



ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

AKOroof kasvikatto

Rakennusbetoni- ja Elementti Oy (FI)



EPD HUB, HUB-4033

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Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.1 (5 Dec 2023) and JRC characterization factors EF 3.1.



Created with One Click LCA



GENERAL INFORMATION

MANUFACTURER

Manufacturer	Rakennusbetoni- ja Elementti Oy (FI)
Address	Kukonkankaantie 8, 15880 Hollola, Finland
Contact details	akoroof@rakennusbetoni.fi
Website	https://www.rakennusbetoni.fi

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2 and ISO14025
PCR	EPD Hub Core PCR Version 1.1, 5 Dec 2023
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Sami Hallikainen, Rakennusbetoni- ja Elementti Oy
EPD verification	Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> Internal verification <input checked="" type="checkbox"/> External verification
EPD verifier	Haiha Nguyen, as an authorized verifier acting for EPD Hub Limited

This EPD is intended for business-to-business and/or business-to-consumer communication. The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	AKOroof kasvikatto
Place(s) of raw material origin	Finland
Place of production	Hollola, Finland
Place(s) of installation and use	Finland
Period for data	Calendar year 2024
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3 (%)	0

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	2,35E-02
GWP-total, A1-A3 (kgCO ₂ e)	-1,61E-01
Secondary material, inputs (%)	64,5
Secondary material, outputs (%)	88,5
Total energy use, A1-A3 (kWh)	0,03
Net freshwater use, A1-A3 (m ³)	0

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Rakennusbetoni- ja Elementti Oy is a family-owned company specializing in the manufacture of high-quality concrete products. As a leading player in the construction of civil defense shelters in Finland, the company also offers a wide range of other key products including room height lightweight partition walls, bathroom modules, concrete blocks, pavement stones, vegetated roofs (green roofs), and various special concrete foundation elements. All our products are for the domestic- and international markets. Located in Hollola, Finland, Rakennusbetoni- ja Elementti Oy benefits from its proximity to major construction companies, house builders, and land developers of all sizes. The company employs 90 people and is proud to hold ISO certifications for quality, environmental management, occupational health, and safety standards.

PRODUCT DESCRIPTION

AKOroof kasvikatto also known as green roofs, is a unique product for sustainable environmental construction that utilizes side streams from concrete production and circular economy. AKOroof has KESY-sign (Granted by the Finnish Association of Landscape Industries) as a symbol, which signifies that the company operates in accordance with the goals of sustainable environmental construction and continuously promotes its practices toward greater sustainability.

AKOroof kasvikatto includes all the biological layers of the vegetated roof starting from the bitumen layers upwards and can be customized to meet the requirements of the specific project. It is researched and developed in collaboration with the University of Helsinki. It has classification as fire-resistant under the Broof (t2) category. The AKOroof vegetated roof structure is suitable for vegetated roofs as well as for the construction of deck gardens. The AKOroof growing medium is also suitable for stormwater management structures and meadow planting. This is averaged EPD. AKOroof kasvikatto structures thickness ranges between 130 -250 mm, it consists always of water

retaining mat 20 mm and common reed 50 mm. The growing medium layer thickness varies from 80 mm upwards, depending on the designed structure. All plants and seed mixtures are ordered by plant nurseries and therefore they don't belong to this study. We use domestic plants and seeds produced near in our production plant or the intended use. Using lightweight concrete crush, a side stream from concrete production, makes the growing medium highly alkaline. The alkalinity of the AKOroof growing medium has been proven to effectively retain phosphorus, preventing it from contributing to the eutrophication of water bodies.

Vegetated roofs (green roofs) provide a range of well-documented environmental, structural, and socio-economic benefits. These include effective stormwater management, enhancement of urban biodiversity, improvement of air quality, and mitigation of the urban heat island effect. In addition, vegetated roofs can extend the lifespan of the underlying roofing materials, reduce noise pollution, and improve the building's energy efficiency. They also contribute to the aesthetic value of the built environment and can lead to an increase in property value.

