Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Asphalt mixtures AC P (AC base), AC PD (AC base-surf)

from

Vilnius asphalt plant of AB Eurovia Lietuva

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	EPD-IES-0014655
Publication date:	2024-07-10
Valid until:	2029-07-05

EPD of multiple products, based on average results of the product group.
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

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction products, version 1.3.4. Together with EN 15804:2012+A2:2019/AC:2021
PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepcion, Chile. The review panel may be contacted via the Secretariat www.envirodec.com/contact
Life Cycle Assessment (LCA)
LCA practitioner: Rita Kleizienė, Road Research Institute of Vilnius Tech
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by an individual verifier Third-party verifier: Anni Oviir, LCA Support – Rangi Maja OÜ Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Company information

Owner of the EPD: AB Eurovia Lietuva

Contact: Technical and Environmental Manager Zigmantas Perveneckas

Description of the organisation: Eurovia Lietuva is one of the oldest and largest road construction companies in Lithuania. The company continues the decades-old traditions by applying the latest and most advanced road construction technologies in the Vilnius and Klaipėda regions. AB Eurovia Lietuva is a company that is specialized in the construction of roads and civil infrastructure. The company seeks to protect the environment and people's well-being by playing a proactive role in road construction to develop sustainable production of road materials.

Product-related or management system-related certifications: AB Eurovia Lietuva is certified according to ISO 9001, 14001, 45001, 50001.

Name and location of production site(s): Vilnius asphalt plant production site is located in the Vilnius suburb Riešė, about 6 km west-north of Vilnius.

Product information

Product name: Asphalt mixtures

Product identification:

Asphalt group name	Mixture types in the group	Temperature class	Binder types	Specification/ Standard
AC P (AC base)	AC 32 PS; AC 22 PS; AC 16 PS; AC 32 PN; AC 22 PN; AC 16 PN; AC 32 PL; AC 22 PL; AC 16 PL	HMA	35/50; 50/70; 70/100	EN 13108-1
AC P (AC base) with RA	AC 32 PS; AC 22 PS; AC 16 PS; AC 32 PN; AC 22 PN; AC 16 PN; AC 32 PL; AC 22 PL; AC 16 PL	HMA	35/50; 50/70; 70/100	EN 13108-1
AC 16 PD (AC base-surf)	AC 16 PD	HMA	70/100; 100/150	EN 13108-1
AC 16 PD (AC base-surf) with RA	AC 16 PD	HMA	70/100; 100/150	EN 13108-1

Product description: Asphalt plant manufacture asphalt mixtures for a variety of different purposes, ranging from highways, roads and city streets to industrial pavements. The asphalt mixtures that can be produced at the declared plant are hot mix asphalt (HMA), warm mix asphalt (WMA), soft asphalt (SA) and cold asphalt. The asphalt mixtures also are grouped by their application in the pavement. This plant can manufacture the following asphalt mixture types: asphalt concrete (AC) for surface (V), binder (A), base (P) and surface-base (PD) layers, stone mastic asphalt (SMA), noise resistant (TM) and for traffic loads - light (L), normal (N) and heavy (S). Mixtures can be produced with paving grade (PG) bitumen or polymer-modified bitumen (PMB) and with reclaimed asphalt (RA) or without.

The main components in asphalt mixtures are coarse and fine aggregates, filler and bitumen. Other materials and additives are added to ensure the durability of the layers, their content varies depending on the asphalt mixture type. These include cellulose fibre which normally constitutes 0.3% of mineral aggregates' weight. Reclaimed asphalt is added to asphalt mixtures to replace virgin aggregates and virgin bitumen.

At the plant, the manufacture of asphalt mixture is managed from the on-site control room. Aggregates, which are purchased and transported from external suppliers, are stored in open stockpiles of different fractions (e.g. 2/5, 5/8, 8/11 etc.). Fine aggregates and RA are stored in covered stockpiles (e.g. 0/2, RA etc.). The aggregates in an individual stockpile are hauled with a front loader to a cold feed bin of the asphalt plant, then together with the other aggregate fractions of a given mix formulation (recipe) are transported further by a conveyor belt running below the bins. The mixed aggregates enter a rotating dryer drum, where the materials are dried and heated to the required temperature. The heated material continues to an elevator and is further transported up to the batch tower. Then dry and hot aggregates

