

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

BRICK SLIPS CEMACON
CEMACON SA



EPD HUB, HUB-7919
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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	CEMACON SA
Address	Calea Turzii 178 K -188 S Et. 1, Cluj-Napoca, county Cluj, Romania, Postal Code 400495
Contact details	office@cemacon.ro
Website	www.cemacon.ro

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
c-PCR	EN 17160 Product category rules for ceramic tiles
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Stefan Cosuta, Envirocert SRL, www.envirocert.ro
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Afzal khan Peerukhan as an authorized verifier for EPD Hub

This EPD is intended for business-to-business 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	BRICK SLIPS CEMACON
Additional labels	-
Product reference	-
Place(s) of raw material origin	ROMANIA
Place of production	Str. Fabricii, No. 1, Recea village, Virsolt Commune, Salaj County, Romania
Place(s) of installation and use	Romania, Hungary
Place(s) of end-of-life	-
Period for data	calendar year 2025
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3 (%)	0; +31.2%; + 72.7%
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	95,7

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 square meter
Declared unit mass	15,925 kg
Mass of packaging	0,2233 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	10,2
GWP-total, A1-A3 ($kgCO_2e$)	9,93
Secondary material, inputs (%)	2,51
Total energy use, A1-A3 (kWh)	50,8
Net freshwater use, A1-A3 (m^3)	0,04

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

CEMACON is one of the leading Romanian manufacturers in the construction materials industry, with a history dating back to 1969 and more than five decades of experience. The company was the leader of the Romanian brick market in 2023, 2024 and 2025 and the leader of the Romanian masonry market in 2025(*), and it is the largest producer with Romanian capital. CEMACON operates 7 high-tech production lines across 3 industrial platforms.

As part of Paval Holding, CEMACON benefits from continuous strategic investment and the integration of innovative technologies aimed at sustainable development.

Core Values and Vision

The company's philosophy is built on the intersection of innovation and experience. CEMACON focuses on:

- Operational Excellence: Recognized with the "Best Managed Companies" certification for three consecutive years (2023, 2024 and 2025).
- Sustainability: Developing durable masonry solutions designed to support industry growth while ensuring the well-being of the community.
- Collaboration: Fostering a diverse work environment where ideas translate into high-quality products and solid professional relationships.

Manufacturing and Innovation

Beyond its core ceramic masonry block range, CEMACON has expanded its manufacturing footprint with a dedicated lintel production line at the Recea platform, opened in 2018, and a facing brick production line within the Recea Industrial Park, opened in 2023, alongside the Biharia platform, integrated into the group in 2023. The company's commitment to a sustainable future is reflected in its own photovoltaic park supplying renewable energy to production, the reintegration of production waste into the raw material recipe, and the use of recyclable raw materials and packaging.

(*)According to Neomar Analysis of Romanian Wall-Building Materials Market 2014 – 2025





PRODUCT DESCRIPTION

This Environmental Product Declaration covers the Cemacon Ceramic Brick Slips product range manufactured by CEMACON S.A. within its production plant in Recea (Vîrșolț Commune, Sălaj County), Romania, on the company's dedicated Special Elements production line. The range comprises four product collections — Dor, Vis, Orizont and Infinit — consisting of thin fired-clay facing elements, obtained by extrusion of natural clays and firing at temperatures above 1150 °C, finished with ceramic angobe/glaze coatings, and designed to reproduce the appearance of traditional brickwork as a lightweight, adhesive-applied cladding for both new construction and renovation. As the raw clay mix, manufacturing methodology and essential raw materials are standardized across the designated production line, the environmental impact results are presented for 1 square meter (1 m²) of installed facing.

Reference standard: SR EN 14411:2012
Product group: Grupa A IIb-2 (per SR EN 14411:2012)

Products covered by this EPD:

Collection(s)	Thickness	Dimensions (L × W × T, mm)	Coverage (pcs/m², incl. 10 mm joint)
Dor, Vis, Orizont	9 mm	240 × 71 × 9	49
Orizont	12 mm	380 × 71 × 12	32
Infinit	14 mm	500 × 55 × 14	30

This EPD uses the 240 × 71 × 9 mm product (9 mm thickness, 0.325 kg/piece, 49 pieces/m²) as the reference product for the declared unit, as it is the format common to three of the four collections (Dor, Vis, Orizont) and the highest-volume format manufactured on the production line. Because the mass per square meter differs across the three thicknesses (each format has its own weight per piece and coverage rate), the resulting GWP per declared unit also differs between formats even though they share the same raw material recipe and production process. For this reason, the Annex to this EPD additionally presents the specific GWP (Global Warming Potential) per m² values calculated individually for the 12 mm (Orizont) and 14 mm (Infinit) formats, so that specifiers of those collections are not required to rely on the 9 mm reference value alone.



Construction and Materials
Cemacon brick slips are manufactured from a specially formulated clay mixture (clay, feldspar and quartz sand), extruded and fired at high industrial temperatures to achieve a dense, durable ceramic body:
- Fired Clay Body: formulated from natural clay and mineral raw materials, burned at high temperature to secure mechanical strength, colour stability, frost resistance and long service life.
- Ceramic Surface Finish: a range of angobe, glaze and pigment coatings applied before firing to obtain the collection-specific colours and textures, permanently fused to the clay body during the firing process.
Complementary Corner Pieces: dedicated L-shaped corner elements, manufactured in the same formats, allow a continuous, mitre-free finish at building corners.

