

# Environmental Product Declaration for asphalt mixtures from Stockholm asphalt plant – Arlanda, 2023



According to EN 15804:2012+A2:2019/AC:2021,  
ISO 14025, ISO 14040 and ISO 14044  
Programme operator: EPD International AB  
EPD owner: NCC Industry Nordic AB

Date of publication (issue): 2021-04-26  
Date of revision: 2024-11-20  
Date of validity: 2027-11-01  
Reg. no. EPD-IES-0003443:005 (S-P-03443)

The verifier and the program operator do not make any claim nor have any responsibility of the legality of the product, its production process or its supply chain. 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](http://www.environdec.com).

See Table 1 for all declared asphalt mixtures in this EPD.

## EPD Information

Declared unit: 1000 kg product

PCR: Product Category Rules PCR 2019:14 Construction products, version 1.11 of 2021-02-05

Programme: The International EPD® System, [www.environdec.com](http://www.environdec.com)



## General product information

The asphalt mixtures declared are manufactured at Arlanda asphalt plant in Stockholm, by NCC Industry, Division Asphalt in Sweden.

Asphalt plants manufacture asphalt mixtures for paving purposes. The asphalt mixtures that can be produced at the declared plant are hot mix asphalt (HMA), warm mix asphalt (WMA), soft bitumen asphalt (SA) and polymer modified asphalt (PMB).

The main components in asphalt mixtures are mineral rock aggregates and bitumen. Other materials are added, and the content varies depending on the asphalt type. These include for instance amines and fibre and they normally constitute less than 0.5 weight-% of the product. In addition, Reclaimed Asphalt (RA) is usually added to the asphalt mixture, replacing virgin aggregates and virgin bitumen. The content declaration of the asphalt mixtures declared is shown in the section Content declaration including packaging, Table 6.

The temperature class of the asphalt mixtures is given in Table 1.

Table 1: Temperature class of the asphalt mixtures declared.

#	Asphalt mixture	Temperature class
1	ABb 22 50/70	HMA
2	ABS 16 70/100 AN7	HMA
3	ABS 16 70/100	HMA
4	ABS 16 45/80-55 70 AN7	PMB
5	ABT 11 70/100	HMA
6	ABT 16 70/100	HMA
7	ABT 16 45/80-55	PMB
8	AG 16 160/220	HMA
9	AG 22 160/220	HMA
10	AG 32 70/100	HMA
11	AGF 22 70/100 LTA	WMA
12	AG 22 70/100 LTA	WMA
13	ABT 11 100/150 LTA	WMA
14	AG 16 160/220 LTA	WMA
15	ABS 16 70/100 AN6	HMA
16	AG 16 70/100	HMA
17	ABb 16 70/100	HMA
18	ABT 16 70/100 AN7	HMA
19	Strongfalt 16 70/100 AN6	HMA

20

ABT 8 160/220

HMA

At the asphalt plant, the manufacture of a typical asphalt mixture is managed from the on-site control room where adjustments are made to individual raw materials. A schematic illustration of an asphalt plant is shown in Figure 1.

Aggregates, which are obtained either from the quarry on-site or purchased from external suppliers, are stored in stockpiles of different fractions (e.g. 0/4, 4/8 and 8/11 etc). The aggregates in an individual stockpile are hauled to a cold feed bin of the asphalt plant before transported further, together with the other aggregate fractions of a given recipe, by a conveyor belt running below the bins. The mixed aggregates enter a rotating dryer drum, where the material is dried and heated to desired temperature. The heated material continues to an elevator and is further transported up to the batch tower.

The next step comprises screening using a hot screen where the heated aggregates are separated according to grain size and put into a weigh hopper. The material is mixed with bitumen, filler, fibres and other additives, such as adhesive agents (amines or cement), in the mixing chamber. When a homogeneous asphalt mixture is obtained it is transferred with a skip hoist to an insulated storage silo before being retrieved by a truck.

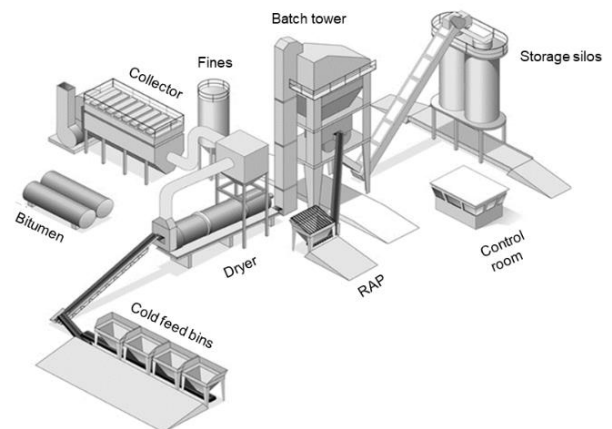


Figure 1: Schematic illustration of an asphalt plant

A schematic illustration of the production process of asphalt in general is presented in Figure 2.

The dashed lines illustrate the six different methods of adding RA to an asphalt mixture. Arlanda asphalt plant uses the methods “parallel drum”.

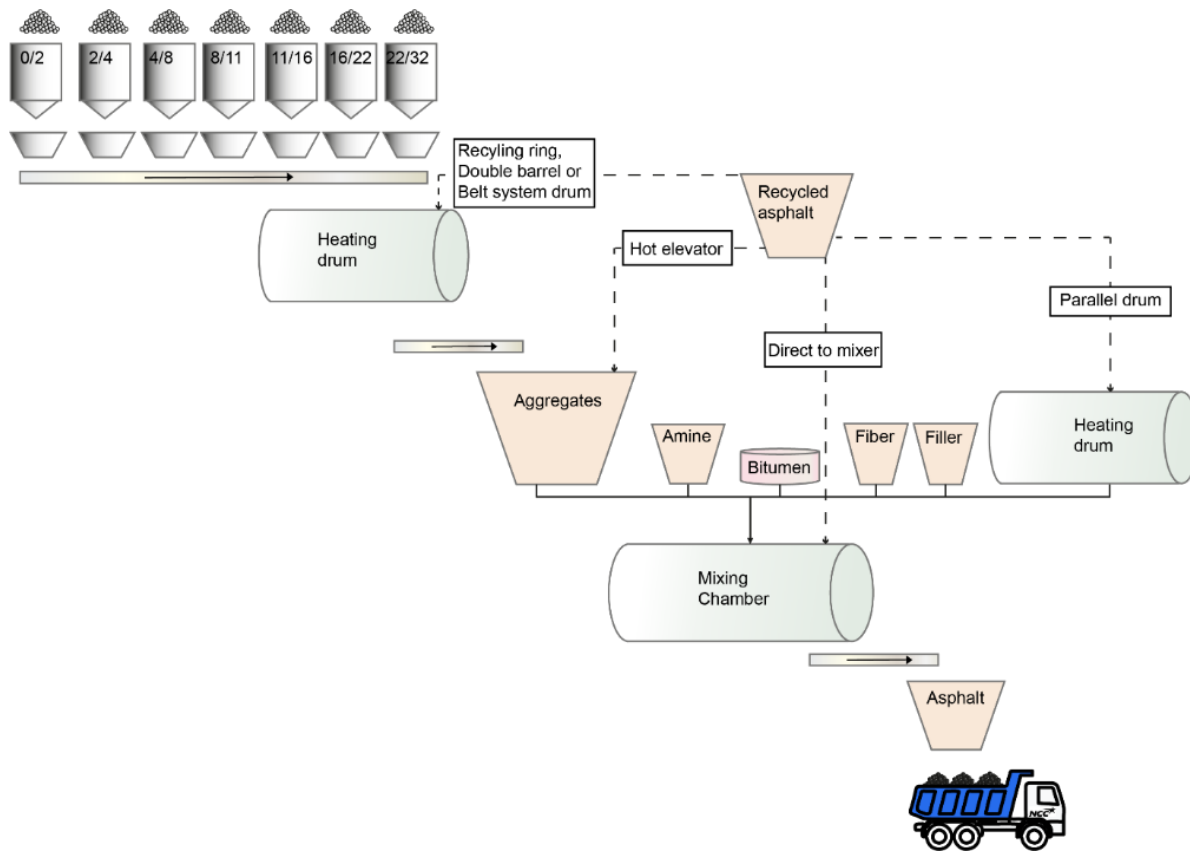


Figure 2: Illustration of the general production process of asphalt.

