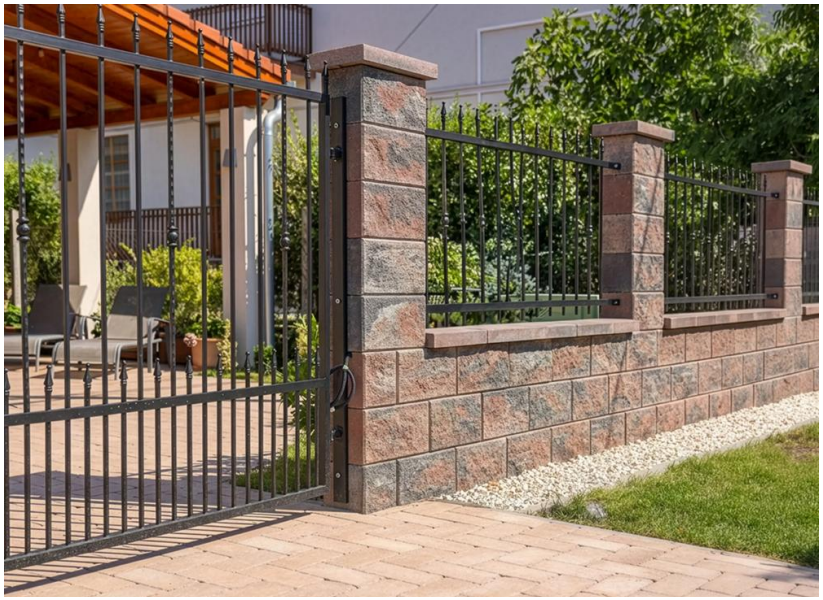


ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

CONCRETE FENCE ELEMENTS
LEIER ROM SRL



EPD HUB, HUB-6717
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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	Leier Rom SRL
Address	14 Cibinului Street, 400615, Cluj-Napoca, Cluj County, Romania
Contact details	info@leier.ro
Website	www.leier.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 EN 16757 Product Category Rules for concrete and concrete elements
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
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 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	Concrete fence elements
Additional labels	-
Product reference	-
Place(s) of raw material origin	Romania, Hungary, Austria
Place of production	Romania: Catcau village, Cluj county; Iasi, Iasi county,
Place(s) of installation and use	Romania, EU
Period for data	calendar year 2025
Averaging in EPD	Multiple factories
Variation in GWP-fossil for A1-A3 (%)	-3.6%; +2.9%
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	93,3

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 tonne
Declared unit mass	1000 kg
Mass of packaging	4,398 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	204
GWP-total, A1-A3 ($kgCO_2e$)	198
Secondary material, inputs (%)	0,64
Total energy use, A1-A3 (kWh)	347
Net freshwater use, A1-A3 (m^3)	2,31

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Company Overview

Founded in 1965, the Leier Group possesses over 60 years of experience and history in operating at full capacity within the construction materials industry across Europe. Present on the Romanian market since 2005 through LEIER ROM S.R.L., the group has established itself as a leading manufacturer of primary importance nationwide. Following a continuous strategy of reinvesting profits into plant modernization, technological upgrades, and production capacity expansion, Leier supports regional economic and social progress by driving private investment and creating numerous stable jobs.

Production Facilities and Strategic Presence

To ensure efficient distribution and to meet nationwide demand, Leier operates advanced, highly performing industrial facilities in strategic locations throughout Romania. The company's production footprint includes major manufacturing plants in Unirea (Alba County), Iași, Câțcău (Cluj County), Sighisoara (Mures County), and Feldioara (Brașov County). These modern units utilize advanced technologies and high-capacity machinery to deliver a comprehensive and diverse portfolio of construction materials that strictly comply with applicable European quality standards.

LEIER Group plants network in Eastern Europe

PRODUCT DESCRIPTION

This Environmental Product Declaration covers concrete fence block elements and fence coping elements manufactured by LEIER ROM S.R.L. exclusively within its designated production plants.
The scope of this EPD encompasses the following specific product lines manufactured at the indicated facilities:
- Arhitektur fence elements,
- Arhitektur pillar elements,
- Arhitektur fence cladding elements,
- Arhitektur pillar cladding elements,
- Modern fence elements,
- Modern pillar elements
- Modus fence coping slabs

These concrete fence elements are engineered for a wide range of exterior enclosure, landscaping, and architectural boundary applications, spanning from private residential properties to commercial and public spaces.

Construction and Materials
The Leier concrete fence element line is defined by a single-layer engineered structure, produced through a vibro-compression manufacturing process. As the core concrete mix, manufacturing methodology and essential raw materials are identical across the production matrix for all covered fence blocks, pillar elements and coping slabs — regardless of the specific shape, layout, or color of the final units — the environmental impact results are presented for 1 tonne (1,000 kg) of finished product. This declared unit provides a precise and scalable environmental assessment for any enclosure layout, boundary configuration, or model variant within the covered product ranges.
It is noted that the fence cladding elements and pillar cladding elements are derived by cutting from the corresponding full fence block units, sharing the same concrete composition and manufacturing origin.