Manufacturing and Sustainability
Production takes place exclusively within Cemacon's dedicated ceramic manufacturing plant in Recea (Vîrșolț Commune, Sălaj County), Romania, on the Special Elements production line, under standardized industrial procedures shared with the company's other ceramic ranges. The process relies on natural, mineral-based raw materials and high-temperature firing, resulting in a chemically stable, inert and durable finished product.

Product Benefits
Authentic Brick Appearance, Lightweight Application: reproduces the appearance of traditional fired-clay brickwork at a fraction of the thickness and weight, allowing direct adhesive fixing onto the substrate without the structural load, thickness or foundation requirements of full masonry brick.
Durability & Weather Resistance: the fired ceramic body resists frost (SR EN ISO 10545-12) and thermal shock (SR EN ISO 10545-9), with water absorption of 6%<Eb≤10% (SR EN ISO 10545-3) and soluble salt content class S2 (SR EN 772-5:2002), preserving its appearance over decades with minimal maintenance.
Fire & Health Safety: classified A1 for reaction to fire, the fully fired mineral ceramic material does not burn and emits no toxic smoke or gases under fire exposure, presenting a safe, inert profile with respect to surrounding air and water quality.
Circular Economy: at the end of the building life cycle, the ceramic facing elements can be crushed and recycled into secondary industrial loops (e.g., aggregate), preserving natural mineral reserves.
Precision & Execution Efficiency: manufactured to consistent dimensional tolerances with dedicated corner pieces, allowing fast, clean on-site installation with reduced adhesive consumption compared to traditional brick-laying.

Further information can be found at:
www.cemacon.ro



PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	0	-
Minerals	100	Romania
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	0,08

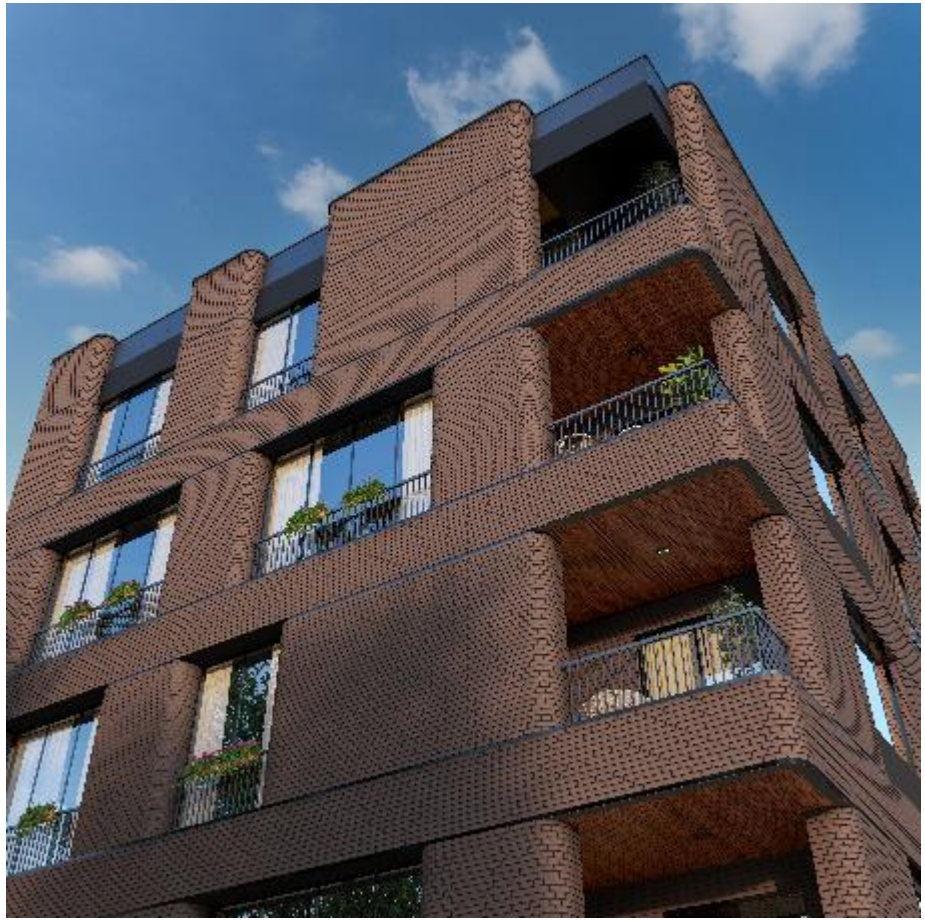
1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 square meter
Mass per declared unit	15,925 kg
Functional unit	1 square meter
Reference service life	50 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	ND	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

Not declared = ND

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.

