KNAUF INSULATION

ENVIRONMENTAL PRODUCT DECLARATION

SmartRoof Top, KON 70, DDP KF Attika

In accordance with: ISO 14025, ISO 21930, EN15804+A2:2019/AC:2021

Program:	The International EPD® System www.environdec.com
Programme operator:	EPD International AB
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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.

Knauf Insulation EPDs are EPD of multiple products, based on a representative product.

Please note that any ancillary materials used for the installation of the product are excluded from the LCA calculations.

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EPD INTERNATIONAL EPD SYSTEM

ECO PLATFORM EPD VERIFIED

Programme-related information and verification

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 characterization factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
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Valid until:	2029-11-29
EPD owner	Knauf Insulation Sprl Rue de Maestricht 95 4600 Visé (Belgium)
Product Category Rules:	PCR 2019:14. Construction products (EN 15804+A2) Version 1.3.3 Sub-PCR-005 Thermal insulation products (EN 16783: 2024) Version: 2024-05-03
Product group classification:	UN CPC 37
Reference year for plant data:	2022 (Sankt Egidien and Nova Bana), 2020 (Skofja Loka) and 2023 (Illange)
Geographical application scope:	Europe

CEN standard EN 15804+A2 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14. Construction products (EN 15804+A2) Version 1.3.3 Sub-PCR-005 Thermal insulation products (EN 16783: 2024) Version: 2024-05-03
PCR review was conducted by: The Technical Committee of the International EPD@ System
Independent third-party verification of the declaration and data, according to ISO 14025:2006. ☒ EPD verification by EPD Process Certification* Third-party verification: *Bureau Veritas* (*Certificate number: SE008541-3)* an approved certification body accountable for third-party verification. Third-party verifier is accredited by: *SWEDAC - Sverige AB 1236* *For EPD Process Certification, an accredited certification body certifies and reviews the management process and verifies EPDs published on a regular basis. For details about third-party verification procedure of the EPDs, see the GPI.
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

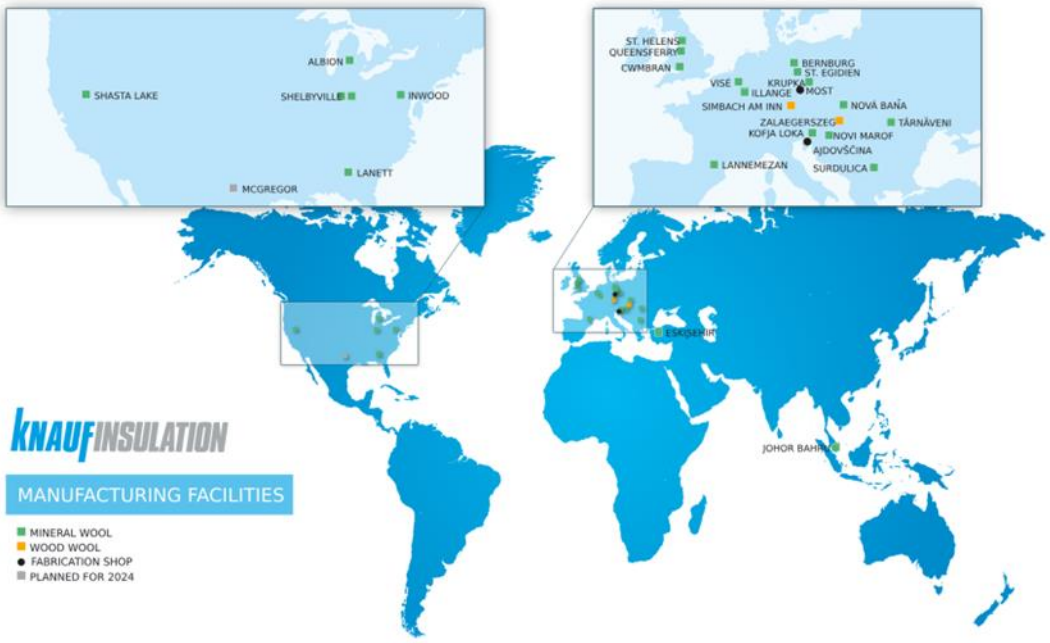
General information

Information about the company

Description of the organisation:
Knauf Insulation is a leading provider of glass and rock mineral wool, as well as wood wool insulation solutions. With more than 40 years of experience in the insulation industry, it is one of the most respected names in insulation worldwide.

