ENVIRONMENTAL PRODUCT DECLARATION

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

PRECAST CONCRETE ARCH

REINFORCED EARTH COMPANY Ltd

EPD HUB, HUB-1309
Published on 18.04.2024, last updated on 18.04.2024, valid until 18.04.2029.

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Reinforced Earth Company Ltd
Address	Innovation House, Euston Way,Telford, Shropshire, TF3 4LT, United Kingdom
Contact details	info@reinforcedearth.co.uk
Website	www.reinforcedearth.co.uk

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	Anais Grandclerc
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	Precast Concrete Arch
Place of production	50 Creagh Road, Toomebridge, Co Antrim, Northern Ireland, BT41 3SE
Period for data	October 2022 - September 2023
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	0%

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 m^3
Declared unit mass	2371.371 kg
GWP-fossil, A1-A3 (kgCO2e)	2,58E+02
GWP-total, A1-A3 (kgCO2e)	2,58E+02
Secondary material, inputs (%)	4.71
Secondary material, outputs (%)	92.4
Total energy use, A1-A3 (kWh)	810
Total water use, A1-A3 (m3e)	1.82

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Reinforced Earth Company Ltd. (RECo) provide the design and supply of materials for retaining walls (MSE and precast), bridge abutments, slopes, seawalls, risk mitigation barriers and precast arches for use in civil engineering applications including roads, rail (including high speed), housing, military, sea and flood defence works, industrial and commercial structures.

PRODUCT DESCRIPTION

The precast arch, while sophisticated in terms of design, is simple for planners and builders to incorporate into their projects. These structures are designed to accommodate high fills, heavy live loads, as well as alternating loading conditions imposed during both installation and in service conditions. Concrete arches are built for different sectors: Roadway and railway bridge underpass, overpass and covered tunnels, explosives and munitions storage facilities for military and industry, industrial reclaim conveyor tunnels and escape routes, commercial and pedestrian overfilled passages, rockfall protection sheds and galleries.

Reinforced Earth have been designing and supplying precast arches for over 30 years. They come in a range of sizes up to and above 30m+ spans. The geometrical properties of the arch mean wall sections range from 200mm to 450mm, depending on the arch configuration and loads.

The manufacturing process of precast concrete involves the production of concrete elements in a controlled environment, typically a specialized precast concrete manufacturing plant. The process generally consists of the following steps: Design and Planning, Materials and Mix Design, Mould Preparation, Reinforcement Placement, Concrete Mixing and Pouring, Curing, Demoulding, Quality Control and Finishing & Storage and Transportation.

Further information can be found at www.reinforcedearth.co.uk.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	5.2	Ireland
Minerals	94.8	Ireland
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 m^3
Mass per declared unit	2371.371 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.

For A1 phase, the main raw materials for pre-cast concrete are cement, aggregates and water. In the manufacturing, ground granulated blast furnace slag is used as secondary raw materials to replace cement as a binder (70% GGBS). Various additives, such as polymers, are also used in concrete to improve its workability (superplasticizer). The pre-cast concrete also includes steel bars which act as reinforcement. For the steel, the EPD proposed by the supplier is used and it is 98% recycling.
Concrete does not harden by evaporation; it hardens or forms by a chemical process called hydration. The water added to concrete mix becomes a part of the concrete and never leaves concrete or evaporates.

For A2 phase, the considered transportation impacts include exhaust emissions resulting from transportation of raw materials from suppliers to manufacturing facilities as well as the environmental impacts of the production of the diesel used. The manufacturing, maintenance, and disposal of the vehicles as well as tyre and road wear during transportation have also been included. The transportation distances and methods were provided by the Manufacturer.
Vehicle capacity utilization volume factor is assumed to be 1 which means full load. It may vary but as role of transportation emission 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.

For A3 phase, no packaging material is used.
Spherical head lifting anchors as ancillary materials are used for lifting and handling concrete unit. This ancillary material is made of prime steel.

Electricity consumption is averaged to 1 m3 of concrete arch (total electricity consumption of the plant averaged by total production of concrete arches in m3 during the period between October 2022 and October 2023).

