

Environmental Product Declaration

In accordance with ISO14025:2006 and EN15804:2012+A2:2019

Puma CarbonBind biogenic bitumen component



The Norwegian
EPD Foundation

Owner of the declaration:
Puma Energy Europe B.V.

Product name:
CarbonBind biogenic bitumen component

Declared unit:
1 metric ton

Product category /PCR:
NPCR Part A for Construction products and
services ver2 260421 + NPCR 025 2022 Part B
for Asphalt ver2-2022

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-6658-5905-EN

Registration number:
NEPD-6658-5905-EN

Issue date: 31.05.2024

Valid to: 31.05.2024

General information

Product:

CarbonBind biogenic bitumen component

Program operator:

The Norwegian EPD Foundation
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Declaration number:

NEPD-6658-5905-EN

This declaration is based on Product

Category Rules:

NPCR Part A for Construction products and services ver2 260421 + NPCR 025 2022 Part B for Asphalt ver2-2022

Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

Declared unit:

1 metric ton of bitumen component

Declared unit with option:

A1-A3, C3

Functional unit:

n/a

Verification:

Independent verification of the declaration and data, according to ISO14025:2010

internal ☐

external ☒

Sigita Židonienė

Independent verifier approved by EPD Norway



Owner of the declaration:

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Manufacturer:

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Place of production:

Vietnam

Management system:

ISO 9001:2015

Organisation no:

18052501 (Netherlands)

Issue date:

31.05.2024

Valid to:

31.05.2029

Year of study:

2022

Comparability:

EPD of construction products may not be able to compare if they do not comply with EN 15804 and are seen in a building context.

The EPD has been worked out by:

J.P.R. Meijer, The Right Environment LLC, USA

Approved



Manager of EPD Norway

Product

Product description:

Biogenic binder component for dosing into paving grade bitumen or polymer modified binder, In the final application the biogenic bitumen component replaces a proportion of the petroleum derived bitumen reducing the carbon footprint.

Product specification:

In its final application, the blend of biogenic binder component and bitumen is formulated to comply with *EN 12591 Bitumen and bituminous binders*.

Materials	Value	%
Agricultural waste derived material	100	%

Technical data:

-

Market:

Europe, Norway

Reference service life, product:

Not relevant for asphalt mix ingredients

Reference service life, building:

n/a

Additional technical information

CarbonBind biogenic bitumen component is used as a percentage in asphalt binder

LCA: Calculation rules

Declared unit:

1 metric ton

Cut-off criteria:

Per PCR Part A

Allocation:

The biogenic bitumen component is a waste product and as such is modelled free of burden

Data quality:

All data collected at Puma and its supplier is representative for the technology, geography and time period. Used literature data is from EcoInvent 3.9.

System boundaries (X=included, MND=module not declared, MNR=module not relevant)

Product stage			Assembly stage		Use stage							End of life stage				Benefits & loads beyond system boundary
Raw materials	Transport	Manufacturing	Transport	Assembly	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
X	X	X	X											X		MND

System boundary:

Manufacture of the biogenic bitumen component and transportation to Europe and subsequently to Norway is modeled.

The technical flowchart for the CarbonBind biogenic component is presented in figure 1.

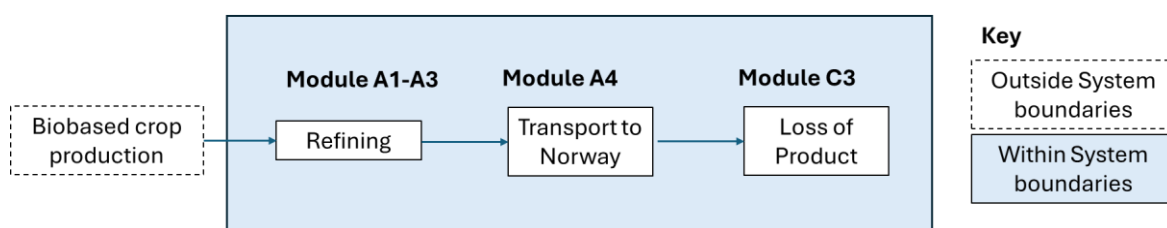


Figure 1. Technical flowchart

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

Transport from production place to assembly/user (A4)

Transport from production place to assembly/user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy consumption	Unit	Value
Ocean freight ship	100%	11981	Heavy fuel oil	kg	24.01

Assembly (A5)

MND

Use (B1)

MND

Maintenance (B2)/Repair (B3)

MND

Replacement (B4)/Refurbishment (B5)

MND

Operational energy (B6) and water consumption (B7)

MND

End of Life (C1, C3, C4)

The Asphalt Part B requires to model some release of biogenic carbon from biogenic binders in the C3 module. It requires a default release of 10% of for trafficked asphalt layers and 1% on un-trafficked layers.

