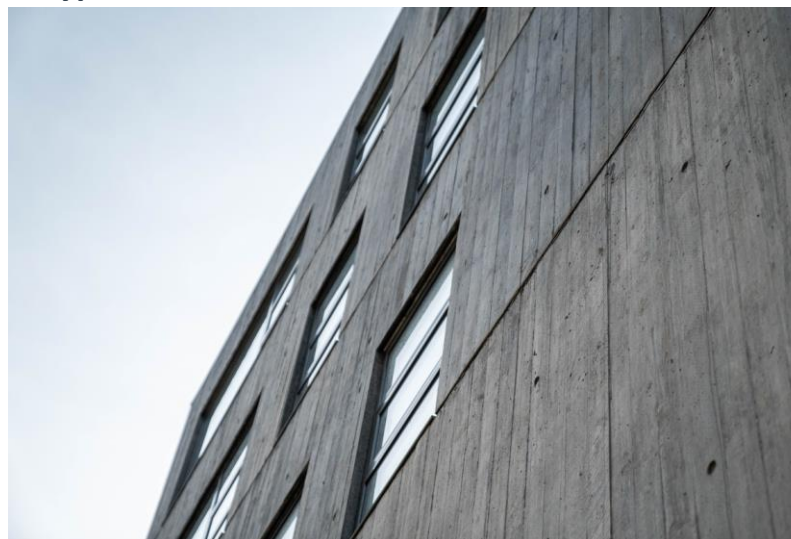


ENVIRONMENTAL PRODUCT DECLARATION

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

Ready-mix concrete C35/45 XC4 XF3 XD3 D22 S4 Ae
Steypustöðin ehf



EPD HUB, HUB-0867

Publishing date 24 November 2023, last updated date 24 November 2023, valid until 24 November 2028

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Steypustöðin ehf
Address	Malarhöfði 10, 110 Reykjavík, Iceland
Contact details	kai@steypustodin.is
Website	www.steypustodin.is

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, and modules C1-C4, D
EPD author	Anna Ingvarsdóttir, Hera Harðardóttir - Verkís
EPD verification	Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> Internal certification <input checked="" type="checkbox"/> External verification
EPD verifier	Sergio Ballen Zamora, 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	Ready-mix concrete C35/45 XC4 XF3 XD3 D22 S4 Ae
Additional labels	
Product reference	05352814
Place of production	Capital area, Iceland
Period for data	2022
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	Not applicable

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 cubic meter (m ³) of ready-mix concrete
Declared unit mass	2339 kg
GWP-fossil, A1-A3 (kgCO₂e)	3,19E+02
GWP-total, A1-A3 (kgCO₂e)	3,21E+02
Secondary material, inputs (%)	1,02E-03
Secondary material, outputs (%)	8,0E+01
Total energy use, A1-A3 (kWh)	4,22E+02
Total water use, A1-A3 (m³e)	5,82E-01

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Production of ready-mix concrete is the main operation of Steypustöðin, where great emphasis is placed on quality issues and all additives and fillers used in the concrete are in accordance with the requirements of building regulations.

PRODUCT DESCRIPTION

The product is a ready-mix concrete made out of cement, aggregates, admixtures and water mixed in a central batch plant. The product is loaded into ready mix trucks and delivered to construction site.

Further information can be found at www.steypustodin.is.

PRODUCT RAW MATERIAL MAIN COMPOSITION

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

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

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit 1 cubic meter (m³) of ready-mix concrete

Mass per declared unit 2339 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	MND	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)

For the product stage the environmental impact considered all materials in relation to raw material and relevant ancillary. This stage also covers the handling of waste generated during production at the manufacturing facilities and the fuels used by machinery. Handling of waste formed during the manufacturing processes is considered in (A1-A3).

