle”.

4.2.4 BENEFITS AND LOADS BEYOND SYSTEM BOUNDARIES

As one option for other environmental information, it is possible to report on recyclability potentials.

- D) Benefits and loads beyond system boundaries:

The information in module D may contain technical information as well as LCA result from product post-consumer recycling, i.e. environmental benefits or loads resulting from reusable products, recyclable materials and/or useful energy carriers leaving a product system e.g. as secondary materials or fuels. Avoided impacts from co-products from module A to C shall not be included in Module D.

4.3 SYSTEM DIAGRAM

To illustrate the product system studied, the EPD shall contain a flow diagram of the processes included in the LCA.

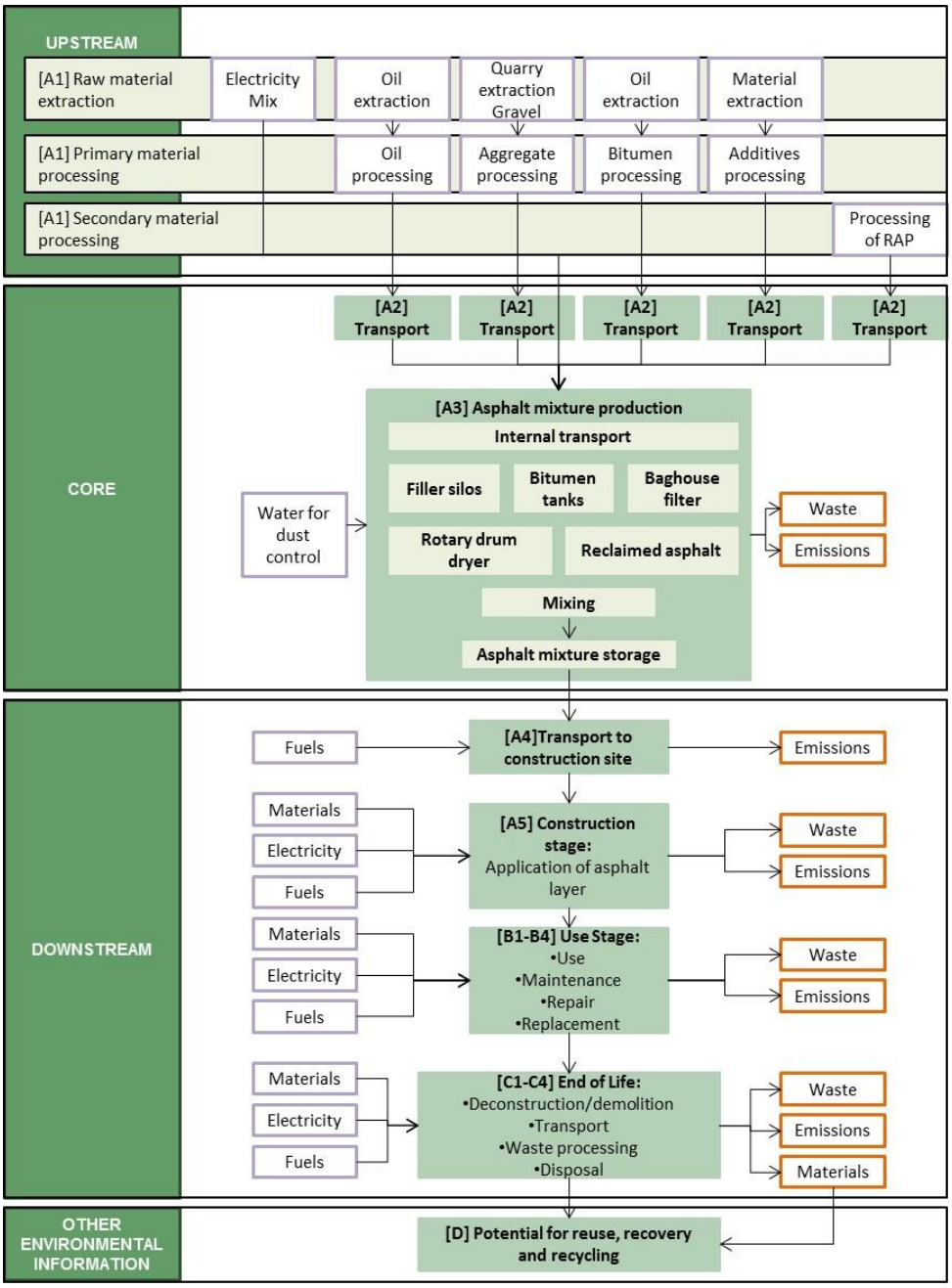

Figure 2. System diagram illustrating one generic example of system boundaries for asphalt mixture production

To illustrate the product system studied, the EPD shall contain a flow diagram of the processes included in the LCA. They shall be sub-divided at least into the life cycle stages of the product stage. The diagram below shall be included too:

Product stage	Construction process stage	Use Stage	End of life stage		Resource recovery stage

Raw materials	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal		Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
									MND	**MND**	**MND**						

MND: module not declared

In the diagram when a module is accounted for the box in the last row is then marked with an "X". When a module is not accounted for the box in the last row is then market with "MND", not declared.