It is important to treat emissions (i.e. polycyclic aromatic hydrocarbons, PAHs) generated in the dryer drum. Such emissions largely depend on production temperature, fuel type, amount and type of technique used for adding RA. Depending on technique used, PAHs created at the drying drum or at the top of the batch tower are transported for filtering at the collector.

Warm Mix Asphalt is a production method used by NCC for manufacturing of any type of asphalt but at a lower temperature compared to conventionally produced asphalt mixtures. To obtain the temperature reduction a foaming technique is used. Water is injected into the bitumen, which expands and forms a foam of bitumen in a foaming chamber. The bitumen is mechanically foamed inside the chamber where the binder increases roughly 20

times in volume before it is mixed with the heated aggregates and the reclaimed asphalt. The procedure reduces the binder viscosity and the compatibility of the asphalt mixture thus allowing it to be laid at typically 30°C lower temperature than conventionally produced asphalt. All other raw materials are added following the same principle as described for conventional asphalt production.

The products declared are classified as the United Nations Central Product Classification (UN CPC) code 15330. The products declared follow the technical standards SS-EN 13108-1, SS-EN 13108-3, SS-EN 13108-5 and SS-EN 13108-7.

The geographical location of the Arlanda asphalt plant is shown in Figure 3.



Figure 3: Map and picture showing the geographical location of the declared plant.

### Declared unit

The declared unit is 1 tonne (1000 kg) of asphalt mixture.

### System boundary

The system boundaries cover aspects such as temporal and geographical. The setting of system boundaries follows two principles according to EN 15804: (1) The “modularity principle” and (2) the “polluter pays principle”.

This is a “cradle to gate with modules C1–C4 and module D” EPD and it is based on a LCA model described in the background report and in the related annex (see reference list). The declared modules are A1-A3, C, D, see Table 2. The product system under study is presented in Figure 4. Figure 4 is modified and originates from the PCR 2018:04 Asphalt Mixtures, version 1.03 of 2019-09-06. The figure has been slightly adjusted to be in line with EN 15804.



Table 3: Share specific data for each asphalt mixture.

#	Asphalt mixture	Share specific data (%)
1	ABb 22 50/70	40
2	ABS 16 70/100 AN7	26
3	ABS 16 70/100	29
4	ABS 16 45/80-55 70 AN7	16
5	ABT 11 70/100	32
6	ABT 16 70/100	34
7	ABT 16 45/80-55	21
8	AG 16 160/220	42
9	AG 22 160/220	44
10	AG 32 70/100	43
11	AGF 22 70/100 LTA	33
12	AG 22 70/100 LTA	39
13	ABT 11 100/150 LTA	32
14	AG 16 160/220 LTA	40
15	ABS 16 70/100 AN6	14
16	AG 16 70/100	39
17	ABb 16 70/100	39
18	ABT 16 70/100 AN7	32
19	Strongfalt 16 70/100 AN6	12
20	ABT 8 160/220	27

Data that represent the current situation of the production process at the plant are used. All input data used in the LCA model (e.g. raw materials and production data) that NCC Industry has influence over are plant-specific data for the production year 2023, except for data on waste that is based on 2020. The geographical scope, i.e. location(s) of use and end-of-life performance, is Sweden.

The environmental impact from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process are not accounted for in the Life Cycle Inventory (LCI). Personnel-related impacts, such as transportation to and from work, are neither accounted for in the LCI.

Declaration of the RSL is only possible if B1-B5 are included, i.e. RSL is not assessed.



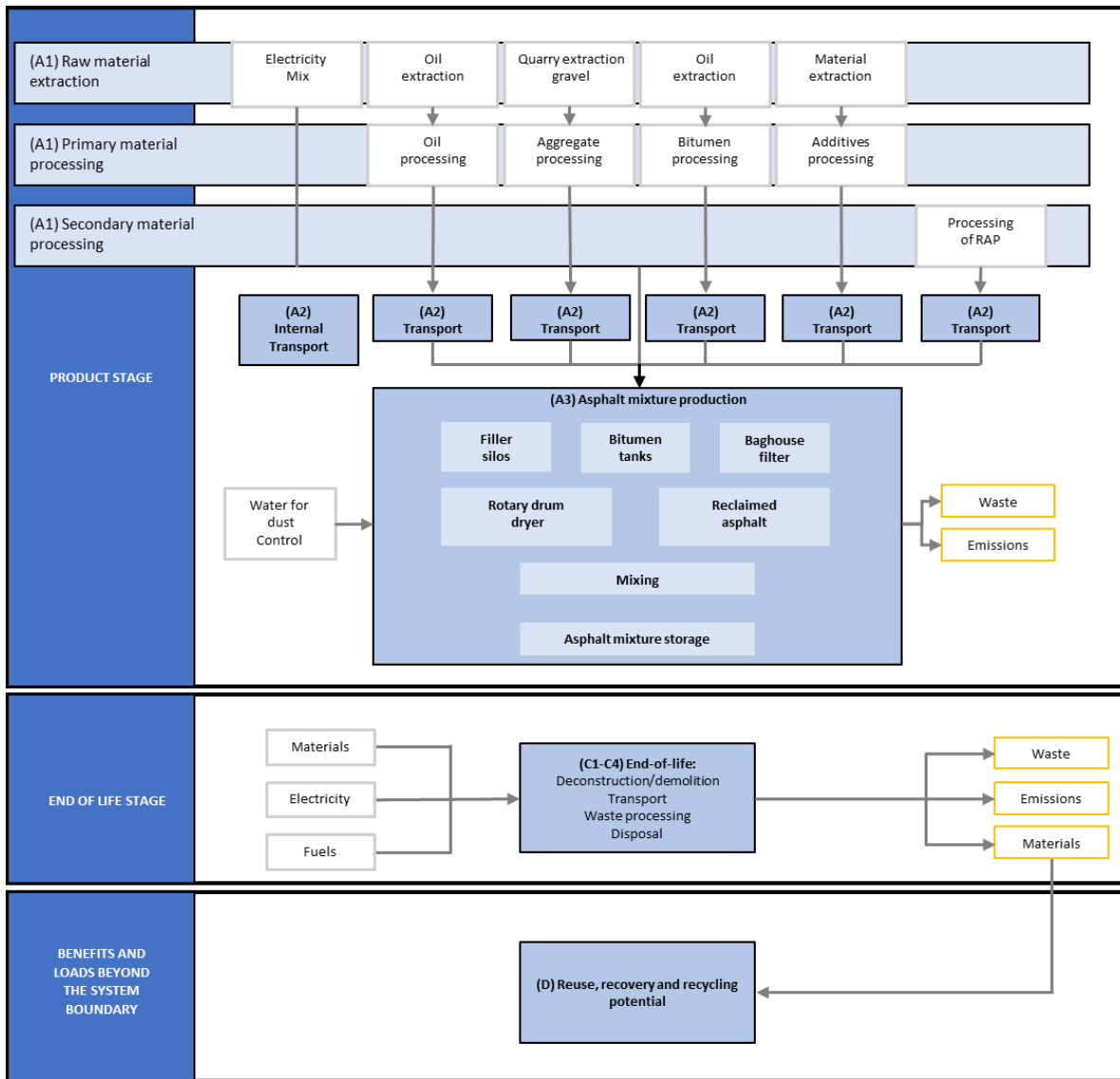


Figure 4: System boundaries for the studied product system.