As part of the Knauf Group, a €15.4bn turnover family-owned global manufacturer of building materials and construction systems, Knauf Insulation employs more than 6,000 employees and has 28 manufacturing sites in 15 countries, with a turnover of €2.5bn.

Knauf Insulation's mission is to challenge conventional thinking and create innovative insulation solutions that shape the way we live and build in the future, with care for the people who make them, the people who use them and the world we all depend on. Its vision is to lead the change in smarter insulation solutions for a better world.



The Headquarters are located in Visé, in Belgium.

Product-related or management system-related certifications:
All Knauf Insulation sites which are covered by EPD process certification system, including the sites considered for this EPD, are ISO 9001, ISO 14001, ISO 50001 and ISO 45001 certified under the scope "Design, Development and Production of Insulation Materials and Systems".

Knauf Insulation supports the Ten Principles of the United Nations Global Compact on human rights, labor, environment and anti-corruption.

Name and location of production site:
The intended application of this product in the construction industry is within Europe. The data used for the production stage life cycle assessment is related to production plant(s) located in Sankt Egidien (Germany), Skofja Loka (Slovenia), Nova Bana (Slovakia) and Illange (France).

Address: Bahnhofstraße 25, 09356 Sankt Egidien, Germany,
Trata 32, 4220 Škofja Loka, Slovenia,
Železničný rad 24, 968 01 Nová Baňa-Priemyselný obvod, Slovakia,
Mégazone d'Illange-Bertrange, D654 MoslParc, 57970 Illange, France.

Information about Rock Mineral Wool production

The rock mineral wool (RMW) products for building construction are available in the form of slabs, boards, lamellas and rolls. RMW slabs are used as a thermal, acoustical and fire insulation product.

In general, the density for rock mineral wool products range goes from 20 to 200 kg/m³. In terms of composition, the inorganic part (92-98%) is composed of volcanic rocks, typically basalt, and some dolomite and with an increasing proportion of recycled material like slags from steel industry or in the form of briquettes, a mix of stone wool scrap, other secondary materials and cement.

The remaining fraction is the thermo set resin binder.

Product information

Product name: SmartRoof Top, KON 70, DDP KF Attika

Product identification: The declared insulation SmartRoof Top, KON 70, DDP KF Attika is a rock mineral wool, uncoated and unfaced of 1m^2 (considered for this EPD).

For the placement of the products on the construction market in the European Union/ EFTA (with exception of Switzerland and UK), the Regulation/ (EU) No 305/2011/ applies. The products concerned need Declarations of Performance / DoP R4309IPCPR, R4238IPCPR, R4308IPCPR, R4296IPCPR taking into consideration the harmonized product standard EN 13162 and the CE-marking.

Product description: The main application for SmartRoof Top, KON 70, DDP KF Attika is in thermal and acoustic insulation as well as fire protection in flat roofs.

UN CPC code:
37990: Non-metallic mineral products (including mineral wool, expanded mineral materials, worked mica, articles of mica, non-electrical articles of graphite or other carbon and articles of peat).

Geographical scope: The product is manufactured in Sankt Egidien (Germany), Skofja Loka (Slovenia), Nova Bana (Slovakia) and Illange (France). Energy-related information is described in the next section. Regarding the market area, the product is mainly marketed in Europe.

Energy:
Residual electricity mix (reference year 2022) and gas inputs (reference year 2020) are taken from Germany, Slovenia, Slovakia and France. 0.847 kg, 0.564 kg, 0.207 and 0.159 kg of CO2 is released for 1 kWh of electricity consumption from Germany, Slovenia, Slovakia and France.

