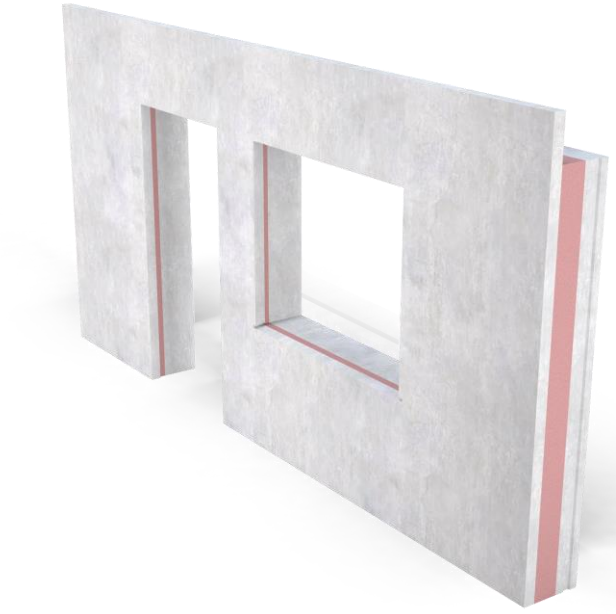
CONELEMENT
BETONGELEMENT FÖR BYGGPROFFS

EPD Hub

ENVIRONMENTAL PRODUCT DECLARATION

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

Precast Concrete Sandwich Wall Element
Conelement AB



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Created with One Click LCA

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GENERAL INFORMATION

MANUFACTURER

Manufacturer	Conelement AB
Address	Stenvretsgatan 2, 749 40 Enköping, Sweden
Contact details	info@conelement.se
Website	www.conelement.se

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022 EN 16757 Product Category Rules for concrete and concrete elements
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	Cristian Sabau, Invator AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	Magaly González Vázquez, 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	Precast Concrete Sandwich Wall Element
Additional labels	Sandwichvägg
Product reference	-
Place of production	Enköping - Sweden
Period for data	Calendar year 2020
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	- %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 tonne
Declared unit mass	1000 kg
GWP-fossil, A1-A3 (kgCO2e)	1,67E2
GWP-total, A1-A3 (kgCO2e)	1,68E2
Secondary material, inputs (%)	0.0
Secondary material, outputs (%)	77.8
Total energy use, A1-A3 (kWh)	607.0
Total water use, A1-A3 (m3e)	4,03E0

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Conelement AB manufactures prefabricated concrete elements for apartment buildings, office buildings, industrial buildings, public buildings, and garages. Production takes place mainly indoors in a factory environment, which ensures high quality and cost efficiency with fewer transports and additions to the construction site. More information is available on the company website: www.conelement.se

PRODUCT DESCRIPTION

The product is a precast reinforced concrete panel consisting of concrete, steel reinforcement, thermal insulation and other embedded steel and plastic components.
Concrete resistance class C30/37.
Exposure class up to XC4+XF1
Fire classes up REI90

Further information can be found at www.conelement.se.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	0.032%	EU
Minerals	99.5%	EU
Fossil materials	0.0176%	EU
Bio-based materials	0.004%	EU

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	5.05
Biogenic carbon content in packaging, kg C	0

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 tonne
Mass per declared unit	1000 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	Deconstr./demol.	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.

The production of the concrete panel begins with the preparation of the casting bed, which includes cleaning the casting platform and applying form oil. At the same time, the steel reinforcement and insulation are put into place together with other embedded steel and plastic parts. When all parts are in place wet concrete is poured into the cast by a moving mold. After casting, the panel is left to cure. When the panel is cured it is lifted out of the form with an electric gantry crane and placed on a steel platform. The forming table and tools used are clean with water. No additional packaging is used. Eventually, the elements are moved out and transported to the construction site.

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.

Transportation impacts occurred from final product delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions. The steel platform is picked up and transported to the building site. After delivery the steel platform is returned to the production plant. The transportation distance is defined according to the PCR. Average distance of transportation from production plant to building site is assumed as 100 km and the transportation method is assumed to be lorry. Vehicle capacity utilisation volume factor is assumed to be 100 % which means full load. In reality, it may vary but as the role of transportation emissions in total results is small, the variety in load is assumed to be negligible. Empty returns are considered as it is assumed that return trips are normally not used by the transportation company to serve the needs of other clients. Transportation does not cause losses as products are secured properly.
Installation includes the energy use. Typically, no additional materials to be used for installing the elements in the building are supplied as part of the product, and no packaging waste is generated. Production loss at installation is assumed negligible as the precast elements are delivered ready made from the factory. Energy consumption for the installation of a precast panel mainly represents the energy necessary to lift the element in place. To estimate the energy consumption an average height of 20 m is assumed based on the characteristics of projects in 2020. Therefore, energy required to lift an object at 20 m height is 0.6 kWh,

assuming 50% efficiency of an electric construction crane the estimated site energy consumption is 1.2kWh/declared unit. The source of energy is grid electricity used by work machines.