## Assumptions and approximations

It is possible to vary the share of RA in the asphalt mixtures. Results are presented for asphalt mixtures containing the mean share. The mean share is the actual annual average RA share in the asphalt mixtures at the plant. In addition, the result for no RA content and the maximum possible share of RA are presented for the impact category GWP-GHG. The maximum is the highest possible RA share for the given product at the plant. By doing so, the improvement potential is shown which can drive the development to demand asphalts mixtures with a higher share of RA.

The content of aggregate and bitumen in RA is assumed to 95.5% aggregates and 4.5% bitumen on average.

The RA replacing virgin aggregates is assumed to have the same fraction sizes (0/2, 2/4 etc) as the fractions of virgin aggregates in the asphalt mixtures. This is a conservative assumption since RA is

normally replacing small size-fractions of aggregates which have a higher environmental impact than larger fractions.

PAHs emitted to air during production are approximately 40 mg per tonne asphalt produced. This is based on that bitumen heated to about 150°C emits PAHs less than 10 mg/kg\*h heated (The German BITUMEN Forum 2016). The hot bitumen is contained in a closed system so no direct emission to air occurs at the asphalt plant, except when the asphalt is transported in contact with outside air. According to measurements and expertise judgments on-site, the time when the asphalt mixture is exposed to air is about five minutes. This time frame is a very conservative estimate. This means that the total direct PAH emissions to air during production are on average 40 mg/tonne asphalt produced.

## Allocation

The asphalt manufacturing process does not produce any co-products.

During normal production in an asphalt plant, steady-state in terms of mass flow or temperatures rarely exists. Instead, there are numerous transients with varying extensions and time delays. In addition, there are ad-hoc adjustments within a specific asphalt mixture because of e.g. weather and transport distance. Therefore, the heat required for specific asphalt mixtures cannot simply be inferred from statistical production data. Instead, allocation between mixtures is based on yearly sums of produced amounts of asphalts and used energy, which is subsequently allocated to mixtures according to a thermodynamic model of asphalt heating described in Ekblad and Lundström (2013). The allocation model is described in the background documentation to this EPD.

Concerning the manufacture of various mixtures, four temperature classes are defined with respect to their annual average production temperature, as summarized in Table 4. The average temperature for each class is based on local experience and requirements in standards. Production temperatures can vary slightly between plants.

Table 4: Temperature classes and corresponding average production temperatures.

Temperature class	Annual average production temperature [°C]
Polymer modified (PMB)	170
Conventional hot mix asphalt (HMA)	160
Reduced temperature, warm mix asphalt (WMA)	130
Soft asphalt (SA)	100

## Cut-offs

The cut-off criteria are 1% of the renewable and non-renewable primary energy usage and 1% of the total mass input of the manufacture process (according to the EN 15804 standard).

In the assessment, all available data from the production process are considered, i.e. all raw materials used, utilised ancillary materials, and energy consumption using the best available LCI datasets.

The following cut-offs have been made:

- The packaging for the input materials used in the production process are negligible.

- Lubricants used in the asphalt plant production are negligible.

## Software and database

The LCA software “LCA for Experts” (formerly GaBi Professional) and its integrated database from Sphera has been used in the LCA modelling.

## Electricity in manufacturing

If the electricity in module A3 accounts for more than 30% of the total energy in stage A1 to A3, the energy sources behind the electricity grid in module A3 shall be documented, including the LCA data of grams CO<sub>2</sub> eq./kWh. For transparency the information is given in Table 5 even though electricity in A3 accounts for less than 30% of the total energy in A1-A3.

Table 5: Electricity in manufacturing (A3).

Energy source	LCA data (g CO <sub>2</sub> eq./kWh)
Hydropower	14.3

## Data quality

The primary data collected by the manufacturer are based on the required materials and energy to manufacture the product. The data of the raw materials are collected per declared unit. All necessary life cycle inventories for the basic materials are available in the database or via 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 about one year. The representativeness, completeness, reliability and consistency are judged as good.

## About NCC

NCC is one of the leading construction and property development companies in the Nordic region, with sales of 57 billion SEK and approximately 12 200 employees in 2023. With the Nordic region as its home market, NCC is active throughout the value chain – developing commercial properties and constructing housing, offices, industrial facilities and public buildings, roads, civil engineering structures and other types of infrastructure. NCC also offers input materials used in construction and accounts for paving and road services.

NCC’s vision is to renew our industry and provide superior sustainable solutions. NCC aims to be the leading society builder of sustainable environments and will proactively develop new businesses in line with this.



NCC works to reduce both our own and our customers' environmental impact and continues to further refine our offerings with additional products and solutions for sustainability. In terms of the environment, this entails that NCC, at every step of the supply chain, is to offer resource and energy-efficient products and solutions to help our customers reduce their environmental impact and to operate more sustainably.

NCC's sustainability work is based on a holistic approach with all three dimensions of sustainability – social, environmental and economical. NCC's sustainability framework is divided into eight impact areas: Data and expertise, Natural resources and biodiversity, Materials and circularity, Climate and energy, Health and safety, People and team, Ethics and compliance and Economic performance. Our sustainability strategy includes the aim of being both a leader and a pioneer in these areas.

NCC reports on its sustainability progress each year and the report has been included in NCC's Annual Report since 2010. NCC applies Global Reporting Initiative (GRI) Standards, the voluntary guidelines of the GRI for the reporting of sustainability information. In addition to GRI, NCC also reports the Group's emission of greenhouse gases to the CDP each year. NCC is a member in BSCI (Business Social Compliance Initiative), which is the broadest business-driven platform for the improvement of social compliance in the global supply chain and has been a member of the UN Global Compact since 2010. The UN Global Compact is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with 10 defined and universally accepted principles in the areas of human rights, labour, environment and anti-corruption.

Also visit: <https://www.ncc.com/sustainability>

### EPD owner

NCC Industry Nordic AB, Herrjärva torg 4, 170 80 Solna, Sweden.

Patrik Österberg, +46 70 020 57 37,  
[patrik.osterberg@ncc.se](mailto:patrik.osterberg@ncc.se)

## Content declaration including packaging

The products do not contain any substances of very high concern (SVHC) according to REACH. Table 6 presents the content of all asphalt mixtures as ranges since it is at corporate secrecy and varies

depending of the mixture. This refers to the actual annual mean share of RA. The mass of biogenic carbon in the products is less than 5%. The packaging material is negligible.

Table 6: Content declaration of the asphalt mixtures declared (ranges for declared products).

Product component	Weight, kg	Post-consumer material, weight-%	Renewable material weight-%
Reclaimed Asphalt (RA)	0 - 391	0 – 39	0
Aggregates 0/2	53 - 338	*	0
Aggregates 2/4	19 - 222	*	0
Aggregates 4/8	0 - 287	*	0
Aggregates 8/11	0 - 229	*	0
Aggregates 11/16	0 - 334	*	0
Aggregates 16/22	0 - 162	*	0
Aggregates 22/32	0 - 88	*	0
Quality aggregates 4/8	0 - 111	*	0
Quality aggregates 8/11	0 - 205	*	0
Quality aggregates 11/16	0 - 736	*	0
Bitumen, virgin	27 - 62	0	0
Polymer modified bitumen (PMB), virgin	53 - 63	0	0
Fibre	< 10	0	90
Baghouse fines	24 - 89	2 – 9**	0
Liquid adhesion (Amine)	< 10	0	0
Packaging material	Weight, kg	Weight-% (versus the product)	
Negligible for all product components	Negligible	Negligible	

\*Data is not available, probably 0.

\*\*Could be either pre- or post-consumer material.

## Environmental performance

The environmental performance results are presented for asphalt mixtures containing the actual annual mean share of RA.

The results of the life cycle assessment based on the declared unit for asphalt mixtures containing the actual annual mean share of RA are presented in Table 7 and 8 (core environmental indicators),

Table 9 and 10 (resource use) and Table 11 and 12 (waste categories and output flows).

In addition, the result for GWP-GHG is presented for asphalt mixtures containing no RA and the potential maximum share of RA. This is presented in Table 15 and 16.