The EPD shall specify which EPD-type is declared:

- A "Cradle-to gate" EPD
- A "Cradle-to-gate with options" EPD
- A "Cradle-to-grave" EPD.

For a "Cradle-to-gate with options" EPD the declaration of the RSL is possible only if all scenarios for the modules A1- A3 and B1-B5 are given. For a "Cradle-to-grave" EPD that is covering all modules in the stages A to C, a declaration of the RSL is required.

4.4 DATA QUALITY REQUIREMENTS

As a general rule, specific data shall always be used, if available, after performing data quality assessment. Specific data shall be used for the core processes. For the upstream processes, downstream processes (if included) and infrastructure generic data may also be used if specific data are not available. Generic data should especially be used in cases where they are representative for the purpose of the EPD, e.g. for bulk and raw materials on a spot market, if there is a lack of specific data on the final product or if a product consists of many components.

Any data used should preferably represent average values for a specific reference year. However, the way these data are being generated could vary, e.g. over time, and in such cases they should have the form of a representative annual average value for a specified reference period. Such deviations should be declared.

5 LIFE CYCLE INVENTORY

In relation to EN 15804, the following criteria for input and output exclusion shall be followed:

- In case of insufficient input data or data gaps for a unit process, the cut off criteria shall be 1% of the total primary energy usage and 1% of the total mass input of that unit process. The total of sum of neglected input flows shall not exceed 5% of energy usage and mass per stage (A1-A3, A4-A5, B1-B5, C1-C4 and D). This applies particularly to material and energy flows known to have the potential to cause significant emissions into air and water or soil during the life cycle of the product; it also applies to processes that are known to be resource intensive.

In case of materials that are less than 1% of the total mass input but are considered environmentally relevant, when publicly available data exists shall be included. Those materials are (no limited to):

- Polymers in binder, broken down into two classes of chemicals: elastomers or rubbers, such as styrene-butadiene-styrene (SBS), and plastomers
- Liquid antistrips, recycling agents, and warm-mix chemical additives
- Fibres

All inputs and outputs to a (unit) process shall be included in the calculation, for which data are available. Data gaps may be filled by conservative assumptions with average or generic data. Any assumptions for such choices shall be documented. Data gap with an assumed potential importance in the included modules shall be reported in the EPD including an evaluation of its significance[3].

It is important to emphasize that – in most cases – all available data shall be used. Using cut-off rules should not give the perceptions of "hiding" information, but rather to facilitate the data collection for practitioners. Data on life cycle of materials or energy inputs are classified into three categories - specific data, selected generic data and proxy data, 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, and data from other parts of the life cycle traced to the specific product system under study, e.g. materials or electricity provided from a contracted supplier being able to provide data for the actual delivered services, transportation taking place based on the actual fuel consumption and related emissions, etc.,
- generic data (sometimes referred to as secondary data), divided into:
  - selected generic data – data from commonly available data sources (e.g. commercial databases and free databases) that fulfil prescribed data quality characteristics for precision, completeness and representativeness,
  - proxy data – data from commonly available data sources (e.g. commercial databases and free databases) that do not fulfil all of the data quality characteristics of "selected generic data".

5.1 REQUIREMENTS REGARDING COLLECTION OF SPECIFIC DATA

Specific data shall be gathered from the actual manufacturing plant(s) where specific processes are carried out and data from other parts of the life cycle traced to the specific product system under study, e.g. materials or electricity provided from a contracted supplier being able to provide data for the actual delivered services, transportation taking place based on the actual fuel consumption and related emissions, etc.

For the following processes, specific data (e.g. annual averages) must be provided:

- manufacturing of product (asphalt)
- transport of asphalt
- transport of mobile asphalt production factory
- construction phase (laying of asphalt)
- amount of wasted asphalt in production and laying that is not recycled
- handling of wasted asphalt, e.g. crushing and sieving.

3 CD ISO 21930:2015 suggests a 100% data cover, but allows proxy data. This approach is recommended and when proxy data are used for data gaps, its influence of the overall result shall be mentioned in the EPD, if this contribution is assumed to be significant (where 10% to any impact category may be as thumb of rule).

5.2 REQUIREMENTS REGARDING GENERIC DATA

The attributional ("book-keeping") LCA approach in the International EPD® System forms the basic prerequisites for selecting generic data. This means that data based on a consequential systems approach shall not be used. Data calculated with substitution (system expansion where include benefits from "avoided production") to solve allocation problems should not be used, but if no other data is available, such data may be accepted as proxy data if negative flows are changed to zero.

For allowing the use of selected generic data selected prescribed characteristics for precision, completeness and representativeness must be fulfilled and demonstrated, including but not limited to:

- Reference year to be as actual as possible, preferably being representative for at least 5 years,
- Cut-off criteria to be met on the level of the modelled product system are the qualitative coverage of at least 99% of-both the energy, the mass, and the overall relevance of the flows,
- Completeness where the inventory data set should in principle cover all elementary flows that contribute to a relevant degree of the impact categories, and
- Representativeness of the resulting inventory for the good or service in the given geographical reference should, as a general principle, be better than ±5 %.