Transport to waste processing (C2)

MND

Benefits and loads beyond the system boundaries (D)

MND

LCA: Results

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	C3
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GWP - total	kg CO2 eq	-2.93E+03	9.96E+01	3.00E+02 / 3.00E+01*
GWP - fossil	kg CO2 eq	6.91E+01	9.95E+01	0.00E+00
GWP - biogenic	kg CO2 eq	-3.00E+03	-1.62E-02	3.00E+02 / 3.00E+01*
GWP - luluc	kg CO2 eq	2.40E-01	8.46E-02	0.00E+00
ODP	kg CFC11 eq	2.25E-06	1.47E-06	0.00E+00
AP	molc H+ eq	5.71E-01	2.64E+00	0.00E+00
EP- freshwater	kg P eq	4.46E-03	4.16E-04	0.00E+00
EP -marine	kg N eq	1.21E-01	6.26E-01	0.00E+00
EP - terrestrial	molc N eq	1.03E+00	6.94E+00	0.00E+00
POCP	kg NMVOC eq	2.17E-01	1.90E+00	0.00E+00
ADP-M&M ²	kg Sb-Eq	7.60E-04	1.04E-04	0.00E+00
ADP-fossil ²	MJ	6.15E+02	1.19E+03	0.00E+00
WDP ²	m ³	5.12E+01	2.66E+00	0.00E+00

GWP-total: Global Warming Potential; **GWP-fossil:** Global Warming Potential fossil fuels; **GWP-biogenic:** Global Warming Potential biogenic; **GWP-LULUC:** Global Warming Potential land use and land use change; **ODP:** Depletion potential of the stratospheric ozone layer; **AP:** Acidification potential, Accumulated Exceedance; **EP-freshwater:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See “additional Norwegian requirements” for indicator given as PO4 eq. **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009

* The Asphalt Part B requires to model release of biogenic carbon from biogenic binders in the C3 module. It requires a default release of 10% of for trafficked asphalt layers and 1% on un-trafficked layers.

Additional environmental impact indicators

Indicator	Unit	A1-A3	A4	C3
PM	Disease incidence	4.78E-06	2.71E-06	0.00E+00
IRP ¹	kBq U235 eq.	7.05E-01	2.67E-01	0.00E+00
ETP-fw ²	CTUe	5.62E+03	6.26E+02	0.00E+00
HTP-c ²	CTUh	4.63E-08	4.42E-08	0.00E+00
HTP-nc ²	CTUh	2.58E-06	5.89E-07	0.00E+00
SQP ²	Dimensionless	4.09E+02	9.02E+01	0.00E+00

PM: Particulate matter emissions; **IRP:** Ionising radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality

¹ This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

² The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Resource use

Parameter	Unit	A1-A3	A4	C3
RPEE	MJ	4.04E+01	6.42E+00	0.00E+00
RPEM	MJ	2.04E+02	2.92E+00	0.00E+00
TPE	MJ	2.45E+02	9.34E+00	0.00E+00
NRPE	MJ	6.56E+02	1.20E+03	0.00E+00
NRPM	MJ	0.00E+00	0.00E+00	0.00E+00

TRPE	MJ	6.56E+02	1.20E+03	0.00E+00
SM	kg	1.00E+03	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00
W	m³	1.11E+02	1.85E-01	0.00E+00

RPEE Renewable primary energy resources used as energy carrier; **RPEM** Renewable primary energy resources used as raw materials; **TPE** Total use of renewable primary energy resources; **NRPE** Nonrenewable primary energy resources used as energy carrier; **NRPM** Nonrenewable primary energy resources used as materials; **TRPE** Total use of non-renewable primary energy resources; **SM** Use of secondary materials; **RSF** Use of renewable secondary fuels; **NRSF** Use of non-renewable secondary fuels; **W** Use of net fresh water.

End of life – Waste

Parameter	Unit	A1-A3	A4	C3
HW	kg	2.04E-03	5.92E-03	0.00E+00
NHW	kg	5.58E+00	3.21E+00	0.00E+00
RW	kg	4.71E-04	1.44E-04	0.00E+00

HW Hazardous waste disposed; **NHW** Non-hazardous waste disposed; **RW** Radioactive waste disposed.

End of life – output flow

Parameter	Unit	A1-A3	A4	C3
CR	kg	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	0.00E+00	0.00E+00	0.00E+00

CR Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energy.

Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	813,6
Biogenic carbon content in the accompanying packaging	kg C	n/a

Additional requirements

Location based electricity mix from the use of electricity in manufacturing

National electricity grid	Data source	Foreground / core [kWh]	GWP _{total} [kg CO ₂ - eq/kWh]	SUM [kg CO ₂ - eq]
Electricity, medium voltage {VN} / market for electricity, medium voltage / Cut-off, U	EcoInvent 3.9	15	0,676	10,14

Additional environmental impact indicators required for construction products

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

Parameter	Unit	A1-A3	A4	C3
GWP-IOBC	kg	5.09E+01	9.96E+01	0.00E+0

GWP-IOBC Global warming potential calculated according to the principle of instantaneous oxidation.

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

- ☒ The product contains no substances given by the REACH Candidate list.
- ☐ The product contains substances given by the REACH Candidate list that are less than 0,1 % by weight.
- ☐ The product contains dangerous substances, more then 0,1% by weight, given by the REACH Candidate List, see table.
- ☐ The product contains no substances given by the REACH Candidate list.
- ☐ The product is classified as hazardous waste, see table.

Name	CAS no.	Amount
n/a		

Indoor environment

n/a

Carbon footprint

Carbon footprint has not been worked out for the product.

Bibliography

ISO 14025:2010	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines

EN 15804:2012+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
NPCR	Part A for Construction products and services ver2 260421
NPCR025 2022 Part B for Asphalt ver2-2022	

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