ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

N30 Negative carbon brick
earth4Earth technology Ltd

EPD HUB, HUB-4829
Published on 09.01.2026, last updated on 09.01.2026, valid until 09.01.2031

Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1.

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	earth4Earth technology Ltd
Address	Xingguang Changwei Industry Park, Caidian District, Wuhan City, Hubei Province, China
Contact details	info@earth4earth.co.uk
Website	https://earth4earth.co.uk/

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025
Sector	Construction product
Category of EPD	Sister EPD
Parent EPD number	HUB-3866
Scope of the EPD	Cradle to gate with options, A4-B1, and modules C1-C4, D
EPD author	Yan Geng earth4Earth
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Imane Uald Lamkaddam as an authorized verifier for EPD Hub

This EPD is intended for business-to-business and/or business-to-consumer communication. 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	N30 Negative carbon brick
Additional labels	-
Product reference	-
Place(s) of raw material origin	China
Place of production	Wuhan, Hubei, China
Place(s) of installation and use	United Kingdom
Period for data	Calendar year 2024
Averaging in EPD	No grouping
Variation in GWP-fossil for A1-A3 (%)	0
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	8.34

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 brick
Declared unit mass	3.0 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	0.07
GWP-total, A1-A3 ($kgCO_2e$)	0.03
Secondary material, inputs (%)	0.02
Secondary material, outputs (%)	100
Total energy use, A1-A3 (kWh)	0.42
Net freshwater use, A1-A3 (m^3)	0

Carbon performance summary:

The life cycle assessment (LCA) reveals that the N30 Brick achieves a net negative global warming potential (GWP) of −0.370 kg CO_2e per unit over its life cycle. While emissions are generated during raw material extraction (A1: 4.73E−02 kg CO_2e), transport (A2: 4.45E−03 kg CO_2e, A4: 6.82E−02 kg CO_2e), installation (A5: 4.90E−02 kg CO_2e), and end-of-life stages (C1 and C3: 1.08E−02 kg CO_2e each), these are offset by significant negative contributions from the manufacturing process (A3:−2.63E−02 kg CO_2e), external impacts (Module D: −3.17E−03 kg CO_2e), and most notably, CO_2 absorption during the use stage (B1: −5.34E−01 kg CO_2e).

Overall, the carbonation of the lime-based component during use is the primary driver of the product's carbon-negative performance, enabling it to absorb more CO_2 over its service life than is emitted during production, transport, installation, and disposal.

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

As scientists and engineers, we recognise the greatest threat facing humanity today is climate change. In 2023 we founded earth4Earth to develop a practical solution to combatting global carbon emissions. Our innovative materials transform buildings into CO_2 absorption systems, helping to mitigate global warming and protect our planet.

PRODUCT DESCRIPTION

Our earth-based bricks absorb CO_2 throughout their life cycle and can be returned to the soil at end of life. Their properties are superior or comparable with commonly used building materials.

This provides a practical and efficient solution to reaching net zero and even enables construction projects to become carbon negative. Our earth-based bricks are made using excavated soil, which would otherwise go to landfill.

Lime is used as a binder/stabiliser to enhance the mechanical properties and durability of our bricks. Whilst conventional lime is produced at high temperatures, releasing significant CO_2 emissions, earth4Earth has developed a novel process for lime production where no direct CO_2 emissions are released.

At end of life, our bricks can be crushed and returned to the earth for crop growth.

The bricks are UKCA-marked (No.IN-SH-CP-5627-24439) /CE-marked (No.IN-SH-CP-5627-24438) and meets EN 771-1 standards with ≥10 MPa compressive strength Suitable for use in structural and non-structural walls in sustainable buildings.

Further information can be found at:
https://earth4earth.co.uk/

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	0	-
Minerals	100	China
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	0.0124854545

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 brick
Mass per declared unit	3.0 kg
Functional unit	part of the building wall
Reference service life	100 years

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	x	ND	ND	ND	ND	ND	ND	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 = ND. 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.