Technical Characteristics:

Parameter	Value
Thermal conductivity/ EN 12667	0.038 W/(mK) at 10°C
Water vapor diffusion resistance (EN 12086)	1
Thermal Resistance (ISO 8301)	2.60 m^{2}K/W
Declared density range/ EN 1602	135 kg/m^3 (+/-10%)
Melting point of fibers DIN 4102-17	≥ 1000°C

The density specified in this document is provided solely and exclusively for the purpose of Life Cycle Assessment (LCA) calculations and should not be relied on for safety or any other technical requirements or specifications. Additional technical characteristics of the product can be found in the Declaration of Performance (DoP).

LCA information

Functional unit / declared unit

The declared unit is 1m^2 of unfaced, uncoated rock mineral wool SmartRoof Top, KON 70, DDP KF Attika with R-value of 2.60 m^{2}K/W (for a thickness of 100 mm and a declared lambda of 0.038 W/mK).

Reference service life: The RSL or durability of SmartRoof Top, KON 70, DDP KF Attika is as long as the lifetime of the building equipment in which it is used (at least 60 years).

Time representativeness & Information on Specific Data:

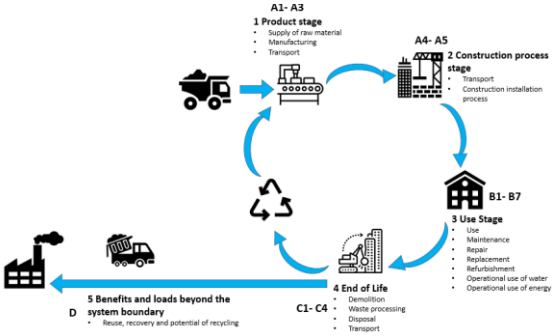
The complete reference year used for the plant(s) production data is 2022 (Sankt Egidien and Nova Bana), 2020 (Skofja Loka) and 2023 (Illange). The product group/s considered in this EPD is produced in multiple Knauf Insulation manufacturing sides with the equal weight.

The data which are used to carry out the LCA calculations contains >60% specific data and less than 40% generic data. Data quality information used in this EPD is compliant with EN 15941.

Database(s) and LCA software used:

The LCA model, the data aggregation and environmental impacts are calculated with the software LCA for Experts (GaBi) 10.9 and its content version 2024.2. The impact models used are those indicated in EN 15804:2012+A2:2019.

System diagram:



Description of system boundaries:

The system boundary of the EPD follows the modularity approach defined by the EN 15804:2012+A2:2019.

The type of EPD is cradle-to-grave.

For a comprehensive assessment, it is strongly recommended to consider the results from all the modules. Relying exclusively on Modules A1-A3 may lead to incomplete conclusions.

A comprehensive list and detailed explanations of each stage within the EPD are available as follows.

The product stage (A1-A3) includes:

- A1 – raw material extraction and processing, processing of secondary material input (e.g. recycling processes),
- A2 – transport to the manufacturer and
- A3 – manufacturing.

This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of-waste state or disposal of final residues during the product stage.

The LCA results are presented in an aggregated format for the product stage, where modules A1, A2, and A3 are consolidated into a single module, denoted as A1-A3.

Product Parameters	Value
Rock mineral wool weight	13.50 kg
Area	1m²
Thickness	100 mm
Volume	0.10 m^3
Packaging - PE film	0.04 kg
Packaging – Stone Wool Kickers	11.16 kg

The construction process stage includes:

- A4 - transport to the construction site and
- A5 - installation into the building.

The transport to the building site (A4) and installation (A5) included in this LCA use the following parameters:

Parameter	Value
Average transport distance	600 km
Type of fuel and vehicle consumption or type of vehicle used for transport.	Truck Euro 6 (28 – 32 t / 22 t payload).
Truck capacity utilisation (including 30% of empty returns)	46% of the weight capacity
Loss of materials on site	2%
Packaging - PE film	40% recycled, 60% incinerated
Packaging - Wooden pallet	40% recycled, 60% incinerated

The treatment and the transport of the packaging waste after the installation of the product (A5) has been considered.

The Use stage (B1-B7) includes:

- B1: Use
- B2: Maintenance
- B3: Repair
- B4: Replacement
- B5: Refurbishment
- B6: Operational Energy Use
- B7: Operational Water Use

Once installation is complete, no actions or technical operations are required during the use stages until the end of life. Therefore, the mineral wool has no impact (excluding potential energy savings) on this stage.

