epd-norge

Product category rules

EN 15804 +A2

NPCR 025
Part B for Asphalt

Issue date: 20.01.2022
Valid to: 20.01.2027

REVISION LOG

This is an overview of the changes made to this PCR.

Typology of changes:

- Editorial (ed): Text or layout edited, with no change in content.
- Technical (te): Existing content has been changed.
- Addendum (ad): New content has been added.

Naming convention: Version x.y, where x is a major revision and y is a minor revision.

Date (2017-04-07)	Type	Description of change
Version 1.0		
Original version, issued 2017-04-07.		
Version 1.1		
Version 1.1 (ed.) EPD-Norway Secretariat References to EN15804+A2 included References to new PCR part A included Inclusion of Specific Norwegian asphalt GHG indicator Allignment of chapter structure according to PCR part A for construction products		

List of Content

Introduction

These product category rules (PCR) are intended for companies preparing an environmental product declaration (EPD) for asphalt (see chapter 6.1 for a definition of the product group). This document contains PCR part B for asphalt, which is the part of the PCR that is specific for asphalt products. Part A contains the requirements that are common for all construction products. When preparing an EPD for asphalt, all requirements outlined in part A and part B must be followed. In PCR part B, the requirements for PCR part A are referred to in each section where they occur.

This EPD was developed from October to December 2016, by a group of representatives from the asphalt industry, road research institute and with the aid from Ostfold Research (Østfoldforskning), Sintef Building and Infrastructure and the EPD program operator The Norwegian EPD Foundation.

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The PCR was updated according to EN 15804+A2:2019 by the EPD secretariat and a limited PCR group. The scope of the update is limited to ensure compliance to EN 15804+A2:2019 in order to acomodate for the 2022 season of Norwegian public asphalt tenders before a full revison is due when the below mentioned c-PCR is ready.

NOTE: ISSUES UNDER DEVELOPMENT
The EN 15804+A2:2019 update process is aware of the process of the work done by the EAPA Task Force LCA for consideration at CEN TC227 WG6
Road materials on «c-PCR Environmental product declarations – Product category rules complementary to EN 15804 for bituminous mixtures – Declaration of modules A1-A5, C1-C4 and D». A revision of NPCR 025 should be considered with scope of alligning to this document when it is published.

1 Scope

This document complements the core rules for the product category of construction products as defined in EN 15804:2012+A2:2019 and NPCR part A and is intended to be used in conjunction with those standards.

In addition, the intended application of this product category rule (PCR) is to give guidelines for the development of environmental product declarations (EPD) for asphalt; cradle to gate with options or cradle to grave; and to further specify the underlying requirements of the life cycle assessment (LCA). The core rules valid for all construction products are given in standard EN 15804, and are expected to be known by those preparing the EPD.

2 Normative references

NPCR Part A: Construction products and services. Oslo: EPD-Norge.

3 Terms and Definitions

As in PCR part A, including the following product-specific terms:

3.1 Asphalt

Product mainly consisting of aggregates and bituminous binders, used as a construction material in roads, including other applications such as road surfaces for airport runways, outdoor car parks, schoolyards etc.

3.2 Aggregates

Mineral materials such as sand, gravel and crushed rock that are used with a binder to form asphalt. Aggregates can be naturally occurring or
manufactures.

3.3 Recycled asphalt

Asphalt that has been in use and has reached its end of life, and has been removed from roads or other application(s), and re- used in production of new asphalt, either on- site or after being transported back to production plant.

3.4 Recycling in production

For example, asphalt waste from asphalt production that is used as input to asphalt production (closed loop recycling).

4. Abbreviations

EPD Environmental product declaration
DU Declared unit
FU Functional unit
PCR Product category rules
LCA Life cycle assessment
LCI Life cycle inventory
LCIA Life cycle impact assessment
RSL Reference service life
ESL Estimated service life
N/A Not applicable

5. General Aspects

5.1 Objective of this PCR

As in PCR part A.

5.2 Types of EPD in respect to life cycle stages covered

As in PCR part A

5.3 Comparability of EPD of construction products

As in PCR part A.

5.4 Additional information

As in PCR part A.

5.5 Ownership, responsibility and liability for the EPD

As in PCR part A.

5.6 Communication format

As in PCR part A.

6. Product Category Rules for LCA

As in PCR part A.

6.1 Product Category

As in PCR part A, including the following additions:

The product groups covered in this PCR are asphalt from cradle to gate with options, or laid asphalt

from cradle to grave. Cradle to gate with options includes at minimum cradle to gate (A1-A3), A4, C and D.