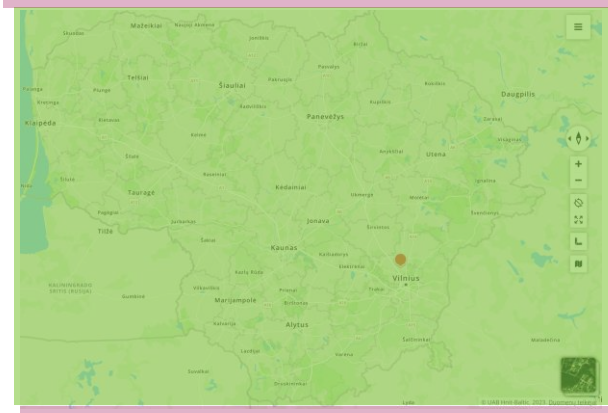
are screened and separated according to particle size and put into a weight hopper. The dry aggregates are mixed with bitumen, filler, fibres and other additives in the mixing chamber. When a homogeneous asphalt mixture is obtained and transferred with a skip hoist to an insulated storage silo before being retrieved by a truck.

The emissions (i.e. polyaromatic hydrocarbons, PAHs) generated in the dryer drum depend on production temperatures, fuel type, amount and type of techniques used for adding RA. In this plant, RA is added without preheating (cold feed) so PAHs content is minimal, all emissions created at the drying drum or at the top of the batch tower are transported for filtering at the collector.

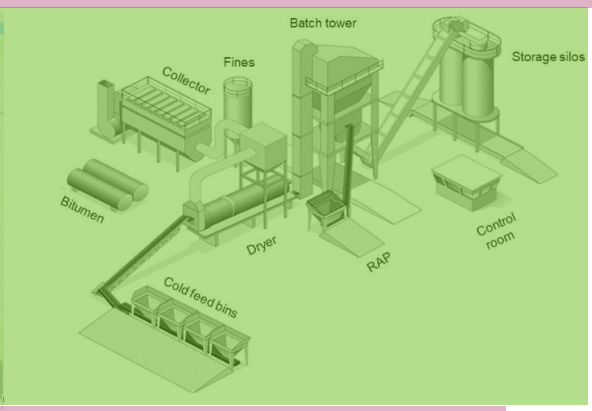
UN CPC code: 15330

Geographical scope: Lithuania

Address of production site(s): Old Ukrmergės road 185 Kirzinės vs. Maišiagalos sen. LT-14247 Vilniaus r.



Location of the AB Eurovia Lietuva asphalt production facilities



Schematic illustration of an asphalt plant

LCA information

Goal

The goal of this is to declare the environmental impact for 1 tonne of asphalt mixtures produced in Vilnius asphalt plant of AB Eurovia Lietuva based on the Product Category Rules. The result is used to understand the environmental impact of the product up until the ”factory gate”. The information provided in this declaration can be used to select asphalt mixtures during the design of engineering structures to reduce environmental impact. The audience are construction and design companies and infrastructure developers.

Declared unit

1 metric tonne (1000 kg) of manufactured asphalt mixture

Time representativeness

The primary data collected are based on the required materials and energy to manufacture the product. The primary data has been collected in the year 2022. Generic data is no older than 10 years and specific data is no older than 5 years. LCI data for polymer-modified bitumen have been adapted from the Australasian EPD Programme Ltd (2019). LCI data for bitumen is taken from Eurobitume (2021a) has been supplemented with data from Ecoinvent (3.9.1), and information on polymer content has been taken from mixture composition.

The representativeness, completeness, reliability, and consistency are judged as good.