A market-based approach is used in modelling the electricity mix utilized in the factory.
The environmental impacts considered for the product stage cover the manufacturing of 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. There is no manufacturing waste.

a) Transport assumptions and distances for materials:

Raw materials are sourced locally in China, with average transport distances as follows:

Recycled clay soil: 24 km

Sand: 15 km

Lime: produced onsite (0 km)

Transport is by truck (Transport, freight, market dataset used in OCLCA).

b) Production losses considered:

There are no significant production losses or manufacturing waste generated during the A3 process. Any minor residual material (e.g., offcuts, powder) is fully collected and internally recycled back into the production process.

c) Manufacturing process:

The process includes:

Mixing of raw materials

Moulding via compression

Low-temperature curing (no kiln firing)

Onsite quality control and visual inspection

No final coating, painting, or finishing is applied.

d) Energy sources profile:

Electricity used in manufacturing is sourced from the Chinese national grid, with green energy certificate applied. Electricity consumption is based on monitored data from the pilot production line.

e) Packaging and ancillary materials used:

The product is packaged on wooden pallets (approx. 25 kg per pallet), wrapped in LDPE plastic film, and secured with polypropylene strapping. Additional protective packaging includes kraft paper air bags and low-density PE film to prevent breakage during transport. The packaging materials are modelled per kilogram of product using national average datasets.

f) Assumptions for EoL for A3 manufacturing waste:

All production waste generated during manufacturing (e.g., broken bricks, dust, trimmings) is 100% recycled onsite. The waste is crushed and reused as soil conditioning material or backfill for planting, in alignment with the product's circular end-of-life principles. No landfill or external waste treatment is required.

g) Transport assumptions and distances for A3 waste:

As all manufacturing waste is fully reused onsite, no transportation is required for A3 waste.
The use of green energy in manufacturing is demonstrated through contractual instruments (GOs, RECs, etc.), and its use is ensured throughout the validity period of this EPD.

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 that occurred from final product delivery to the construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

The transportation distance is defined according to the PCR. The total distance of transportation for both sea and road from the production plant to the installation site is 2168km and is based on the data published by Carrier Logistics. These documents and their background reports include industry consensus estimates of the resource use, emissions and affluent of typical European installations; these parameters have been used as input for the earth4Earth EPD modelling.

The product is transported from the manufacturing facility to the construction site via two transport legs: 5 km by road (truck transport) and 2163 km by sea freight, resulting in a total transport distance of 2168 km.

No material losses are assumed during installation (0% loss).

Installation requires the use of mortar, with an average consumption of 0.2 kg of mortar per declared unit (brick).

No energy consumption during installation.

A small quantity of packaging waste is generated during installation, assumed to be 0.5% of the declared unit mass.

Packaging waste is assumed to be transported 50 km by road to the nearest waste treatment facility.

The waste is treated as follows: 50% incinerated and 50% recycled, based on EPD Hub PCR guidance and typical European practice.

PRODUCT USE AND MAINTENANCE (B1-B7)

B1 e4E lime is used to absorb co2 from air. 0.5345Kg co2 can be absorbed per brick.

During the use stage, carbonation of the lime component in the brick is assumed to result in CO_2 absorption.

Based on literature values, it is estimated that each brick absorbs approximately 0.5345kg CO_2 over the course of its use phase. Carbon Capture:

• Ca(OH)2+CO2=CaCO3+H2O

N30 brick has 30% lime, therefore, 1kg brick has 0.3kg lime Ca(OH)2. It can absorb 0.3kg * 44.01/74.1= 0.178kg CO2.

0.178kg co2 absorption is for 1kg, but our brick is 3kg. Therefore, one brick absorb co2 is 0.178kg x 3 = 0.5345kg CO2.

The absorption is assumed to occur gradually over the Reference Service Life (RSL) of 100 years.

Calculations in the OCLCA model are based on this RSL and declared unit (1 brick), and the quantity field reflects full CO_2 uptake over the RSL.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Components made of clay can be deconstructed and recycled. The clay is first crushed, separated into individual grain fractions, and then reused as garden soil.At the end of its service life, the product is removed manually or using light mechanical tools, with negligible energy consumption (C1).