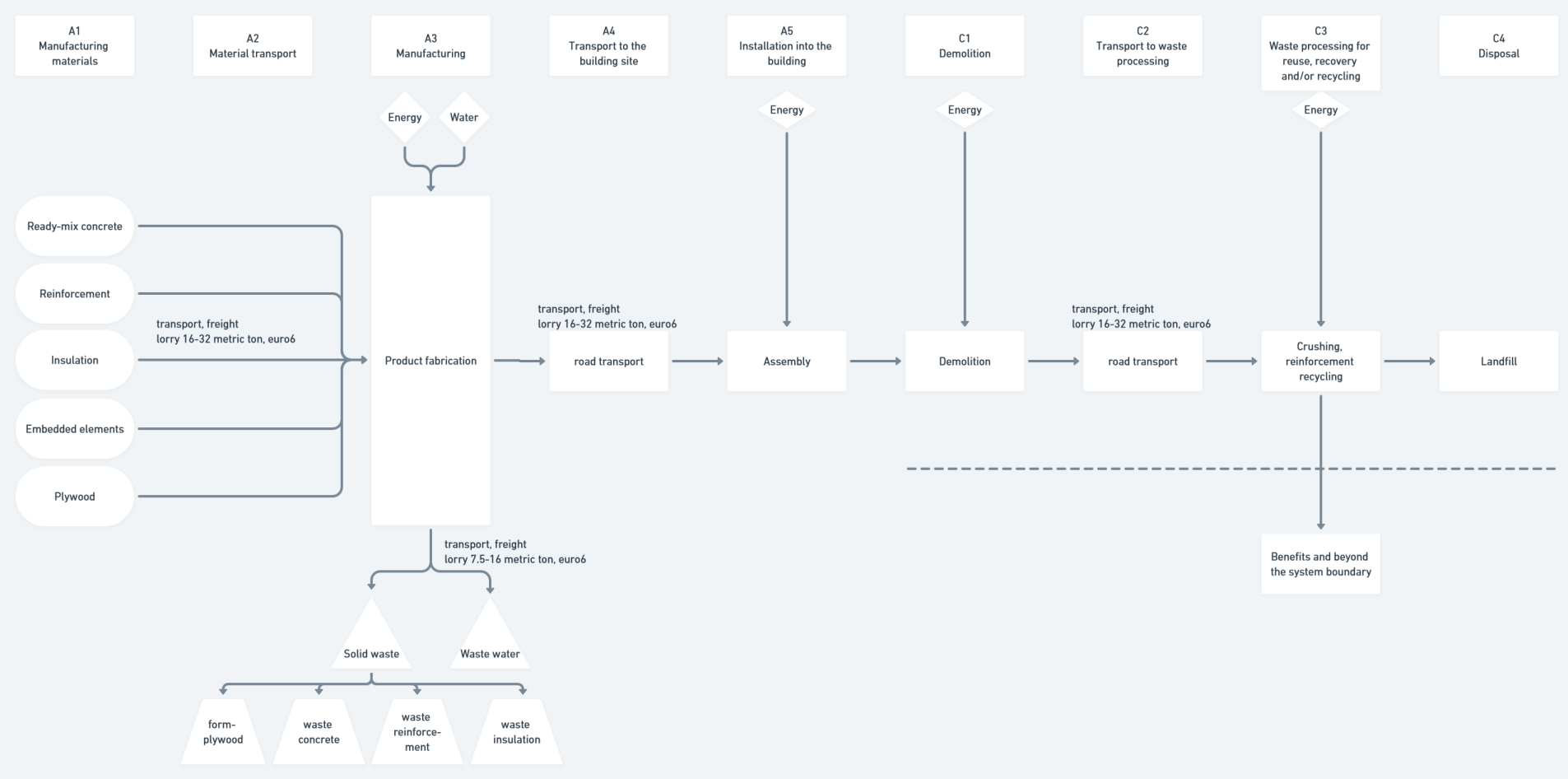
PRODUCT USE AND MAINTENANCE (B1-B7)