Database(s) and LCA software used:

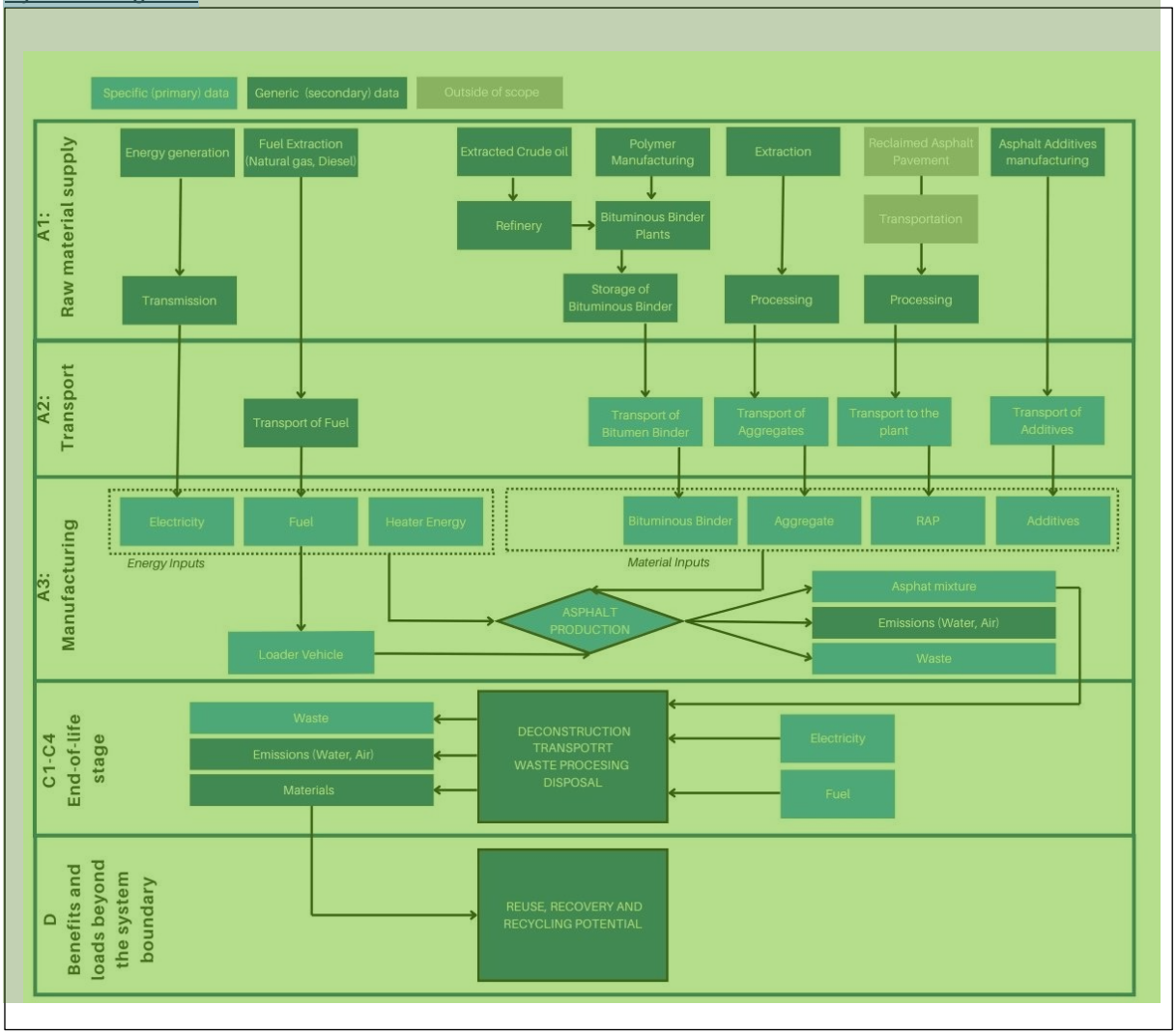
The life cycle assessment has been carried out using the software SimaPro 9.6. The database that provided the inventory data was Ecoinvent version (3.9.1, Ecoinvent 3 – allocation, cut-off, EN 15804). LCI data for bitumen was obtained from Eurobitume (2021a, 2021b). The selected potential environmental impact categories comply with EN 15804:2012+A2:2019/AC:2021 standard and are aligned with the Environmental Footprint EF 3.1 method.

Electricity in manufacturing

The Electricity in A3 accounts for less than 30% of the total energy in A1- A3. The electricity provider UAB “Ignitis”, which states that energy is produced from renewable resources, based on LCA data the GWP-GHG indicator is 1.85 g CO2 eq./kWh.