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.

Table 7: Results of the LCA (modules A1-A3) – Core environmental indicators per declared unit of specific asphalt mixtures. The table presents results for asphalt mixtures containing the actual annual mean share of Reclaimed Asphalt (RA).

Core environmental indicators			1	2	3	4	5
			ABb 22 50/70	ABS 16 70/100 AN7	ABS 16 70/100	ABS 16 45/80-55 70 AN7	ABT 11 70/100
Impact category	Unit	A1-A3	A1- A3	A1- A3	A1- A3	A1-A3	A1-A3
Climate change	Total	kg CO <sub>2</sub> eq.	15	22	19	34	18
	Fossil	kg CO <sub>2</sub> eq.	15	22	19	34	18
	Biogenic <sup>a</sup>	kg CO <sub>2</sub> eq.	0	0	0	0	0
	Land use and land use change	kg CO <sub>2</sub> eq.	0.021	0.046	0.027	0.047	0.025
	GWP-GHG	kg CO <sub>2</sub> eq.	15 <sup>c</sup>	22 <sup>b</sup>	20 <sup>b</sup>	35 <sup>p</sup>	18 <sup>b</sup>
Ozone depletion	kg CFC 11 eq.	5.4E-07	8.7E-07	8.6E-07	8.6E-08	8.2E-07	
Acidification	mol H <sup>+</sup> eq.	0.12	0.17	0.16	0.30	0.15	
Eutrophication aquatic freshwater	kg P eq.	7.5E-04	1.0E-03	1.0E-03	3.6E-03	1.0E-03	
Eutrophication aquatic marine	kg N eq.	0.041	0.059	0.053	0.078	0.051	
Eutrophication terrestrial	mol N eq.	0.38	0.57	0.51	0.76	0.48	
Photochemical ozone formation	kg NMVOC eq.	0.10	0.15	0.14	0.21	0.13	
Depletion of abiotic resources - minerals and metals	kg Sb eq.	2.3E-06	2.3E-06	2.4E-06	2.4E-06	2.3E-06	
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	1671	2619	2571	3162	2420	
Water use	m <sup>3</sup> world eq. deprived	3.5	3.9	4.0	22	3.7	

Core environmental indicators			6	7	8	9	10
			ABT 16 70/100	ABT 16 45/80-55	AG 16 160/220	AG 22 160/220	AG 32 70/100
Impact category	Unit	A1-A3	A1- A3	A1- A3	A1- A3	A1-A3	A1-A3
Climate change	Total	kg CO <sub>2</sub> eq.	17	27	14	13	14
	Fossil	kg CO <sub>2</sub> eq.	17	27	14	13	14
	Biogenic <sup>a</sup>	kg CO <sub>2</sub> eq.	0	0	0	0	0
	Land use and land use change	kg CO <sub>2</sub> eq.	0.024	0.020	0.020	0.020	0.020
	GWP-GHG	kg CO <sub>2</sub> eq.	17 <sup>b</sup>	27 <sup>b</sup>	14 <sup>c</sup>	14 <sup>c</sup>	14 <sup>c</sup>
Ozone depletion	kg CFC 11 eq.	7.5E-07	8.0E-08	5.1E-07	4.5E-07	4.7E-07	
Acidification	mol H <sup>+</sup> eq.	0.14	0.25	0.11	0.11	0.11	
Eutrophication aquatic freshwater	kg P eq.	9.6E-04	3.2E-03	7.3E-04	7.7E-04	7.7E-04	
Eutrophication aquatic marine	kg N eq.	0.049	0.063	0.039	0.039	0.040	
Eutrophication terrestrial	mol N eq.	0.45	0.60	0.37	0.36	0.37	
Photochemical ozone formation	kg NMVOC eq.	0.12	0.16	0.10	0.094	0.096	
Depletion of abiotic resources - minerals and metals	kg Sb eq.	2.3E-06	2.4E-06	2.3E-06	2.3E-06	2.3E-06	
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	2205	2651	1559	1341	1396	
Water use	m <sup>3</sup> world eq. deprived	3.6	19	3.4	3.3	3.3	

Core environmental indicators			11	12	13	14	15
			AGF 22 70/100 LTA	AG 22 70/100 LTA	ABT 11 100/150 LTA	AG 16 160/220 LTA	ABS 16 70/100 AN6
Impact category	Unit	A1-A3	A1- A3	A1- A3	A1- A3	A1-A3	A1-A3
Climate change	Total	kg CO <sub>2</sub> eq.	16	14	17	13	39
	Fossil	kg CO <sub>2</sub> eq.	16	14	17	13	39
	Biogenic <sup>a</sup>	kg CO <sub>2</sub> eq.	0	0	0	0	0
	Land use and land use change	kg CO <sub>2</sub> eq.	0.022	0.020	0.023	0.019	0.19
	GWP-GHG	kg CO <sub>2</sub> eq.	16 <sup>c</sup>	14 <sup>c</sup>	17 <sup>b</sup>	14 <sup>c</sup>	40 <sup>b</sup>
Ozone depletion	kg CFC 11 eq.	6.7E-07	5.3E-07	7.6E-07	5.1E-07	9.6E-07	
Acidification	mol H <sup>+</sup> eq.	0.13	0.11	0.14	0.11	0.20	
Eutrophication aquatic freshwater	kg P eq.	8.4E-04	7.7E-04	9.3E-04	6.8E-04	1.1E-03	
Eutrophication aquatic marine	kg N eq.	0.045	0.040	0.047	0.037	0.070	
Eutrophication terrestrial	mol N eq.	0.42	0.37	0.44	0.35	0.69	
Photochemical ozone formation	kg NMVOC eq.	0.11	0.098	0.12	0.096	0.18	
Depletion of abiotic resources - minerals and metals	kg Sb eq.	2.1E-06	2.1E-06	2.1E-06	2.1E-06	3.4E-06	
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	2000	1572	2217	1552	3122	
Water use	m <sup>3</sup> world eq. deprived	3.3	3.1	3.3	3.1	4.3	

Core environmental indicators		16	17	18	19	20
		AG 16 70/100	ABb 16 70/100	ABT 16 70/100 AN7	Strongfalt 16 70/100 AN6	ABT 8 160/220
Impact category	Unit	A1-A3	A1- A3	A1- A3	A1-A3	A1-A3
Climate change	Total	kg CO <sub>2</sub> eq.	15	15	19	20
	Fossil	kg CO <sub>2</sub> eq.	15	15	19	20
	Biogenic <sup>a</sup>	kg CO <sub>2</sub> eq.	0	0	0	0
	Land use and land use change	kg CO <sub>2</sub> eq.	0.022	0.022	0.033	0.024
	GWP-GHG	kg CO <sub>2</sub> eq.	15 <sup>c</sup>	15 <sup>c</sup>	19 <sup>b</sup>	20 <sup>b</sup>
Ozone depletion	kg CFC 11 eq.	5.8E-07	5.7E-07	7.5E-07	6.5E-07	9.6E-07
Acidification	mol H <sup>+</sup> eq.	0.12	0.12	0.15	0.18	0.17
Eutrophication aquatic freshwater	kg P eq.	8.5E-04	8.5E-04	9.7E-04	8.8E-04	9.5E-04
Eutrophication aquatic marine	kg N eq.	0.043	0.043	0.052	0.063	0.054
Eutrophication terrestrial	mol N eq.	0.40	0.40	0.49	0.64	0.52
Photochemical ozone formation	kg NMVOC eq.	0.11	0.11	0.13	0.16	0.15
Depletion of abiotic resources - minerals and metals	kg Sb eq.	2.3E-06	2.3E-06	2.3E-06	3.5E-06	2.4E-06
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	1725	1687	2248	2307	2934
Water use	m <sup>3</sup> world eq. deprived	3.4	3.5	3.6	3.8	4.0

<sup>a</sup>This indicator is set to zero, due to inconsistencies in the dataset used delivered by Sphera. Though, net result over the life cycle is zero since carbon uptake and emission is zero during a life-cycle.