If selected generic data that meets the requirements of the International EPD® System are not available as the necessary input data, proxy data may be used and documented. The environmental impacts associated to proxy data must not exceed 10% of the overall environmental impact from the product system.

The EPD may include a data quality declaration to demonstrate the share of specific data, selected generic data and proxy data for the environmental impacts. Some reference databases for LCA are the following below:

- Ecoinvent database: contains international industrial life cycle inventory data on energy supply, resource extraction, material supply, chemicals, metals, agriculture, waste management services, and transport services. http://www.ecoinvent.ch/
- GaBi LCA database. http://www.gabi-software.com/international/databases/gabi-databases/
- European reference Life-Cycle Database (ELCD). http://elcd.jrc.ec.europa.eu/ELCD3/
- The Greenhouse Gas Protocol Initiative. http://www.ghgprotocol.org/
- Database ÖKOBAUDAT. http://www.oekobaudat.de/

If relevant, the EPD may include a reference to the database(s) used.

5.3 MODELING PARAMETERS AND ASSUMPTIONS

5.3.1 UPSTREAM PROCESSES

The following requirements apply to the upstream processes:

- Data referring to processes and activities upstream in the supply chain, over which an organisation has a direct management control, shall be specific and collected on site.
- Data referring to contractors supplying main parts or main auxiliaries should be asked for from the contractor as specific data, as well as infrastructure, if relevant.
- Transport of materials 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 based on the actual transportation mode, distance from the supplier and vehicle load.
- In case specific data are lacking, selected generic data may be used. If this is also lacking, proxy data may be used.
- Electricity production impacts should be accounted for in this priority when specific data is used in the upstream processes:
    1. Specific electricity mix from electricity supplier as documented by Renewable Energy Certificates (RECs) or Guarantees of Origin
    2. Electricity supplier's residual electricity mix,
    3. National electricity production mix/electricity mix on the market (preferably residual mix, otherwise national electricity production mix).

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

5.3.2 CORE PROCESSES

The following requirements apply to the core processes:

- Specific data shall be used for the product manufacture, as well as for on-site generation of steam, heat, electricity, etc., if relevant.
- Electricity production impacts should be accounted for in this priority for the core processes:
  1. Specific electricity mix from electricity supplier as documented by Renewable Energy Certificates (RECs) or Guarantees of Origin,
  2. Electricity supplier's residual electricity mix,
  3. National electricity production mix/electricity mix on the market (preferably residual mix, otherwise national electricity production mix).

  The mix of electricity used in the core processes shall be documented, if relevant.
- Waste treatment processes of manufacturing waste should be based on specific data, if available.

5.3.3 DOWNSTREAM PROCESSES

Downstream processes include the use stage and end-of-life stages/end of life treatment of the product. Downstream processes are optional when developing EPD following this PCR. A "cradle-to-grave" EPD will require a development of detailed information that defines the function of the product and scenarios for handling the usage and end of life stage in order to meet comparability within the specific application of the product group.

As the objective of this PCR is to cover a large variety of asphalt mixtures, a specific use phase scenario could not be defined. That's why the following information is given only as general guidelines for developing downstream stage scenarios. The EPD will need detailed information about the scenarios taken into account (based on these guidelines or on specific scenarios defined by the company to represent the certified product downstream stage).

The following requirements apply to the downstream processes, if included:

- The downstream module shall be based on relevant scenarios for the geographical area in which the EPD® is valid.
- Use phase: If relevant, product use phase scenarios will be realistic and coherent. These use scenarios must be declared in the EPD for full understanding of the product declared and to allow comparability between products.
  - 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,
  - The use of the energy mix in the region/country where the product is sold and then used shall be approximated with OECD electricity mix statistics. For non-OECD countries, in order to adopt a suitable region- or country-specific electricity mix (reflecting approximately the region(s)/countries' share) a similar precision will be required. The mix used shall be documented, if significant.
- Transport of the product to customer shall, as a first option be based on the actual transportation distances. As a second option, it could be calculated as the average distance of a product of that product type transported with different means of transport.
- With regard to data quality requirements for the end-of-life stage based on scenarios, the following shall apply for the information being:
  - technically and economically practicable, and
  - compliant with current regulations in the relevant geographical area.

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

Key assumptions regarding the end-of-life stage shall be documented.

5.4 REQUIREMENTS REGARDING ALLOCATION FOR MULTIFUNCTIONAL PRODUCTS AND MULTIPRODUCT PROCESSES

An allocation problem occurs when a process results in multiple output products and where there is only aggregate information available about the emissions. The priorities suggested by ISO 14040 shall be considered in the procedure definition, however, the method of avoiding allocation by expanding the system boundaries is not applicable within the framework of the International EPD® System due to the rationale of the book-keeping LCA approach (attributional LCA) used and the concept of modularity. Allocation shall be avoided, dividing the unit process into different subprocesses that can be allocated to the coproducts and by collecting the input and output data related to these subprocesses.