6.2 Life cycle stages and their information modules to be declared

6.2.1 General

As in PCR part A, including the following clarification: EPD 1 - Cradle to gate or Cradle to gate with options:

- Mandatory: Information modules A1- A3
- Mandatory: Information modules A4
- Mandatory: Information modules C1-C4
- Mandatory: Information module D
- Optional A5 + B1-B4

EPD 2 - Cradle to grave:

- Mandatory: Information modules A1- A3
- Mandatory: Information modules A4-A5
- Mandatory: Information modules B1 – B4
- Mandatory: Information modules C1-C4
- Mandatory : Information module D

6.2.2 A1-A3, Product stage, information modules

As in PCR part A, including the following further clarification.

Module A1 includes the production of raw materials used in asphalt and the production of ingredients used in the raw materials, starting with the extraction of material and energy resources from nature. The module also includes all transports of materials and energy upstream of the asphalt raw material production processes. Only materials in the final product are considered.

Module A2 includes the transportation of asphalt raw materials to the asphalt production facility. For binder transport, the energy needed, and associated emissions and resource use for keeping the bitumen hot shall also be included. The transport of reclaimed asphalt is also included here.
Module A3 includes the production of asphalt and all waste processes up to the end-of waste state or disposal of final residues during the product stage.
If a mobile asphalt production plant is used, the transport of the production plant shall be allocated to A3. 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.
In situations where the use stage is included, B4 includes all stages from A1 to A3 for the asphalt in the surfacing layer.
Energy consumption in A3 should be based upon annual averages.

6.2.3 A4-A5, Construction process stage, information modules

As in PCR part A including the following further clarification.

Module A4 includes the transportation of produced asphalt to the place where it is to be used. The energy needed, and associated emissions and resource use for keeping the asphalt hot shall also be included.

Module A5 is the construction phase, which for asphalt means the application of a layer of asphalt with a defined thickness and reference service life. All relevant processes are included, e.g. cleaning of equipment. Laying a replacement layer on a 1 m^2 surface with 4 cm of asphalt would require 100 kg of asphalt assuming a density of 2,5 tonnes per m^3. Laying asphalt on a newly built road would require in most cases several more layers, which would require much more than 100 kg asphalt per 1 m^2 surface. In the EPD, the life cycle module scenario description should clarify whether module A5 covers a replacement layer scenario or a new construction (e.g. a road) scenario.

In cases where the use stage is included in the system boundary is the replacement surfacing layer included in life cycle module B4. Note that such replacement covers the same LCI scope as the life cycle modules A1-A5 and relevant part of C1-C4 that is part of the Module B4 replacement scenario.

6.2.4 B1-B5, Use stage, information modules

As in PCR part A including the following further clarification.

When the use stage is included, all asphalt related processes that take place during the estimated service life (ESL) of the construction shall be included. For roads, a default ESL of 40 years is used. For all other constructions, a 30-year default ESL is used. Examples of constructions are given in ch 6.3.8.

In life cycle module B1, the use phase involves emissions to air and water, and in particular particulate emissions. The emissions are in part dependent on the use pattern and in part dependent on the quality of asphalt. Environmental impacts relating to indirect effects, e.g. traffic accidents or the surface texture impact of vehicles fuel consumption is not included in this PCR. The impacts relating to surface wear during the use stage shall be included as waste, and as direct or indirect environmental impacts. Impacts from the use stage shall be calculated based on average yearly asphalt wear. All wear is assumed to come from studded tires. The yearly wear shall be calculated in the following way:

Total wear = wear from heavy vehicles + wear from light vehicles.

Wear from heavy vehicles = Number of vehicles per day ("ÅDT")* wear rate for heavy vehicles (see table 2)* share of heavy vehicles (default 0,10) * share of heavy vehicles that use studded tires (default 0,251) * number of days when studded tires are allowed (default 166 days)

Wear from light vehicles = Number of vehicles per day ("ÅDT")* wear rate for light vehicles (see table 2)* share of light vehicles (default 0,90) * share of light vehicles that use studded tires (default 0,434) * number of days when studded tires are allowed (default 166 days)

Table 2: Asphalt wear rate (g/km) for vehicles with studded tires.

Asphalt type	Name	Light Vehicles	Heavy vehicle
Ska	Stone Mastic asphalt #	7,5	37,5
Ag	Asphalt concrete ##	17,5	87,5
Agb	Asphalt concrete###	22,5	112,5

Defined in EN 13108-5
Variety of asphalt concrete, in Norwegian "asfaltert grus". Defined in EN 13108-1 and The Norwegian Public Roads Administration Handbook N200
Variety of asphalt concrete in Norwegian "asfaltgrusbetong". Defined in EN 13108-1 and The Norwegian Public Roads Administration Handbook N200

The wear rates given in table 2 are assumed average values. The actual wear rate depends in great part on factors such as traffic speed and stone particle size, and could vary significantly from case to case. In cases where no wear rate is calculated, a default scenario for wear shall be used for roads, see values in parenthesis.