The ready-mix concrete is made of cement, aggregates, admixtures, and water. Most of the concrete aggregate comes from Bakki quarry and Vatnsskarð quarry. Vatnsskarð is the largest production site of aggregates for Steypustöðin. The cement is imported from Aalborg Portland A/S. The concrete constituent materials such as aggregates, cement, additives, admixtures, and water are weighed and mixed in a central batching plant at Steypustöðin. When the product is ready after mixing it is loaded to a ready-mix concrete truck and transported to construction site.

Waste is collected at the manufacturing site and delivered to a recycling facility 15 kilometres away. Ancillary materials other than lubricant oil for

machinery is negligible. Process water from cleaning mixing equipment and trucks is reclaimed and re-used in concrete production, spillage goes to the wastewater sewage system. The energy source for manufacturing is electricity from the national grid and diesel fuel for machinery and vehicles. There are no direct emissions from the manufacturing process other than combustion of fuel.

TRANSPORT AND INSTALLATION (A4-A5)

The product is loaded into ready-mix concrete truck and delivered to construction site (A4). The environmental impacts cover the fuel consumption in direct exhaust emissions, environmental impact of fuel production as well as other related impacts from infrastructure. The average distance from production to building site is assumed to be 18 km. The capacity utilization volume factor of the ready-mix concrete truck is assumed to 100%.

At construction site the product is conveyed by concrete pumps or concrete buckets and cranes into the formwork. The product is suitable for structures with or without reinforcement steel. It can be used in residential or civil structures. Installation (A5) is not covered in the EPD according to standards and applied PCR.

PRODUCT USE AND MAINTENANCE (B1-B7)

This environmental product declarations (EDP) do not include product use and maintenance (B1-B7).

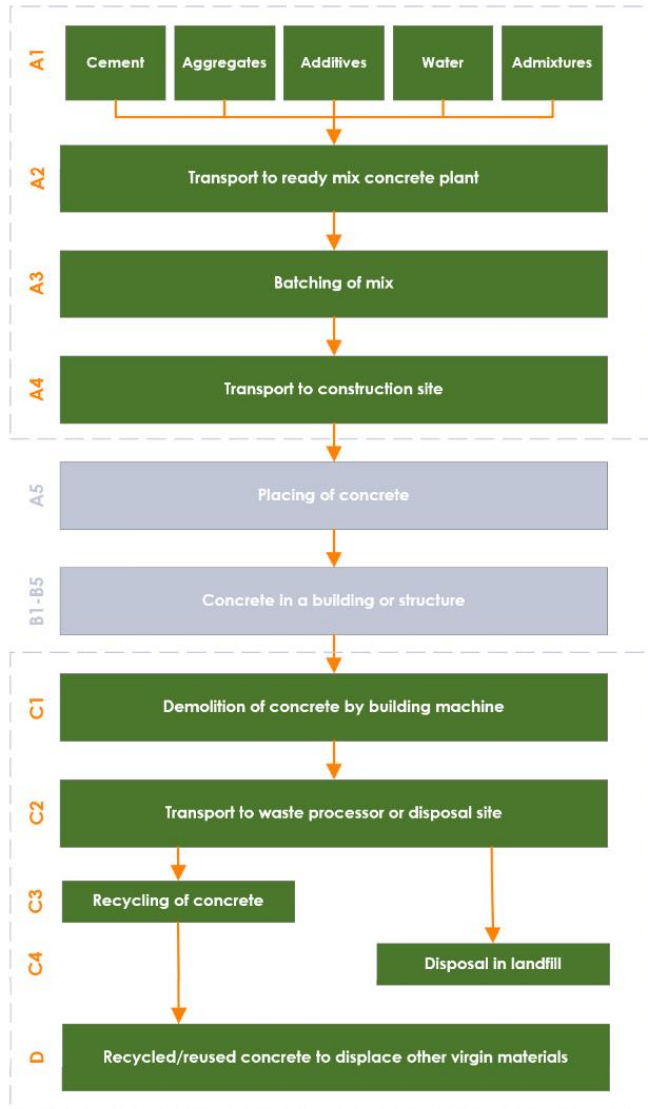
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

At the end-of-life, in the demolition phase, 100% of the waste is assumed to be collected and there is no mass loss during the use of the product. It is assumed that 80% of the concrete is re-used at Bolaöldur.