Description of system boundaries: Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D);

System diagram:



Additional information:

The key assumptions in the LCA are:

- **Asphalt composition:** The asphalt composition of each product is taken from Vilniaus Asphalt plant of AB “Eurovia Lietuva” systems. These data are considered to be of high accuracy.
- **Site energy data:** When calculating the environmental efficiency of individual asphalt mixtures, the energy used for drying aggregates was calculated for individual asphalt mixtures according to the production temperature, assigning annual energy consumption equally to all products (by mass).
- **Other site-related impacts** (site electricity use, fuel use for front loader equipment) have been attributed to asphalt products based on their respective production volumes (in tonnes). This approach assumes that the impacts are similar per tonne of asphalt product. Mass allocation is considered the most reasonable approach to attributing generic site-related environmental impacts to different products.
- Road transports are assumed to be carried out by EURO 5 standard vehicles.
- **The polymer-modified bitumen** is set to Styrene-Butadiene-Styrene SBS.
- **Asphalt mixtures is 100 % recyclable**, in calculations for module D the recycling rate is set to 90% of reuse to produce a new asphalt mixture and 10% recycling to unbound base layers. This is based on specific data provided by ”Eurovia Lietuva” representatives. The assumption is considered reasonable as the industry strives to recycle as much asphalt as possible due to

both economical and environmental benefits. This end-of-life scenario is representative as one of the most probable alternatives.

- **Asphalt mixture grouping.** The average results in the group have been obtained by modelling each asphalt mixture to determine their environmental impact, and then the average environmental impact per group has been determined and declared.

Cut-off rules:

In relation to EN 15804:2012+A2:2019/AC:2021, the cut-off criteria for input and output exclusion for the insufficient input data or data gaps for the asphalt mixture manufacturing process, is 1% of the total primary energy usage and 1% of the total mass input of the process. The total of sum of neglected input flows is not exceed 5% of energy usage and mass per stage (A1-A3, C1-C4 and D). The following cut-offs have been made:

- The packaging for the input materials used in the production process are negligible.
- Lubricants and pigments used in asphalt plant production are negligible;
- Water is not used in the asphalt plant production;
- Asphalt mixtures as products have been grouped based on mass allocation of raw materials.

Validation of the data:

Primary data collection by the manufacturer are based on the required materials and energy to manufacture the asphalt product. The data of the raw materials are collected per declared unit (1 tonne). All necessary life cycle inventories for the basic materials are available in the database or EPDs. No generic selected datasets (secondary data) used are older than ten years. No specific data collected is older than five years and represent a period of one year. The representativeness, completeness, reliability and consistency are judged as good.

Product end of the life

The EPD details information about the scenarios taken into account, based on these guidelines or on specific scenarios defined by the company to represent the certified product at the downstream stage. All scenarios used in this study are plausible.

In the demolition phase the asphalt is removed by cold milling. It was calculated that the energy consumption of a demolition process for asphalt is on average 0.32 liters of diesel per tonne of asphalt (C1). It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed that it has the same weight as the decreased product. Transportation distance to the waste treatment facility, which is located in the asphalt plant, is estimated 50 km by transporting with EURO5 type lorry (C2). At the waste treatment facility, milled asphalt is recycled and diverted for further use. Two scenarios have been analysed: (1) when 100% of crushed asphalt pavement is reused, and (2) when 90% of reclaimed asphalt is reused to produce new asphalt mixtures and 10 % of RAP is recycled and used for unbound road layers. Scenario 2 included in the following study is representative as one of the most probable alternatives.

EOL scenario	Recycling to use in new asphalt mix, %	Recycling to use in unbound base, %	Landfilling, %	Incineration,%	Transportation, km
Scenario 1	100	0	0	0	50
Scenario 2	90	10	0	0	50

Modules declared, geographical scope, share of specific data and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	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
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	LT/ EU	LT/ EU	LT	ND	ND	ND	ND	ND	ND	ND	ND	ND	LT	LT	LT	LT	LT
Share of specific data	**>90%**			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation products	**<10%**			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	**0**			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X – module is included in this study
ND – module is not declared
The results of modules A1-A3 have to be considered together with module C.

Content information

The content of declared asphalt mixtures is presented in table below. The asphalt mixtures have been grouped based on the average mass of materials for determination of the impact categories. In the table, the composition of the asphalt mixture is presented in percentages and intervals depending on the type of mixtures, as this is a company secret.

The packaging of asphalt mixtures is negligible since after mixing the loose mixture is poured straight to the trailer.