Module B2, maintenance of an asphalt surface, can take many forms, e.g. removing snow, applying salt, removing particles, leaves and other solid materials. These processes are mostly a result of extrinsic circumstances, such as the amount of precipitation, temperature and the presence of deciduous threes. Thus, the impact of these processes are not included.

Module B3, repair, is in Norway mostly related to cases when the existing asphalt layer is broken because of planned groundwork, e.g. laying water or sewage pipes or cables. Such repair is not attributable to the asphalt itself or the laying process, and shall not be included in the EPD. In general, repair is completed through replacement. See B4.

Module B4, replacement, starts when the service life of the asphalt surface ends. In situations where the use stage is included, B4 includes all stages information modules from A1 to A5 and C1-C4 for the asphalt in the surfacing layer. Thus, this module includes not only laying the new surfacing layer but also preparation work. This includes e.g. removing parts of the old surface, production of the asphalt and its raw materials, transport of raw materials and finishing the asphalt. The processes involved in handling waste generated during this replacement process shall also be included in this module.
The impacts of the replacement layer shall be linked to the $RSL_{asphalt}$ (reference service life) of the replacement layer, see section 6.3.3.
Module B5, refurbishment is not relevant for asphalt.

6.2.5 Modules B6 and B7

As in PCR part A. In addition, these modules are described as follows.
A number of processes are completed during the service life of an asphalt road, see module B2, maintenance. These are mostly related to safety and accessibility, e.g. removing snow, applying salt, removing particles, leaves and other solid materials. These activities cannot be defined as "operation" of the asphalt surface. Hence, these activities are not included in modules B6 or B7.

6.2.6 C1-C4 End-of-life stage, information modules

As in PCR part A, including the following further clarification.

This stage involves the removal and treatment of asphalt after the estimated service life of the construction work is over. For roads, the estimated service life is set to a default value of 40 years, for other construction works 30 years.

The deconstruction life cycle module, C1, involves milling of the existing asphalt layers at the end of life. For the removal of asphalt in cases where no replacement occurs, e.g. after a road has been decommissioned it is assumed that all asphalt layers are removed.

The transport life cycle module, C2, involves the transport of the removed asphalt to waste treatment, except in cases where repaving occurs, e.g. after the road or other construction work has been decommissioned.

Module C3, waste processing, includes processes taking place during recycling, incineration or other waste treatment that transforms the removed asphalt if no repaving occurs, e.g. from a road or other construction work that has been decommissioned.

Module C4, disposal, includes impacts incurred while asphalt removed from a road or other construction work is in a landfill site or returned to nature. This can occur e.g. after decommissioning a road. It is forbidden in Norway to deposit asphalt in nature, hence the impact at this stage is assumed to be low.

6.2.7 Benefits and loads beyond the system boundary, information module

As in PCR part A, including the following clarifications.

In addition, the system boundary is defined as the point in which used asphalt enters a recycling or recovery process. That means the negative and positive impacts of all activities occurring after this stage have been reached outside of the system boundary. This is only relevant when the asphalt is not used as a raw material in new asphalt production, and in cases whereby the construction work that asphalt has been used on, has been decommissioned. In such cases, the benefits and loads of the recycling or recovery processes may be included in module D.

6.3 Calculation rules for the LCA

6.3.1 Functional unit

As in PCR part A, with the following additions:

The functional unit for a cradle to gate EPD with options and/or cradle to grave EPD is defined as:

When the system border includes information modules A1-A5 and thus only one replacement cycle: An asphalted surface of 1 m^2, which fulfils the specified quality criteria during the Reference Service Life, $RSL_{asphalt}$.
When the system border includes one or more life information modules beyond A1-A5 and as minimum B1 and B4 in addition to C1-C4 and D: .An asphalted surface of 1 m^2, which fulfils the specified quality criteria during the Estimated Service Life of the construction: $ESL_{construction}$. For roads this is set to a default value of 40 years, whilst for other construction works it is set to 30 years.

6.3.2 Declared unit

As in PCR part A, with the following additions:
The declared unit is used for EPDs when the system boundary includes only information modules (A1-A3), A4, C1-C4 and D.

The declared unit (cradle to gate) is:

1 tonne of manufactured asphalt delivered to the construction site (A1-A4) including end-of-life treatment (C1-C4) and potential benefits/loads outsite the product system (D)

6.3.3 Reference service life and Estimated service life

As in PCR part A, with the following additions:

In this document, the reference service life (RSL) is defined for the asphalt-surfacing layer (RSL_{aphalt}) and Estimated Service Life (ESL) for the construction work of which the asphalt is a part ($ESL_{construction}$).
The RSL_{aphalt} is the expected lifetime of an asphalt-surfacing layer. The asphalt producers can define this themselves, but the claim must be documented. For roads, a default value for $RSL_{asphalt}$ as defined in PMS 2010 (table 7) serves as the estimated service life, and is used in the calculations of environmental impacts. The impacts of the surfacing layer shall be linked to the RSL of the surfacing layer. If the RSL specified by the asphalt producer (hereafter called $RSL_{asphalt, set}$) differs from $RSL_{asphalt}$ all impacts must be multiplied with the following correction factor (CF):

$CF = (RSL_{asphalt} / RSL_{asphalt\ set})$.

