ENVIRONMENTAL PRODUCT DECLARATION

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

Hybridbjälklag

Hedareds Sand & Betong AB

EPD HUB, EPDHUB-0135

Publishing date 29 September 2022, last updated date 29 September 2022, valid until 29 September 2027

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Hedareds Sand & Betong AB
Address	Älvsgården 2 504 92 Hedared
Contact details	hedared@heda.se
Website	www.heda.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
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	Mattias Gustafsson
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	NH Lim as an authorized verifier acting for EPD Hub

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 TCC slab
Additional labels	Hybridbjälklag
Place of production	Hedared
Period for data	2021
Averaging in EPD	No averaging

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 tonne
Declared unit mass	1000 kg
GWP-fossil, A1-A3 (kgCO2e)	205.0
GWP-total, A1-A3 (kgCO2e)	144.0
Secondary material, inputs (%)	4.05
Secondary material, outputs (%)	80.0
Total energy use, A1-A3 (kWh)	788.0
Total water use, A1-A3 (m3e)	12.8

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Hedareds Sand & Betong AB is a family-owned concrete manufacturing company that started in 1952 in Hedared Sweden. Today the production takes place in two factories located in Hedared and Bollebygd, and all aggregates used are taken from our own quarries nearby. Heda manufactures prefabricated concrete elements such as balconies, slabs and pillars for apartment, office or industrial buildings as well as block and foundation products.

PRODUCT DESCRIPTION

Service life 50 years

Concrete strength C40/50

Precast TCC slabs made from concrete and sawn timber. The main raw materials for the product are portland cement, aggregates, reinforcing steel, spruce or pine timber, additives and water. Any other raw materials account for less than 1% of total mass.

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

UNIT CONVERSIONS

Product mass per m^2	210 kg
GWP-total, A1-A3 (kgCO2e) per m^2	30,24

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	3,91	EU
Minerals	92,2	SE
Fossil materials	-	-
Bio-based materials	3,89	SE

BIOGENIC CARBON CONTENT

Products biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	17.349
Biogenic carbon content in packaging, kg C	0.0

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 tonne
Mass per declared unit	1000 kg

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 manufacturing of a timber-concrete composite slab begins with the preparation of the casting bed, which will house the mould of the element. After the mould is built, form oil is applied, and reinforcement is put into place, after which the timber is fastened. When the reinforcement and timber is in place and all quality checks are done, wet concrete is poured into the mould and left to cure until it has reached the right consistency for surface treatment. After the surfaces have been worked, the cast is left to cure.

Once they have been cured to the appropriate strength, the elements are moved to the storage yard, ready for delivery.

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 precast TCC slabs are loaded on to wooden beams and transported to the construction site. After delivery, the wooden beams are returned to the factory. The transportation distance is defined according to the PCR. Average distance of transportation from production plant to building site is assumed as 200 km and the transportation method is assumed to be lorry. Vehicle capacity utilization volume factor is assumed to be 80 %. These values may vary, but the impacts of the transportation emissions in the results are so small that the variety can be 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 of the crane needed to install the elements. 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 element mainly represents the energy necessary to lift the element in place. To estimate the energy consumption a crane with the power output of 88kW was used. One element takes 10 minutes to install, and weighs on average 3,4 tonnes. This gives an average energy use of 4,3kWh per declared unit.

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)