<sup>b</sup>The default value in the Swedish Transport Administration's tool Klimatkalkyl is 49 kg per tonne asphalt mixture (ABS and ABT) for A1-A3 (Trafikverket, Klimatkalkyl version 8.0, 2024).

<sup>c</sup>The default value in the Swedish Transport Administration's tool Klimatkalkyl is 43 kg per tonne asphalt mixture (ABb and AG) for A1-A3 (Trafikverket, Klimatkalkyl version 8.0, 2024).

Table 8: Results of the LCA (modules C and D) – Core environmental indicators per declared unit of specific asphalt mixtures. The table presents results for asphalt mixtures containing the actual annual mean share of Reclaimed Asphalt (RA). S1=Scenario 1, S2=Scenario 2.

Core environmental indicators		1-20	1	2	3	4	5	6				
		All asphalt mixtures	ABb 22 50/70	ABS 16 70/100 AN7	ABS 16 70/100	ABS 16 45/80-55 70 AN7	ABT 11 70/100	ABT 16 70/100				
Impact category	Unit	C1 (S1/S2)	C2	C3	C4	D	D	D				
Climate change	Total	kg CO <sub>2</sub> eq.	2.2/0.64	3.7	0	0	-3.6	-7.2	-6.7	-11	-5.4	-4.8
	Fossil	kg CO <sub>2</sub> eq.	2.1/0.64	3.7	0	0	-3.6	-7.2	-6.7	-11	-5.4	-4.8
	Biogenic <sup>a</sup>	kg CO <sub>2</sub> eq.	0/0	0	0	0	0	0	0	0	0	0
	Land use and land use change	kg CO <sub>2</sub> eq.	0.019/5.7E-03	0.035	0	0	-6.2E-04	-1.1E-03	-1.1E-03	-1.7E-03	-8.4E-04	-7.6E-04
	GWP-GHG	kg CO <sub>2</sub> eq.	2.2/0.65	3.8	0	0	-3.6	-7.2	-6.7	-11	-5.4	-4.8
Ozone depletion	kg CFC 11 eq.	1.9E-13/5.4E-14	4.9E-13	0	0	-3.0E-07	-5.7E-07	-5.7E-07	-8.3E-07	-4.6E-07	-4.1E-07	
Acidification	mol H <sup>+</sup> eq.	5.2E-03/1.5E-03	0.015	0	0	-0.036	-0.073	-0.065	-0.11	-0.052	-0.047	
Eutrophication aquatic freshwater	kg P eq.	7.7E-06/2.2E-06	1.4E-05	0	0	-1.2E-04	-2.3E-04	-2.2E-04	-3.3E-04	-1.8E-04	-1.6E-04	
Eutrophication aquatic marine	kg N eq.	2.3E-03/6.8E-04	7.2E-03	0	0	-0.010	-0.022	-0.018	-0.032	-0.014	-0.013	
Eutrophication terrestrial	mol N eq.	0.026/7.7E-03	0.081	0	0	-0.11	-0.24	-0.20	-0.36	-0.16	-0.14	
Photochemical ozone formation	kg NMVOC eq.	7.2E-03/2.2E-03	0.014	0	0	-0.035	-0.073	-0.062	-0.11	-0.049	-0.044	
Depletion of abiotic resources - minerals and metals	kg Sb eq.	1.3E-07/4.0E-08	2.5E-07	0	0	-8.9E-08	9.4E-09	-1.3E-07	1.4E-08	-9.2E-08	-8.9E-08	
Depletion of abiotic resources - fossil fuels	MJ, net calorific value	28/8.3	51	0	0	-936	-1790	-1766	-2594	-1433	-1270	
Water use	m <sup>3</sup> world eq. deprived	0.098/7.0E-03	0.045	0	0	-0.45	-0.78	-0.81	-1.1	-0.65	-0.58	

Core environmental indicators		7	8	9	10	11	12	13	14	
		ABT 16 45/80-55	AG 16 160/220	AG 22 160/220	AG 32 70/100	AGF 22 70/100 LTA	AG 22 70/100 LTA	ABT 11 100/150 LTA	AG 16 160/220 LTA	
Impact category	Unit	D	D	D	D	D	D	D	D	
Climate change	Total	kg CO <sub>2</sub> eq.	-7.0	-3.4	-2.8	-3.1	-5.3	-3.4	-4.6	-3.4
	Fossil	kg CO <sub>2</sub> eq.	-7.0	-3.4	-2.8	-3.1	-5.3	-3.4	-4.6	-3.4
	Biogenic <sup>a</sup>	kg CO <sub>2</sub> eq.	0	0	0	0	0	0	0	0
	Land use and land use change	kg CO <sub>2</sub> eq.	-1.1E-03	-6.1E-04	-5.1E-04	-5.8E-04	-9.2E-04	-6.0E-04	-7.1E-04	-6.1E-04
	GWP-GHG	kg CO <sub>2</sub> eq.	-7.0	-3.4	-2.8	-3.1	-5.3	-3.4	-4.6	-3.4
Ozone depletion	kg CFC 11 eq.	-5.9E-07	-2.8E-07	-2.3E-07	-2.5E-07	-4.4E-07	-2.8E-07	-3.9E-07	-2.8E-07	



Use of renewable primary energy excl. renewable primary energy resources used as raw materials	MJ, net calorific value	305	301	305	298	398	335	349	337	373	339
Use of renewable primary energy as raw materials	MJ, net calorific value	0	0	0	0	48	0	16	0	48	0
Total use of renewable primary energy	MJ, net calorific value	305	301	305	298	446	335	365	337	421	339
Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials	MJ, net calorific value	203	180	217	173	520	195	196	245	537	253
Use of non-renewable primary energy as raw materials	MJ, net calorific value	1747	1353	1944	1341	2531	1487	1450	1948	1722	2606
Total use of non-renewable primary energy	MJ, net calorific value	1950	1533	2161	1514	3051	1683	1645	2193	2259	2860
Use of secondary material	kg	266	400	422	389	139	396	418	380	24	90
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0	0	0	0	0
Use of net fresh water	m <sup>3</sup>	0.21	0.20	0.21	0.20	0.24	0.21	0.21	0.21	0.23	0.24

Table 10: Results of the LCA (modules C and D) – Resource use per declared unit of specific asphalt mixtures. The table presents results for asphalt mixtures containing the actual annual mean share of Reclaimed Asphalt (RA). S1=Scenario 1, S2=Scenario 2.

Use of resources	Parameter	Unit	1-20 All asphalt mixtures				1	2	3	4	5	6
			C1 (S1/S2)	C2	C3	C4	ABb 22 50/70	ABS 16 70/100 AN7	ABS 16 70/100	ABS 16 45/80-55 70 AN7	ABT 11 70/100	ABT 16 70/100
Use of renewable primary energy excl. renewable primary energy resources used as raw materials	MJ, net calorific value		2.0/0.59	3.7	0	0	-6.7	-7.6	-10	-12	-7.5	-7.1
Use of renewable primary energy as raw materials	MJ, net calorific value		0/0	0	0	0	0	0	0	0	0	0
Total use of renewable primary energy	MJ, net calorific value		2.0/0.59	3.7	0	0	-6.7	-7.6	-10	-12	-7.5	-7.1
Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials	MJ, net calorific value		28/8.3	51	0	0	-44	-93	-83	-135	-67	-60
Use of non-renewable primary energy as raw materials	MJ, net calorific value		0/0	0	0	0	-867	-1650	-1636	-2390	-1327	-1177
Total use of non-renewable primary energy	MJ, net calorific value		28/8.3	51	0	0	-911	-1743	-1719	-2526	-1395	-1236
Use of secondary material	kg		0/0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value		0/0	0	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value		0/0	0	0	0	0	0	0	0	0	0
Use of net fresh water	m <sup>3</sup>		0.022/6.5E-04	4.1E-03	0	0	-0.030	-0.041	-0.049	-0.061	-0.038	-0.035
Use of resources	Parameter	Unit	7		8		9	10	11	12	13	14
			ABT 16 45/80-55	AG 16 160/220	AG 22 160/220	AG 32 70/100	AGF 22 70/100 LTA	AG 22 70/100 LTA	ABT 11 100/150 LTA	AG 16 160/220 LTA		
Use of renewable primary energy excl. renewable primary energy resources used as raw materials	MJ, net calorific value		-11	-6.8	-5.9	-6.9	-9.9	-6.5	-6.4	-6.8		
Use of renewable primary energy as raw materials	MJ, net calorific value		0	0	0	0	0	0	0	0		
Total use of renewable primary energy	MJ, net calorific value		-11	-6.8	-5.9	-6.9	-9.9	-6.5	-6.4	-6.8		
Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials	MJ, net calorific value		-87	-42	-34	-38	-66	-42	-57	-42		
Use of non-renewable primary energy as raw materials	MJ, net calorific value		-1703	-819	-652	-735	-1282	-812	-1124	-819		