Wastes of steel are calculated by averaging total waste steel production in the plant by total production of concrete arches in m3 during the period between October 2022 and October 2023. The steel wastes from the plant are send to Chittahong in Bangladesh, where it is remelted and reprocessed. We consider 9 888 km by lorry and 317 km by bulk cargo for the transportation from Ireland to Bangladesh.
Concrete wastes are calculated from the consideration that there is concrete overmixed to ensure the arch pour is complete. This waste is used

to make Kelly blocks for resale and for own internal usage. In one arch there was 6.50 m3 required as per drawings. From the batch plant records, there is 7 m^3 mixed. 0.5 m^3 were used to fill the Kelly block moulds.

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 types of transportation used are freight service overseas and transport by land euro 6 lorry > 32 tons. Due to the manufacture being in North Ireland, exact mileage can be detailed from manufacturer to the mainland UK and from within the UK an average has been estimated over a year's worth of deliveries using Reinforced Earth standard product deliveries.
Average distance of transportation from production plant to building site is assumed as 450 km and the transportation method is known to be 250 km over sea (mainly from Belfast harbour to Birkenhead harbour) and 200 km over land by a lorry. Vehicle capacity utilization volume factor is assumed to be 0.8 which means partial load (estimated by the manufacturer). Transportation does not cause losses as product are packaged properly.

Regarding the installation process (A5), we use data from a current arch installation site: 90 m3 of arches are installed during 10 hours of work and 40 L of diesel are burned during this work time. 0.44 L of diesel are then consumed to install 1 m3 of concrete arch and then 4.72 kWh (by taking calorific value for diesel equal to 10,74 kWh/L).
There is no installation loss during A5 phase.

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)

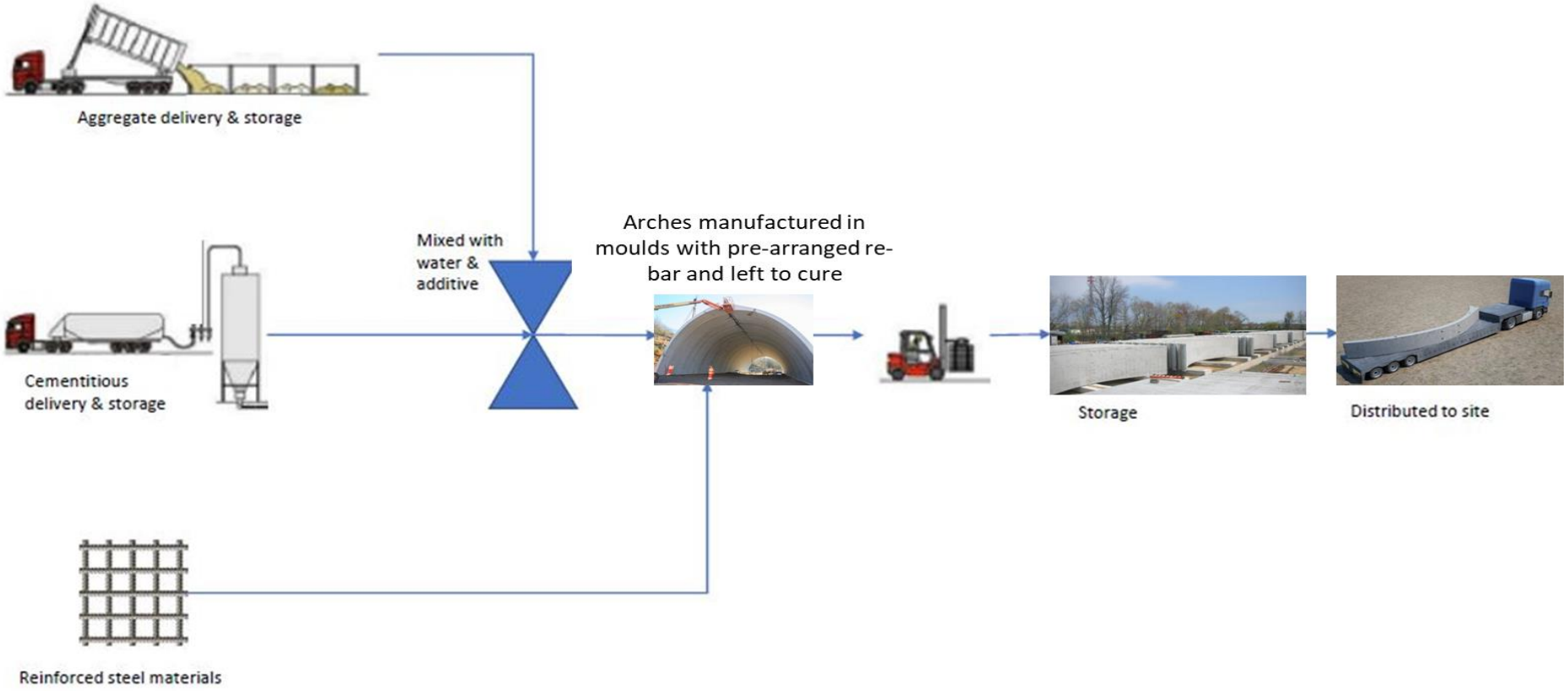
For C1 phase, the process for demolition of concrete arches requires demolition machine and standard crushing machines to remove the concrete from the reinforced steel on-site. We consider that 1.5L of diesel are used for 1 m3 of concrete in demolition and 0,22 L are consumed to crush concrete. A total of 1.72 L is consumed and with a calorific value of 10.74 kWh/L, we can estimate a diesel consumption for C1 phase equal to 18.5 kWh.