The product is not transported to external waste processing facilities; instead, it is 100% recycled on-site (C3) through mechanical crushing.

The crushed material is reused locally as a soil conditioner or planting substrate, aligned with its carbon-negative and non-toxic nature.

No landfill is assumed (C4 = 0%).

As the recycled material replaces conventional soil additives and eliminates the need for transport and virgin resource extraction, Module D accounts for environmental benefits.

At the end of its service life, the product is removed manually or using light mechanical tools, with negligible energy consumption (C1) which is included

in data point in C3.

The product is not transported to external waste processing facilities; instead, it is 100% recycled on-site (C3) through mechanical crushing.

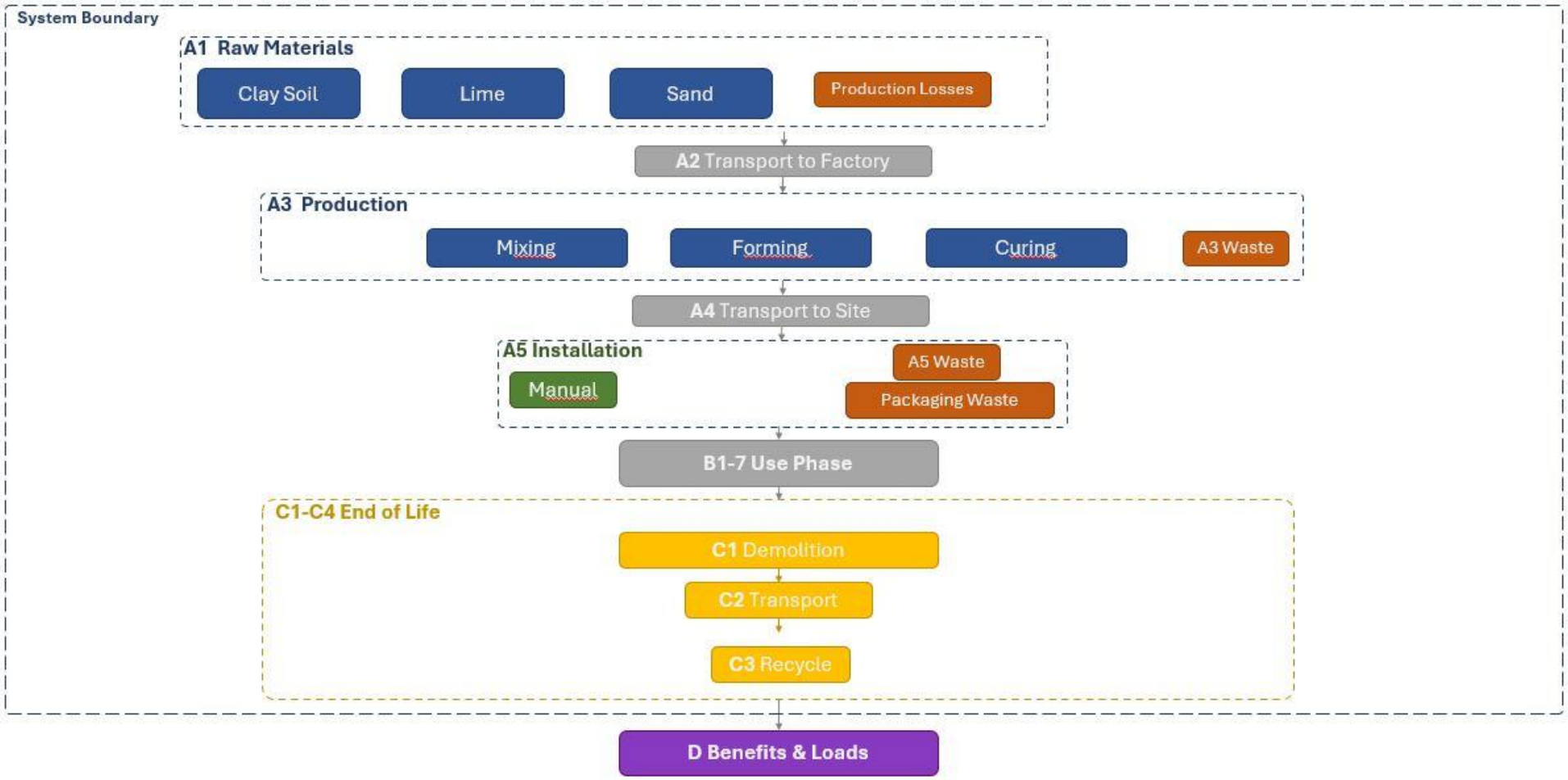
The crushed material is reused locally as a soil conditioner or planting substrate, aligned with its carbon-negative and non-toxic nature.