A1 – Raw material supply

This stage includes the extraction, processing and delivery of the primary materials that form the Cemacon Ceramic Brick Slips fired clay facing elements. The clay body is based exclusively on natural clay, feldspar (as a flux) and quartz sand (as a filler/temper) — no pigments or colorants are used within the body mixture itself. Color and texture are introduced entirely at the surface: after shaping and drying, and before firing, the brick slips receive a ceramic finishing system of angobes, glazes, mineral pigments and ceramic inks, applied to the surface to produce the collection-specific colours and textures of the Dor, Vis, Orizont and Infinit ranges. Unlike hollow masonry blocks, this product is a thin, solid extruded tile with no internal cavities, so no combustible pore-forming additives (coal, sawdust, husks or similar organic residues) are used. The environmental burdens of all material inputs, including upstream extractions, are tracked and allocated to the declared unit of 1 square meter (m^2) of installed product, using the 9 mm / 49 pieces-per-m^2 reference product for the product family, with per-m^2 values for the 12 mm and 14 mm formats presented separately in the Annex, utilizing the Ecoinvent database to model the upstream impacts of raw material production.

A2 – Transport to factory

This stage covers the transportation of raw materials from suppliers to the Cemacon manufacturing plant in Recea (Vîrșolț Commune, Sălaj County). Transport distances and vehicle types are derived directly from Cemacon's internal logistics records for calendar year 2025, differentiated by raw material: the clay-body materials (clay, feldspar, quartz sand) are sourced regionally, with recorded distances ranging from 20 km to 175 km, while the ceramic surface-finishing materials (angobes, glazes, pigments and inks) are sourced from a specialized supplier at a recorded distance of 470 km. All

inbound transport is by 24-tonne truck. Load factors and empty-return assumptions are set to reflect the regional road-transport infrastructure and the company's actual delivery patterns.



A3 – Manufacturing, Finishing and Packaging
In this stage, the raw materials are transformed into finished fired clay facing tiles. Key processes at the Cemacon Recea manufacturing facility (Special Elements production line) include:
- Preparation and Mixing: crushing, grinding and precise dosing of clay, feldspar, quartz sand and water, followed by intensive mixing to obtain a homogeneous clay body (the "klinker" batch).
- Shaping and Cutting: the prepared clay mass is extruded through specialized dies to form continuous columns with the precise cross-sections of each collection's format, subsequently cut into individual brick slips and, for a share of production, into corner (mitred) pieces.
- Drying: the shaped brick slips undergo controlled drying to reduce moisture content prior to surface finishing.
Ceramic Surface Finishing: application of the angobe, glaze, pigment and ink finishing system onto the surface of the dried (unfired) tile, defining the specific colour and texture of each collection.
- Firing: the finished brick slips are fired at high temperature in a tunnel kiln, where ceramic bonding, permanent fusion of the surface finishing system and dimensional stabilisation occur.
- Quality Control and Sorting: final inspection, dimensional verification and sorting of the fired tiles prior to packaging and storage.

Energy modelling: Firing is the facility's most energy-intensive stage, reaching temperatures above 1150°C, and is fuelled by natural gas together with the upstream drying stage. Auxiliary production processes — mixing, extrusion, handling and surface finishing — draw on a combination of grid electricity and self-generated photovoltaic power, while diesel covers internal forklift handling of the finished product. All consumption figures are real 2025 data, allocated specifically to the Ceramic Brick Slips product family from Cemacon's internal utility records for the Special Elements production line.
Packaging: Includes cardboard boxes and separator sheets, PET stretch film and PP strapping band, adhesive for box closure, and wood (Euro/EPAL) pallets, ensuring safe delivery, stable stacking and weather-protected handling.
Direct process emissions and air quality: Firing generates direct process CO2 emissions from clay decarbonation as well as combustion emissions from natural gas firing. Stack emissions at the kiln and dryer exhaust points are subject to the facility's environmental permit.
Waste Management: Wood pallets are largely recovered and reused (up to five cycles) before replacement; PET strapping and film are directed to

recycling. Raw material losses are re-routed back into production where possible. All waste transport uses standard road transport.

System boundary and cut-off criteria
For modules A1–A3, the system boundary includes all processes under Cemacon S.A.'s control at the Recea plant up to the factory gate (Cradle-to-Gate). Processes excluded include the manufacture of capital goods (machinery, buildings), infrastructure maintenance, and indirect company management overheads. Cut-off criteria ensure that all major raw material and energy flows are included, confirming that no neglected individual process exceeds 1% of total mass or energy, and that total neglected input flows do not exceed 5% of each inventory module.

Data quality and representativeness
The data used reflect the actual production period of Cemacon S.A.'s Recea plant Special Elements line operations, specifically covering the calendar year 2025. Foreground data, including specific raw material consumption, transport distances, energy consumption and packaging allocations, are collected directly from site-specific internal ERP and logistics records, allocated at production-order level to isolate the Ceramic Brick Slips family from the line's other ceramic product. Background data are derived from recognized LCA databases, specifically Ecoinvent and One Click LCA. The representativeness of the data is verified, and all assumptions are documented.

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.

A4 – Transport to Building Site
This stage covers transport of the finished Cemacon Ceramic Brick slips (Dor, Vis, Orizont, Infinit) from the Recea (Vârșolț, Sălaj) manufacturing facility to the construction site.
Loading and securing: finished brick slips leave the factory packed in the same protective system documented in module A3 — corrugated cardboard boxes (with cardboard separators between pieces), stacked on reusable wood pallets and secured with stretch film and PP strapping — to prevent breakage or displacement in transit.
Transport distances: the average delivery distance is calculated as a sales-volume-weighted average across every Romanian county (and neighbouring export markets) actually supplied from the Recea plant in 2025, based on Cemacon's internal commercial delivery records — resulting in a representative distance of approximately 195 km.