The end-of-life stage includes:

- C1 – de-construction, demolition,
- C2 – transport to waste processing,
- C3 – waste processing for reuse, recovery and/or recycling and
- C4 – disposal.

This includes provision of all transport, materials, products and related energy and water use. The common manual dismantling impact of insulation is considered as very small and can be neglected in C1.

Although glass mineral wool products from Knauf Insulation are partly recycled at their end-of-life, an established collection system does not yet exist. Therefore, the assumption chosen in this study, 100% landfill (C4) after the use phase, is the most conservative approach.

Parameter	Value
Disposal type (mineral wool)	100% landfill
Average transport distance waste (C2)	50 km
Type of fuel and vehicle consumption or type of vehicle used for transport.	Truck-trailer, Euro 6, 34 - 40t gross weight / 27t payload capacity/ 40 L for 100 km. (if 100 % utilization).
Truck capacity utilization	50 % of the weight capacity

Module D includes reuse, recovery and/or recycling potentials. According to EN 15804:2012+A2:2019 any declared benefits and loads from net flows leaving the product system not allocated as co-products and having passed the end-of waste state shall be included in module D. Benefits considered in module D originate from packaging recycling or incineration.

Recycled material

The mineral wool scrap generated during the manufacturing process is recycled internally and fed back into the mineral wool production process at multiple stages.

Recycled content average for the considered plant(s) for this product was calculated at 16% in 2022 (8% in Sankt Egidien and 36% in Nova Bana), 2020 (7% in Skofja Loka) and 2023 (12% in Illange). The calculation is taking into account the % of secondary materials from external supply input into the batch against virgin raw materials supply. The external waste considerations and the calculation methodology applied are also in accordance with the ISO 14021 standard.

Additional information:

All raw materials used in the manufacture of the declared product, the required energy, water consumption and the resulting emissions are considered in the LCA. As a result, recipe components with a share of less than 1% are included. All neglected processes contribute less than 5% to the total mass or less than 5% to the total energy consumption. For information, the impact of the glass mineral wool plant construction or manufacturing equipment is not taken into account in the life cycle assessment. Allocation criteria with by-products (mineral wool for ceiling tiles) are based on cost.

Materials required for fixing and installation are not included in the scope of this LCA. The impact of any additional construction products or materials not included in this EPD should be accounted for at building level. Regarding installation, this EPD only includes the environmental impacts relating to the product itself, such as material losses and packaging disposal.

Knauf Insulation adopts a conservative approach in its EPDs.

Conversion to mass and specific thicknesses

The results of this EPD apply to a thickness of 100 mm, with an R-value of 2.60 m²K/W. Multiplication factors for thicknesses ranging from 40 mm to 120 mm are provided to calculate the environmental performance for each thickness.

The table below lists the primary product thicknesses. To adjust the results for all indicators across all modules to different thicknesses, multiply the values in this EPD by the corresponding conversion factor in the table. For thicknesses not listed, conversion factors can be calculated by dividing the product thickness (mm) by 100 (mm), as the results scale linearly.

Product thickness (mm)	Thickness Conversion factor
40	0.4
50	0.5
60	0.6
80	0.8
100	1
120	1.2

The conversion factor used in this EPD involves multiplying the results by 0.07 to obtain Environmental Impact Indicator results for 1 kg. Please note, an insulation product should always be defined by both its thickness and R-value. Focusing only on the product's weight could result in misinterpretations.

More information:
www.knaufinsulation.com

Name and contact information of LCA practitioner:
Clara del Val
Knauf Insulation Sprl
Rue de Maestricht 95
4600 Visé (Belgium)
Contact : sustainability@knaufinsulation.com

Content Declaration

The product does not contain substances on the "Candidate List of Substances of Very High Concern for Authorisation" under the REACH regulation (if above 0.1% of the mass).