- **C1:** The energy consumption of a demolition process is on average 10 kWh/m² (Seçer & Bozdağ, 2007). The average mass of reinforced concrete material after demolition in Iceland is about 1293 kg/m² (Sigurbjörnsdóttir & Svavarsson, 2019). As a result, it is assumed that the energy used by the building machines during demolition is 0,008 kWh/kg of concrete element. The source of energy is diesel fuel used by work machines.
- **C2:** It is estimated that the transportation distances are 25 km to the nearest disposal landfill and 35 km to Bolaöldur for re-use. Lorry is the most common form of transportation.
- **C3:** At the end-of-life approximately 80% of the concrete is re-used (Betoniteollisusur ry, 2020) at Bolaöldur (where concrete waste is used for reclamation of land in older mines) (Sigurbjörnsdóttir & Brynjarsson, 2021). The process losses of the waste treatment plant are assumed to be negligible. The reinforced concrete is treated before it is transported to Bolaöldur by trimming the concrete units, which involves cleaning the plastic and other materials and cutting away any protruding concrete rebar.
- **C4:** The remaining 20% of concrete that is not fit for re-use at Bolaöldur is assumed to be sent to nearest landfill.
- **D:** The benefits and loads of concrete re-use are included and the re-used materials displace the need for virgin material production.

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	No allocation
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	Not applicable

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 ₂ e	3,05E+02	1,29E+01	3,20E+00	3,21E+02	3,67E+00	MND	MND	MND	MND	MND	MND	MND	MND	5,97E+00	7,02E+00	1,05E+01	2,47E+00	-1,45E+00
GWP – fossil	kg CO ₂ e	3,03E+02	1,29E+01	2,29E+00	3,19E+02	3,67E+00	MND	MND	MND	MND	MND	MND	MND	MND	5,97E+00	7,01E+00	1,05E+01	2,46E+00	-1,45E+00
GWP – biogenic	kg CO ₂ e	9,12E-01	3,20E-03	9,06E-01	1,82E+00	2,78E-03	MND	MND	MND	MND	MND	MND	MND	MND	1,66E-03	5,09E-03	2,92E-03	4,88E-03	-5,33E-04
GWP – LULUC	kg CO ₂ e	1,25E-01	6,86E-03	4,30E-04	1,33E-01	1,15E-03	MND	MND	MND	MND	MND	MND	MND	MND	5,04E-04	2,11E-03	8,86E-04	7,32E-04	-1,95E-04
Ozone depletion pot.	kg CFC ₁₁ e	6,08E-06	2,93E-06	4,32E-07	9,44E-06	9,00E-07	MND	MND	MND	MND	MND	MND	MND	MND	1,29E-06	1,65E-06	2,26E-06	1,01E-06	-3,01E-07
Acidification potential	mol H ⁺ e	8,47E-01	1,79E-01	2,09E-02	1,05E+00	1,18E-02	MND	MND	MND	MND	MND	MND	MND	MND	6,24E-02	2,95E-02	1,10E-01	2,34E-02	-1,52E-02
EP-freshwater ²⁾	kg Pe	4,43E-03	9,19E-05	3,56E-05	4,56E-03	3,11E-05	MND	MND	MND	MND	MND	MND	MND	MND	2,41E-05	5,71E-05	4,24E-05	2,98E-05	0,00E+00
EP-marine	kg Ne	1,42E-01	4,02E-02	1,05E-02	1,93E-01	2,59E-03	MND	MND	MND	MND	MND	MND	MND	MND	2,76E-02	8,88E-03	4,84E-02	8,05E-03	-6,58E-03
EP-terrestrial	mol Ne	1,57E+00	4,48E-01	9,72E-02	2,11E+00	2,88E-02	MND	MND	MND	MND	MND	MND	MND	MND	3,02E-01	9,81E-02	5,31E-01	8,87E-02	-7,34E-02
POCP (“smog”) ³⁾	kg NMVOCe	5,13E-01	1,26E-01	2,71E-02	6,65E-01	1,13E-02	MND	MND	MND	MND	MND	MND	MND	MND	8,31E-02	3,15E-02	1,46E-01	2,58E-02	-2,07E-02
ADP-minerals & metals ⁴⁾	kg Sbe	7,17E-04	1,84E-04	1,35E-05	9,15E-04	6,53E-05	MND	MND	MND	MND	MND	MND	MND	MND	9,11E-06	1,20E-04	1,60E-05	2,25E-05	-3,63E-06
ADP-fossil resources	MJ	1,05E+03	1,91E+02	2,97E+01	1,27E+03	5,96E+01	MND	MND	MND	MND	MND	MND	MND	MND	8,21E+01	1,09E+02	1,44E+02	6,89E+01	-2,10E+01
Water use ⁵⁾	m ³ e depr.	1,36E+01	6,32E-01	-2,05E+01	-6,22E+00	2,21E-01	MND	MND	MND	MND	MND	MND	MND	MND	1,53E-01	4,06E-01	2,69E-01	3,18E+00	-6,11E-01