A5 – Installation into the Building
This module covers on-site installation of Cemacon Brick Slips as an adhered ceramic facing system.
On-site handling: installation is fully manual — unpacking, cutting to size where needed (corners, edges, window reveals) and fixing each tile directly to the prepared substrate wall with a notched trowel, followed by joint finishing. No motorised site equipment is modelled for this module.
Auxiliary materials: the scenario uses cement-based tile adhesive, dry jointing mortar and mixing water.
Installation losses: installation generates inert waste sent to sanitary landfill; the recycled fraction of installation losses carries no additional burden

under the cut-off approach.
Waste Management of Packaging: covers end-of-life treatment of all packaging removed on site — wood pallets, corrugated cardboard boxes and separators, stretch film and PP strapping — modelled with One Click LCA's EU-average end-of-life scenarios:
- Wood packaging: 32% recycled, 30% energy recovery, 38% landfill;
- Plastic packaging: 40% recycled, 37% energy recovery, 23% landfill;
- Paper/cardboard packaging: 83% collected and sorted (recycling), 9% sanitary landfill, 8% municipal incineration with energy recovery (thermal and electricity export).
All packaging waste and installation losses are assumed to be transported over a representative distance of 50 km to authorized regional waste management facilities.

PRODUCT END OF LIFE (C1-C4, D)

C1 – Deconstruction / Disassembly
At the end of its service life, the Cemacon Ceramic Brick Slips facing system is removed from the wall during building deconstruction or renovation. Because the cured tile adhesive and jointing mortar remain permanently bonded to the fired ceramic body, they cannot be physically separated on site and are removed together as a single combined waste stream. Disassembly considers a minimal energy input. Since the fired ceramic and the cured cementitious matrix are chemically inert and fully stable, no hazardous emissions or volatile compounds are released during disassembly.

C2 – Transport to Waste Processing Facilities
Following disassembly, the combined tile/adhesive/mortar waste is transported to authorized regional collection points, recycling centers, or treatment facilities. For the LCA model, transport is assumed to occur via standard heavy-duty road vehicles over a representative average distance of 50 km. Fuel consumption and logistics emissions are calculated based on the total combined mass utilizing standard transport datasets from Ecoinvent to reflect regional waste logistics infrastructure.

C3 – Waste Processing
This stage involves the physical sorting, crushing, and preparation of the discarded facing system. As the adhesive and jointing mortar cannot be separated from the fired ceramic body, the combined tile/adhesive/mortar mass is processed as a single stream, directed towards authorized construction and demolition waste processing facilities for mechanical crushing and screening into secondary mineral aggregates.