Further information can be found on:
<https://www.rakennusbetoni.fi>

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	-	
Minerals	70	EU
Fossil materials	-	
Bio-based materials	30	EU

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0,052
Biogenic carbon content in packaging, kg C	0

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg
Mass per declared unit	1 kg
Functional unit	-
Reference service life	-

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
x	x	x	x	x	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x	
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery
																	Recycling

Modules not declared = MND. Modules not relevant = MNR

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

A market-based approach is used in modelling the electricity mix utilized in the factory.

AKOroof kasvikatto is manufactured using recycled materials. The system includes a water-retaining mat, made entirely from 100 % recycled fibers, placed at the bottom of the layering system. Above this, a layer of common reed, collected from local lake restoration projects, is added. The common reed is baled, stacked on pallets, and covered with protective plastic wrap before use. The top layer consists of a growing medium, which is a carefully balanced mixture of compost, fine sand, wood chips and lightweight concrete crush, a side stream material from concrete production. All components of the growing medium are mixed in the correct proportions and packaged in sacks.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

The transportation distance from production plant to building site is calculated based on real average distance from factory to customer to be 101 km. The transportation method is assumed to be lorry. Vehicle capacity utilization is assumed to be full load. It may vary but as role of transportation emissions in total results is small, the variety in load is assumed to be negligible. Empty returns are not considered as it is assumed that return trip is used by the transportation company to serve the needs of other clients. Transportation does not cause losses as products are packaged properly. Installation includes energy use as well as the packaging waste generated. Production loss at installation is assumed to be maximum 5 % loss as the products are delivered from the factory well packaged. The transportation distance to treatment for installation waste is estimated as 50 km in Finland. In this study the producer can collect wooden pallets and reuse 90 % of the pallets in the factory. All these products' polypropene plastic sacks are cut open and can't be reused. Plastic sacks are treated as waste. 50 % of plastic

cover bags can be collected and reused in the products storage and transportation. The source of energy is only diesel of installation cranes. The release of biogenic carbon dioxide from waste processing of wood pallets is also included.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.

Air, soil, and water impacts during the use phase have not been studied.

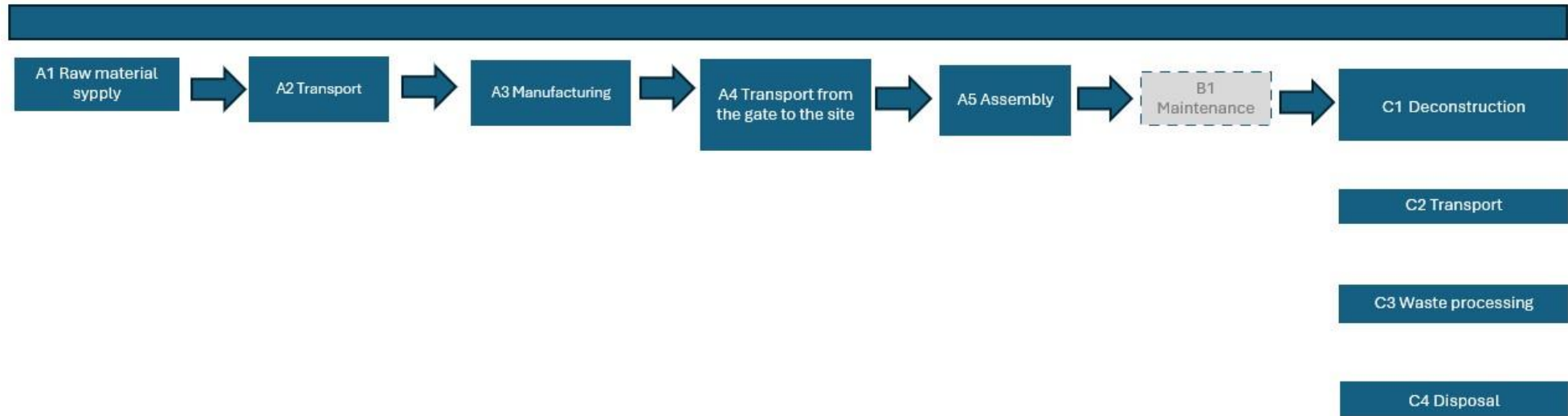
PRODUCT END OF LIFE (C1-C4, D)