Product components	Weight %	Post-consumer recycled material % *(out of total)*	Biogenic material % *(out of total)*	Biogenic material, kg C/product *(out of total)*
Basalt	55 - 60	0	0	0
Dolomite - Limestone	15 - 20	0	0	0
Recovered metallurgical slags	5 - 20	0	0	0
Thermo set resin binder	2 - 5	0	0	0
Additives	< 1	0	0	0

Packaging Materials	Weight, kg/ DU or FU	Weight -% (versus the product)	Biogenic material, kg C/product *(out of total)*
Packaging - PE film	0.04	0.27%	0
Packaging - Stone wool kickers	0.36	2.65%	0
TOTAL	0.39	2.92%	0

Note: This content declaration table applies to all product thicknesses covered in this EPD.

Declared Modules, geography, share of specific data (in GWP-GHG indicator) & data variation

Life cycle stages and the description of the system boundaries for the reference product LCA (X = included in the LCA, MND = module is not declared)

	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	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe	Europe
Share of specific data	> 60 %																
Variation* – products	<10 %																
Variation** – Sankt Egidien	5.6%																
Variation** – Skofja Loka	-1.9%																
Variation** - Nova Bana	-13.6%																
Variation** - Illange	10.0%																

*Variation regarding the average EPD result in terms of GWP-GHG indicator

**Variation regarding the average EPD result in terms of GWP-GHG indicator amongst products covered with this EPD

According to PCR 2019:14 v1.3.3 infrastructure should be outside of the system boundary. However, infrastructure impacts could have been considered in some GaBi background datasets.

Environmental performance

Potential environmental impacts: 1m² of rock mineral wool SmartRoof Top, KON 70, DDP KF Attika with a thickness of 100 mm and the R-value of 2.60 m²K/W.

These results are representative of all the products mentioned in this EPD.

ENVIRONMENTAL IMPACTS										
Parameter	**Unit**	**A1-3*****	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D****
GWP-fossil	kg CO_2 eq.	2.00E+01	2.41E-01	4.71E-01	0.00E+00	0.00E+00	5.54E-02	0.00E+00	2.01E-01	-4.17E-02
GWP-biogenic	kg CO_2 eq.	-1.73E-02	1.88E-04	4.32E-02	0.00E+00	0.00E+00	4.26E-05	0.00E+00	-2.61E-02	0.00E+00
GWP-luluc	kg CO_2 eq.	1.50E-02	3.92E-03	4.65E-04	0.00E+00	0.00E+00	8.87E-04	0.00E+00	6.00E-04	-4.05E-06
GWP-total	kg CO_2 eq.	2.00E+01	2.45E-01	5.15E-01	0.00E+00	0.00E+00	5.64E-02	0.00E+00	1.76E-01	-4.17E-02
ODP	kg CFC 11 eq.	6.61E-11	3.44E-14	1.33E-12	0.00E+00	0.00E+00	7.78E-15	0.00E+00	7.93E-16	-1.69E-13
AP	mol H^+ eq.	6.87E-02	2.13E-04	1.46E-03	0.00E+00	0.00E+00	6.15E-05	0.00E+00	1.45E-03	-6.68E-05
EP-freshwater	kg P eq.	1.53E-05	9.97E-07	3.60E-07	0.00E+00	0.00E+00	2.26E-07	0.00E+00	3.43E-07	-2.13E-08
EP-marine	kg N eq.	9.11E-03	6.41E-05	2.04E-04	0.00E+00	0.00E+00	2.12E-05	0.00E+00	3.77E-04	-2.14E-05
EP-terrestrial	mol N eq.	1.00E-01	7.79E-04	2.26E-03	0.00E+00	0.00E+00	2.51E-04	0.00E+00	4.15E-03	-2.31E-04
POCP	kg NMVOC eq.	3.06E-02	2.23E-04	6.80E-04	0.00E+00	0.00E+00	6.85E-05	0.00E+00	1.14E-03	-8.82E-05
ADP-minerals&metals*	kg Sb eq.	7.00E-07	2.03E-08	1.57E-08	0.00E+00	0.00E+00	4.60E-09	0.00E+00	1.93E-08	-2.65E-09
ADP-fossil*	MJ	2.84E+02	3.07E+00	5.94E+00	0.00E+00	0.00E+00	6.96E-01	0.00E+00	2.71E+00	-1.21E+00
WDP*	m^3 world eq.	9.46E-01	3.61E-03	2.53E-02	0.00E+00	0.00E+00	8.18E-04	0.00E+00	2.19E-02	-5.70E-03
Acronyms	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; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption									