No landfill is assumed (C4 = 0%).

Soil is already recycled, so the benefit is only from packaging and the e4E lime.

D is the benefit from packaging because brick is 100% recycled, so no benefit from the product.

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.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

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	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	No grouping
Grouping method	Not applicable
Variation in GWP-fossil for A1-A3, %	0

This EPD is product and factory specific.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD System Verification v3.2.3. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11 environmental data sources follow the methodology ‘allocation, Cut-off, EN 15804+A2‘.

ENVIRONMENTAL IMPACT DATA

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

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	4.73E-02	4.45E-03	-2.63E-02	2.54E-02	6.82E-02	4.90E-02	-5.34E-01	ND	ND	ND	ND	ND	ND	1.08E-02	0.00E+00	1.08E-02	0.00E+00	-3.17E-03
GWP – fossil	kg CO_2e	4.72E-02	4.45E-03	1.93E-02	7.10E-02	6.82E-02	3.25E-03	0.00E+00	ND	ND	ND	ND	ND	ND	1.08E-02	0.00E+00	1.08E-02	0.00E+00	-2.09E-03
GWP – biogenic	kg CO_2e	3.47E-05	9.78E-07	-4.57E-02	-4.57E-02	1.07E-05	4.58E-02	-5.34E-01	ND	ND	ND	ND	ND	ND	1.10E-06	0.00E+00	-1.10E-06	0.00E+00	-1.08E-03
GWP – LULUC	kg CO_2e	3.32E-05	1.98E-06	3.67E-05	7.19E-05	3.67E-05	1.70E-06	0.00E+00	ND	ND	ND	ND	ND	ND	1.11E-06	0.00E+00	1.10E-06	0.00E+00	8.56E-07
Ozone depletion pot.	kg CFC_{-11}e	4.70E-10	6.61E-11	3.34E-10	8.70E-10	9.80E-10	1.81E-11	0.00E+00	ND	ND	ND	ND	ND	ND	1.66E-10	0.00E+00	1.65E-10	0.00E+00	-8.42E-11
Acidification potential	mol H^+e	3.31E-04	2.56E-05	9.95E-05	4.56E-04	1.97E-03	6.51E-06	0.00E+00	ND	ND	ND	ND	ND	ND	9.76E-05	0.00E+00	9.73E-05	0.00E+00	-8.28E-06
EP-freshwater[2)]	kg Pe	1.08E-05	3.45E-07	4.85E-06	1.60E-05	2.21E-06	3.27E-07	0.00E+00	ND	ND	ND	ND	ND	ND	3.12E-07	0.00E+00	3.11E-07	0.00E+00	-8.43E-07
EP-marine	kg Ne	8.68E-05	1.04E-05	2.45E-05	1.22E-04	4.91E-04	6.66E-06	0.00E+00	ND	ND	ND	ND	ND	ND	4.53E-05	0.00E+00	4.52E-05	0.00E+00	-1.71E-06
EP-terrestrial	mol Ne	1.02E-03	1.14E-04	2.65E-04	1.40E-03	5.45E-03	2.66E-05	0.00E+00	ND	ND	ND	ND	ND	ND	4.96E-04	0.00E+00	4.94E-04	0.00E+00	-1.69E-05
POCP ("smog")[3)]	kg NMVOCe	2.90E-04	3.71E-05	1.05E-04	4.33E-04	1.48E-03	8.70E-06	0.00E+00	ND	ND	ND	ND	ND	ND	1.48E-04	0.00E+00	1.47E-04	0.00E+00	-1.11E-05
ADP-minerals & metals[4)]	kg Sbe	3.01E-07	1.23E-08	9.97E-08	4.13E-07	6.92E-08	3.51E-09	0.00E+00	ND	ND	ND	ND	ND	ND	3.88E-09	0.00E+00	3.87E-09	0.00E+00	-1.25E-08
ADP-fossil resources	MJ	5.64E-01	6.50E-02	3.31E-01	9.60E-01	8.38E-01	1.62E-02	0.00E+00	ND	ND	ND	ND	ND	ND	1.41E-01	0.00E+00	1.41E-01	0.00E+00	-6.20E-02
Water use[5)]	m^3e depr.	4.78E-02	3.18E-04	4.30E+00	4.35E+00	2.39E-03	6.03E-04	0.00E+00	ND	ND	ND	ND	ND	ND	3.53E-04	0.00E+00	3.52E-04	0.00E+00	-2.05E-04