For C2 phase, it is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed that it has the same weight with the declared product (except the wastes of steel and concrete generated in the plant - A3). Transportation distance to the closest disposal area or the waste treatment plant is estimated as 50 km and the transportation method is assumed as lorry which is the most common.

For C3 phase, the steel is separated from the concrete and are sent directly to recycling facilities for 92.6% of the total amount. Concrete is sent directly to recycling facilities for 92.6% of the total amount. The steel of the ancillary materials is also sent to recycling facilities for 92.6% of the total amount. Per the UK statistics on waste (Updated 28 June 2023), the latest statistics on Recovery rate from non-hazardous construction and demolition (C&D) waste is 92.6% (https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste#recovery-rate-from-non-hazardous-construction-and-demolition-cd-waste).

For C4 phase, it is assumed that 7.4% of concrete and steel wastes are sent to 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	No allocation
Packaging materials	No allocation
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	0%

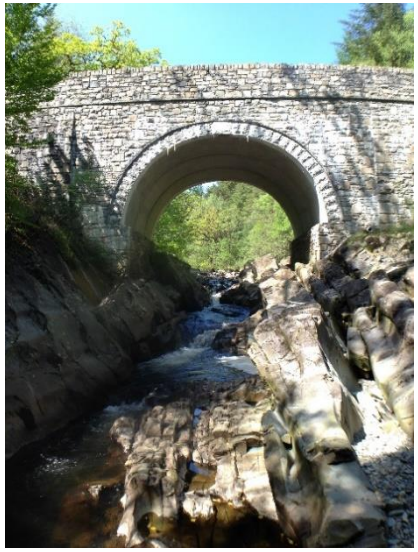
This EPD is for one type of product.

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.