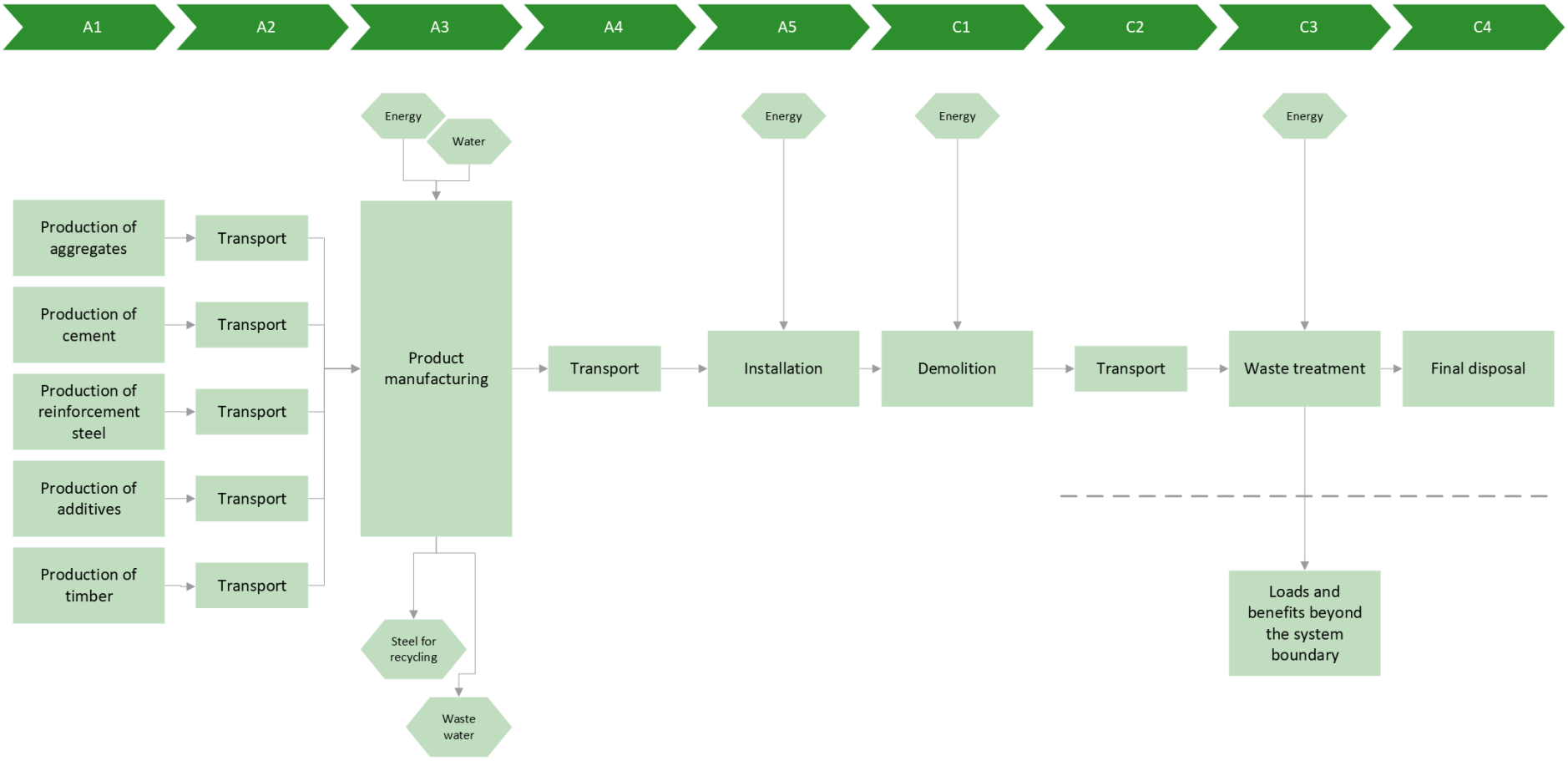
Due to the recycling potential of reinforcement steel and concrete, they can be used as secondary raw material, which avoids the use of virgin raw materials. 80 % of concrete and 95% of steel going to waste processing are converted into secondary raw materials after recycling.

At the end-of-life, in the demolition phase 100% of the waste is assumed to be collected as separate construction waste. The demolition process consumes energy in the form of both electricity and diesel used by various construction equipment, such as cranes and excavators. Energy consumption of a demolition process is on average 10 kWh/tonne and another 2 kWh/tonne for crushing the concrete and separating the rebar and timber. (IVL, 2015).

The crushed concrete and separated rebar are delivered to the nearest construction waste treatment plant. It is estimated that there is no mass loss during the use of the product and therefore the end-of-life product is assumed to have the same mass as the declared product. Transportation distance to the closest waste treatment is estimated to 100 km and the transportation method is assumed to be lorry as it 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 timber is incinerated for heat and electricity production. The process losses of the waste treatment plant are assumed to be negligible. The remaining 20% of concrete and 5% of steel are assumed to be sent to the landfill.

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	Partly 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 EPD is product and factory specific and does not contain average calculations.