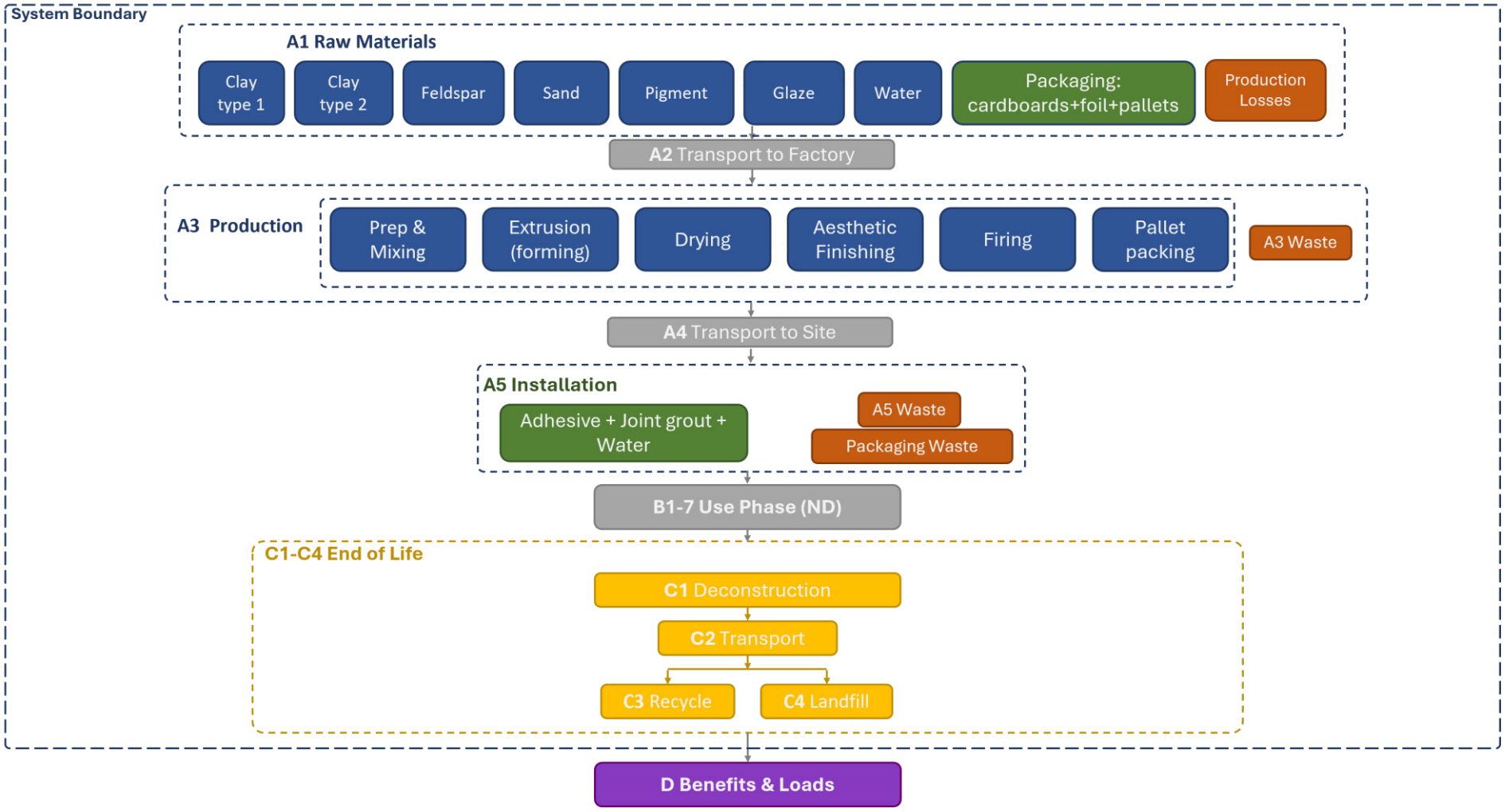
C4 – Final Disposal
The disposal scenario is defined according to representative regional construction and demolition waste practices for fired ceramic C&D waste: the combined tile/adhesive/mortar stream follows a 70% recycling / 30% landfill split. The fired ceramic body and the cured cementitious matrix are non-leaching, highly stable materials that do not undergo biochemical degradation; therefore, they do not generate greenhouse gas emissions, leachate, or environmental contamination when directed to compliant landfills or structural inert storage facilities. All waste is assumed to be transported over a representative distance of 50 km from the site to authorized regional waste management facilities.

Module D – Benefits and Loads Beyond the System Boundary
The recovery of materials and energy at the end-of-life provides net benefits beyond the system boundary, reported as negative environmental impacts in Module D. The net-flow modelling accounts separately for each recovered material stream (the combined ceramic tile/adhesive/mortar waste, wood packaging, plastic packaging, paper/cardboard packaging), combining the environmental loads of processing/recycling with the benefits of avoided virgin material and energy production.
Mineral Recycling Credit: the 70% recycled fraction of the combined tile/adhesive/mortar waste is modelled as an avoided production of virgin

crushed gravel/aggregate, offsetting primary aggregate extraction for local road infrastructure and construction applications.
Packaging Credits: for wood packaging, the net flow transfers the renewable and non-renewable energy content embodied in the material (PERM/PENRM), accounts for the release of its biogenic carbon content, credits the exported electricity and heat from its incinerated fraction, and credits the avoided production of virgin wood chips for its recycled fraction (net of a small diesel load from wood processing). For plastic packaging, the net flow transfers the non-renewable energy content of the material, credits the exported electricity and heat from its incinerated fraction, and credits the avoided production of virgin HDPE granulate for its recycled fraction (net of the recycled-granulate processing load). For paper/cardboard packaging, the net flow credits the avoided production of virgin kraft paper for its recycled/sorted fraction, transfers the biogenic carbon content and the embodied renewable/non-renewable energy of the material, credits the exported electricity and heat from its incinerated fraction, and nets the processing load of the recycled newsprint paper fraction.



LIFE CYCLE FLOW DIAGRAM



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.

In accordance with the PCR and EN 15804+A2 cut-off criteria, the following processes and infrastructure components have been excluded from the system boundaries of this study:
- Capital goods and infrastructure: The manufacturing, maintenance, and disposal of production machinery, industrial buildings, kilns, and other capital equipment.
- Corporate overheads: Administrative activities, corporate office energy consumption, business travel, and R&D activities that are not directly tied to the shop-floor manufacturing line.
- Minor auxiliary inputs: Minor material or energy flows that contribute less than 1% to the total input mass or energy, and whose cumulative exclusion does not exceed 5% of any given inventory module.

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	Physical Properties
Packaging material	Physical Properties
Ancillary materials	Physical Properties
Manufacturing energy and waste	Physical Properties

Where primary operational data was unavailable, conservative engineering estimates and standard scenarios based on the Product Category Rules (PCR) were applied:
- Installation Scenario (Module A5): The installation of Cemacon Ceramic Brick Slips onto the wall (tile adhesive and jointing mortar) is assumed to be entirely manual, requiring no mechanical energy inputs.
- Deconstruction Scenario (Module C1): Removal of the facing system is assumed to be predominantly manual, consistent with the low-energy nature of dismantling an adhered facing system rather than a structural masonry wall; a minimal energy input (a small diesel consumption for on-

site machinery assistance) is nonetheless modeled for this stage.
- Cementitious Fraction Inclusion at End-of-Life (Modules C and D): For the end-of-life deconstruction, transport, and processing scenarios, the cured tile adhesive and jointing mortar remain permanently bonded to the fired ceramic tile and cannot be physically separated on site.
- Transportation Parameters: For all standard logistics scenarios where specific vehicle profiles were not logistically restricted, transportation was modeled using generic Euro 5 or Euro 6 heavy-duty road freight datasets from Ecoinvent to maintain a representative and conservative carbon accounting approach.