The products do not contain any substances of very high concern (SVHC) according to REACH.

Group No	Group name	Mixture types in the group	Aggregate material type	Aggregates, %			RA, %	Added binder content, %	Binder types (definitive)
				< 0.063	0.063-2	>2			
6.	AC P (AC base) HMA	AC 32 PS; AC 22 PS; AC 16 PS; AC 32 PN; AC 22 PN; AC 16 PN; AC 32 PL; AC 22 PL; AC 16 PL	Dolomite/ Gravel	4	28	68	0	3.8	35/50; 50/70; 70/100
7.	AC P (AC base) with RA HMA	AC 32 PS; AC 22 PS; AC 16 PS; AC 32 PN; AC 22 PN; AC 16 PN; AC 32 PL; AC 22 PL; AC 16 PL	Dolomite/ Gravel	4	28	68	25	2.7	35/50; 50/70; 70/100
14	AC 16 PD (AC base - surf) HMA	AC 16 PD	Dolomite/ Gravel	8	32	60	0	5.2	70/100; 100/150
15	AC 16 PD (AC base - surf) with RA HMA	AC 16 PD	Dolomite/ Gravel	8	32	60	20	4.3	70/100; 100/150

Results[1] of the environmental performance indicators

Mandatory impact category indicators according to EN 15804+A2, EF 3.1

Impact category	Unit	AC P (AC base), AC P (AC base) with RA, AC 16 PD (AC base and surf), AC 16 PD (AC base and surf) with RA					
		AC 32 PS; AC 22 PS; AC 16 PS; AC 32 PN; AC22PN; AC 16 PN; AC 32 PL; AC 22 PL; AC 16 PL; AC 16 PD					
		A1-A3	C1	C2	C3	C4	D
Climate change - Total	kg CO_2 eq.	59.64	1.21	5.20	0.70	0.00	-25.31
Climate change - Fossil	kg CO_2 eq.	59.51	1.21	5.19	0.70	0.00	-25.25
Climate change - Biogenic	kg CO_2 eq.	1.11E-01	2.77E-04	3.99E-03	1.60E-04	0.00	-4.24E-02
Climate change - Land use and land use change	kg CO_2 eq.	2.27E-02	1.36E-04	2.44E-03	7.85E-05	0.00	-1.39E-02
Ozone depletion	kg CFC 11 eq.	2.19E-06	1.92E-08	1.14E-07	1.11E-08	0.00	-8.83E-07
Acidification	mol H+ eq.	2.02E-01	1.12E-02	1.75E-02	6.47E-03	0.00	-1.35E-01
Eutrophication aquatic freshwater	kg P eq.	4.89E-03	3.70E-05	3.69E-04	2.14E-05	0.00	-3.33E-03
Eutrophication aquatic marine	kg N eq.	5.92E-02	5.18E-03	6.05E-03	3.00E-03	0.00	-3.66E-02
Eutrophication terrestrial	mol N eq.	6.49E-01	5.63E-02	6.39E-02	3.26E-02	0.00	-4.05E-01
Photochemical ozone formation	kg NMVOC eq.	2.34E-01	1.67E-02	2.72E-02	9.65E-03	0.00	-1.28E-01
Depletion of abiotic resources - minerals and metals*	kg Sb eq.	1.30E-04	4.22E-07	1.40E-05	2.44E-07	0.00	-7.96E-05
Depletion of abiotic resources - fossil fuels*	MJ, net calorific value	2589.73	15.69	74.37	9.07	0.00	-1929.21
Water use*	m3 world eq. deprived	22.99	0.03	0.36	0.02	0.00	-19.56

* 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.

Environmental impact indicator GWP-GHG

Impact category	Unit	AC P (AC base), AC P (AC base) with RA, AC 16 PD (AC base and surf), AC 16 PD (AC base and surf) with RA					
		AC 32 PS; AC 22 PS; AC 16 PS; AC 32 PN; AC22PN; AC 16 PN; AC 32 PL; AC 22 PL; AC 16 PL; AC 16 PD					
		A1-A3	C1	C2	C3	C4	D
GWP-GHG	kg CO_2 eq.	59.53	1.21	5.19	0.70	0.00	-25.26