Flood protection with precast arches

High Speed Rail Arches



Single piece arch with stone facings

Green Bridge

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	2,28E+02	1,65E+01	1,33E+01	2,58E+02	4,52E+01	1,56E+00	MND	MND	MND	MND	MND	MND	MND	6,11E+00	1,03E+01	1,50E+01	9,25E-01	-1,78E+01
GWP – fossil	kg CO_2e	2,28E+02	1,65E+01	1,33E+01	2,58E+02	4,51E+01	1,56E+00	MND	MND	MND	MND	MND	MND	MND	6,11E+00	1,03E+01	1,50E+01	9,24E-01	-1,78E+01
GWP – biogenic	kg CO_2e	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
GWP – LULUC	kg CO_2e	1,45E-01	6,19E-03	1,40E-02	1,65E-01	1,90E-02	1,56E-04	MND	MND	MND	MND	MND	MND	MND	6,09E-04	3,87E-03	1,49E-03	8,73E-04	-2,32E-02
Ozone depletion pot.	kg CFC_{-11}e	1,40E-05	4,11E-06	1,80E-06	1,99E-05	1,11E-05	3,34E-07	MND	MND	MND	MND	MND	MND	MND	1,31E-06	2,57E-06	3,21E-06	3,74E-07	-1,40E-06
Acidification potential	mol H^+e	7,33E-01	5,26E-02	4,38E-02	8,30E-01	2,44E-01	1,63E-02	MND	MND	MND	MND	MND	MND	MND	6,35E-02	3,29E-02	1,56E-01	8,69E-03	-1,13E-01
EP-freshwater[2)]	kg Pe	5,83E-03	1,18E-04	2,31E-04	6,18E-03	3,11E-04	5,18E-06	MND	MND	MND	MND	MND	MND	MND	2,03E-05	7,37E-05	4,97E-05	9,69E-06	-9,94E-04
EP-marine	kg Ne	1,87E-01	1,16E-02	8,70E-03	2,07E-01	5,44E-02	7,19E-03	MND	MND	MND	MND	MND	MND	MND	2,81E-02	7,25E-03	6,90E-02	3,01E-03	-2,44E-02
EP-terrestrial	mol Ne	2,19E+00	1,29E-01	9,76E-02	2,42E+00	6,05E-01	7,89E-02	MND	MND	MND	MND	MND	MND	MND	3,08E-01	8,04E-02	7,57E-01	3,31E-02	-3,16E-01
POCP ("smog")[3)]	kg NMVOCe	5,78E-01	5,06E-02	3,42E-02	6,63E-01	2,01E-01	2,17E-02	MND	MND	MND	MND	MND	MND	MND	8,48E-02	3,17E-02	2,08E-01	9,63E-03	-8,38E-02
ADP-minerals & metals[4)]	kg Sbe	1,23E-03	4,04E-05	5,16E-05	1,33E-03	1,08E-04	7,93E-07	MND	MND	MND	MND	MND	MND	MND	3,10E-06	2,53E-05	7,62E-06	2,12E-06	-1,83E-04
ADP-fossil resources	MJ	1,94E+03	2,64E+02	2,00E+02	2,41E+03	7,08E+02	2,10E+01	MND	MND	MND	MND	MND	MND	MND	8,23E+01	1,65E+02	2,02E+02	2,53E+01	-2,51E+02
Water use[5)]	m^3e depr.	5,29E+01	1,22E+00	1,83E+00	5,60E+01	3,21E+00	5,66E-02	MND	MND	MND	MND	MND	MND	MND	2,21E-01	7,60E-01	5,43E-01	8,04E-02	-3,22E+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	7,31E-06	1,91E-06	8,13E-07	1,00E-05	4,91E-06	4,36E-07	MND	MND	MND	MND	MND	MND	MND	1,70E-06	1,20E-06	1,97E-05	1,75E-07	-1,47E-06
Ionizing radiation[6)]	kBq U235e	1,47E+01	1,36E+00	1,09E+00	1,71E+01	3,62E+00	9,67E-02	MND	MND	MND	MND	MND	MND	MND	3,78E-01	8,49E-01	9,28E-01	1,15E-01	-3,56E+00
Ecotoxicity (freshwater)	CTUe	2,10E+03	2,19E+02	1,64E+02	2,48E+03	5,80E+02	1,26E+01	MND	MND	MND	MND	MND	MND	MND	4,94E+01	1,37E+02	1,21E+02	1,65E+01	-3,43E+02
Human toxicity, cancer	CTUh	3,30E-07	5,70E-09	1,31E-08	3,48E-07	1,70E-08	4,85E-10	MND	MND	MND	MND	MND	MND	MND	1,90E-09	3,56E-09	4,65E-09	4,13E-10	-7,66E-09
Human tox. non-cancer	CTUh	9,02E-06	2,23E-07	1,57E-07	9,40E-06	5,79E-07	9,15E-09	MND	MND	MND	MND	MND	MND	MND	3,57E-08	1,39E-07	8,77E-08	1,08E-08	-3,37E-07
SQP[7)]	-	2,90E+03	3,07E+02	1,23E+02	3,33E+03	7,75E+02	2,74E+00	MND	MND	MND	MND	MND	MND	MND	1,07E+01	1,92E+02	2,62E+01	5,42E+01	-2,35E+02