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	9,83E-06	8,32E-07	5,30E-07	1,12E-05	3,22E-07	MND	MND	MND	MND	MND	MND	MND	MND	1,65E-06	6,35E-07	1,03E-05	4,55E-07	-3,95E-07
Ionizing radiation ⁶⁾	kBq U235e	2,35E+00	8,30E-01	1,24E-01	3,30E+00	2,60E-01	MND	MND	MND	MND	MND	MND	MND	MND	3,52E-01	4,77E-01	6,18E-01	2,83E-01	-8,57E-02
Ecotoxicity (freshwater)	CTUe	2,66E+03	1,39E+02	3,98E+01	2,84E+03	4,55E+01	MND	MND	MND	MND	MND	MND	MND	MND	4,82E+01	8,34E+01	8,47E+01	4,35E+01	-1,32E+01
Human toxicity, cancer	CTUh	2,15E-07	5,85E-09	2,22E-09	2,23E-07	1,15E-09	MND	MND	MND	MND	MND	MND	MND	MND	1,73E-09	2,13E-09	3,03E-09	1,03E-09	-5,84E-10
Human tox. non-cancer	CTUh	1,07E-06	1,46E-07	2,99E-08	1,24E-06	5,20E-08	MND	MND	MND	MND	MND	MND	MND	MND	4,25E-08	9,88E-08	7,47E-08	3,17E-08	-1,31E-08
SQP ⁷⁾	-	2,21E+02	1,89E+02	3,78E+00	4,13E+02	8,99E+01	MND	MND	MND	MND	MND	MND	MND	MND	2,11E+00	1,65E+02	3,70E+00	1,17E+02	-5,84E-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	1,72E+02	2,08E+00	1,14E+01	1,86E+02	7,49E-01	MND	MND	MND	MND	MND	MND	MND	MND	4,44E-01	1,37E+00	7,81E-01	5,57E-01	-1,44E-01
Renew. PER as material	MJ	4,03E-01	0,00E+00	0,00E+00	4,03E-01	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	1,73E+02	2,08E+00	1,14E+01	1,86E+02	7,49E-01	MND	MND	MND	MND	MND	MND	MND	MND	4,44E-01	1,37E+00	7,81E-01	5,57E-01	-1,44E-01
Non-re. PER as energy	MJ	1,11E+03	1,91E+02	2,97E+01	1,33E+03	5,96E+01	MND	MND	MND	MND	MND	MND	MND	MND	8,21E+01	1,09E+02	1,44E+02	6,89E+01	-2,10E+01
Non-re. PER as material	MJ	1,58E+01	0,00E+00	0,00E+00	1,58E+01	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-re. PER	MJ	1,13E+03	1,91E+02	2,97E+01	1,35E+03	5,96E+01	MND	MND	MND	MND	MND	MND	MND	MND	8,21E+01	1,09E+02	1,44E+02	6,89E+01	-2,10E+01
Secondary materials	kg	2,39E-02	0,00E+00	1,27E-04	2,41E-02	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-4,49E-03
Renew. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	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	4,81E-01	3,27E-02	6,89E-02	5,82E-01	1,24E-02	MND	MND	MND	MND	MND	MND	MND	MND	7,25E-03	2,27E-02	1,27E-02	7,53E-02	-3,19E-02