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	Multiple products
Grouping method	Based on a representative product
Variation in GWP-fossil for A1-A3, %	0; +31.2%; + 72.7%

This Environmental Product Declaration (EPD) represents a product-specific group covering the four Cemacon Ceramic Brick Slips collections (Dor, Vis, Orizont, Infinit), manufactured at a single production facility: Cemacon SA – Recea plant, Comuna Vârșolț, Județul Sălaj, Romania.
The technical characteristics within this product group span three declared thicknesses (9mm, 12mm, 14mm) and a range of surface finishes — embossed or smooth textures, natural fired tone (Orizont) or surface-applied angobe/glaze/pigment finishing (Dor, Vis, Infinit) — depending on the specific collection and format.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.5. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11/3.12 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11/3.12 environmental data sources follow the methodology ‘allocation, Cut-off, EN 15804+A2‘.

1. EN 15804:2012+A2:2019/AC:2021 – Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
2. ISO 14025:2006 – Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
3. EN 17160:2019 – Product category rules for ceramic tiles.
4. SR EN 14411:2012 – Ceramic tiles - Definitions, classification, characteristics, evaluation of conformity and marking (Grupe A IIb-2).
5. Primary operational data from Cemacon SA for the calendar year 2025 (internal bills of materials, energy logs, transport, and waste records for the Recea manufacturing plant, Comuna Vârșolț, Județul Sălaj).
6. Ecoinvent 3.10 or newer database and One Click LCA platform – Background datasets used for upstream raw materials, energy grids, transport logistics, and end-of-life scenarios.