In the case of co-production, where the processes cannot be subdivided, it must follow the coherence of the process. Processes generating overall revenue of the order of 1% or less are considered as very low contribution to the overall revenue, and may be neglected. In the other cases the allocation procedure criteria is as follows:

Revenue classification	Revenue contribution	Allocation type
Very low	Processes generating overall revenue of the order of 1% or less	The process may be neglected
High	A difference in revenue of more than 25%	Allocation shall be based on economic values
Low	A difference in revenue of less than 25%	Allocation shall be based on physical properties, e.g. mass, volume

Allocation types

For asphalt, allocation can occur when the asphalt raw materials are produced or when asphalt is produced. Material flow carrying specific inherent properties, e.g. energy content, elementary composition, shall always be allocated reflecting the physical flows, irrespective of the allocation chosen for the process. In the case of combined heat and power production, a distribution based on the best efficiency for the (potential) separate generation of electricity or heat shall be considered. For use generic efficiency factors see appendix A.

5.5 REQUIREMENTS REGARDING ALLOCATION PROCEDURES FOR REUSE, RECYCLING

In the framework of the International EPD® System, the methodological choices for allocation for reuse, recycling have been set according to the polluter pays principle (PPP).

If there is an inflow of recycled material to the production system, the recycling process and the transportation from the recycling process to where the material is used shall be included.

If there is an outflow of material to recycling, the transportation of the material to the recycling process shall be included. The material going to recycling is then an outflow from the production system as an indicator.

Impacts associated with the processes involved in preparing the recycled materials for use in the asphalt mixture are considered part of the system boundary. e.g. crushing, screening of RAP to become RA at the plant site. If the processing is outside the asphalt mixing plant, transport has to be considered.

For further information about system boundaries concerning waste, etc., see the General Programme Instructions of the International EPD® System.

5.6 REQUIREMENTS REGARDING ALLOCATION PROCEDURE FOR WASTE HANDLING

The treatment processes (final disposal) of wastes generated by the activities included in the system boundaries should be included in the LCA calculation. When it is not possible for some reasons (such as database framework or lack of information), the amount of wastes and the destination shall be declared.

For the purposes of the EPD® preparation, the final disposal processes include:

- landfilling that has to be attributed to the studied process,
- incineration. For the calculation of impacts related to incineration with energy recovery the environmental impact of waste destruction shall be attributed to the waste generator and the impacts related to making use of the thermal energy shall be attributed to the next product life cycle. If data are missing, as a default option, 50% of the impacts of the waste incineration plant may be attributed to waste treatment and 50% to the energy recovery. In case of incineration without energy recovery, the product system generating the waste must include 100% of the environmental impacts from incineration.

In case where waste flows are sent to material recycling or energy recovery or other recovery (e.g. composting), impacts should be borne by the product under study until it enters the facility gate where the recycling or recovery processes take place (e.g. transportation to the facility shall be included). Even if benefits related to the material recovery have to be considered out of the system boundaries, an estimation of the avoided impacts due to such recovery could be made and declared separately as additional environmental information. Deviations may be accepted and declared. All the assumption on the inclusion or not of waste treatment processes shall be clearly declared in the EPD.

For further information about system boundaries concerning waste, etc., see the General Programme Instructions of the International EPD® System.

6 LIFE CYCLE IMPACT ASSESSMENT

LCA results to be reported in the EPD® are:

- Potential environmental impacts
- Use of resources
- Waste production
- Other environmental indicators

6.1 ENVIRONMENTAL IMPACTS

The following potential environmental impacts shall be calculated and reported in the EPD®, divided into the stages A to C and D if relevant according to EN 15804.

PARAMETER		UNIT	A1	A2	A3	A4	A5	B1	B2	B3	B4	C1	C2	C3	C4	D
Global warming potential (GWP)	Fossil	Kg CO_2 eq.														
	Biogenic	Kg CO_2 eq.														
	Land use / land transform.	Kg CO_2 eq.														
	TOTAL	Kg CO_2 eq.														
Acidification potential (AP)		Kg SO_2 eq.														
Eutrophication potential (EP)		Kg PO_4^{3-} eq.														
Formation potential of tropospheric ozone (POCP)		Kg C_2H_4 eq.														
Abiotic depletion potential – Elements		Kg Sb eq.														
Abiotic depletion potential – Fossil resources		MJ, net calorific value														
Ozone layer depletion		Kg CFC-11 eq														

The impact categories have been included according to EN 15804. Always check for latest amendment to EN 15804 to be sure that you use the correct characterisation factors. The impact categories shall be calculated using characterisation factors recommended in regionally accepted impact assessment methods. In Europe, the characterisation factors outlined in EN 15804 (CML baseline) shall be used, or improves ones if these factors are updated in a forthcoming revision of EN 15804. The characterisation factors for ADP-fossil fuels are the net calorific values at the point of extraction of the fossil fuels. Abiotic depletion of elements includes all non-renewable, abiotic material resources (i.e. excepting fossil resources). CML characterisation factors can be downloaded at http://cml.leiden.edu/software/data-cmlia.html

According to EN 15804, the indicators declared in the individual information modules of a product life cycle A1 to A5, B1 to B7, C1 to C4 and module D as described in Figure 1 shall not be added up in any combination of the individual information modules into a total or sub-total of the life cycle stages A, B, C or D. As an exception information modules A1, A2, and A3 may be aggregated. In conclusion according to EN 15804 all life cycle stages modules shall be reported separately as information modules, except module A1-3, that may be aggregated.