** Disclaimer 2: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

***: [Life Cycle D stage covers benefits and loads beyond the system boundary stage (reuse, recovery and recycling potential) therefore, when summing up results, this stage should be considered separately].*

**** The indicator's results are calculated using a reference product, with equal weighting between plants, if this is a single plant, it means 100% for that plant.*

Potential environmental impact – additional mandatory and voluntary indicators

These results are representative of all the products mentioned in this EPD.

Indicator	Unit	Tot.A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-GHG [2]	kg CO_2 eq.	2.03E+01	2.46E-01	4.78E-01	0.00E+00	0.00E+00	5.67E-02	0.00E+00	2.03E-01	-4.33E-02

[2] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product.

Use of resources: 1m² of rock mineral wool SmartRoof Top, KON 70, DDP KF Attika with a thickness of 100 mm and the R-value of 2.60 m²K/W.

These results are representative of all the products mentioned in this EPD.

RESOURCES USE										
Parameter	Unit	A1-3***	A4	A5	B1-B7	C1	C2	C3	C4	D*
PERE [3]	MJ	1.63E+01	2.65E-01	2.46E-01	0.00E+00	0.00E+00	5.99E-02	0.00E+00	3.65E-01	0.00E+00
PERM [3]	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT [3]	MJ	1.63E+01	2.65E-01	2.46E-01	0.00E+00	0.00E+00	5.99E-02	0.00E+00	3.65E-01	0.00E+00
PENRE [3]	MJ	2.71E+02	3.07E+00	2.90E+02	0.00E+00	0.00E+00	6.96E-01	0.00E+00	2.71E+00	0.00E+00
PENRM [3]	MJ	1.34E+01	0.00E+00	2.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT [3]	MJ	2.84E+02	3.07E+00	2.90E+02	0.00E+00	0.00E+00	6.96E-01	0.00E+00	2.71E+00	0.00E+00
SM	kg	2.14E-01	0.00E+00	4.27E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	5.24E-02	2.95E-04	1.21E-03	0.00E+00	0.00E+00	6.68E-05	0.00E+00	6.68E-04	-1.72E-04
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									

** : [Life Cycle D stage covers benefits and loads beyond the system boundary stage (reuse, recovery and recycling potential) therefore, when summing up results, this stage should be considered separately].*
**** The indicator's results are calculated using a reference product, with equal weighting between plants, if this is a single plant, it means 100% for that plant.*

[3] From International EPD PCR 1.3.3. for Construction Products, the option B, mentioned in Annex 3, was used for the calculation if the primary energy use indicators.

Waste production and output flows: 1m² of rock mineral wool SmartRoof Top, KON 70, DDP KF Attika with a thickness of 100 mm and the R-value of 2.60 m^2K/W.

These results are representative of all the products mentioned in this EPD.

WASTE PRODUCTION AND OUTPUT FLOWS										
Parameter	**Unit**	**A1-3*****	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D***
Hazardous waste disposed	kg	3.46E-06	1.18E-10	6.91E-08	0.00E+00	0.00E+00	2.66E-11	0.00E+00	2.88E-10	1.46E-09
Non-hazardous waste disposed	kg	1.47E+00	5.02E-04	6.71E-01	0.00E+00	0.00E+00	1.14E-04	0.00E+00	1.35E+01	1.18E-03
Radioactive waste disposed	kg	8.11E-03	5.60E-06	1.65E-04	0.00E+00	0.00E+00	1.27E-06	0.00E+00	2.84E-05	-2.50E-05
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	1.46E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	9.94E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	1.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**: [Life Cycle D stage covers benefits and loads beyond the system boundary stage (reuse, recovery and recycling potential) therefore, when summing up results, this stage should be considered separately].*
**** The indicator's results are calculated using a reference product, with equal weighting between plants, if this is a single plant, it means 100% for that plant.*

Additional impact categories and indicators: 1m² of rock mineral wool SmartRoof Top, KON 70, DDP KF Attika with a thickness of 100 mm and the R-value of 2.60 m²K/W.