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 near 100% of the waste is assumed to be collected as separate construction waste. The demolition process consumes energy in the form of diesel fuel used by building machines. Energy consumption of a demolition process is on the average 10 kWh/m2 (Bozdağ, Ö & Seçer, M. 2007). Based on a Level(s) project, the average mass of a reinforced concrete building is about 1000 kg/m2. Therefore, energy consumption demolition is assumed to be 10 kWh/1000 kg = 0,01 kWh/kg. The source of energy is diesel fuel used by work machines (C1).
The dismantled concrete panel is delivered to the nearest construction waste treatment plant. It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed to have the same weight as the declared product. Transportation distance to the closest disposal area is estimated as 100 km and the transportation method is lorry which is the most common.
At the waste treatment plant, waste that can be reused, recycled or recovered for energy is separated and diverted for further use. About 95% of steel (World Steel Association. 2020) and 80% of concrete (Betoniteollisuus ry, 2020) are recycled. The process losses of the waste treatment plant are assumed to be negligible (C3). The remaining 20% of concrete and 5% of steel are assumed to be sent to the landfill (C4).
Due to the recycling potential of reinforcement steel and concrete, they can be used as secondary raw material, which avoids the use of virgin raw materials. 80 % of concrete and 95% of steel going to waste processing are converted into secondary raw materials after recycling. The recycled material content in the concrete itself is assumed to be 0 % but in steel it is assumed to be 70% (D). It is assumed that the insulation material cannot be recovered.

MANUFACTURING PROCESS



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	Allocated by mass or volume
Packaging materials	Not applicable
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	- %

This is a single product EPD - no averaging is considered.

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. Ecoinvent 3.6 and One Click LCA databases were used 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	1,58E2	1,13E0	8,56E0	1,68E2	3,27E1	6,16E-2	MND	MND	MND	MND	MND	MND	MND	3,3E0	9,1E0	1,11E1	1,1E0	-2,48E1
GWP – fossil	kg CO_2e	1,56E2	1,13E0	9,78E0	1,67E2	3,27E1	5,56E-2	MND	MND	MND	MND	MND	MND	MND	3,3E0	9,09E0	1,11E1	1,1E0	-2,49E1
GWP – biogenic	kg CO_2e	1,29E0	6,06E-4	-1,3E0	-1,3E-2	1,76E-2	2,25E-3	MND	MND	MND	MND	MND	MND	MND	9,17E-4	6,6E-3	-1,64E-2	2,18E-3	6,39E-2
GWP – LULUC	kg CO_2e	4,48E-1	4,07E-4	8,85E-2	5,37E-1	1,18E-2	3,76E-3	MND	MND	MND	MND	MND	MND	MND	2,79E-4	2,74E-3	3,46E-3	3,27E-4	-7,35E-3
Ozone depletion pot.	kg $CFC_{-11}e$	6,33E-6	2,56E-7	2,27E-6	8,85E-6	7,43E-6	2,82E-8	MND	MND	MND	MND	MND	MND	MND	7,12E-7	2,14E-6	3,13E-6	4,54E-7	-1,05E-6
Acidification potential	mol H^+e	5,45E-1	3,24E-3	6,15E-2	6,1E-1	9,38E-2	2,65E-4	MND	MND	MND	MND	MND	MND	MND	3,45E-2	3,82E-2	1,04E-1	1,05E-2	-1,12E-1
EP-freshwater[2)]	kg Pe	2,84E-3	9,59E-6	6,01E-4	3,45E-3	2,78E-4	4,16E-6	MND	MND	MND	MND	MND	MND	MND	1,33E-5	7,39E-5	1,32E-4	1,33E-5	-1,14E-3
EP-marine	kg Ne	1,63E-1	6,43E-4	1,88E-2	1,82E-1	1,86E-2	5,86E-5	MND	MND	MND	MND	MND	MND	MND	1,52E-2	1,15E-2	3,95E-2	3,6E-3	-2,27E-2
EP-terrestrial	mol Ne	1,83E0	7,17E-3	2,01E-1	2,04E0	2,08E-1	7,6E-4	MND	MND	MND	MND	MND	MND	MND	1,67E-1	1,27E-1	4,35E-1	3,97E-2	-2,62E-1
POCP ("smog")[3)]	kg NMVOCe	5,13E-1	2,75E-3	7,45E-2	5,9E-1	7,96E-2	1,68E-4	MND	MND	MND	MND	MND	MND	MND	4,59E-2	4,08E-2	1,22E-1	1,15E-2	-1,27E-1
ADP-minerals & metals[4)]	kg Sbe	2,67E-5	1,7E-5	1,92E-4	2,36E-4	9,01E-4	9,33E-7	MND	MND	MND	MND	MND	MND	MND	5,03E-6	1,55E-4	1,23E-4	1,01E-5	-7,09E-4
ADP-fossil resources	MJ	3,34E2	9,31E0	2,83E2	6,27E2	4,94E2	6,76E0	MND	MND	MND	MND	MND	MND	MND	4,54E1	1,41E2	2,12E2	3,08E1	-2,25E2
Water use[5)]	m^3e depr.	4,16E1	5,58E-2	6,72E-1	4,23E1	1,62E0	8,66E-2	MND	MND	MND	MND	MND	MND	MND	8,46E-2	5,26E-1	5,56E0	1,42E0	-1,38E1

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.