6.2 USE OF RESOURCES

The use of resources shall be presented in the EPD® using results from the life cycle inventory. Resources are the elementary flows crossing the system boundary between nature and the studied product system. They are required and shall be included in the EPD divided into the stages A to C and D if relevant according to EN 15804 as follows:

PARAMETER		UNIT	A1	A2	A3	A4	A5	B1	B2	B3	B4	C1	C2	C3	C4	D
Primary energy resources – Renewable	Used as energy carrier	MJ, net calorific value														
	Used as raw materials	MJ, net calorific value														
	TOTAL	MJ, net calorific value														
Primary energy resources – Non-renewable	Used as energy carrier	MJ, net calorific value														
	Used as raw materials	MJ, net calorific value														
	TOTAL	MJ, net calorific value														
Secondary material		Kg														
Renewable secondary fuels		MJ, net calorific value														
Non-renewable secondary fuels		MJ, net calorific value														
Use of net fresh water (see Appendix B for definition)		M3														

EN 15804 accepts that only one figure is given for each parameter given in the table above.

6.3 WASTE PRODUCTION & OUTPUT FLOWS

The following indicators shall also be reported in the EPD per functional/declared unit divided into the stages A to C and D if relevant according to EN 15804:

PARAMETER	UNIT	A1	A2	A3	A4	A5	B1	B2	B3	B4	C1	C2	C3	C4	D
Hazardous waste disposed	Kg														
Non-hazardous waste disposed	Kg														
Radioactive waste disposed	Kg														

If considered relevant, EN 15804 indicators may be added to the EPD:

PARAMETER	UNIT	A1	A2	A3	A4	A5	B1	B2	B3	B4	C1	C2	C3	C4	D
Components for re-use	Kg														
Materials for recycling	Kg														
Materials for energy recovery	Kg														
Exported energy	MJ per energy carrier														

- The parameters are calculated on the gross amounts leaving the system boundary of the product system in the life cycle inventory. If, e.g. there is no gross amount of “exported energy, electricity” leaving the system boundary, this indicator is set to zero.
- The parameter “Materials for energy recovery” does not include materials for waste incineration. Waste incineration is a method of waste processing, when R1< 60% (European Guideline on R1 energy interpretation), and it is allocated within the system boundary.
- In the event that flows of these types never leave the system boundary for a product category, the indicators may be removed from the PCR.

6.4 UNITS AND QUANTITIES

The International System of Units (SI units) shall be used. Reasonable multiples may be adopted for a better understanding.

A maximum of three significant digits shall be used when reporting LCA results.

The thousands separator and decimal mark in the EPD® shall follow one of the following styles:

- SI style (French version): 1 234,56
- SI style (English version): 1 234.56

In case of any potential confusion, 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 Data elements and interchange formats – Information interchange – Representation of dates and times. For years, the prescribed format is YYYY-MM-DD, e.g. 2015-03-26 for March 26th, 2015.

6.5 INTERPRETATION

The LCA report underlying the EPD® should include, as a minimum, a sensitivity analysis of key parameters and a data quality assessment. The results do not have to be included in the EPD, but should be available to the verifier.

The General Programme Instructions recommend that the EPDs include an indicator suitable for demonstrate the share of specific data, selected generic data and proxy data for the environmental impacts.

6.6 ASSUMPTIONS AND LIMITATIONS

The LCA report underlying the EPD® should include key assumptions made and the limitations of the study. The results do not have to be included in the EPD, but should be available to the verifier.

6.7 UNCERTAINTY

The LCA report underlying the EPD® may include uncertainty assessment of the results. The results do not have to be included in the EPD, but should be available to the verifier.

7 CONTENT AND FORMAT OF THE EPD

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

- Cover page
- Programme information
- Asphalt mixture information
- Content declaration
- Environmental performance
- Additional environmental information and References

The following information shall be included, where applicable:

- Information related to pre-certified EPDs
- Information related to sector EPDs
- Differences versus previous versions

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, and wildlife that are not related to the declared product should, 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.

7.1 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 that includes the main content of the EPD. This summary is part of the EPD and, thus, subject to the same verification procedure.

7.1 COVER PAGE

The cover page shall include:

- Asphalt mixture 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
- Date of publication (issue): 20XX-YY-ZZ
- Date of revision: 20XX-YY-ZZ, where applicable,
- Date of validity; 20XX-YY-ZZ. For clarification, a note may be added 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 construction products: a statement of conformity or non-conformity with EN 15804+A1 and/or ISO 21930

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

- ECO EPD logotype and reference number as issued by the programme operator as approved by the ECO Platform,
- information about dual registration of EPD in another programme, such as registration number and logotype, and
- a statement of conformity with other standards and methodological guides.