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, EF 3.1

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	5.82E-09	5.51E-10	1.94E-09	8.32E-09	2.17E-09	1.32E-10	0.00E+00	ND	ND	ND	ND	ND	ND	2.77E-09	0.00E+00	2.51E-08	0.00E+00	-4.34E-11
Ionizing radiation[6)]	kBq U235e	1.48E-03	5.59E-05	7.83E-04	2.32E-03	3.86E-04	4.30E-05	0.00E+00	ND	ND	ND	ND	ND	ND	6.27E-05	0.00E+00	6.25E-05	0.00E+00	-2.85E-04
Ecotoxicity (freshwater)	CTUe	1.29E-01	9.15E-03	1.34E-01	2.72E-01	6.33E-02	6.76E-02	0.00E+00	ND	ND	ND	ND	ND	ND	7.79E-03	0.00E+00	7.77E-03	0.00E+00	-7.93E-04
Human toxicity, cancer	CTUh	1.31E-11	1.50E-12	6.29E-11	7.75E-11	1.47E-11	7.88E-13	0.00E+00	ND	ND	ND	ND	ND	ND	1.11E-12	0.00E+00	1.11E-12	0.00E+00	-2.50E-13
Human tox. non-cancer	CTUh	4.33E-10	5.04E-11	1.70E-10	6.53E-10	2.16E-10	3.32E-11	0.00E+00	ND	ND	ND	ND	ND	ND	1.76E-11	0.00E+00	1.76E-11	0.00E+00	-1.36E-11
SQP[7)]	-	3.05E+00	6.45E-02	5.84E+00	8.96E+00	8.62E-02	1.55E-02	0.00E+00	ND	ND	ND	ND	ND	ND	9.91E-03	0.00E+00	9.89E-03	0.00E+00	-5.89E-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	9.10E-02	8.80E-04	5.29E-01	6.21E-01	6.53E-03	-4.69E-01	0.00E+00	ND	ND	ND	ND	ND	ND	8.96E-04	0.00E+00	8.93E-04	0.00E+00	-7.33E-03
Renew. PER as material	MJ	0.00E+00	0.00E+00	3.95E-01	3.95E-01	0.00E+00	-3.95E-01	0.00E+00	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-02
Total use of renew. PER	MJ	9.10E-02	8.80E-04	9.24E-01	1.02E+00	6.53E-03	-8.64E-01	0.00E+00	ND	ND	ND	ND	ND	ND	8.96E-04	0.00E+00	8.93E-04	0.00E+00	3.37E-03
Non-re. PER as energy	MJ	5.64E-01	6.50E-02	2.41E-01	8.70E-01	8.38E-01	-5.77E-02	0.00E+00	ND	ND	ND	ND	ND	ND	1.41E-01	0.00E+00	1.41E-01	0.00E+00	-6.76E-02
Non-re. PER as material	MJ	0.00E+00	0.00E+00	8.98E-02	8.98E-02	0.00E+00	-8.98E-02	0.00E+00	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-02
Total use of non-re. PER	MJ	5.64E-01	6.50E-02	3.31E-01	9.60E-01	8.38E-01	-1.47E-01	0.00E+00	ND	ND	ND	ND	ND	ND	1.41E-01	0.00E+00	1.41E-01	0.00E+00	-4.13E-02
Secondary materials	kg	6.16E-04	2.73E-05	1.30E-03	1.94E-03	3.98E-04	1.25E-05	0.00E+00	ND	ND	ND	ND	ND	ND	5.88E-05	0.00E+00	5.86E-05	0.00E+00	1.07E-03
Renew. secondary fuels	MJ	9.88E-06	3.47E-07	1.04E-02	1.04E-02	9.66E-07	1.30E-07	0.00E+00	ND	ND	ND	ND	ND	ND	1.54E-07	0.00E+00	1.53E-07	0.00E+00	-4.69E-06
Non-ren. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.18E-03	9.51E-06	3.03E-04	1.49E-03	5.87E-05	-4.14E-05	0.00E+00	ND	ND	ND	ND	ND	ND	9.35E-06	0.00E+00	9.33E-06	0.00E+00	-1.30E-05