If the reference service life set by the producer is lower than the default lifetime, then the CF will be higher than 1. The opposite will be true if the producer uses a more durable asphalt, which gives a RSL larger than the default value. For applications other than roads. no $RSL_{asphalt}$ is given, and hence no CF shall be calculated. In such cases, the producer must use their own RSL. The rationale behind the choice of RSL shall be given and supported through supporting documentation.

Default values, 40 years for roads, and 30 years for other construction works define the ESL of the construction work.

The life cycle stages for installed asphalt are shown in *Figure 2 and Figure 3*.

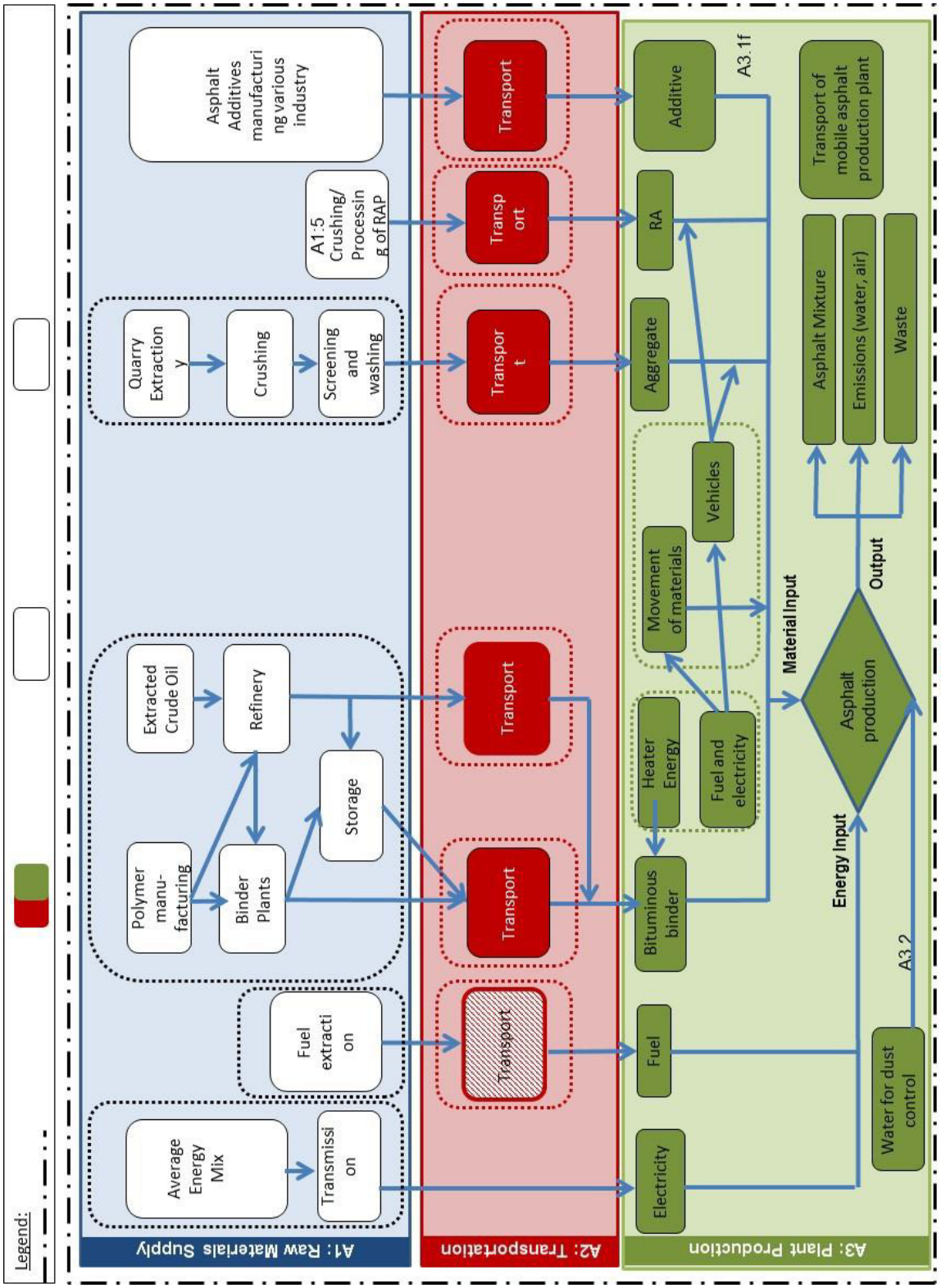

Figure 2. Asphalt product system A1-A3 (Cradle to Gate). (Based on a figure from: EAPA CFD- 15-N070).