7.2 PROGRAMME-RELATED INFORMATION

The EPD® shall include the following programme-related information:

- Reference to the International EPD® System and to EPD International AB as the programme operator,
- Reference to www.environdec.com,
- The EPD® logotype,
- The reference PCR document upon which the EPD® is based identified according to registration number, date and CPC codes,
- Registration number (provided by the Secretariat),
- Date of publication and 5 year period of validity. The date of the latest revision should also be provided.
- Declaration of the year(s) covered by the data used for the LCA calculation and other relevant reference years. The main database(s) for generic data and LCA software used may be declared, if relevant,
- Geographical scope of application of the EPD®
- Reference to relevant websites for more information.

The following information is mandatory to include in the EPD:

- Differences versus previous versions of the EPD
- Any omission of life cycle stages not making the EPD® cover the full life cycle, with a justification of the omission,
- Means of obtaining explanatory materials, for example references to chosen methodologies,

The EPD® shall also give the following information about the verification process:

The following table is recommended to include in the EPD for declaring all this information.

CEN standard EN 15804 served as the core PCR	
EPD programme	The International EPD® System operated by EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com E-mail: info@environdec.com
Reference Product category rules (PCR)	PCR 2018:04 Asphalt mixtures, version 1.0
Product category rules (PCR) review conducted by	The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:2006	☐ EPD verification ☐ EPD process certification
Third party verifier	*Name and contact information*
Third party verifier accredited or approved by	*For certification bodies: Name of the accreditation body.* *For individual verifiers:* "The International EPD® System"
Procedure for follow-up of data during EPD validity involves third-party verifier	☐ Yes ☐ No
Date of EPD publication	*Date*
EPD validity	*Date*
EPD valid within the following geographical area	*Geographical scope*
EPDs within the same product category but from different programmes may not be comparable. EPD of construction products may not be comparable if they do not comply with EN 15804.	

7.3 PRODUCT-RELATED INFORMATION

The EPD shall include the following product and company-related information:

- Asphalt mixture identification by name, trade name and product code (if applicable),
- A simple visual representation or image of the asphalt mixture,
- Identification of the asphalt mixture according to the CPC classification system,
- Identification of the asphalt mixture according to other relevant codes for product classification (if appropriate), e.g. CPV code, the United Nations Standard Products and Services Code® (UNSPSC) or Classification of Products by Activity (CPA)
- Recognised standards may be used when referring to specific technical issues (SAE, ISO/TS 4949, EN 10027, UNS, ASTM, SAE, JIS, DIN, GB standard, etc.).
- Name and contact information of the EPD owner,

- Manufacturing site and country,
- Functional unit or declared unit,
- Short description of the underlying LCA-based information (e.g. summary of an existing LCA study or similar studies),

In case of a Sector EPD, the declaration shall also include the following product and company-related information:

- 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.
- A list of the contributing manufacturers

The following information is voluntary to include in the EPD:

- Technical description of asphalt mixture product in terms of functional characteristics, main product components and or materials, expected service life time etc.,
- Description of the intended use of the asphalt mixture,
- Manufacturers logotype,
- Short description of the organisation, including information on asphalt mixture or management system related certifications (e.g. ISO 14024 Type I ecolables, ISO 9001- and 14001-certificates and EMAS-registrations) and environmental policy,
- Other relevant work the organisation wants to communicate (e.g. SA 8000, supply-chain management and social responsibility),

Any claims made about the product must be verifiable.

7.4 CONTENT DECLARATION

The content declaration section shall contain information about the contents of the asphalt mixture, and shall have the form of a list of materials and chemical substances including information on their environmental and hazardous properties. A harmonisation is recommended if similar information is issued from central authorities, initially preferably based on international regulations and legislation. In such a case, it is important to complement a list of materials and chemical substance product content in quantitative terms.

The content declaration does not apply to proprietary materials and substances such as those covered by exclusive legal rights including patent and trademarks. As a general rule, 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), issued by the United Nations or national or regional applications of the GHS.

According to EN15804 declaration of material content of the product shall list as a minimum substances contained in the product that are listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorisation when their content exceeds the limits for registration with the European Chemicals Agency (EChA).

An optional detailed list of the product’s substances, including CAS[4] number, environmental class and health class, may be included in the product content declaration.

7.4.1 INFORMATION ABOUT RECYCLED MATERIALS

When the asphalt 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 may be considered “recycled material”, the guidance given in ISO 14021 shall be taken into account. 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.

[4] The reporting could also be given with use of EINEC number.

7.5 ENVIRONMENTAL PERFORMANCE

See 6.1, 6.2 and 6.3 for required environmental performance information required.