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 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	1,06E2	7,84E0	3,08E1	1,44E2	1,73E1	1,84E0	MND	MND	MND	MND	MND	MND	MND	3,96E0	8,72E0	6,67E1	2,41E0	2,83E1
GWP – fossil	kg CO_2e	1,67E2	7,84E0	3,06E1	2,05E2	1,74E1	2,43E0	MND	MND	MND	MND	MND	MND	MND	3,96E0	8,71E0	5,23E0	2,41E0	-2,86E1
GWP – biogenic	kg CO_2e	-6,15E1	5,2E-3	1,25E-1	-6,14E1	1,32E-2	-6,06E-1	MND	MND	MND	MND	MND	MND	MND	1,1E-3	6,6E-3	6,15E1	2,7E-3	5,69E1
GWP – LULUC	kg CO_2e	6,52E-2	2,69E-3	1,66E-1	2,34E-1	5,47E-3	1,59E-2	MND	MND	MND	MND	MND	MND	MND	3,34E-4	2,74E-3	1,18E-3	6,98E-4	-5,94E-2
Ozone depletion pot.	kg $CFC_{-11}e$	4,96E-6	1,89E-6	7,4E-6	1,42E-5	4,28E-6	2,86E-7	MND	MND	MND	MND	MND	MND	MND	8,54E-7	2,14E-6	1,08E-6	7,06E-7	-1,97E-6
Acidification potential	mol H^+e	3,19E-1	4,65E-2	8,86E-2	4,54E-1	5,6E-2	6,05E-3	MND	MND	MND	MND	MND	MND	MND	4,14E-2	2,8E-2	5,3E-2	2,18E-2	-2,24E-1
EP-freshwater[2)]	kg Pe	7,65E-3	6,34E-5	2,87E-4	8E-3	1,48E-4	9,64E-5	MND	MND	MND	MND	MND	MND	MND	1,6E-5	7,39E-5	5,53E-5	2,36E-5	-1,33E-3
EP-marine	kg Ne	4,29E-2	1,09E-2	1,4E-2	6,78E-2	1,23E-2	1,01E-3	MND	MND	MND	MND	MND	MND	MND	1,83E-2	6,16E-3	2,28E-2	8,43E-3	-2,84E-2
EP-terrestrial	mol Ne	9,71E-1	1,21E-1	1,49E-1	1,24E0	1,37E-1	1,65E-2	MND	MND	MND	MND	MND	MND	MND	2E-1	6,85E-2	2,51E-1	9,27E-2	-3,35E-1
POCP ("smog")[3)]	kg NMVOCe	2,64E-1	3,88E-2	4,76E-2	3,51E-1	5,38E-2	4,65E-3	MND	MND	MND	MND	MND	MND	MND	5,51E-2	2,69E-2	6,89E-2	2,61E-2	-9,98E-2
ADP-minerals & metals[4)]	kg Sbe	4,62E-4	2,45E-5	7,74E-5	5,64E-4	3,1E-4	1,21E-5	MND	MND	MND	MND	MND	MND	MND	6,04E-6	1,55E-4	8,78E-6	2,33E-5	-2,29E-4
ADP-fossil resources	MJ	7,58E2	2,08E1	6,8E2	1,46E3	2,83E2	4,16E1	MND	MND	MND	MND	MND	MND	MND	5,44E1	1,41E2	7,41E1	4,76E1	-3,59E2
Water use[5)]	m^3e depr.	3,67E1	4,45E-1	-2,32E0	3,48E1	1,05E0	6,69E-1	MND	MND	MND	MND	MND	MND	MND	1,02E-1	5,26E-1	2,11E-1	1,33E0	-5E1