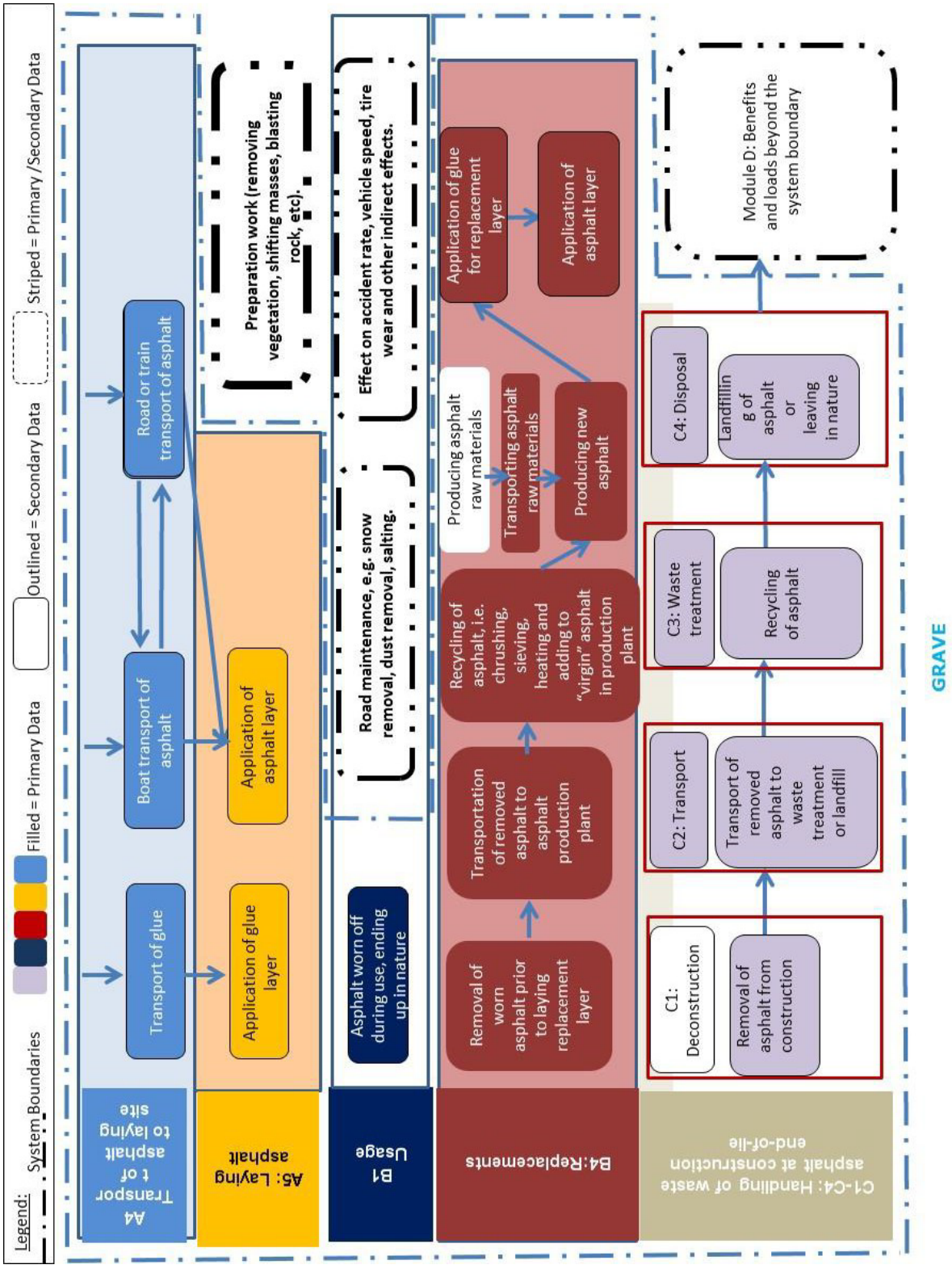

Figure 3. Asphalt product system Cradle to Gate with options or Cradle to Grave A4-D (Based on a figure from EAPA CFD-15-N070).

Bitumen shall be produced according to NS-EN 12591 *Bitumen and bituminous binders - Specifications for paving grade bitumen [8]* and NS-EN 14023 *Bitumen and bituminous binders. Framework specification for polymer modified bitumen (PMB) [9].*

Bitumen emulsion as adhesive (bond coat) in construction phase shall be used according to NS-EN 13808 *Bitumen and bituminous binders - Framework for specifying cationic bituminous emulsions* [10].