Total use of non-renewable primary energy	MJ, net calorific value	-1790	-861	-685	-773	-1348	-853	-1181	-861
Use of secondary material	kg	0	0	0	0	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0	0	0
Use of net fresh water	m <sup>3</sup>	-0.053	-0.030	-0.025	-0.029	-0.044	-0.029	-0.032	-0.030

Use of resources

15	16	17	18	19	20
ABS 16 70/100 AN6	AG 16 70/100	ABb 16 70/100	ABT 16 70/100 AN7	Strongfalt 16 70/100 AN6	ABT 8 160/220

Parameter	Unit	D	D	D	D	D	D
Use of renewable primary energy excl. renewable primary energy resources used as raw materials	MJ, net calorific value	-10	-6.7	-6.2	-6.2	-12	-15
Use of renewable primary energy as raw materials	MJ, net calorific value	0	0	0	0	0	0
Total use of renewable primary energy	MJ, net calorific value	-10	-6.7	-6.2	-6.2	-12	-15
Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials	MJ, net calorific value	-123	-46	-43	-65	-104	-121
Use of non-renewable primary energy as raw materials	MJ, net calorific value	-2169	-898	-841	-1208	-1669	-2372
Total use of non-renewable primary energy	MJ, net calorific value	-2291	-944	-884	-1273	-1773	-2493
Use of secondary material	kg	0	0	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0
Use of net fresh water	m <sup>3</sup>	-0.055	-0.031	-0.028	-0.032	-0.052	-0.074

Table 11: Results of the LCA (modules A1- A3) – Waste categories and output flows per declared unit of specific asphalt mixtures. The table presents results for asphalt mixtures containing the actual annual mean share of Reclaimed Asphalt (RA).

Waste categories & output flows		1	2	3	4	5	6	7	8	9	10
		ABb 22 50/70	ABS 16 70/100 AN7	ABS 16 70/100	ABS 16 45/80-55 70 AN7	ABT 11 70/100	ABT 16 70/100	ABT 16 45/80-55	AG 16 160/220	AG 22 160/220	AG 32 70/100
Parameter/Indicator	Unit	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3
Hazardous waste disposed	kg	0.025	0.027	0.029	0.017	0.028	0.027	0.019	0.024	0.023	0.024
Non-hazardous waste disposed	kg	0.47	0.58	0.54	0.52	0.48	0.48	0.42	0.45	0.45	0.45
Radioactive waste disposed	kg	6.7E-04	8.8E-04	8.3E-04	9.2E-04	6.1E-04	6.0E-04	6.3E-04	6.0E-04	6.0E-04	6.0E-04
Components for re-use	kg	0	0	0	0	0	0	0	0	0	0
Materials for recycling	kg	0.055	0.085	0.055	0.092	0.055	0.055	0.055	0.055	0.055	0.055
Materials for energy recovery	kg	0.069	0.075	0.070	0.078	0.069	0.069	0.070	0.069	0.069	0.069
Exported energy	MJ per energy carrier	0	0	0	0	0	0	0	0	0	0

Waste categories & output flows		11	12	13	14	15	16	17	18	19	20
		AGF 22 70/100 LTA	AG 22 70/100 LTA	ABT 11 100/150 LTA	AG 16 160/220 LTA	ABS 16 70/100 AN6	AG 16 70/100	ABb 16 70/100	ABT 16 70/100 AN7	Strongfalt 16 70/100 AN6	ABT 8 160/220
Parameter/Indicator	Unit	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3
Hazardous waste disposed	kg	0.027	0.024	0.027	0.024	0.028	0.025	0.025	0.026	0.025	0.032
Non-hazardous waste disposed	kg	0.44	0.42	0.44	0.42	0.62	0.46	0.47	0.50	0.59	0.51
Radioactive waste disposed	kg	5.6E-04	5.4E-04	5.5E-04	5.5E-04	1.2E-03	6.0E-04	6.7E-04	6.3E-04	1.2E-03	6.4E-04

Components for re-use	kg	0	0	0	0	0	0	0	0	0	0
Materials for recycling	kg	0.055	0.055	0.055	0.055	0.090	0.055	0.055	0.070	0.10	0.055
Materials for energy recovery	kg	0.070	0.069	0.068	0.069	0.077	0.069	0.069	0.071	0.080	0.071
Exported energy	MJ per energy carrier	0	0	0	0	0	0	0	0	0	0

Table 12: Results of the LCA (modules C and D) – Waste categories and output flows per declared unit of specific asphalt mixtures. The table presents results for asphalt mixtures containing the actual annual mean share of Reclaimed Asphalt (RA). S1=Scenario 1, S2=Scenario 2.

Waste categories & output flows		1-20 All asphalt mixtures				1 ABb 22 50/70	2 ABS 16 70/100 AN7	3 ABS 16 70/100	4 ABS 16 45/80- 55 70 AN7	5 ABT 11 70/100	6 ABT 16 70/100
Parameter/Indicator	Unit	C1 (S1/S2)	C2	C3	C4	D	D	D	D	D	D
Hazardous waste disposed	kg	1.0E-10/3.1E-11	1.6E-10	0	0	-6.4E-03	-9.2E-03	-0.011	-0.013	-8.6E-03	-7.8E-03
Non-hazardous waste disposed	kg	9.7E-03/1.2E-03	7.8E-03	0	0	-0.038	-0.094	-0.070	-0.14	-0.056	-0.050
Radioactive waste disposed	kg	3.7E-05/1.1E-05	9.6E-05	0	0	-4.0E-05	-6.7E-05	-5.8E-05	-1.0E-04	-4.2E-05	-4.0E-05
Components for re-use	kg	0/0	0	0	0	0	0	0	0	0	0
Materials for recycling	kg	0/0	0	1000	0	0	-0.022	0	-0.034	0	0
Materials for energy recovery	kg	0/0	0	0	0	-3.1E-03	-8.2E-03	-4.4E-03	-0.013	-3.2E-03	-3.1E-03
Exported energy	MJ per energy carrier	0/0	0	0	0	0	0	0	0	0	0

Waste categories & output flows		7 ABT 16 45/80-55	8 AG 16 160/220	9 AG 22 160/220	10 AG 32 70/100	11 AGF 22 70/100 LTA	12 AG 22 70/100 LTA	13 ABT 11 100/150 LTA	14 AG 16 160/220 LTA
Parameter/Indicator	Unit	D	D	D	D	D	D	D	D
Hazardous waste disposed	kg	-0.012	-6.2E-03	-5.2E-03	-5.9E-03	-9.4E-03	-6.1E-03	-7.3E-03	-6.2E-03
Non-hazardous waste disposed	kg	-0.073	-0.037	-0.030	-0.034	-0.057	-0.036	-0.047	-0.037
Radioactive waste disposed	kg	-6.3E-05	-4.1E-05	-3.7E-05	-4.3E-05	-5.9E-05	-4.0E-05	-3.6E-05	-4.1E-05
Components for re-use	kg	0	0	0	0	0	0	0	0
Materials for recycling	kg	0	0	0	0	0	0	0	0
Materials for energy recovery	kg	-4.9E-03	-3.2E-03	-2.8E-03	-3.3E-03	-4.6E-03	-3.1E-03	-2.8E-03	-3.2E-03
Exported energy	MJ per energy carrier	0	0	0	0	0	0	0	0