7.6 ADDITIONAL TECHNICAL INFORMATION

The following information shall be included:

7.6.1 A4, TRANSPORT TO THE CONSTRUCTION SITE

If product stage A4 is declared, or if additional technical information is provided in the EPD for transport from the production gate to the construction site, the following information shall be provided:

Parameter	Parameter unit expressed per functional/declared unit
Type of transport	Dump truck, train, etc.
Fuel type	Diesel, gasoline, electricity
Distance	km
Capacity utilisation (including empty returns)	%
Bulk density of transported products	kg/m3

A4: transport to the construction site

Transport distance shall be as specific as possible. If the market varies, the distance to the construction site can be estimated based on weighted average distance to the market of the product.

The return trip is assumed empty, but in some cases, a return load is possible, e.g. used asphalt intended for recycling.

7.6.2 A5, APPLICATION OF THE ASPHALT IN CONSTRUCTION WORKS

If product stage A5 is declared or if additional technical information is provided in the EPD for the application of the asphalt mixture in the construction Works the following information shall be provided:

Parameter	Unit (expressed per functional/declared unit)
Ancillary materials (e.g. cleaning agent consumption);	kg
Water use	m^3
Electricity consumption during the application	kWh
Other energy consumptions during the application	kWh or MJ
Wastage of materials on construction site before waste processing, generated by the product application (specified by type)	kg
Output materials (specified by type) as result of waste processing at the construction site e.g. collection for recycling, for energy recovery, disposal (specified by route)	kg

A5: Application of the asphalt in construction works

This should cover, for example typical materials and energy required for e.g. extention, compactation.

7.6.3 REFERENCE SERVICE LIFE

The “service life” of an asphalt mixture, after first installation, is its expected life time following which it is no longer fit for purpose. The asphalt producers can define this themselves, but the claim must be documented.

In the EPD the following statement will be made: “ RSL is dependent on the properties of the product and reference in use conditions”.

The description of the reference service life may be based on data collected as average data or at the beginning or end of the service life. The reference conditions for achieving the declared technical and functional performance and the declared reference service life shall include the reference service life, where relevant:

Parameter	Unit
Reference Service Life	Years
Declared product properties	Units as appropriate
Design application parameters (if instructed by the manufacturer), including the references to the appropriate practices and application codes	Units as appropriate
An assumed quality of work, when installed in accordance with the manufacturer’s instructions	Units as appropriate
Outdoor environment, e.g. weathering, pollutants, UV and wind exposure, building orientation, shading, temperature	Units as appropriate
Usage conditions, e.g. frequency of use, mechanical exposure	Units as appropriate
Maintenance e.g. required frequency, type and quality and replacement of components	Units as appropriate

A5: Reference service life

Information regarding the temperature range for asphalt production (and type of warm-mix technology) must be included also, in order to recognize effort of companies regarding reduction of energy requirement/consumption.

7.6.4 B1-B4, USE STAGE

The provision of additional technical information to support the calculation of life cycle modules B1-B4 at the construction/infrastructure level is optional and if included must be based on typical scenarios which must be described. This stage includes all processes occurring during the service life of the construction, e.g. a road, airport, until it is ready to be decommissioned.

B1: Environmental aspects and impacts connected to the normal use of products. Parts of the asphalt is worn during use, in the form of asphalt particles, some of which are small and remain in the air for extended periods.

These may constitute a health risk. Some particles are deposited in areas near the road and are not collected; these may also pose an environmental risk. The amount of particles released is affected by road usage, as well as asphalt properties, where by the risk posed by asphalt particles is largely determined by the ingredients of the asphalt. Release of dangerous substances during the use stage are reported as additional information (see 7.3.6).

B2-B4: if additional technical information is provided in the EPD for products requiring maintenance, repair, replacement, refurbishment the following information shall be provided to specify the scenarios or to support the development scenarios of these modules at the building level. Information given for tables below shall be consistent with the reference service life data given:

Parameter	*Parameter unit expressed per functional/declared unit*
Maintenance process	Description or source where description can be found
Maintenance cycle	Number per RSL or year
Ancillary materials for maintenance (e.g. cleaning agent, specify materials)	kg / cycle
Quantitative description of energy type and use during maintenance (e.g. vacuum cleaning), energy carrier type e.g. electricity, and amount, if applicable and relevant	kWh or MJ
Net fresh water consumption	m3
Waste material resulting from maintenance; specified by type	kg

B2 Maintenance

Parameter	*Parameter unit expressed per functional/declared unit*
Inspection process	Description or source where description can be found
Repair process	
Repair cycle	Number per RSL or year
Ancillary materials for repair; specify materials	kg / cycle
Quantitative description of energy type and use during repair (e.g. crane activity), energy carrier type e.g. electricity, and amount, if applicable and relevant	kWh or MJ
Net fresh water consumption	m3
Waste material resulting from repair; specified by type	kg

B3 Repair

Parameter	*Parameter unit expressed per functional/declared unit*
Replacement cycle	Number per RSL or year
Exchange of worn parts during the product's life cycle, (e.g. zinc galvanised steel sheet), specify materials	kg
Quantitative description of energy type and use during replacement (e.g. crane activity), energy carrier type e.g. electricity, and amount, if applicable and relevant	kWh or MJ

B4 Replacement

7.6.5 C1-C4, END OF LIFE

If additional technical information is provided in the EPD about end-of-life processes, the following information shall be provided to specify the end-of-life scenarios of the asphalt that is removed from any surface to support development of the end-of-life scenarios at the construction/infrastructure level.

