ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

AKOwall

RAKENNUSBETONI- JA ELEMENTTI OY

EPD HUB, HUB-2063
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Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

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

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 und ISO 14025
PCR	EPD Hub Core PCR Version 1.1, 5 Dec 2023
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Sami Hallikainen
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Haiha Nguyen, as an authorized verifier acting for EPD Hub Limited

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	AKOwall
Additional labels	AKOwall 68, AKOwall 92, AKOwall 120, AKOwall 130
Product reference	-
Place of production	Hollola Finland
Period for data	Calender year 2023
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 ($kgCO_2e$)	2,56E-01
GWP-total, A1-A3 ($kgCO_2e$)	2,22E-01
Secondary material, inputs (%)	0.15
Secondary material, outputs (%)	80.3
Total energy use, A1-A3 (kWh)	0.77
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, 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

AKOwall is a lightweight concrete indoor wall, made from cement, expanded clay and aggregates. AKOwalls are non-load bearing hollowcore walls that offer superior properties for a whole range of uses. Wall elements are 600 mm wide and room-height, 2500...3300 mm. Each elements are fireproof and tested by fire and sound insulation. Walls are suitable for residential properties, school buildings, warehouses and technical facilities, recidential care facilities and hospitals. AKOwall elements are classified as M1 for indoor air quality. The walls are factory made, transported to the side on pallets and installed by nationwide network of assembly staff in Finland and neighbouring countries.

Further information can be found at https://www.rakennusbetoni.fi.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	0	
Minerals	100	EU
Fossil materials	-	
Bio-based materials	-	

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0.0114

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.

AKOwall production starts by transporting cement, fly ash, aggregates and light expanded clay aggregate to silos, from where they are dosed onto a conveyor. Cement is then added to the ingredients, after which the material is mixed dry. Water added to the mixture, followed by wet mixing. The wet mass is exfilled into plate and shaped to its final shape in the production line. AKOwall elements are then transported on an automatic line to storage. When elements are dry, they go to the packaging line, where they are taken for storage. The element is packaged in plastic film and sent to the installation site on a wooden pallet. Storage is outside and covered.

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 is from production plant to building site is calculated based on real average distance from factory to customer to be 291 km. The transportation method is assumed to be lorry. Vehicle capacity utilization is assumed to be full load. In reality, 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 taken into account 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 product are packaged properly. Installation includes the energy use as well as the packaging waste generated. Production loss at installation is assumed level is 3 % loss as the precast elements are delivered ready made from the factory and the cut waste pieces is intended to be utilized in the installation. The transportation distance to treatment for installation waste is estimated as 50 km in Finland. 32,5 % of plastic packaging is resycled and 31 % of wood packaging pallets. (Ref. Euro Parl 2023 and Eurostats & PSR-0014 v2.) The source of energy is grid electricity and used by work machines like drills, cut-off machines and the installation cranes. The release of biogenic carbon dioxide from waste processing of wood pallets is also included.

PRODUCT USE AND MAINTENANCE (B1-B7)