At the end of life in the demolition phase of the waste is assumed to be collected and it can be returned to manufacturing site and reused in the same place or another nearby vegetated roofs or meadows. The demolition process consumes energy, diesel fuel used by building machines. Transportation distance to the utilization area is estimated as back to factory 101 km. The transportation method is lorry, which is the most common in Finland (C2). The process losses of the waste treatment plant are assumed to be negligible (C3). Due to the recycling potential of AKOroof, it is entirely recyclable product, which avoids the use of virgin raw materials. All remaining recoverable packaging waste is separated for recycling and directed to further use as in material or utilizing as energy (D).

The producer is committed to operating in accordance with the goals of KESY (Finnish framework for sustainable landscape construction). The KESY framework provides guidelines on how to achieve sustainable development in the green sector. The purpose of KESY is to design, build and maintain the environment in such a way as to avoid, reduce, compensate or prevent the negative effects of construction. In planning, the producer follows the strategies of the client and its own organization, environmental and sustainable development programs, quality and operating systems, and other operating instructions. An organization that has received the KESY symbol

commits to reporting on its KESY activities to the Finnish Association of Landscape Industries at least once a year. More information about KESY: <https://www.vyl.fi/kesy/mika-on-kesy/kesy-in-english/>

MANUFACTURING PROCESS AND SYSTEM BOUNDARY



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process that is more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

No electricity is needed in the manufacturing process. Production loss is assumed to be 5 % and it is added to volume of materials. Differences between 130-250 mm layer have no effects.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are made according to the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging material	No allocation
Ancillary materials	Not applicable
Manufacturing energy and waste	Allocated by mass or volume

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	Multiple products
Grouping method	Based on the average results of the product group
Variation in GWP-fossil for A1-A3, %	0

The data was used to calculate average impacts on the products. The variability of the primary data and the emissions between the products was 0 %, due to **same mix design per 1 kg of product**. The primary data was averaged by calculating a weighted average of the products consumption of raw materials, energy and production of waste. The production amount mass shares per product was used in the weighting. Plants and seeds are not included in the calculations as part of this product. The designer can design seedlings and seed mixtures in the growing medium or other vegetation options.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1 environmental data sources follow the methodology 'allocation, Cut-off, EN 15804+A2'.