These results are representative of all the products mentioned in this EPD.

ADDITIONAL IMPACT CATEGORIES AND INDICATORS										
Parameter	**Unit**	**A1-3******	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D*****
PM	Disease Incidence	5.23E-07	2.62E-09	1.15E-08	0.00E+00	0.00E+00	6.46E-10	0.00E+00	1.81E-08	-5.73E-10
IRP*	kBq U235 eq.	1.12E+00	8.12E-04	2.27E-02	0.00E+00	0.00E+00	1.84E-04	0.00E+00	2.98E-03	-4.10E-03
ETP-fw**	CTUe	7.59E+01	2.28E+00	1.69E+00	0.00E+00	0.00E+00	5.16E-01	0.00E+00	1.54E+00	-5.17E-01
HTP-c**	CTUh	5.34E-09	4.61E-11	1.20E-10	0.00E+00	0.00E+00	1.04E-11	0.00E+00	2.28E-10	-1.41E-11
HTP-nc**	CTUh	3.92E-07	2.07E-09	9.12E-09	0.00E+00	0.00E+00	4.68E-10	0.00E+00	2.41E-08	-4.25E-10
SQP**	dimensionless	2.38E+01	1.51E+00	5.62E-01	0.00E+00	0.00E+00	3.42E-01	0.00E+00	5.47E-01	-6.66E-02
Acronyms	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									

** 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 of these results are high or as there is limited experience with the indicator.*

****: [Life Cycle D stage covers benefits and loads beyond the system boundary stage (reuse, recovery and recycling potential) therefore, when summing up results, this stage should be considered separately].*

***** The indicator's results are calculated using a reference product, with equal weighting between plants, if this is a single plant, it means 100% for that plant.*

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	**kg C**	**kg CO_2 eq.**
Biogenic carbon content in product	0.00E+00	0.00E+00
Biogenic carbon content in packaging	0.00E+00	0.00E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

LCA interpretation

ENVIRONMENTAL IMPACTS

All impact categories, except the Abiotic Depletion Potential Element and the Ozone Depletion Potential, are dominated by the manufacturing processes. This can be explained by the huge impact of the energy use (electricity, natural gas and coke) for rock mineral wool production.

The Global Warming Potential (GWP-total) is dominated by the manufacturing in the cupola, mostly due to CO_2 emissions from raw materials and energy consumption.

The Depletion Potential of the Stratospheric Ozone layer (ODP) is mostly influenced by the manufacturing phase (module A1-A3) and significantly influenced using electricity.

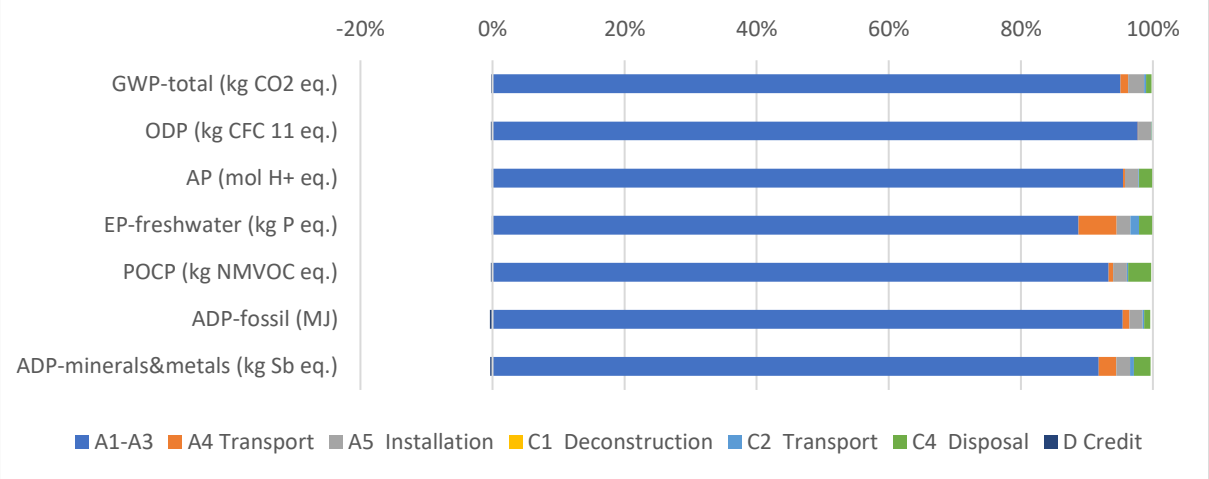
The Acidification Potential (AP) is also dominated by the manufacturing due to the emissions related to the processes and the energy consumption.