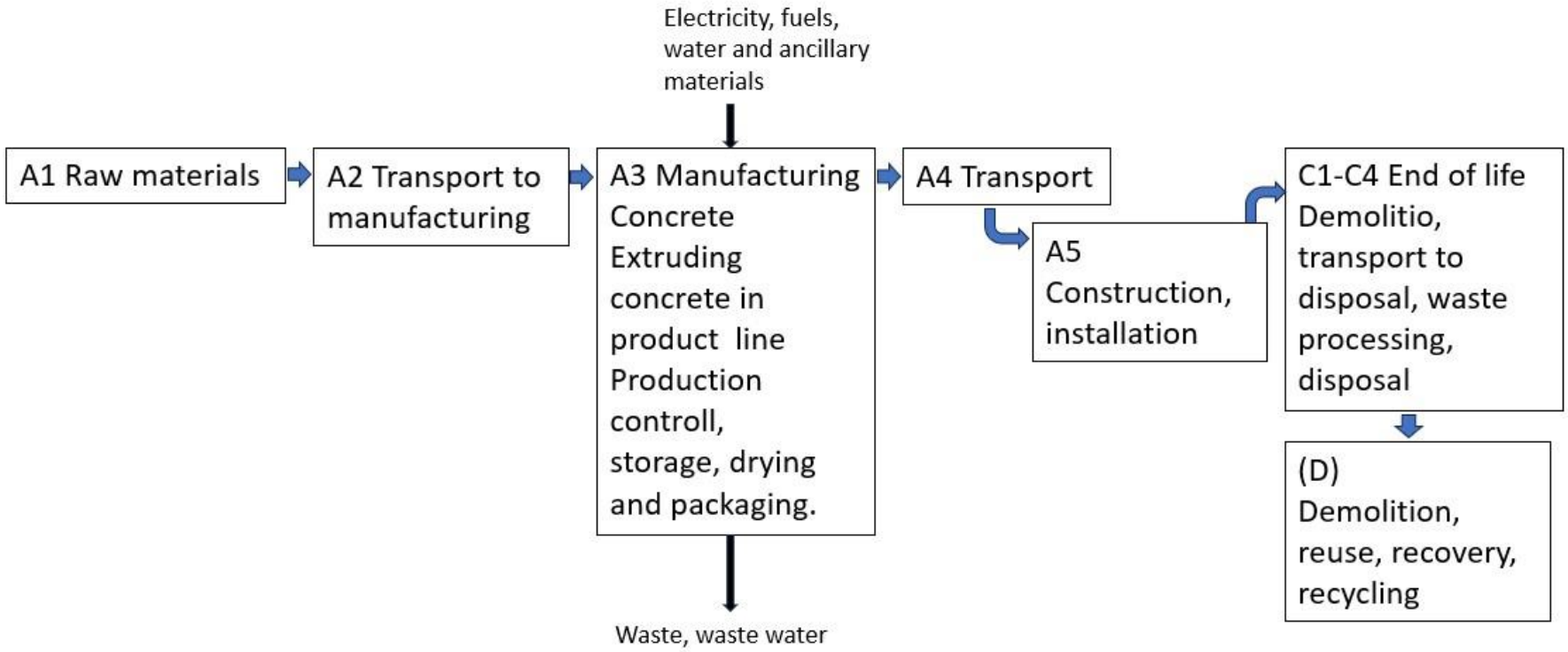
AKOwall elements are moisture-resistant, non-combustible, emission-free and maintenance free. Walls are sustainable and energy-efficient in its life cycle. When installation is complete, no actions or technical operations are required during the use stages. Design age is the life cycle of the building. This EPD doesnt cover the use phase B1-B7.

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 as construction waste. The demolition process consumes energy, diesel fuel used by building machines. The waste handling scenario is that deconstruction and demolition energy consumption is 0,01 kwh/kg of concrete building material (C1). Transportation distance to the closest disposal area is estimated as 50 km and the transportation method is lorry. This is the most common in Finland (C2). It can be assumed that 100 % of the concrete wall elements are transported to a waste treatment plant, where the walls are crushed and separated. About 80 % of concrete (Betoniteollisuus ry, 2020) is recycled. The process losses of the waste treatment plant are assumed to be negligible (C3). The remaining 20 % of concrete are assumed to be sent to the landfill (C4). The recoverable packaging waste is separated for recycling and directed to further use as in material or utilizing as energy. Due to the recycling potential of concrete, it can be crushed and used as secondary raw material, which avoids the use of virgin raw materials. The 80 % of concrete going to waste processing is converted into secondary raw materials after recycling. Concrete waste can be used to replace virgin gravel in some applicable road and other land construction purposes (D).

MANUFACTURING PROCESS AND LIFE CYCLE



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 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.

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 done as per 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

AVERAGES AND VARIABILITY

Type of average	Multiple products
Averaging method	Averaged by shares of total mass
Variation in GWP-fossil for A1-A3	0 %

Primary data represents the manufacturing of AKOwall 68, 92, and 120. The data was used to calculate average impacts for 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 weighed average of the products consumption of raw materials, energy and production of wastes. The production amount mass shares per each product was used in the weighting.