ENVIRONMENTAL IMPACT DATA

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

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	-1,80E-01	1,07E-03	1,76E-02	-1,61E-01	1,90E-02	1,90E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,37E-02	1,98E-01	0,00E+00	-2,64E-03
GWP – fossil	kg CO ₂ e	3,86E-03	1,07E-03	1,86E-02	2,35E-02	1,90E-02	1,80E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,36E-02	1,41E-02	0,00E+00	-2,63E-03
GWP – biogenic	kg CO ₂ e	-1,84E-01	6,62E-09	-1,01E-03	-1,85E-01	3,82E-06	1,02E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,67E-06	1,84E-01	0,00E+00	-1,12E-06
GWP – LULUC	kg CO ₂ e	1,35E-05	4,77E-07	9,63E-06	2,36E-05	6,83E-06	3,14E-06	MND	MND	MND	MND	MND	MND	MND	0,00E+00	5,52E-06	1,08E-05	0,00E+00	-2,18E-06
Ozone depletion pot.	kg CFC-11e	3,68E-10	1,59E-11	3,79E-10	7,64E-10	3,79E-10	2,67E-10	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,33E-10	1,66E-10	0,00E+00	-9,14E-11
Acidification potential	mol H ⁺ e	4,87E-05	3,62E-06	1,26E-04	1,78E-04	3,96E-05	1,30E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	4,48E-05	7,43E-04	0,00E+00	-1,10E-05
EP-freshwater ²⁾	kg Pe	-1,13E-03	8,31E-08	2,42E-06	-1,13E-03	1,28E-06	-5,60E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	9,90E-07	2,26E-06	0,00E+00	-8,39E-07
EP-marine	kg Ne	1,63E-05	1,18E-06	5,07E-05	6,82E-05	9,51E-06	5,91E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,49E-05	4,50E-05	0,00E+00	-1,83E-06
EP-terrestrial	mol Ne	1,78E-04	1,29E-05	5,51E-04	7,42E-04	1,03E-04	6,44E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,62E-04	3,28E-03	0,00E+00	-1,89E-05
POCP (“smog”) ³⁾	kg NMVOCe	5,43E-05	5,34E-06	1,85E-04	2,45E-04	6,59E-05	1,96E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	6,78E-05	8,67E-05	0,00E+00	-1,24E-05
ADP-minerals & metals ⁴⁾	kg Sbe	4,53E-09	3,00E-09	5,54E-08	6,29E-08	6,34E-08	1,32E-08	MND	MND	MND	MND	MND	MND	MND	0,00E+00	4,11E-08	3,55E-08	0,00E+00	-1,53E-08
ADP-fossil resources	MJ	2,60E-02	1,55E-02	3,36E-01	3,77E-01	2,68E-01	2,10E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,95E-01	1,68E-01	0,00E+00	-7,01E-02
Water use ⁵⁾	m ³ e depr.	3,72E-02	7,67E-05	4,74E-03	4,20E-02	1,33E-03	2,70E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	9,61E-04	3,63E-03	0,00E+00	-7,17E-04

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterization method and data are in kg P-eq. Multiply by 3,07 to get PO₄e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	1,11E-09	1,07E-10	3,03E-09	4,24E-09	1,40E-09	3,66E-09	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,23E-09	9,63E-09	0,00E+00	-8,63E-11
Ionizing radiation ⁶⁾	kBq 11235e	6,10E-04	1,37E-05	7,59E-04	1,38E-03	3,45E-04	1,75E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,05E-04	5,08E-04	0,00E+00	-3,78E-04
Ecotoxicity (freshwater)	CTUe	1,15E-01	2,19E-03	5,29E-02	1,71E-01	3,56E-02	2,17E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,67E-02	2,67E+00	0,00E+00	-5,54E-03
Human toxicity, cancer	CTUh	-6,60E-12	1,77E-13	3,82E-12	-2,61E-12	3,19E-12	1,58E-12	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,29E-12	5,39E-12	0,00E+00	-5,16E-13
Human tox. non-cancer	CTUh	5,01E-11	1,00E-11	7,93E-11	1,39E-10	1,69E-10	4,62E-11	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,25E-10	1,30E-10	0,00E+00	-2,08E-11
SQP ⁷⁾	-	1,97E+00	1,55E-02	1,26E-01	2,11E+00	1,62E-01	1,31E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,60E-01	1,75E-01	0,00E+00	-9,40E-03