The Formation Potential of Tropospheric Ozone (POCP) is dominated by emissions from the manufacturing processes (including energy use) and raw materials.

The Formation Potential of Tropospheric Ozone (POCP) is particularly dominated by the manufacturing (emissions in the cupola furnace and other unit processes).

The Abiotic Depletion Potential for Non-Fossil Resources (ADP- minerals &metals) impact mainly comes from the manufacturing of the product.

The Abiotic Depletion Potential for Fossil Resources Potential (ADP-fossil) is dominated by the use of coke as energy carrier. Next to the coke, we have also the impact of natural gas and upstream the electricity energy mix.



The variation in Global Warming Potential (GWP) results (A1-A3) between the manufacturing sites covered by this EPD and the average varies from -13.6% in Nova Bana, -1.9% in Skofja Loka, to 5.7% in Sankt Egidien and 10.0% in Illange. Nova Bana plant has a lower environmental impact, followed by Skofja Loka compared to Nova Bana and Illange plants due to variations in energy and raw material consumption.

RESOURCES USE

Total Use of Non-Renewable Primary Energy Resources (PENRT) is dominated by the manufacturing of rock mineral wool products (especially due to the energy carrier, coke).

Total Use of Renewable Primary Energy Resources (PERT) is dominated by the manufacturing, mostly due to electricity consumption.

Version history

Version	Date	Difference(s) versus previous version(s)
Original	2023-10-23	-
2	2024-12-17	The recycled content of products was reported by plant in the second version of this document and not as an avergae.
3	2025-10-01	KON 70 and DDP KF Attika product names were added to the EPD.

References

International EPD® System
General Programme Instructions of the International EPD® System. Version 4.0.
Product category rules (PCR): PCR 2019:14 v1.3.2. Construction products (EN 15804+A2) Version 1.0
Sub-PCR-005 Thermal insulation products (EN 16783: 2024) Version: 2024-05-03

ISO 14025
DIN EN ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804:2012+A2:2019/AC:2021
EN 15804:2012+A2:2019/AC:2021: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

EN 16783:2024
Thermal insulation products - Environmental Product Declarations (EPD) - Product Category Rules (PCR) complementary to EN 15804 for factory made and in-situ formed products

LCA for Experts 10.9
LCA for Experts 10.9: Software and database for life cycle engineering. LBP, University of Stuttgart and Sphera, 2024.

DoP R4309IPCPR, R4238IPCPR, R4308IPCPR, R4296IPCPR
Declaration of Performance
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EN 1602
EN1602: 2013 Thermal insulation products for building applications – Determination of the apparent density

EN 12667
EN 12667: 2001 Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance

EN 13162
EN 13162:2012 Thermal insulation products for buildings - Factory made mineral wool (MW) products - Specification

EN 12086
EN 12086: 2013 Thermal insulating products for building applications –determination of water vapour transmission properties.

ISO 14021
ISO 14021:2016 Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)

EN 15978: 2011
EN 15978: 2011 Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method.

ISO 8301:1991
Thermal insulation — Determination of steady-state thermal resistance and related properties — Heat flow meter apparatus.

ISO 21930:2017
Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services

2024_11_19 SmartRoof Top, KON 70, DDP KF Attika - SE, SL, NB, ILL **(I-report)**
I-report is an interactive report created with GaBi based on the scenario. More details on the product characteristics, plant allocation and scenario can be found in the i-report.

BR_RMW_2022 **(Background Report)**
Calculation rules for the Life Cycle Assessment and Requirements and more details about the production on the Background Report.

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