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 v3.8, Plastics Europe, Federal LCA Commons and One Click LCA databases as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

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_2e	2,25E-01	9,74E-03	-1,25E-02	2,22E-01	5,08E-02	9,97E-03	MND	MND	MND	MND	MND	MND	MND	3,31E-03	8,55E-03	3,75E-02	1,07E-03	-1,69E-01
GWP – fossil	kg CO_2e	2,24E-01	9,73E-03	2,17E-02	2,56E-01	5,08E-02	9,95E-03	MND	MND	MND	MND	MND	MND	MND	3,31E-03	8,54E-03	3,23E-03	1,06E-03	-1,69E-01
GWP – biogenic	kg CO_2e	2,30E-04	3,56E-06	-3,42E-02	-3,40E-02	0,00E+00	1,95E-15	MND	MND	MND	MND	MND	MND	MND	0,00E+00	3,32E-06	3,42E-02	6,93E-07	0,00E+00
GWP – LULUC	kg CO_2e	3,36E-04	4,96E-06	3,75E-05	3,78E-04	2,13E-05	1,28E-05	MND	MND	MND	MND	MND	MND	MND	3,30E-07	3,58E-06	3,21E-07	1,00E-06	-1,34E-04
Ozone depletion pot.	kg $CFC\text{-}_{11}$e	5,76E-09	2,08E-09	2,00E-09	9,85E-09	1,10E-08	7,65E-10	MND	MND	MND	MND	MND	MND	MND	7,07E-10	1,84E-09	6,90E-10	4,30E-10	-4,38E-09
Acidification potential	mol H^+e	1,13E-03	5,34E-05	8,64E-05	1,27E-03	1,50E-04	4,62E-05	MND	MND	MND	MND	MND	MND	MND	3,44E-05	2,52E-05	3,35E-05	1,00E-05	-6,80E-04
EP-freshwater[2)]	kg Pe	4,71E-06	8,79E-08	6,46E-07	5,45E-06	4,31E-07	2,54E-07	MND	MND	MND	MND	MND	MND	MND	1,10E-08	7,25E-08	1,07E-08	1,11E-08	-2,20E-06
EP-marine	kg Ne	2,55E-04	1,28E-05	2,20E-05	2,90E-04	2,98E-05	1,05E-05	MND	MND	MND	MND	MND	MND	MND	1,52E-05	5,02E-06	1,48E-05	3,46E-06	-1,09E-04
EP-terrestrial	mol Ne	2,84E-03	1,42E-04	2,40E-04	3,22E-03	3,32E-04	1,17E-04	MND	MND	MND	MND	MND	MND	MND	1,67E-04	5,58E-05	1,63E-04	3,81E-05	-1,26E-03
POCP ("smog")[3)]	kg NMVOCe	7,42E-04	4,40E-05	8,83E-05	8,74E-04	1,25E-04	3,30E-05	MND	MND	MND	MND	MND	MND	MND	4,59E-05	2,10E-05	4,47E-05	1,11E-05	-5,66E-04
ADP-minerals & metals4)	kg Sbe	4,24E-07	3,73E-08	2,67E-07	7,29E-07	1,80E-07	3,01E-08	MND	MND	MND	MND	MND	MND	MND	1,68E-09	3,03E-08	1,64E-09	2,44E-09	-9,30E-07
ADP-fossil resources	MJ	1,27E+00	1,40E-01	3,15E-01	1,72E+00	7,37E-01	8,68E-02	MND	MND	MND	MND	MND	MND	MND	4,45E-02	1,24E-01	4,34E-02	2,92E-02	-5,56E+00
Water use[5)]	m^3e depr.	1,23E+01	6,77E-04	9,10E-03	1,23E+01	3,25E-03	3,68E-01	MND	MND	MND	MND	MND	MND	MND	1,20E-04	5,48E-04	1,17E-04	9,25E-05	-8,18E-02

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation 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, PEF