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	3E2	2,44E-1	2,12E2	5,12E2	7,07E0	3,25E0	MND	MND	MND	MND	MND	MND	MND	2,45E-1	1,78E0	2,93E0	2,49E-1	-5,43E0
Renew. PER as material	MJ	0E0	0E0	8,95E0	8,95E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	-8,95E0	0E0
Total use of renew. PER	MJ	3E2	2,44E-1	2,21E2	5,21E2	7,07E0	3,25E0	MND	MND	MND	MND	MND	MND	MND	2,45E-1	1,78E0	2,93E0	-8,7E0	-5,43E0
Non-re. PER as energy	MJ	1,37E3	1,7E1	2,83E2	1,67E3	4,94E2	6,76E0	MND	MND	MND	MND	MND	MND	MND	4,54E1	1,41E2	2,12E2	3,08E1	-2,25E2
Non-re. PER as material	MJ	4,81E2	0E0	0E0	4,81E2	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	-4,81E2	0E0
Total use of non-re. PER	MJ	1,85E3	1,7E1	2,83E2	2,15E3	4,94E2	6,76E0	MND	MND	MND	MND	MND	MND	MND	4,54E1	1,41E2	2,12E2	-4,5E2	-2,25E2
Secondary materials	kg	0E0	0E0	1,24E-2	1,24E-2	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	9,22E0
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	3,61E0	2,94E-3	4,1E-1	4,03E0	8,53E-2	1,76E-3	MND	MND	MND	MND	MND	MND	MND	4,01E-3	2,94E-2	1,38E-1	3,37E-2	-1,02E0

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	2,9E0	1,75E-2	5,05E-1	3,42E0	5,08E-1	5,07E-3	MND	MND	MND	MND	MND	MND	MND	4,88E-2	1,37E-1	0E0	2,87E-2	-2,66E0
Non-hazardous waste	kg	1,48E2	1,21E0	7,92E1	2,29E2	3,5E1	1,47E-1	MND	MND	MND	MND	MND	MND	MND	5,22E-1	1,52E1	0E0	2,09E2	-4,4E1
Radioactive waste	kg	1,93E-2	1,17E-4	2,51E-3	2,19E-2	3,38E-3	9,49E-5	MND	MND	MND	MND	MND	MND	MND	3,18E-4	9,7E-4	0E0	2,04E-4	-2,95E-4

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	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	3,08E1	0E0	4,13E0	3,5E1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	7,79E2	0E0	0E0
Materials for energy rec	kg	0E0	0E0	3,67E0	3,67E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

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	1,15E2	6,1E-1	1,1E1	1,26E2	3,24E1	5,85E-2	MND	MND	MND	MND	MND	MND	MND	3,27E0	9,01E0	1,1E1	1,08E0	-2,38E1
Ozone depletion Pot.	kg CFC_{-11}e	2,47E-6	1,11E-7	2,26E-6	4,83E-6	5,91E-6	4,56E-8	MND	MND	MND	MND	MND	MND	MND	5,63E-7	1,7E-6	2,49E-6	3,59E-7	-9,4E-7
Acidification	kg SO_2e	5,53E-2	1,24E-3	3,89E-2	9,55E-2	6,59E-2	2,01E-4	MND	MND	MND	MND	MND	MND	MND	4,87E-3	1,85E-2	3,62E-2	4,36E-3	-8,13E-2
Eutrophication	kg PO_4^3e	1,51E-5	2,57E-4	2,59E-2	2,61E-2	1,36E-2	1,22E-4	MND	MND	MND	MND	MND	MND	MND	8,57E-4	3,74E-3	8,37E-3	8,43E-4	-4,45E-2
POCP (“smog”)	kg C_2H_4e	1,58E-1	7,43E-5	3,35E-3	1,61E-1	3,94E-3	9,05E-6	MND	MND	MND	MND	MND	MND	MND	5,01E-4	1,17E-3	2,35E-3	3,2E-4	-1,67E-2
ADP-elements	kg Sbe	2,67E-5	1,7E-5	1,92E-4	2,36E-4	9,01E-4	9,33E-7	MND	MND	MND	MND	MND	MND	MND	5,03E-6	1,55E-4	1,23E-4	1,01E-5	-7,09E-4
ADP-fossil	MJ	3,34E2	9,31E0	2,83E2	6,27E2	4,94E2	6,76E0	MND	MND	MND	MND	MND	MND	MND	4,54E1	1,41E2	2,12E2	3,08E1	-2,25E2

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.

Magaly González Vázquez, as an authorized verifier acting for EPD Hub Limited
22.09.2023