Additional environmental impact indicators according to EN 15804+A2, EF 3.1

Impact category	Unit	A1-A3	C1	C2	C3	C4	D
Particulate matter emissions	Disease incidence	3.49E-06	3.12E-07	5.25E-07	1.80E-07	0.00E+00	-1.58E-06
Ionizing radiation, human health**	kBq U235 eq.	1.42E+01	7.50E-03	9.58E-02	4.34E-03	0.00E+00	-1.23E+01
Eco-toxicity (freshwater)*	CTUe	1.46E+02	5.69E+00	2.69E+01	3.29E+00	0.00E+00	-9.01E+01
Human toxicity, cancer effects *	CTUh	2.02E-08	3.70E-10	2.25E-09	2.14E-10	0.00E+00	-1.16E-08
Human toxicity, non-cancer effects *	CTUh	3.36E-07	2.57E-09	5.46E-08	1.49E-09	0.00E+00	-1.99E-07
Land use related impacts/Soil quality*	dimension less	2.79E+02	1.06E+00	7.71E+01	6.15E-01	0.00E+00	-1.66E+02

*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.

**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

[1] It is discouraging to use the results of modules A1-A3 without considering the results of module C.

Resource use indicators per functional unit

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	5.78	0.02	0.25	0.01	0.00	-2.35
PERM	MJ	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	5.78	0.02	0.25	0.01	0.00	-2.35
PENRE	MJ	1.13E+03	1.68E+01	8.07E+01	1.67E+03	0.00	-2.07E+03
PENRM	MJ	1.66E+03	0.00E+00	0.00E+00	-1.66E+03	0.00	0.00E+00
PENRT	MJ	2.79E+03	1.68E+01	8.07E+01	9.71E+00	0.00	-2.07E+03
SM	kg	1.01E+02	0.00	0.00	0.00	0.00	8.99E+02
RSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00
FW	m^3	0.59	0.00	0.01	0.00	0.00	-0.48
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

Waste indicators

Final waste and output flows, refers to flows that are leaving the system of the LCA. In this LCA only elementary flows (substances) are leaving the system. For the manufacturing, there are no such flows for any type of asphalt. All waste equals zero due to the use of ecoinvent as the database, which already accounts for the waste in the datasets.

Output flow indicators

Results per declared unit							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0
Material for recycling	kg	0	0	0	1000	0	0
Materials for energy recovery	kg	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0

Other environmental performance indicators

In accordance with EN 15804+A2, the biogenic carbon content of asphalt mixtures containing cellulose has not been calculated due to the fact that the amount is less than 5 % of the total mass of the final product.

Additional environmental information

Reclaimed asphalt is used in several of the declared asphalt mixtures, which contributes to a reduced use of virgin raw materials. With the mixing of reclaimed asphalt, not only does the amount of aggregate decrease, but also the amount of added binder decreases.

Differences versus previous versions

There are no previous versions of this EPD.

References

Kleizienė, R. (2024). LCA Report, Road Research Institute of Vilnius TECT.

Eurobitume. (2021a). 2021 update to the Eurobitume Life-Cycle Inventory For Bitumen (Version 3.1). Eurobitume
https://www.eurobitume.eu/fileadmin/Feature/LCI/EUB2975.001_LCI_Update_2020_01_LR_pages.pdf

Eurobitume. (2021b). Life Cycle Inventory 2021 update, without Infrastructure - Bitumen [Excelfil]. Eurobitume

The Australasian EPD Programme Ltd (2019). Appendix to product category rules for asphalt mixtures – Australia.

EN 15804:2012+A2:2020 Sustainability of construction works – Environmental product declarations – Core rules for product category of construction products

EN ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO 14040:2006: Environmental management - Life cycle assessment — Principles and framework
ISO 14044:2006: Environmental management — Life cycle assessment — Requirements and guidelines

EN 15643-5:2017: Sustainability of construction works - Sustainability assessment of buildings and civil engineering works - Part 5: Framework on specific principles and requirement for civil engineering works -> parallel standard

ISO/FDIS 21931-2:2018 Sustainability in buildings and civil engineering works -Framework for methods of assessment of the sustainability performance of construction works - Part 2: Civil engineering works.

Product category rules (PCR) (2024) Construction products PCR 2019:14, Version 1.3.4 Valid until 2025-06-20

EPD®

www.environdec.com