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	1,60E-08	8,11E-10	1,16E-09	1,80E-08	4,04E-09	7,22E-10	MND	MND	MND	MND	MND	MND	MND	9,22E-10	6,80E-10	6,87E-09	2,01E-10	-6,81E-09
Ionizing radiation[6)]	kBq U235e	3,40E-03	6,60E-04	1,28E-03	5,34E-03	3,45E-03	3,44E-04	MND	MND	MND	MND	MND	MND	MND	2,05E-04	5,80E-04	1,99E-04	1,32E-04	-2,13E-02
Ecotoxicity (freshwater)	CTUe	3,76E+00	1,32E-01	3,43E-01	4,24E+00	6,75E-01	1,57E-01	MND	MND	MND	MND	MND	MND	MND	2,68E-02	1,14E-01	2,61E-02	1,90E-02	-9,82E-01
Human toxicity, cancer	CTUh	5,38E-11	4,24E-12	5,11E-11	1,09E-10	1,90E-11	4,28E-12	MND	MND	MND	MND	MND	MND	MND	1,03E-12	3,20E-12	1,00E-12	4,76E-13	-4,85E-11
Human tox. non-cancer	CTUh	1,24E-09	1,19E-10	3,84E-10	1,75E-09	6,13E-10	7,96E-11	MND	MND	MND	MND	MND	MND	MND	1,94E-11	1,03E-10	1,89E-11	1,24E-11	-1,01E-09
SQP[7)]	-	1,79E+00	1,11E-01	2,77E+00	4,68E+00	5,16E-01	1,69E-01	MND	MND	MND	MND	MND	MND	MND	5,79E-03	8,68E-02	5,64E-03	6,24E-02	-3,78E-01

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	1,61E-01	1,84E-03	4,18E-01	5,81E-01	8,75E-03	1,86E-02	MND	MND	MND	MND	MND	MND	MND	2,54E-04	1,47E-03	2,48E-04	2,53E-04	-1,59E-01
Renew. PER as material	MJ	0,00E+00	0,00E+00	3,00E-01	3,00E-01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	-3,00E-01	0,00E+00	0,00E+00
Total use of renew. PER	MJ	1,61E-01	1,84E-03	7,18E-01	8,81E-01	8,75E-03	1,86E-02	MND	MND	MND	MND	MND	MND	MND	2,54E-04	1,47E-03	-3,00E-01	2,53E-04	-1,59E-01
Non-re. PER as energy	MJ	1,27E+00	1,40E-01	2,64E-01	1,68E+00	7,37E-01	8,54E-02	MND	MND	MND	MND	MND	MND	MND	4,45E-02	1,24E-01	4,34E-02	2,92E-02	-2,33E+00
Non-re. PER as material	MJ	0,00E+00	0,00E+00	5,09E-02	5,09E-02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	-5,09E-02	0,00E+00	0,00E+00
Total use of non-re. PER	MJ	1,27E+00	1,40E-01	3,15E-01	1,73E+00	7,37E-01	8,54E-02	MND	MND	MND	MND	MND	MND	MND	4,45E-02	1,24E-01	-7,45E-03	2,92E-02	-2,33E+00
Secondary materials	kg	1,54E-03	5,46E-05	1,25E-03	2,85E-03	2,46E-04	9,76E-05	MND	MND	MND	MND	MND	MND	MND	1,74E-05	4,14E-05	1,70E-05	6,13E-06	7,94E-02
Renew. secondary fuels	MJ	8,72E-02	6,40E-07	1,01E-02	9,73E-02	3,19E-06	2,92E-03	MND	MND	MND	MND	MND	MND	MND	5,70E-08	5,36E-07	5,55E-08	1,60E-07	-7,84E-07
Non-ren. secondary fuels	MJ	4,26E-01	0,00E+00	0,00E+00	4,26E-01	0,00E+00	1,28E-02	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	m^3	4,76E-04	1,82E-05	2,19E-04	7,14E-04	8,77E-05	3,10E-05	MND	MND	MND	MND	MND	MND	MND	2,70E-06	1,48E-05	2,64E-06	3,19E-05	-2,32E-03

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	7,04E-03	2,24E-04	1,13E-03	8,39E-03	1,07E-03	3,14E-04	MND	MND	MND	MND	MND	MND	MND	5,96E-05	1,79E-04	5,81E-05	0,00E+00	-4,95E-03
Non-hazardous waste	kg	1,62E-01	3,48E-03	3,13E-02	1,97E-01	1,70E-02	3,77E-02	MND	MND	MND	MND	MND	MND	MND	4,19E-04	2,86E-03	4,08E-04	2,02E-01	-9,25E-02
Radioactive waste	kg	3,13E-06	9,22E-07	5,95E-07	4,65E-06	4,90E-06	3,42E-07	MND	MND	MND	MND	MND	MND	MND	3,13E-07	8,24E-07	3,06E-07	0,00E+00	-5,68E-06