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	3.34E-03	1.09E-04	1.57E-03	5.01E-03	1.12E-03	1.24E-04	0.00E+00	ND	ND	ND	ND	ND	ND	1.57E-04	0.00E+00	1.57E-04	0.00E+00	-6.24E-05
Non-hazardous waste	kg	5.88E-02	2.02E-03	4.60E-02	1.07E-01	1.53E-02	4.45E-02	0.00E+00	ND	ND	ND	ND	ND	ND	2.15E-03	0.00E+00	2.14E-03	0.00E+00	-1.77E-02
Radioactive waste	kg	3.59E-07	1.37E-08	1.92E-07	5.65E-07	9.41E-08	1.07E-08	0.00E+00	ND	ND	ND	ND	ND	ND	1.54E-08	0.00E+00	1.53E-08	0.00E+00	-7.27E-08

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	0.00E+00	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-02	0.00E+00	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	3.00E+00	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	0.00E+00	ND	ND	ND	ND	ND	ND	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	6.11E-02	0.00E+00	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy – Electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-02	0.00E+00	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy – Heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.54E-02	0.00E+00	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

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	3.93E-02	4.43E-03	1.93E-02	6.31E-02	6.79E-02	4.03E-03	0.00E+00	ND	ND	ND	ND	ND	ND	1.08E-02	0.00E+00	1.07E-02	0.00E+00	-2.03E-03
Ozone depletion Pot.	kg $CFC_{-11}e$	3.14E-10	5.27E-11	2.83E-10	6.50E-10	7.78E-10	1.46E-11	0.00E+00	ND	ND	ND	ND	ND	ND	1.31E-10	0.00E+00	1.31E-10	0.00E+00	-6.81E-11
Acidification	kg SO_2e	2.04E-04	1.86E-05	7.93E-05	3.02E-04	1.57E-03	4.83E-06	0.00E+00	ND	ND	ND	ND	ND	ND	6.86E-05	0.00E+00	6.85E-05	0.00E+00	-6.82E-06
Eutrophication	kg PO_4^3e	3.26E-05	4.60E-06	4.29E-04	4.66E-04	1.73E-04	1.79E-06	0.00E+00	ND	ND	ND	ND	ND	ND	1.60E-05	0.00E+00	1.60E-05	0.00E+00	-1.78E-06
POCP (“smog”)	kg C_2H_4e	1.35E-05	1.49E-06	8.63E-06	2.36E-05	7.80E-05	5.83E-07	0.00E+00	ND	ND	ND	ND	ND	ND	5.14E-06	0.00E+00	5.13E-06	0.00E+00	-6.76E-07
ADP-elements	kg Sbe	5.29E-08	1.20E-08	9.68E-08	1.62E-07	6.83E-08	3.37E-09	0.00E+00	ND	ND	ND	ND	ND	ND	3.77E-09	0.00E+00	3.76E-09	0.00E+00	-1.23E-08
ADP-fossil	MJ	4.56E-01	6.41E-02	3.18E-01	8.38E-01	8.32E-01	1.55E-02	0.00E+00	ND	ND	ND	ND	ND	ND	1.40E-01	0.00E+00	1.40E-01	0.00E+00	-5.70E-02