Waste categories & output flows		15 ABS 16 70/100 AN6	16 AG 16 70/100	17 ABb 16 70/100	18 ABT 16 70/100 AN7	19 Strongfalt 16 70/100 AN6	20 ABT 8 160/220
Parameter/Indicator	Unit	D	D	D	D	D	D
Hazardous waste disposed	kg	-0.012	-6.5E-03	-6.1E-03	-7.2E-03	-0.010	-0.016
Non-hazardous waste disposed	kg	-0.13	-0.039	-0.037	-0.062	-0.13	-0.10
Radioactive waste disposed	kg	-9.3E-05	-4.0E-05	-3.7E-05	-4.5E-05	-1.2E-04	-9.0E-05
Components for re-use	kg	0	0	0	0	0	0
Materials for recycling	kg	-0.030	0	0	-9.6E-03	-0.044	0
Materials for energy recovery	kg	-0.011	-3.1E-03	-2.9E-03	-4.8E-03	-0.016	-6.9E-03
Exported energy	MJ per energy carrier	0	0	0	0	0	0

Table 13: Additional environmental impact indicators are only declared in the Annex to the General background report.

Impact category	Unit	Module A1-D
Particulate matter emissions	Disease incidence	Not declared in EPD, see Background Annex Report
Ionizing radiation, human health	kBq U235 eq.	Not declared in EPD, see Background Annex Report
Eco-toxicity (freshwater)	CTUe	Not declared in EPD, see Background Annex Report
Human toxicity, cancer effects	CTUh	Not declared in EPD, see Background Annex Report
Human toxicity, non-cancer effects	CTUh	Not declared in EPD, see Background Annex Report
Land use related impacts/Soil quality	dimensionless	Not declared in EPD, see Background Annex Report

Table 14: Classification of disclaimers to the declaration of core and additional environmental impact indicators.

ILCD classification	Indicator	Disclaimer
ILCD Type 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD Type 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1*
ILCD Type 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2**
	Abiotic depletion potential for fossil resources (ADP-fossil)	2**
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2**
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2**
	Potential Comparative Toxic Unit for humans (HTP-c)	2**
	Potential Comparative Toxic Unit for humans (HTP-nc)	2**
	Potential Soil quality index (SQP)	2**

\*Disclaimer 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

\*\*Disclaimer 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.

Note that Table 15 and 16 are additional results and do only present the result for the impact category GWP Fossil+LULUC, for no RA, the annual actual mean share of RA (as presented in Table 7 and 8) and the maximum possible share of RA.

Table 15: Results of the LCA (modules A1-A3) – GWP Fossil+LULUC per 1000 kg for three different RA content, (1) no RA content, (2) the actual annual mean share of RA and (3) the maximum possible share of RA in the various asphalt mixtures.

			1	2	3	4	5	6	7	8	9	10
Core environmental indicators			ABb 22 50/70	ABS 16 70/100 AN7	ABS 16 70/100	ABS 16 45/80- 55 70 AN7	ABT 11 70/100	ABT 16 70/100	ABT 16 45/80- 55	AG 16 160/220	AG 22 160/220	AG 32 70/100
Impact category	Unit	RA content	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3
GWP Fossil + LULUC	kg CO <sub>2</sub> eq.	No RA	18	24	21	34	21	20	30	17	17	17
		Mean RA	15	22	19	34	18	17	27	14	13	14
		Max RA	14	21	19	29	18	17	23	13	13	14
Core environmental indicators			11	12	13	14	15	16	17	18	19	20
			AGF 22 70/100 LTA	AG 22 70/100 LTA	ABT 11 100/150 LTA	AG 16 160/220 LTA	ABS 16 70/100 AN6	AG 16 70/100	ABb 16 70/100	ABT 16 70/100 AN7	Strongfa It 16 70/100 AN6	ABT 8 160/220
Impact category	Unit	RA content	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3	A1-A3
GWP Fossil + LULUC	kg CO <sub>2</sub> eq.	No RA	18	17	20	17	41	18	18	22	41	20
		Mean RA	16	14	17	13	39	15	15	19	41	20
		Max RA	14	13	16	13	32	14	15	17	41	18

Table 16: Results of the LCA (modules C and D) – GWP Fossil+LULUC per 1000 kg for three different RA content, (1) no RA content, (2) the actual annual mean share of RA and (3) the maximum possible share of RA in the various asphalt mixtures.

			1-20	1	2	3	4	5	6	7	8	9			
Core environmental indicators			All asphalt mixtures	ABb 22 50/70	ABS 16 70/100 AN7	ABS 16 70/100	ABS 16 45/80-55 70 AN7	ABT 11 70/100	ABT 16 70/100	ABT 16 45/80-55	AG 16 160/220	AG 22 160/220			
Impact category	Unit	RA content	C1 (S1/S2)	C2	C3	C4	D	D	D	D	D	D			
GWP Fossil + LULUC	kg CO <sub>2</sub> eq.	No RA	2.2/0.64	3.7	0	0	-8.5	-11	-9.8	-11	-11	-9.9	-9.9	-8.0	-7.5
		Mean RA	2.2/0.64	3.7	0	0	-3.6	-7.2	-6.7	-11	-5.4	-4.8	-7.0	-3.4	-2.8

		Max RA	2.2/0.64	3.7	0	0	-3.2	-6.1	-5.6	-6.1	-4.5	-4.2	-3.3	-2.4	-2.0
			10	11	12	13	14	15	16	17	18	19	20		
	Core environmental indicators		AG 32 70/100	AGF 22 70/100 LTA	AG 22 70/100 LTA	ABT 11 100/150 LTA	AG 16 160/220 LTA	ABS 16 70/100 AN6	AG 16 70/100	ABb 16 70/100	ABT 16 70/100 AN7	Strongfalt 16 70/100	ABT 8 160/220 AN6		
Impact category	Unit	RA content	D	D	D	D	D	D	D	D	D	D	D	D	D
GWP Fossil + LULUC	kg CO <sub>2</sub> eq.	No RA	-7.3	-8.5	-8.1	-10	-8.0	-11	-8.5	-8.5	-10	-8.1	-9.9		
		Mean RA	-3.1	-5.3	-3.4	-4.6	-3.4	-9.5	-3.7	-3.5	-5.1	-8.1	-9.7		
		Max RA	-3.2	-2.6	-2.3	-3.5	-2.4	-5.7	-2.7	-2.9	-3.4	-8.1	-6.1		

## General information

Components in asphalt, such as aggregates and bitumen, are finite resources. Bitumen is a fossil resource. To extract aggregates or oil will affect the environment.

The production of asphalt mixtures requires equipment and vehicles running on fossil and renewable energy. The operations, including transports, cause mainly emissions and dust to air and disturbances such as noise.

Asphalt production is, depending on size, country and activities, regulated through specific legislation or site-specific decisions from authorities.

NCC's stationary plants in Denmark, Finland and Sweden are certified according to ISO 14001. The Business Management System in NCC Industry, including Norway, contains routines corresponding to this standard.

In the Nordic countries (Iceland excluded) approximately 1 tonne of asphalt mixtures per capita and year are produced and paved at our roads (EAPA, 2017). No asphalt is disposed during manufacture, application, maintenance or in the end-of life.

Since asphalt is a valuable resource, it is recycled into new asphalt mixtures. In NCC, Division Asphalt, 29 % - as an average – of the produced asphalt mixtures originated from Reclaimed Asphalt (RA) in 2023.