6.3.4 System boundaries

As in PCR part A, including the following additions:

The system boundaries for asphalt is described in section 6.2.1

6.3.5 Criteria for the exclusion of inputs and outputs (cut-off)

As in PCR part A, with the following exceptions:

Based upon knowledge in the industry the following fall under the cut-off limits:

- 6.3.5.1 The non-asphalt part of construction works, of which asphalt is a part, e.g. earthmoving to construct a road.
- 6.3.5.2 The production of machinery for production of asphalt, due to the assumption that the machinery has relatively low impacts relative to other impacts.
- 6.3.5.3 The production of machinery for the production of aggregates, due to the assumption that the aggregate machinery has relatively low impacts relative to other impacts.
- 6.3.5.4 Packaging.
- 6.3.5.5 Laboratory.
- 6.3.5.6 Office.
- 6.3.5.7 Business travel.
- 6.3.5.8 Travel to workplace.
- 6.3.5.9 Inspections by authorities or commissioning body.
- 6.3.5.10 Effect on vehicle emissions during laying of asphalt, e.g. due to traffic congestion.

A list of hazardous and toxic materials and substances shall be included in the inventory. The general cut-off rules do not apply to such substances. However, substances included in amounts below the limits for chemical products health and environment hazard classification do not have to be declared.

Exceptions apply for substances on the REACH candidate list and Norwegian priority list, whereby a cut-off of 0.1 % applies. All REACH candidate list substances occurring in amounts exceeding 0.1 % of the finished asphalt product must be declared. The same limit applies to all substances on the Norwegian priority list.

6.3.6 Selection of data

As in PCR part A, with the following additions:

For bitumen production, average data from Eurobitume (Eurobitume, 2020) or most recent version may be used. If specific data are used, these must be average data for the last year for which data is available.

All transports must be included and allocated based on the weight [tonne km] of transported products. For transport of produced asphalt, specific data shall be used. Specific transport distances shall be used when available, as well as transport mode, vehicle type, emissions class, fuel consumption and capacity utilisation including return load. For the transport of raw materials to asphalt production a simplified procedure may be followed using average transport distances, transport mode and vehicle type. Transport of bitumen from production facility to asphalt is an exception to this general rule. For this transport, a default value of 550 nautical miles for transport to Norway may be used. In addition, sea transport can be set as default transport mode and a load factor of 0,5 used as default.

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 waste asphalt in production and laying that is not recycled
- handling of re-claimed asphalt, e.g. crushing and sieving.

6.3.7 Data quality requirements

As in PCR part A.

6.3.8 Scenarios at the product level

As in PCR part A with the following additions:
The scenarios described below define the life cycle modules after A1-A3, for a cradle to gate EPD with options, or a cradle to grave EPD.
When the system boundary A1-A4 + C1-C4 and D is selected:
Scenarios for module A4 shall be developed based on expected transport distances, transport mode, fuel consumption, weight of asphalt load and return trip load utilisation. Emissions and resource use from keeping the asphalt hot during transport must be included.

When the system boundary A1-A5 + C1-C4 and D is chosen:
Scenarios for module A4 (see above) and module A5 must be defined. For asphalt used in roads, the reference service life ($RSL_{asphalt}$) is determined by specific expected traffic load (ÅDT, yearly average day traffic load). The pavement management system PMS2010 provides measured condition data for roads that shall be used as a basis for determination of service life. Laying a

replacement layer on other applications such as e.g. parking lots, courtyards, play grounds, airport runways the reference service life ($RSL_{asphalt}$) must be given and must be backed by supporting documentation.

6.3.9 Units

As in PCR part A.

6.4 Inventory analysis

6.4.1 Allocation of input flows and output emissions

As in PCR part A, including clarifications in the following sub-chapters:

6.4.1.1 Co-product allocation

As in PCR part A, with the following clarification:

Co-product allocation is relevant A1-A3 when several products are produced, transported or handled in the same process. For asphalt, this can occur for example when the asphalt raw materials (or their ingredients) are produced and transported or when asphalt is produced. In asphalt production and all transports, mass allocation shall be used. In raw material production, other principles can be used, see the general rules outlined in PCR part A.

6.4.1.2 Allocation for reuse, recycling or recovery

As in PCR part A, including the following clarification:

Post consumer recycled asphalt do not have a historical environmental pack-pack when recycles and used in new asphalt, but shall carry the burdens from the recycling process, however the transport from the place where it is removed to the recycling process shall be included. See section 6.2.6.

6.5 Impact assessment

As in PCR part A.

7 Content of the EPD

7.1 Declaration of general information

As in PCR part A.