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	8,07E+00	2,12E-01	9,98E-02	8,39E+00	5,78E-02	MND	MND	MND	MND	MND	MND	MND	MND	8,84E-02	1,06E-01	0,00E+00	6,43E-02	-2,75E-02
Non-hazardous waste	kg	1,73E+02	1,45E+01	7,20E+00	1,95E+02	6,40E+00	MND	MND	MND	MND	MND	MND	MND	MND	9,45E-01	1,17E+01	0,00E+00	4,68E+02	-3,46E-01
Radioactive waste	kg	4,70E-03	1,32E-03	1,94E-04	6,21E-03	4,09E-04	MND	MND	MND	MND	MND	MND	MND	MND	5,75E-04	7,49E-04	0,00E+00	4,56E-04	-1,40E-04

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	7,56E+00	0,00E+00	0,00E+00	7,56E+00	0,00E+00	MND	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	1,60E+00	0,00E+00	0,00E+00	1,60E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	1,87E+03	0,00E+00	0,00E+00
Materials for energy rec	kg	8,14E-01	0,00E+00	0,00E+00	8,14E-01	0,00E+00	MND	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	MND	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	2,96E+02	1,28E+01	2,27E+00	3,11E+02	3,63E+00	MND	MND	MND	MND	MND	MND	MND	MND	5,92E+00	6,95E+00	1,04E+01	2,42E+00	-1,45E+00
Ozone depletion Pot.	kg CFC ₁₁ e	5,12E-06	2,32E-06	3,45E-07	7,78E-06	7,16E-07	MND	MND	MND	MND	MND	MND	MND	MND	1,02E-06	1,31E-06	1,79E-06	8,04E-07	-2,47E-07
Acidification	kg SO ₂ e	6,66E-01	1,41E-01	4,11E-03	8,11E-01	7,79E-03	MND	MND	MND	MND	MND	MND	MND	MND	8,81E-03	1,43E-02	1,55E-02	9,75E-03	-2,25E-03
Eutrophication	kg PO ₄ ³ e	1,43E-01	1,62E-02	2,40E-03	1,61E-01	1,57E-03	MND	MND	MND	MND	MND	MND	MND	MND	1,55E-03	2,88E-03	2,73E-03	1,89E-03	-4,73E-04
POCP (“smog”)	kg C ₂ H ₄ e	3,38E-02	4,40E-03	3,66E-04	3,86E-02	4,48E-04	MND	MND	MND	MND	MND	MND	MND	MND	9,07E-04	9,04E-04	1,59E-03	7,15E-04	-2,39E-04
ADP-elements	kg Sbe	7,17E-04	1,84E-04	1,35E-05	9,15E-04	6,53E-05	MND	MND	MND	MND	MND	MND	MND	MND	9,11E-06	1,20E-04	1,60E-05	2,25E-05	-3,63E-06
ADP-fossil	MJ	1,05E+03	1,91E+02	2,97E+01	1,27E+03	5,96E+01	MND	MND	MND	MND	MND	MND	MND	MND	8,21E+01	1,09E+02	1,44E+02	6,89E+01	-2,10E+01

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.

Sergio Ballen Zamora, as an authorized verifier acting for EPD Hub Limited
24.11.2023