Additional technical information for all scenarios		
Module	**Parameter**	**Unit (expressed per functional unit or per declared unit)**
C1 Deconstruction	Collection process specified by type	kg Hazardous waste disposed
		kg collected separately
		kg collected with mixed construction waste
C2 Transport	Assumptions for scenario development	type of transport
		km distance
		l/tkm fuel consumption
C3 Waste processing	Recovery system specified by type	kg for re-use
		kg for recycling
		kg for energy recovery
C4 Disposal	Disposal specified by type	kg product or material for final deposition

C1-C4 End of life

7.7 OTHER ENVIRONMENTAL INFORMATION

The following environmental information may be included (optional):

- Ecotoxicity, in [kg 1,4-DB eq] units: to freshwater, terrestrial and humans.
- Reduction of energy consumption in vehicles during the use phase of the asphalt mixture due to rugosity.
- Urban heat island effect: Asphalt technologies to reduce pavement surface temperature and the impact of the urban heat island effect.
- Noise: asphalt's surface and composition have influence on noise and vibration during the use phase.

7.7.1 RELEASE OF DANGEROUS SUBSTANCES DURING THE USE STAGE

Information shall be provided for products release of dangerous substances to soil and water during the use stage according to standards on measurement of release of regulated dangerous substances from asphalt mixture using harmonised testing methods (e.g. according to the provisions of the respective Technical Committees for European product standards, when available). If such standards on measurement of release of regulated dangerous substances are not available, the EPD can lack this information.

7.8 INFORMATION RELATED TO SECTOR EPDS

For sector EPDs, the following information shall also be included:

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

7.9 DIFFERENCES VERSUS PREVIOUS VERSIONS OF THE EPD

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

- a description of the differences versus previously published versions, e.g. a description of the percentage change in results and the main reason for the change,
- a revision date on the cover page

7.10 REFERENCES

The EPD® shall, if relevant, refer to:

- The underlying LCA
- The name, CPC code and version number of the PCR used
- Other documents that verify and complement the EPD®
- Instruction for recycling, if relevant
- The General Programme instructions of the International EPD® System

8 GLOSSARY

CO_2	Carbon dioxide
CFC	Chlorofluorocarbon
C_2H_4	Ethene
PO_4^{3-}	Phosphate
Sb	Antimony
CPC	Central product classification
EPD	Environmental product declaration
ISO	International Organization for Standardization
kg	Kilogram
MJ	Megajoule
LCA	Life cycle assessment
PCR	Product Category Rules
SI	The International System of Units
SO_2	Sulphur dioxide
UN	United Nations
CML	Institute of Environmental Sciences-Leiden University (Centrum voor Milieuwetenschappen-Universiteit Leiden)

9 REFERENCE LITERATURE

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10 VERSION HISTORY OF PCR

VERSION 1.0, 2018-06-11

Original version of PCR Asphalt mixtures.

APPENDIX A: BASIS FOR ALLOCATION IN COMBINED HEAT AND ELECTRICITY PRODUCTION

Combined heat and power		**Alternative heat**	**Alternative electricity**
Fuel type	**Technology**	**Efficiency, heat ηh (%)**	**Efficiency, electricity ηe (%)**
Biofuel	Steam cycle, heat and power	90 %	38 %
	Steam cycle, heat and power, flue gas condensation	110 %	38 %
Waste	Steam cycle, heat and power,	90 %	35 %
	Steam cycle, heat and power, flue gas condensation	100 %	35 %
Black coal	Steam cycle, heat and power	90 %	46 %
Natural gas	Steam cycle, heat and power	90 %	47 %
	Steam cycle, heat and power flue gas condensation	105 %	47 %
	Combined cycle, heat and power	90 %	58 %
Oil	Steam cycle, heat and power	90 %	46 %

APPENDIX B: DEFINITION ON USE OF NET FRESH WATER CONSUMPTION

Net use of fresh water shall be calculated and reported.

The net use of fresh water does not constitute a “water footprint” as a potential environmental impact because the water use in different geographical locations is not captured. For this indicator:

- evaporation, transpiration, product integration, release into different drainage basins or the sea, displacement of water from one water resource type to another water resource type within a drainage basin (e.g. from groundwater to surface water) is included.
- in-stream water use is not included.
- The intention that use of water, which it is not consumed (e.g. water used for river transport, used to power hydroelectric turbines or used as coolant and returned to the original source) should not be considered within the indicator. Only the net water consumption (such as the reintegration of water losses) of water used in closed-loop processes and in power generation should be considered.
- seawater shall not be included
- tap water or treated water (e.g. from a water treatment plant), or wastewater that is not directly released into the environment (e.g. sent to a wastewater treatment plant) do not count as elementary water flows, but intermediate flows from a process within the technosphere.
- additional transparency in terms of geographical location, type of water resource (e.g. groundwater, surface water), water quality, and temporal aspects may be included as additional information.