Explanatory material is given in the background report to this EPD.

To read more about NCCs general sustainability work, please refer to our webpage: <https://www.ncc.com/sustainability>

## Release of dangerous substances to indoor air, soil and water during the use stage

According to EN 15804, the EPD does not need to give this information if the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available. This criterion is fulfilled for asphalt material.

## Scenario information

For modules other than A1-A3, scenario-based information shall be declared for the products.

### Module C

#### Scenario 1:

Pavement milling of asphalt is carried out in this scenario. It is further transported to the waste processing where it is crushed and sieved. It is assumed that all asphalt mixtures are recyclable, why no asphalt is sent for disposal. Crushing of RA is accounted for in the next life cycle, to avoid double counting.

#### Scenario 2:

Asphalt excavation resulting in asphalt slabs is carried out in this scenario. It is further transported to the waste processing where it is crushed and sieved. It is assumed that all asphalt mixtures are recyclable, why no asphalt is sent for disposal. Crushing of RA is accounted for in the next life cycle, to avoid double counting.

Table 17: Scenario-based information for end of life.

Scenario information	Unit (per declared unit)	Scenario 1 and 2
	kg collected separately	1000
	kg collected with mixed construction waste	0
	kg for re-use	0
	kg for recycling	1000
	kg for energy recovery	0
	kg product or material for final disposal	0
Assumptions for scenario development, e.g. transportation	units as appropriate	Further scenario-based information is presented in the Annex of the Background Report

### Module D

Information in module D aims at transparency of the 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.

The specific calculation procedure is described in the Annex of the Background Report.

Loads are assigned to module D for materials and fuels (that have left the system from any of the modules A4-C4) where further processing occur after the end-of-waste state is reached. This, in order to replace primary material or fuel input in another product system.

Benefits are assigned to module D for materials and fuels (that have left the system in any of the modules A4-C4) that can substitute primary material of fuels that do not need to be produced. A functional equivalence must be reached.

The substitution effect is only calculating the resulting net output flow. The net output flow for the asphalt mixtures declared can be found in Table 18.

Table 18: Net output flow for module D per declared unit.

#	Asphalt mixture	Mass (kg)
1	ABb 22 50/70	603
2	ABS 16 70/100 AN7	732
3	ABS 16 70/100	729
4	ABS 16 45/80-55 70 AN7	911
5	ABT 11 70/100	625
6	ABT 16 70/100	611
7	ABT 16 45/80-55	763
8	AG 16 160/220	611
9	AG 22 160/220	574
10	AG 32 70/100	620
11	AGF 22 70/100 LTA	734
12	AG 22 70/100 LTA	600
13	ABT 11 100/150 LTA	578
14	AG 16 160/220 LTA	611
15	ABS 16 70/100 AN6	861
16	AG 16 70/100	604
17	ABb 16 70/100	582
18	ABT 16 70/100 AN7	620
19	Strongfalt 16 70/100 AN6	976
20	ABT 8 160/220	910

Loads accounted for are crushing of the RA (the same in both scenarios).

Benefits accounted for are aggregates and bitumen material which are replaced by RA (the same in both scenarios).



## Programme information

This EPD is developed by NCC Industry Nordic AB. It is a result from an EPD certification process verified by Bureau Veritas. The EPD is valid for five years (after which it can be revised and reissued). NCC Industry Nordic AB is the declaration owner and has the liability and responsibility for the EPD.

EPDs of construction products may not be comparable if they do not comply with EN 15804.

EPDs within the same product category but from different programmes may not be comparable.

The aim of this EPD is that it shall provide objective and reliable information on the environmental impact of the production of the declared product.

The intended use of the EPD is for business-to-business communication.

Table 19: Verification details.

CEN standard EN 15804 serves as the core Product Category Rules (PCR)	
Product Category Rules (PCR):	PCR 2019:14 Construction products, version 1.11
PCR review was conducted by:	The Technical Committee of the International EPD® System. See <a href="http://www.environdec.com/TC">www.environdec.com/TC</a> for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat <a href="http://www.environdec.com/contact">www.environdec.com/contact</a> .
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	<input checked="" type="checkbox"/> EPD process certification (Internal) <input type="checkbox"/> EPD verification (External)
Certification body:	Bureau Veritas
Accredited:	SWEDAC
Procedure for follow-up of data during EPD validity involves third party verifier:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Address of programme operator: EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: [info@environdec.com](mailto:info@environdec.com)

## References

- Annex to General Background Report, Asphalt mixtures, Plant specific information for asphalt mixtures from Stockholm asphalt plant – Arlanda, 2023. Version 2024-11-20
- EAPA (2017). Asphalt in Figures 2017. European Asphalt Pavement Association.
- Ekblad, J. and Lundström, R. (2013). NCC Green Asphalt: energibehov och utsläpp av CO<sub>2</sub>. NCC Rapport 2013-01. NCC Roads, Upplands Väsby.
- EN 15804:2012+A2:2019/AC:2021: Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products
- EPD International (2019) General Programme Instructions for the International EPD® System, version 3.01, dated 2019-09-18. [www.environdec.com](http://www.environdec.com)
- EPD process – general description (2024) NCC Industry, Division Asphalt.
- Eurobitume (2012) Life Cycle Inventory: Bitumen.
- General background report – Environmental Product Declarations for asphalt mixtures. Version 2024-10-22.
- NCC (2022). Environmental Product Declaration for aggregates from Umeå quarry – Bjurholm, S-P-05221, published at EPD International. Version 2022-02-21.
- NCC (2022). Environmental Product Declaration for aggregates from Uddevalla quarry – Glimmingen, S-P-01640, published at EPD International. Version 2022-03-08.
- Product Category Rules PCR 2018:04 Asphalt Mixtures, version 1.03 of 2019-09-06
- Product Category Rules PCR 2019:14 Construction products, version 1.11 of 2021-02-05
- Rubio M C, Martínez G, Baena L & Moreno F. Warm mix asphalt: an overview. Journal of Cleaner Production, 24 (2012) 76-84.
- SS-EN 13108-1:2016 Bituminous mixtures – Material specifications – Part 1: Asphalt Concrete
- SS-EN 13108-3:2016 Bituminous mixtures – Material specifications – Part 3: Soft Asphalt
- SS-EN 13108-5:2016 Bituminous mixtures – Material specifications – Part 5: Stone Mastic Asphalt
- SS-EN 13108-7:2016 Bituminous mixtures – Material specifications – Part 7: Porous Asphalt
- SS-EN ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations – Principles and procedures (ISO 14025:2006)
- SS-EN ISO 14040:2006 Environmental management – Life cycle assessment – Principles and framework (ISO 14040:2006). Including Amd 1:2020.
- SS-EN ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines. Including Amd 1:2018 and Amd 2:2020.
- The German BITUMEN Forum (2016). Progress report 2006.
- The International EPD® System, EPD International AB, Stockholm, Sweden, <http://www.environdec.com/>
- Trafikverket (2024). Klimatkalkyl version 8.0 – emissionsfaktorer. <https://klimatkalkyl.trafikverket.se/Modell>.
- United Nations Statistics Division (2015). Central Product Classification, version 2.1. <https://unstats.un.org/unsd/classifications/unsdclassifications/cpcv21.pdf>.

## Differences versus previous versions

Table 20: Versions of this EPD.

Date of revision	Description of difference versus previous versions
2021-04-26	Original version
2022-02-18	Editorial changes
2022-11-02	EPD update due to (1) significant changes to the result when using data from 2021 compared to 2020 and (2) a few different asphalt mixtures are different than previous version.
2023-12-04	EPD update due to (1) significant changes to the result when using data from 2022 compared to 2021 and (2) different asphalt mixtures are declared than in previous version.
2024-11-20	EPD update due to (1) significant changes to the result when using data from 2023 compared to 2022 and (2) different asphalt mixtures are declared than in previous version.