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	7,61E-01	2,49E-01	8,92E+00	9,93E+00	3,34E-01	3,98E+00	ND	ND	ND	ND	ND	ND	ND	3,62E-01	2,66E-01	3,23E-01	8,20E-02	-3,60E-01
GWP – fossil	kg CO_2e	7,40E-01	2,49E-01	9,22E+00	1,02E+01	3,33E-01	3,69E+00	ND	ND	ND	ND	ND	ND	ND	3,62E-01	2,66E-01	3,21E-01	8,16E-02	-1,74E-01
GWP – biogenic	kg CO_2e	2,03E-02	5,71E-05	-3,08E-01	-2,88E-01	1,73E-04	2,85E-01	ND	ND	ND	ND	ND	ND	ND	6,90E-05	1,70E-04	8,26E-04	3,69E-04	-1,87E-01
GWP – LULUC	kg CO_2e	5,07E-04	1,11E-04	6,49E-03	7,11E-03	1,17E-04	2,27E-03	ND	ND	ND	ND	ND	ND	ND	3,71E-05	8,81E-05	5,08E-04	2,05E-05	4,86E-04
Ozone depletion pot.	kg $CFC\text{-}_{11}e$	8,85E-08	3,63E-09	1,15E-06	1,24E-06	7,57E-09	8,90E-08	ND	ND	ND	ND	ND	ND	ND	5,38E-09	5,79E-09	5,24E-09	2,74E-09	-1,21E-09
Acidification potential	mol H^+e	2,79E-03	8,66E-04	1,41E-02	1,78E-02	1,08E-03	7,76E-03	ND	ND	ND	ND	ND	ND	ND	3,24E-03	8,53E-04	2,44E-03	9,19E-04	-1,15E-03
EP-freshwater[2)]	kg Pe	2,31E-05	2,70E-05	4,77E-04	5,27E-04	2,37E-05	3,18E-04	ND	ND	ND	ND	ND	ND	ND	1,17E-05	1,81E-05	1,75E-04	1,40E-04	-1,07E-04
EP-marine	kg Ne	7,76E-04	2,86E-04	3,31E-03	4,37E-03	3,79E-04	2,33E-03	ND	ND	ND	ND	ND	ND	ND	1,51E-03	2,87E-04	8,25E-04	2,29E-04	-3,77E-04
EP-terrestrial	mol Ne	9,04E-03	3,10E-03	3,36E-02	4,58E-02	4,12E-03	2,48E-02	ND	ND	ND	ND	ND	ND	ND	1,65E-02	3,12E-03	8,93E-03	2,47E-03	-4,18E-03
POCP ("smog")[3)]	kg NMVOCe	2,38E-03	1,27E-03	1,15E-02	1,51E-02	1,78E-03	7,59E-03	ND	ND	ND	ND	ND	ND	ND	4,94E-03	1,29E-03	2,89E-03	8,95E-04	-1,17E-03
ADP-minerals & metals[4)]	kg Sbe	7,62E-06	7,13E-07	8,94E-06	1,73E-05	9,67E-07	4,59E-06	ND	ND	ND	ND	ND	ND	ND	1,30E-07	9,15E-07	8,24E-07	1,42E-07	-9,89E-07
ADP-fossil resources	MJ	1,25E+01	3,56E+00	1,56E+02	1,72E+02	4,85E+00	3,10E+01	ND	ND	ND	ND	ND	ND	ND	4,72E+00	3,77E+00	5,10E+00	1,93E+00	-2,19E+00
Water use[5)]	m^3e depr.	5,70E-01	2,08E-02	1,62E+00	2,21E+00	2,80E-02	5,24E-01	ND	ND	ND	ND	ND	ND	ND	1,21E-02	1,97E-02	1,08E-01	9,12E-02	-1,94E-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, 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	4,22E-08	2,44E-08	5,59E-08	1,23E-07	3,37E-08	3,60E-08	ND	ND	ND	ND	ND	ND	ND	9,25E-08	2,12E-08	1,94E-07	1,40E-08	-1,82E-08
Ionizing radiation[6]	kBq U235e	3,49E-02	2,98E-03	1,14E+00	1,17E+00	5,22E-03	6,60E-02	ND	ND	ND	ND	ND	ND	ND	2,01E-03	4,49E-03	1,01E-02	2,44E-03	2,19E-03
Ecotoxicity (freshwater)	CTUe	1,01E+01	7,37E-01	3,78E+01	4,86E+01	6,53E-01	9,46E+00	ND	ND	ND	ND	ND	ND	ND	2,69E+00	3,17E+00	1,59E+02	1,03E+02	-5,96E+00
Human toxicity, cancer	CTUh	5,93E-10	3,91E-11	9,57E-10	1,59E-09	5,27E-11	7,97E-10	ND	ND	ND	ND	ND	ND	ND	3,69E-11	4,54E-11	7,56E-11	3,29E-11	-3,72E-11
Human tox. non-cancer	CTUh	1,31E-08	2,21E-09	1,63E-08	3,17E-08	3,02E-09	1,06E-08	ND	ND	ND	ND	ND	ND	ND	5,80E-10	2,36E-09	3,05E-09	2,06E-09	-9,03E-10
SQP[7]	-	3,89E+00	3,55E+00	1,72E+01	2,46E+01	4,90E+00	3,82E+00	ND	ND	ND	ND	ND	ND	ND	3,12E-01	2,23E+00	6,04E+00	4,77E+00	-1,67E+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	1,36E+00	4,95E-02	9,83E+00	1,12E+01	7,54E-02	1,54E+00	ND	ND	ND	ND	ND	ND	ND	2,96E-02	6,13E-02	1,58E-01	3,71E-02	-2,69E+00
Renew. PER as material	MJ	0,00E+00	0,00E+00	2,79E+00	2,79E+00	0,00E+00	-2,79E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,88E+00
Total use of renew. PER	MJ	1,36E+00	4,95E-02	1,26E+01	1,40E+01	7,54E-02	-1,25E+00	ND	ND	ND	ND	ND	ND	ND	2,96E-02	6,13E-02	1,58E-01	3,71E-02	-8,07E-01
Non-re. PER as energy	MJ	1,29E+01	3,56E+00	1,55E+02	1,72E+02	4,85E+00	3,10E+01	ND	ND	ND	ND	ND	ND	ND	4,72E+00	3,77E+00	5,10E+00	1,93E+00	-2,23E+00
Non-re. PER as material	MJ	0,00E+00	0,00E+00	8,32E-01	8,32E-01	0,00E+00	-8,32E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,23E-01
Total use of non-re. PER	MJ	1,29E+01	3,56E+00	1,56E+02	1,73E+02	4,85E+00	3,02E+01	ND	ND	ND	ND	ND	ND	ND	4,72E+00	3,77E+00	5,10E+00	1,93E+00	-1,91E+00
Secondary materials	kg	4,00E-01	1,49E-03	1,46E-01	5,47E-01	2,06E-03	3,28E-02	ND	ND	ND	ND	ND	ND	ND	1,95E-03	1,68E-03	1,91E-03	6,18E-04	9,01E-02
Renew. secondary fuels	MJ	4,89E-05	1,94E-05	4,73E-02	4,74E-02	2,72E-05	9,49E-04	ND	ND	ND	ND	ND	ND	ND	5,12E-06	2,21E-05	2,27E-05	1,17E-05	-1,33E-03
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	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	9,92E-03	5,10E-04	3,41E-02	4,45E-02	6,41E-04	1,31E-02	ND	ND	ND	ND	ND	ND	ND	3,02E-04	4,55E-04	-2,83E-02	-2,31E-02	-5,82E-03

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	2,67E-02	2,27E-02	1,25E-01	1,74E-01	2,74E-02	7,57E-03	ND	ND	ND	ND	ND	ND	ND	5,29E-03	5,40E-03	1,27E-02	3,06E-03	-8,31E-03
Non-hazardous waste	kg	5,29E-01	4,49E-01	4,42E+00	5,40E+00	5,69E-01	1,70E+00	ND	ND	ND	ND	ND	ND	ND	7,71E-02	1,16E-01	2,09E+01	2,72E+01	-9,08E-01
Radioactive waste	kg	2,14E-04	7,14E-07	4,16E-04	6,31E-04	1,26E-06	6,65E-04	ND	ND	ND	ND	ND	ND	ND	4,93E-07	1,11E-06	2,48E-06	5,86E-07	7,35E-07