7.2 Declaration of environmental parameters derived from LCA

7.2.1 General

As in PCR part A.

7.2.2 Rules for declaring LCA information per module

As in PCR part A.

7.2.3 Parameters describing environmental impacts

As in PCR part A.

7.2.4 Parameters describing resource use

As in PCR part A.

7.2.4.1 Water use

As in PCR part A.

7.2.4.2 Electricity used in A3 Manufacturing

As in PCR part A.

7.2.5 Other environmental information describing waste categories and output flows

As in PCR part A.

7.2.6 Accounting of biogenic carbon during the life cycle

As in PCR part A.

7.2.7 Greenhouse gas emissions from land use change

As in PCR part A.

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7.2.8 Carbonation

As in PCR part A.

7.3 Scenarios and additional technical information

7.3.1 General

As in PCR part A.

7.3.2 Construction process stage

7.3.2.1 A4, Transport from the production site to the construction site.

As in PCR part A, including the following clarifications:

Transport from the production site is typically carried out using heavy trucks. The return trip is assumed to be empty, but in some cases a return load is possible, e.g. used asphalt intended for recycling. Table 3 shows which information shall be provided in the EPD when module A4 is included.

Table 3. Information on the transport to the laying site (A4) required in the EPD.

Type	Capacity utilisation (incl return) %	Type of vehicle, incl emissions class	Distance km	Fuel/energy consumption pr tkm	Fuel energy consumption pr km
Truck					
Railway					
Other transport mode					

Capacity utilization is calculated as % of the mass carried of the total load capacity of the vehicle. The number given shall be the average of the capacity utilisation on the trip to the construction site and the capacity utilisation on the return trip.

7.3.2.2 A5, Installation

As in PCR part A, including the following clarifications:

This life cycle module involves the laying asphalt, and all associated processes, see scenarios described in section 6.3.8. Table4 specifies which scenario specific information about the installation is required in the EPD.

Table4. Information on the installation required in the EPD.

	Unit	Value
Auxillary, e.g. cleaning agent consumption	kg	
Electricity consumption	kWh	
Other energy carriers, e.g. natural gas or LPG	MJ	
Material loss	kg	
VOC in the air	kg	

7.3.3 Use stage

As in PCR part A, including the following clarifications:

This stage includes all processes occurring during the estimated service life of the construction work, e.g. a road, until it is ready to be decommissioned. 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, whereas the risk posed by asphalt particles is largely determined by the ingredients of the asphalt. Table 5 specifies the scenario information required for the use stage in the EPD. Table 6 contains a list of default reference service life values of a range of asphalt replacement layers.

Table5. Information about Use (B1) required in the EPD.

	Default	Value
Asphalt type	No default	
Number of vehicles pr day (ÅDT)	No default	
Share of light vehicles	0,90	
Share of heavy vehicles	0,10	
Share of light vehicles that use studded tires	0,434	
Share of heavy vehicles that use studded tires	0,251	
Number of days when studded tires are allowed	166	
Wear rate (g/km) for light vehicles for the given asphalt type	See table 2	
Wear rate (g/km) for heavy vehicles for the given asphalt type	See table 2	

Table 6. Information about Replacement (B4) required in the EPD.

	Unit	Value
Replacement cycles* during 40 years for roads, 30 years for other constructions		
Diesel consumption	l/m2	
Other energy carriers	MJ	
VOC in the air	kg	

Table 7. The default reference service life for the asphalt replacement layer ($RSL_{asphalt}$)

Name	$RSL_{asphalt}$ (Years)
Case 1. Yearly average daily traffic in excess of 20,000 vehicles	4
Case 2. Yearly average daily traffic 10,001-20,000 vehicles	5
Case 3. Yearly average daily traffic 5,001-10,000 vehicles	8
Case 4. Yearly average daily traffic 3,001-5,000 vehicles	13
Case 5. Yearly average daily traffic 1,501-3,000 vehicles	15
Case 6. Yearly average daily traffic 301- 1,500 vehicles	16
Case 7. Yearly average daily traffic < 301 vehicles	17
Case 8. Smaller roads and small and medium size applications, e.g. parking lots, driveways etc.	

7.3.4 End of life

As in PCR part A, including the following clarifications:

This stage includes all processes from the time asphalt is removed from any surface, until the time it leaves a recycling or recovery process. If asphalt remains on any surface, e.g. a disused road, landfilled or left in nature, all burdens are allocated to the product system laying the asphalt. Table 7and Table 8 specify which information about the end-of-life stage is required.

Table 8. Information on the end of life cycle modules C1, C3, C4, as required in the EPD.