ADDITIONAL INDICATOR – GWP-GHG

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	4.73E-02	4.45E-03	1.94E-02	7.11E-02	6.82E-02	3.25E-03	0.00E+00	ND	ND	ND	ND	ND	ND	1.08E-02	0.00E+00	1.08E-02	0.00E+00	-2.09E-03

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH4 fossil, CH4 biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO2 is set to zero.

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity production, hydro, run-of-river, hubei, Ecoinvent
Electricity CO2e / kWh	0.0047
District heating data source and quality	Electricity production, solar tower power plant, 20 MW, World, Ecoinvent
District heating CO2e / kWh	0.0474

Transport scenario documentation - A4 (Transport resources)

Scenario parameter	Value
Transport, freight, lorry >32 metric ton	EURO3, 5 km
Transport, freight, sea, container ship	2163 km

Transport scenario documentation A4

Scenario parameter	Value
Capacity utilization (including empty return) %	100%
Bulk density of transported products	0.00E+00
Volume capacity utilization factor	1

Installation scenario documentation - A5

Scenario parameter	Value
Exported Energy: Thermal, Ecoinvent	0.0049 MJ
Exported Energy: Thermal, Ecoinvent	1.2E-4 MJ
Exported Energy: Thermal, Ecoinvent	0.0014 MJ
Exported Energy: Thermal, Ecoinvent	0.029 MJ
Exported Energy: Electricity, Ecoinvent	0.0036 MJ
Exported Energy: Electricity, Ecoinvent	8.9E-5 MJ
Exported Energy: Electricity, Ecoinvent	0.001 MJ
Exported Energy: Electricity, Ecoinvent	0.021 MJ
Treatment of waste polyethylene, for recycling, unsorted, sorting, Ecoinvent, Materials for recycling	5.7E-4 kg
Treatment of waste polyethylene, for recycling, unsorted, sorting, Ecoinvent, Materials for recycling	1.6E-4 kg
Treatment of waste polyethylene, municipal incineration, Ecoinvent	5.2E-4 kg
Treatment of waste polyethylene, municipal incineration, Ecoinvent	1.5E-4 kg
Treatment of waste polyethylene, sanitary landfill, Ecoinvent	3.3E-4 kg
Treatment of waste polyethylene, sanitary landfill, Ecoinvent	9.4E-5 kg
. Treatment of waste paper, unsorted, sorting, Ecoinvent, Materials for recycling	4.1E-4 kg
Treatment of waste packaging paper, municipal incineration, Ecoinvent	4.0E-5 kg

Treatment of waste packaging paper, sanitary landfill, Ecoinvent	4.5E-5 kg
Treatment of waste wood, post-consumer, sorting and shredding, Ecoinvent, Materials for recycling	0.01 kg
Treatment of waste wood, untreated, municipal incineration, Ecoinvent	0.0094 kg
Treatment of waste wood, untreated, sanitary landfill, Ecoinvent	0.012 kg

Use stages scenario documentation - C1-C4

Scenario information	Value
Treatment of waste brick, recycling, Ecoinvent, Materials for recycling	3.0 kg
Diesel, burned in building machine, Ecoinvent	0.03 kWh
Scenario assumptions e.g. transportation	100km from construction site to reuse or recycling

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools

Tool verifier: Magaly Gonzalez Vazquez
Tool verification validity: 27 March 2025 - 26 March 2028

Imane Uald Lamkaddam as an authorized verifier for EPD Hub Limited
09.01.2026