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	ND	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	4,44E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	1,95E+01	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	2,62E-02	ND	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	2,69E-01	ND	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	1,13E-01	ND	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	1,56E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Radioactive waste, high	kg	5,27E-07	2,06E-07	2,49E-04	2,49E-04	3,22E-07	5,03E-06	ND	ND	ND	ND	ND	ND	ND	1,43E-07	2,73E-07	7,00E-07	1,37E-07	-3,08E-08
Radioactive waste, int/low	kg	9,97E-06	5,07E-07	8,94E-05	9,99E-05	9,36E-07	2,13E-06	ND	ND	ND	ND	ND	ND	ND	3,50E-07	8,35E-07	1,78E-06	4,49E-07	7,66E-07

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	7,41E-01	2,49E-01	9,23E+00	1,02E+01	3,33E-01	3,70E+00	ND	ND	ND	ND	ND	ND	ND	3,62E-01	2,66E-01	3,22E-01	8,16E-02	-1,73E-01

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

DATA SOURCES

Manufacturing energy scenario documentation

1. Natural gas, One Click LCA, 0.25 kgCO2e/kWh
2. Electricity, medium voltage, residual mix, Romania, Ecoinvent, 0.28 kgCO2e/kWh
3. Electricity production, photovoltaic, Romania, Ecoinvent, 0.0770 kgCO2e/kWh
4. Market for diesel, burned in building machine, World, Ecoinvent, 0.10 kgCO2e/MJ

Transport scenario documentation - A4 (Transport resources)

1. Transport, freight, lorry, >32 metric ton, diesel, EURO 5, 195.45 km

Transport to the building site (A4) - Scenario documentation

Scenario parameter	Value
Capacity utilization (including empty return) %	85
Bulk density of transported products	1760
Volume capacity utilization factor	<1

Installation at the building site (A5) - Scenario documentation

Scenario parameter	Value
Energy: type and consumption (MJ or kWh)	-
Water use (m^3)	tap water: 0.002 m3
Ancillary materials: type and mass (kg)	cement based adhesive: 5 kg jointing mortar: 7 kg
Waste materials: type and mass (kg)	0.32 kg ceramic tiles 0.065 kg wood pallets 0.017 kg plastic packaging 0.14 kg cardboard packaging
Waste materials: output routes	ceramice tiles waste: 70% recycled, 30% landfill Wood packaging: 32% recycled, 30% incineration, 38% landfill Plastic packaging: 40% recycled, 37% incineration, 23% landfill Cardboard packaging: 83% recycled, 8% incineration, 9% landfill
Direct emissions (kg)	-

End of life (C1-C4) - Scenario documentation

Scenario information	Value
Collection process: collected separately (kg)	27.93 kg
Collection process: Mixed waste (kg)	-
Recovery: re-use (kg)	0
Recovery: recycling (kg)	19,5
Recovery: energy recovery (kg)	0
Disposal (kg)	8,38
Scenario assumptions e.g. transportation (mode, km) & other	Landfill: 50km, Recycling: 50km, Incineration 100 km

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

Afzal khan Peerukhan as an authorized verifier for EPD Hub Limited 23.10.2026



ANNEX 1 – GWP VARIATION ACROSS PRODUCT THICKNESSES

Cemacon Ceramic Brick Slips are manufactured in three thicknesses (9 mm, 12 mm, 14 mm) sharing the same body recipe, extrusion, drying, finishing and firing process. Unlike a simple thickness variant, each thickness corresponds to a distinct piece format: the 240×71×9 mm piece (Dor / Vis / Orizont collections) is the reference product for the results declared in the main body of this EPD; the 12 mm piece measures 380×71 mm and weighs 0.66 kg/piece; the 14 mm piece measures 500×55 mm and weighs 0.912 kg/piece. Because both the piece format and the coverage rate (pieces/m²) differ across thicknesses, the mass per declared unit (1 m²) is not a simple thickness scaling of the reference product.

Coverage rate for the 9 mm reference product is 49 pieces/m² (240×71 mm face plus a 10 mm joint), 31.7 pieces/m² for the 12 mm format and 30.2 pieces/m² for the 14 mm format. GWP-fossil and GWP-total per m² are then obtained by applying the declared per-kilogram factors of the reference product (GWP-fossil: 0.6405 kgCO2e/kg; GWP-total: 0.6235 kgCO2e/kg — EN 15804+A2 mass-based allocation) to each format's own mass per declared unit.

Product / Collection	Thickness (mm)	Piece size (mm)	Coverage (pieces/m²)	Mass (kg/m²)	GWP-fossil, A1-A3 (kgCO2e/m²)	GWP-total, A1-A3 (kgCO2e/m²)
Dor / Vis / Orizont	9	240×71	49	15.93	10.2	9.93
Orizont	12	380×71	31.7	20.89	13.38	13.03
Infinit	14	500×55	30.2	27.51	17.62	17.15

Note: the 9 mm row reproduces the declared results from the main body of this EPD (reference product). The 12 mm and 14 mm rows are derived and are not independently declared results.