	Unit	Value
Hazardous waste disposed	kg	
Collected as mixed construction waste	kg	
Reuse	kg	
Recycling	kg	
Energy recovery	kg	
To landfill	kg	

Table 9. Information on transport to waste processing (C2) required in the EPD.

Type	Capacity utilisation (incl return) %	Type of vehicle, incl emissions class	Distance km	Fuel/energy consumption pr tkm	Fuel energy consumption pr km
Truck					
Railway					
Other transport mode					

7.4 Additional information

As in PCR part A.

This clause includes all significant environmental and health impacts not included in the impact categories of this PCR see section 7.2.3.

7.4.1 Additional information on release of dangerous substances to indoor air, soil and water

7.4.1.1 Indoor air

As in PCR part A including the following addition.

No indoor emissions are expected from asphalt.

7.4.1.2 Soil, ambient air and water

As in PCR part A, including the following addition:

Emissions to air and water are likely to occur during the asphalt laying and use phases. As mentioned in section 7.3.3, asphalt will be worn from the top layer, in the form of particles, which in part will be transported to locations outside of the asphalt layer. These may release substances to air and water. In the same way, leaching or evaporation may occur directly from the road surface. The environmental effect of these must be included in the EPD, if significant. Furthermore, a description of possible occupational safety risks from laying asphalt must be given.

7.4.2 Additional Norwegian requirements

As in PCR part A and Norwegian EPD programme General Programme instructions including the following additions:

The Norwegian Public Roads Administration (NPRA) and regional municipalities have set ambitious targets for green-house gas reductions. One of the solutionas are the use of bio-based binders and additives, which are increasing in the Norwegian asphalt industry. Together with the above mentioned public roads owners and the Norwegian ascociation of contracters (EBA) there is an agreement to pilot an indicator for the effect of GHG reductions as they avait the «c-PCR Environmental product declarations – Product category rules complementary to EN 15804 for bituminous mixtures – Declaration of modules A1-A5, C1-C4 and D».

Their collected agreement is the following:

In the perspective of the life-cycle stages C3, the perception in the Asphalt industry is that the biogenic carbon content uptake from producing bio-based asphalt additives and binders in A1 is not fully released – allthought knowing it contradicts EN 15804. The reason is that asphalt is reused over and over again. Either in new asphalt or as edge filling or road gravel. In all cases, the binder remains in the asphalt and none of the asphalt is burned. Some asphalt will not come in again due to studded tire wear or other wear. It is calculated that 10% of the asphalt will not be reused on traficated asphalt layers and 1% on un-traficated layers.

The joint proposal from EBA and NPRA is to assume 10% / 1% of biogenic carbon from bio-based asphalt additives and binders is leaving the system boundary in C3 compared to the uptake in A1. The reason why only 10% / 1% of the deduction for CO2 emissions in A1 is added to C3 is that biogenic binder is assumed to be obtained from sustainably managed forestry.

Following this - table 10 could then be presented under the section of specific Norwegian requirements for information purposes:

Table 10: Declarataion of corrected GWP for asphalt

Indicator	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-total-asphalt$_{(NO)}$	kg CO_2 eq.	-	-	-	-	-	-	vv	-	-
GWP-fossil	kg CO_2 eq.	-	-	-	-	-	-	-	-	-
GWP-biogenic-asphalt$_{(NO)}$	kg CO_2 eq.	-	-	-	-	-	-	v	-	-
GWP-LULUC	kg CO_2 eq.	-	-	-	-	-	-	-	-	-

- Same as Core environmental indicators

v = Modified GHG acc. to. 7.4.2

vv = GWP-total(C3) using modified GWP-biogenic(C3)

7.5 Aggregation of information modules

As in PCR part A.

8 Project Report

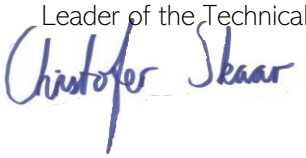
As in PCR part A.

9 Verification and Validity of an EPD

As in PCR part A.

Approved 20.01.2022, valid until 20.01.2027 Norwegian EPD Foundation, Technical committee

Christofer Skaar
Leader of the Technical committee



10 Bibliography

As in PCR part A, including the following additions:

- NS-EN 12591: 2009 Bitumen and bituminous binders - Specifications for paving grade
- bitumens.
- NS-EN 14023: 2010 Bitumen and bituminous binders. Framework specification for polymer modified bitumens.
- S-EN 13808: 2005 Bitumen and bituminous binders. Framework for specifying cationic bituminous emulsions.
- EAPA CFD-15-N070 - Guidance Document for preparing Product Category Rules (PCR) and Environmental Product Declarations (EPD) for Asphalt Mixtures
- PMS2010. Brukerveiledning for entrepenører. Statens Vegvesen, Vegdirektoratet, februar 2010. Document in Norwegian. Translated title: PMS 2010, guidance document for road contractors.

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