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	4,22E+02	3,41E+00	2,53E+01	4,51E+02	8,92E+00	1,20E-01	MND	MND	MND	MND	MND	MND	MND	4,70E-01	2,13E+00	1,15E+00	2,20E-01	-2,25E+01
Renew. PER as material	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
Total use of renew. PER	MJ	4,22E+02	3,41E+00	2,53E+01	4,51E+02	8,92E+00	1,20E-01	MND	MND	MND	MND	MND	MND	MND	4,70E-01	2,13E+00	1,15E+00	2,20E-01	-2,25E+01
Non-re. PER as energy	MJ	2,00E+03	2,64E+02	2,00E+02	2,47E+03	7,08E+02	2,10E+01	MND	MND	MND	MND	MND	MND	MND	8,23E+01	1,65E+02	2,02E+02	2,53E+01	-2,51E+02
Non-re. PER as material	MJ	2,70E+01	0,00E+00	0,00E+00	2,70E+01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	-2,50E+01	-1,99E+00	0,00E+00
Total use of non-re. PER	MJ	2,03E+03	2,64E+02	2,00E+02	2,49E+03	7,08E+02	2,10E+01	MND	MND	MND	MND	MND	MND	MND	8,23E+01	1,65E+02	1,77E+02	2,33E+01	-2,51E+02
Secondary materials	kg	1,12E+02	7,42E-02	1,92E-01	1,12E+02	2,13E-01	8,24E-03	MND	MND	MND	MND	MND	MND	MND	3,22E-02	4,64E-02	7,90E-02	5,33E-03	3,59E-01
Renew. secondary fuels	MJ	2,87E-03	6,55E-04	4,34E-04	3,96E-03	1,71E-03	2,69E-05	MND	MND	MND	MND	MND	MND	MND	1,05E-04	4,10E-04	2,58E-04	1,39E-04	-2,00E-03
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	m^3	1,74E+00	3,49E-02	4,40E-02	1,82E+00	9,10E-02	1,28E-03	MND	MND	MND	MND	MND	MND	MND	5,00E-03	2,19E-02	1,23E-02	2,77E-02	-7,72E-01

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	3,58E+00	2,82E-01	1,13E+00	4,99E+00	7,84E-01	2,82E-02	MND	MND	MND	MND	MND	MND	MND	1,10E-01	1,77E-01	2,70E-01	0,00E+00	-1,78E+00
Non-hazardous waste	kg	1,13E+02	4,91E+00	8,61E+00	1,26E+02	1,29E+01	1,98E-01	MND	MND	MND	MND	MND	MND	MND	7,74E-01	3,07E+00	1,90E+00	1,76E+02	-4,34E+01
Radioactive waste	kg	9,47E-03	1,82E-03	1,17E-03	1,25E-02	4,89E-03	1,48E-04	MND	MND	MND	MND	MND	MND	MND	5,79E-04	1,14E-03	1,42E-03	0,00E+00	-1,20E-03

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	2,20E+01	0,00E+00	3,98E+02	4,20E+02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	2,20E+03	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	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
Exported energy	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

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	2,53E+02	1,63E+01	1,32E+01	2,82E+02	4,47E+01	1,55E+00	MND	MND	MND	MND	MND	MND	MND	6,05E+00	1,02E+01	1,48E+01	9,05E-01	-1,73E+01
Ozone depletion Pot.	kg CFC_{-11}e	1,12E-05	3,26E-06	1,47E-06	1,59E-05	8,75E-06	2,65E-07	MND	MND	MND	MND	MND	MND	MND	1,03E-06	2,04E-06	2,54E-06	2,96E-07	-1,18E-06
Acidification	kg SO_2e	8,14E-01	4,26E-02	3,59E-02	8,93E-01	1,98E-01	1,16E-02	MND	MND	MND	MND	MND	MND	MND	4,53E-02	2,67E-02	1,11E-01	6,57E-03	-8,75E-02
Eutrophication	kg PO_4^3e	3,34E-01	9,03E-03	1,07E-02	3,54E-01	3,20E-02	2,69E-03	MND	MND	MND	MND	MND	MND	MND	1,05E-02	5,65E-03	2,58E-02	1,42E-03	-4,12E-02
POCP (“smog”)	kg C_2H_4e	3,71E-02	1,99E-03	2,10E-03	4,12E-02	7,47E-03	2,53E-04	MND	MND	MND	MND	MND	MND	MND	9,91E-04	1,24E-03	2,43E-03	2,75E-04	-6,32E-03
ADP-elements	kg Sbe	9,94E-04	3,93E-05	5,08E-05	1,08E-03	1,05E-04	7,80E-07	MND	MND	MND	MND	MND	MND	MND	3,05E-06	2,46E-05	7,49E-06	2,09E-06	-1,82E-04
ADP-fossil	MJ	2,29E+03	2,64E+02	1,88E+02	2,74E+03	7,08E+02	2,10E+01	MND	MND	MND	MND	MND	MND	MND	8,23E+01	1,65E+02	2,02E+02	2,53E+01	-2,51E+02

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
18.04.2024

VERIFIED ISO 14025