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	8,87E2	2,66E-1	1,43E2	1,03E3	3,56E0	2,2E1	MND	MND	MND	MND	MND	MND	MND	2,94E-1	1,78E0	1,52E0	4,47E-1	-1,15E2
Renew. PER as material	MJ	5,38E2	0E0	0E0	5,38E2	0E0	5,38E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	5,37E2	0E0	0E0
Total use of renew. PER	MJ	1,42E3	2,66E-1	1,43E2	1,57E3	3,56E0	2,74E1	MND	MND	MND	MND	MND	MND	MND	2,94E-1	1,78E0	5,38E2	4,47E-1	-1,15E2
Non-re. PER as energy	MJ	8,75E2	2,08E1	6,8E2	1,58E3	2,83E2	4,28E1	MND	MND	MND	MND	MND	MND	MND	5,44E1	1,41E2	7,41E1	4,76E1	-3,59E2
Non-re. PER as material	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	8,75E2	2,08E1	6,8E2	1,58E3	2,83E2	4,28E1	MND	MND	MND	MND	MND	MND	MND	5,44E1	1,41E2	7,41E1	4,76E1	-3,59E2
Secondary materials	kg	4,05E1	0E0	0E0	4,05E1	0E0	4,05E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	1,17E0
Renew. secondary fuels	MJ	9,42E1	0E0	0E0	9,42E1	0E0	9,42E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	1,36E2	0E0	0E0	1,36E2	0E0	1,36E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	1,23E1	4,24E-3	4,49E-1	1,28E1	5,89E-2	1,35E-1	MND	MND	MND	MND	MND	MND	MND	4,81E-3	2,94E-2	8,09E-3	3,29E-2	-1,11E0

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	2,35E-1	2,03E-2	3,8E-1	6,36E-1	2,75E-1	2,73E-2	MND	MND	MND	MND	MND	MND	MND	5,86E-2	1,37E-1	0E0	5,4E-2	-2,97E0
Non-hazardous waste	kg	1,28E1	2,14E0	1,08E1	2,58E1	3,04E1	1,09E0	MND	MND	MND	MND	MND	MND	MND	6,26E-1	1,52E1	0E0	1,86E2	-1,25E1
Radioactive waste	kg	3,68E-2	1,43E-4	6,92E-3	4,38E-2	1,94E-3	7,98E-4	MND	MND	MND	MND	MND	MND	MND	3,81E-4	9,71E-4	0E0	3,17E-4	-2E-3

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	8,37E0	0E0	0E0	8,37E0	0E0	8,37E-2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	7,71E2	0E0	0E0
Materials for energy rec	kg	1,58E-1	0E0	0E0	1,58E-1	0E0	1,58E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	2,84E1	0E0	0E0
Exported energy	MJ	2,03E0	0E0	0E0	2,03E0	0E0	2,03E-2	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	1,68E2	1,28E0	3,05E1	2E2	1,73E1	2,38E0	MND	MND	MND	MND	MND	MND	MND	3,93E0	8,63E0	5,19E0	2,38E0	-2,78E1
Ozone depletion Pot.	kg $CFC_{-11}e$	3,79E-6	2,5E-7	6,87E-6	1,09E-5	3,4E-6	3,06E-7	MND	MND	MND	MND	MND	MND	MND	6,76E-7	1,7E-6	8,69E-7	5,6E-7	-1,91E-6
Acidification	kg SO_2e	2,63E-1	2,72E-3	7,3E-2	3,39E-1	3,7E-2	4,48E-3	MND	MND	MND	MND	MND	MND	MND	5,84E-3	1,85E-2	8,82E-3	7,72E-3	-1,89E-1
Eutrophication	kg PO_4^3e	5,8E-2	5,52E-4	1,36E-2	7,21E-2	7,47E-3	1,23E-3	MND	MND	MND	MND	MND	MND	MND	1,03E-3	3,74E-3	2,39E-3	1,65E-3	-3,96E-2
POCP (“smog”)	kg C_2H_4e	6,61E-2	1,58E-4	3,01E-3	6,92E-2	2,13E-3	7,46E-4	MND	MND	MND	MND	MND	MND	MND	6,01E-4	1,06E-3	8,09E-4	5,04E-4	-9,83E-3
ADP-elements	kg Sbe	4,62E-4	2,45E-5	7,74E-5	5,64E-4	3,1E-4	1,21E-5	MND	MND	MND	MND	MND	MND	MND	6,04E-6	1,55E-4	8,78E-6	2,33E-5	-2,29E-4
ADP-fossil	MJ	7,58E2	2,08E1	6,8E2	1,46E3	2,83E2	4,16E1	MND	MND	MND	MND	MND	MND	MND	5,44E1	1,41E2	7,41E1	4,76E1	-3,59E2

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.

Nohyun Lim as an authorized verifier acting for EPD Hub Limited
29.09.2022

Noh-hyun Lim

VERIFIED ISO 14025