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy ⁸⁾	MJ	-2,06E-01	2,14E-04	1,71E-02	-1,88E-01	4,69E-03	-1,66E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,99E-03	-1,35E+00	0,00E+00	-2,26E-03
Renew. PER as material	MJ	4,89E-01	0,00E+00	8,93E-03	4,98E-01	0,00E+00	-8,93E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	-4,89E-01	0,00E+00	2,40E-03
Total use of renew. PER	MJ	2,83E-01	2,14E-04	2,61E-02	3,09E-01	4,69E-03	-2,55E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,99E-03	-1,84E+00	0,00E+00	1,43E-04
Non-re. PER as energy	MJ	5,04E-02	1,55E-02	2,45E-01	3,11E-01	2,68E-01	1,31E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,95E-01	1,68E-01	0,00E+00	-7,01E-02
Non-re. PER as material	MJ	0,00E+00	0,00E+00	5,90E-04	5,90E-04	0,00E+00	7,59E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,22E-02
Total use of non-re. PER	MJ	5,04E-02	1,55E-02	2,45E-01	3,11E-01	2,68E-01	2,07E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,95E-01	1,68E-01	0,00E+00	-3,80E-02
Secondary materials	kg	6,45E-01	6,62E-06	1,46E-04	6,45E-01	1,24E-04	3,23E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	8,59E-05	1,52E-04	0,00E+00	7,93E-04
Renew. secondary fuels	MJ	2,01E-06	8,41E-08	3,77E-04	3,79E-04	1,57E-06	1,93E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,09E-06	8,62E-06	0,00E+00	-7,01E-08
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m³	3,66E-04	2,29E-06	1,18E-04	4,86E-04	3,65E-05	3,67E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,77E-05	-1,13E-05	0,00E+00	-2,25E-05

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	3,01E-04	2,62E-05	6,25E-04	9,53E-04	3,89E-04	2,94E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	3,08E-04	5,84E-04	0,00E+00	-1,28E-04
Non-hazardous waste	kg	2,13E-01	4,86E-04	5,04E-02	2,64E-01	8,21E-03	2,08E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	6,02E-03	4,80E-02	0,00E+00	-1,85E-02
Radioactive waste	kg	2,85E-07	3,35E-09	1,91E-07	4,79E-07	8,58E-08	5,01E-08	MND	MND	MND	MND	MND	MND	MND	0,00E+00	5,07E-08	1,24E-07	0,00E+00	-9,68E-08

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	6,80E-01	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,50E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	3,20E-01	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,80E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,21E-02	MND	MND	MND	MND	MND	MND	MND	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	0,00E+00	0,00E+00	0,00E+00	5,10E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,04E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO ₂ e	3,81E-03	1,06E-03	1,85E-02	2,33E-02	1,89E-02	1,79E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,36E-02	2,30E-02	0,00E+00	-2,59E-03
Ozone depletion Pot.	kg CFC ₋₁₁ e	2,94E-10	1,27E-11	3,06E-10	6,12E-10	3,01E-10	2,12E-10	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,86E-10	1,33E-10	0,00E+00	-7,43E-11
Acidification	kg SO ₂ e	3,16E-05	2,76E-06	9,20E-05	1,26E-04	3,18E-05	9,18E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	3,41E-05	4,09E-04	0,00E+00	-9,20E-06
Eutrophication	kg PO ₄ ³ e	8,58E-06	6,74E-07	1,13E-04	1,22E-04	8,03E-06	2,62E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	8,47E-06	9,37E-05	0,00E+00	-3,17E-06
POCP (“smog”)	kg C ₂ H ₄ e	2,30E-06	2,47E-07	9,28E-06	1,18E-05	3,37E-06	7,09E-06	MND	MND	MND	MND	MND	MND	MND	0,00E+00	3,13E-06	5,94E-06	0,00E+00	-9,50E-07
ADP-elements	kg Sbe	4,57E-08	2,93E-09	5,46E-08	1,03E-07	6,19E-08	1,50E-08	MND	MND	MND	MND	MND	MND	MND	0,00E+00	4,01E-08	3,47E-08	0,00E+00	-1,51E-08
ADP-fossil	MJ	4,27E-02	1,53E-02	3,23E-01	3,81E-01	2,62E-01	2,09E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,92E-01	1,60E-01	0,00E+00	-6,35E-02

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ⁹⁾	kg CO ₂ e	3,87E-03	1,07E-03	1,86E-02	2,35E-02	1,90E-02	1,80E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,36E-02	1,41E-02	0,00E+00	-2,64E-03

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO₂ is set to zero.

THIRD-PARTY VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? [Read more online](#)

This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

HaiHa Nguyen, as an authorized verifier acting for EPD Hub Limited

25.09.2025