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	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	1,91E-05	0,00E+00	1,21E-02	1,21E-02	0,00E+00	3,11E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	8,03E-01	0,00E+00	0,00E+00
Materials for energy rec	kg	5,74E-05	0,00E+00	-7,90E-03	-7,84E-03	0,00E+00	-2,35E-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	3,28E-04	0,00E+00	0,00E+00	3,28E-04	0,00E+00	9,83E-06	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_2e	2,24E-01	9,63E-03	2,12E-02	2,55E-01	5,03E-02	9,91E-03	MND	MND	MND	MND	MND	MND	MND	3,27E-03	8,46E-03	3,19E-03	1,04E-03	-1,59E-01
Ozone depletion Pot.	kg CFC_{-11}e	4,77E-09	1,65E-09	1,69E-09	8,11E-09	8,69E-09	6,23E-10	MND	MND	MND	MND	MND	MND	MND	5,60E-10	1,46E-09	5,46E-10	3,41E-10	-3,72E-09
Acidification	kg SO_2e	9,04E-04	4,28E-05	6,83E-05	1,02E-03	1,23E-04	3,71E-05	MND	MND	MND	MND	MND	MND	MND	2,45E-05	2,06E-05	2,39E-05	7,56E-06	-5,68E-04
Eutrophication	kg PO_4^3e	1,98E-04	7,74E-06	2,76E-05	2,33E-04	2,70E-05	9,34E-06	MND	MND	MND	MND	MND	MND	MND	5,69E-06	4,55E-06	5,54E-06	1,63E-06	-9,70E-05
POCP (“smog”)	kg C_2H_4e	4,38E-05	1,62E-06	8,06E-06	5,35E-05	6,09E-06	1,92E-06	MND	MND	MND	MND	MND	MND	MND	5,36E-07	1,02E-06	5,23E-07	3,17E-07	-5,10E-05
ADP-elements	kg Sbe	4,24E-07	3,64E-08	2,65E-07	7,25E-07	1,76E-07	2,99E-08	MND	MND	MND	MND	MND	MND	MND	1,65E-09	2,96E-08	1,61E-09	2,41E-09	-9,31E-07
ADP-fossil	MJ	1,27E+00	1,40E-01	3,15E-01	1,72E+00	7,37E-01	8,68E-02	MND	MND	MND	MND	MND	MND	MND	4,45E-02	1,24E-01	4,34E-02	2,92E-02	-5,54E+00

ENVIRONMENTAL IMPACTS – ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Radioactive waste, high	kg	9,01E-08	8,13E-09	6,85E-08	1,67E-07	3,85E-08	7,87E-09	MND	MND	MND	MND	MND	MND	MND	1,15E-09	6,48E-09	1,12E-09	1,09E-09	-8,52E-07
Radioactive waste, int/low	kg	2,08E-06	9,14E-07	5,38E-07	3,53E-06	4,86E-06	3,35E-07	MND	MND	MND	MND	MND	MND	MND	3,12E-07	8,18E-07	3,04E-07	1,94E-07	-4,83E-06

ENVIRONMENTAL IMPACTS – FRENCH NATIONAL COMPLEMENTS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADP-elements	kg Sbe	2,56E-07	3,64E-08	2,65E-07	5,57E-07	1,76E-07	2,48E-08	MND	MND	MND	MND	MND	MND	MND	1,65E-09	2,96E-08	1,61E-09	2,41E-09	-9,31E-07
Hazardous waste disposed	kg	5,56E-03	2,24E-04	1,13E-03	6,91E-03	1,07E-03	2,59E-04	MND	MND	MND	MND	MND	MND	MND	5,96E-05	1,79E-04	5,81E-05	0,00E+00	-4,95E-03
Non-haz. waste disposed	kg	1,60E-01	3,48E-03	3,13E-02	1,95E-01	1,70E-02	3,76E-02	MND	MND	MND	MND	MND	MND	MND	4,19E-04	2,86E-03	4,08E-04	2,02E-01	-9,25E-02
Air pollution	m^3	5,14E+01	1,62E+00	4,66E+00	5,77E+01	7,51E+00	2,06E+00	MND	MND	MND	MND	MND	MND	MND	4,54E-01	1,26E+00	3,72E+00	2,34E-01	-2,18E+01
Water pollution	m^3	2,07E-01	1,20E-02	8,47E-02	3,03E-01	5,88E-02	1,21E-02	MND	MND	MND	MND	MND	MND	MND	1,97E-03	9,89E-03	1,92E-03	1,55E-03	-2,26E-01

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

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_2e	2,24E-01	9,73E-03	2,17E-02	2,56E-01	5,08E-02	9,95E-03	MND	MND	MND	MND	MND	MND	MND	3,31E-03	8,54E-03	3,23E-03	1,06E-03	-1,69E-01

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013). In addition, the characterisation factors for the flows - CH4 fossil, CH4 biogenic and Dinitrogen monoxide - were updated in line with the guidance of IES PCR 1.2.5 Annex 1. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO2 is set to zero.

ENVIRONMENTAL IMPACTS – TRACI 2.1. / 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_2e	2,20E-01	1,19E-02	2,11E-02	2,53E-01	5,03E-02	9,86E-03	MND	MND	MND	MND	MND	MND	MND	3,29E-03	8,46E-03	3,20E-03	1,04E-03	-1,55E-01
Ozone Depletion	kg $CFC_{-11}e$	5,79E-09	2,05E-09	1,68E-09	9,52E-09	8,68E-09	6,71E-10	MND	MND	MND	MND	MND	MND	MND	5,60E-10	1,46E-09	5,46E-10	3,40E-10	-3,66E-09
Acidification	kg SO_2e	3,92E-02	3,72E-03	3,97E-03	4,69E-02	6,70E-03	1,73E-03	MND	MND	MND	MND	MND	MND	MND	1,78E-03	1,13E-03	1,73E-03	4,89E-04	-2,99E-02
Eutrophication	kg Ne	4,07E-05	5,39E-06	6,85E-06	5,30E-05	1,67E-05	2,53E-06	MND	MND	MND	MND	MND	MND	MND	2,59E-06	2,81E-06	2,52E-06	9,15E-07	-1,68E-05
POCP (“smog”)	kg O_3e	2,25E-02	5,03E-05	6,11E-05	2,26E-02	7,74E-05	6,93E-04	MND	MND	MND	MND	MND	MND	MND	3,93E-05	1,30E-05	3,83E-05	8,99E-06	-3,31E-04
ADP-fossil	MJ	9,76E-02	2,35E-02	3,94E-02	1,60E-01	1,00E-01	9,14E-03	MND	MND	MND	MND	MND	MND	MND	6,35E-03	1,69E-02	6,19E-03	4,08E-03	-7,36E-01

ENVIRONMENTAL IMPACTS – BEPALINGSMETODE, NETHERLANDS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Shadow price	€	1,85E-02	1,31E-03	3,36E-03	2,32E-02	6,07E-03	1,01E-03	MND	MND	MND	MND	MND	MND	MND	5,28E-04	1,02E-03	5,18E-04	1,75E-04	-1,64E-02
Terrestrial ecotoxicity	DCB eq	6,27E-05	2,73E-05	6,40E-05	1,54E-04	1,40E-04	1,17E-05	MND	MND	MND	MND	MND	MND	MND	4,30E-06	2,36E-05	4,19E-06	2,90E-06	6,39E-06
Seawater ecotoxicity	DCB eq	6,99E+00	1,58E+00	5,23E+00	1,38E+01	7,67E+00	8,57E-01	MND	MND	MND	MND	MND	MND	MND	2,22E-01	1,29E+00	2,17E-01	1,83E-01	-2,35E+01
Freshwater ecotoxicity	DCB eq	2,35E-04	1,47E-04	3,06E-04	6,88E-04	7,67E-04	5,45E-05	MND	MND	MND	MND	MND	MND	MND	2,97E-05	1,29E-04	2,90E-05	1,82E-05	-5,41E-04
Human ecotoxicity	DCB eq	1,14E-02	4,60E-03	1,34E-02	2,94E-02	2,17E-02	2,02E-03	MND	MND	MND	MND	MND	MND	MND	2,08E-03	3,65E-03	2,07E-03	6,25E-04	-2,69E-02
EEE	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
ETE	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
ADP Fossil Fuels	kg Sbe	6,11E-04	6,74E-05	1,52E-04	8,30E-04	3,54E-04	4,18E-05	MND	MND	MND	MND	MND	MND	MND	2,14E-05	5,96E-05	2,09E-05	1,40E-05	-2,66E-03

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
19.09.2024