Technical Characteristics
The concrete fence elements covered by this EPD are manufactured in conformity with two harmonized European technical specifications, depending on the product type:
- Fence body blocks and pillar blocks: EN 15435:2008 — Precast concrete products — Normal weight and lightweight concrete shuttering blocks
- Fence cladding elements, pillar cladding elements, and Modus coping slabs: EN 1339:2004 and EN 1339:2004/AC:2006 — Concrete paving flags

All products are CE marked under Assessment and Verification of Constancy of Performance (AVCP) System 4.

Manufacturing and Sustainability
The production process takes place across Leier's indicated concrete manufacturing plants in Romania, situated in Câțcău village (Cluj County) and Iași (Iași County), operating under standardized vibro-compression industrial protocols. The manufacturing process relies on natural raw materials — primarily cement, aggregates, water and mineral-based pigments — establishing a clean, mineral-based ecological profile.

Product Benefits
Structural durability and freeze-thaw resistance: the concrete fence elements are engineered to withstand severe weathering conditions, including repeated freeze-thaw cycles, hydrocarbon exposure, and mechanical impact, ensuring long-term structural integrity in all climatic conditions encountered in Romania.
Versatility and design flexibility: the product family is available in multiple color variants — including Foc, Sepia, Quartz and Alb Piatra Lunii, Antracit Onix, Maro Safir, Galben Topaz — and is compatible with a wide range of enclosure styles, from classic ornamental fencing to contemporary minimalist boundary walls.
Longevity and Circular Economy: the inherent structural durability of the concrete fence system provides high resistance to frost, wear and environmental degradation. Individual elements can be dismantled and reinstalled without damage in the event of modifications to the boundary layout, avoiding material disposal and eliminating the need for full replacement.
Precision and Execution Efficiency: the elements are manufactured to

precise dimensional tolerances with a uniform element height across the product range, ensuring straightforward installation, structural uniformity, and seamless integration with complementary elements (pillar blocks, cladding units, and coping slabs) from the same system.
Complementary System Architecture: the Arhitektur and Modern fence systems each comprise a complete set of interlocking components — fence body blocks, pillar blocks, surface cladding units, and coping slabs — enabling the construction of fully integrated, architecturally coherent enclosure structures using elements from a single declared product family.
Secure Delivery: finished fence elements are delivered securely on pallets, optimized for transport efficiency and vehicular loading from the regional production plants.

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

PRODUCT RAW MATERIAL MAIN COMPOSITION

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

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0,08
Biogenic carbon content in packaging, kg C	1,74

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 tonne
Mass per declared unit	1000 kg
Functional unit	-
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 used in the manufacture of Leier Rom SRL concrete fence elements. The product formulation is based on a mineral-intensive composition, relying on natural raw materials to establish a clean, mineral-based ecological profile.

The main raw material inputs consist of aggregates and cement, supplemented by mineral pigments and other concrete admixtures. The product range covered by this EPD encompasses two structurally distinct product types, each with a specific material profile:

- Fence body blocks and pillar blocks (Arhitektur and Modern series, manufactured under SR EN 15435:2008): single-layer vibro-compressed concrete units, formulated from optimized concrete recipes to ensure high structural stability, resistance to vertical and lateral loads, and compatibility with dry-stack or mortar-bedded assembly. The hollow-core geometry of these elements reduces material consumption while maintaining the required compressive and bending strength performance.
- Fence cladding elements and pillar cladding elements (Arhitektur and Modern series, manufactured under SR EN 1339:2004 and SR EN 1339:2004/AC:2006): these elements are produced by splitting full-sized fence block units of equivalent concrete composition. They therefore share the same single-layer concrete mix and raw material inputs as the parent blocks from which they are derived.
- Modus coping slabs (manufactured under SR EN 1339:2004 and SR EN 1339:2004/AC:2006): single-layer vibro-compressed concrete units produced by direct pressing, formulated from optimized concrete recipes.

The environmental burdens of all material inputs are tracked and allocated to the declared unit of 1 tonne of finished product, utilizing the Ecoinvent

v3.10.1/3.11/3.12 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 Leier Rom SRL manufacturing plants located in Câțcău village (Cluj County) and Iași (Iași County), Romania — the two production facilities within the scope of this EPD. The primary raw materials, including aggregates and cement originate mainly from Romania. Transport distances are derived from actual logistics records, while vehicle types, load factors, and fuel consumption are modeled based on operational data. Standard road freight using lorries over 32 metric tons (EURO 5, diesel) is assumed. Assumptions on empty-return trips and load consolidation are specified in the LCA modelling to reflect regional transport infrastructure.

A3 – Manufacturing, Finishing and Packaging
In this stage, raw materials are transformed into finished concrete fence elements at Leier's two Romanian manufacturing facilities in Câțcău (Cluj County) and Iași (Iași County). Both plants operate under standardized vibro-compression industrial protocols. Key processes include:
- Batching and mixing: precise dosing and mixing of cement, aggregates, pigments and admixtures to produce optimized concrete recipes tailored to the specific structural and aesthetic requirements of each product type within the covered range.
- Pressing and curing: the concrete mixture is formed using high-capacity industrial vibro-compression presses, followed by controlled curing to achieve the required structural, mechanical, and surface properties.
- Splitting / Cutting: fence cladding elements are produced by precision splitting of the corresponding full fence block units after curing. The cutting process generates a controlled volume of concrete offcuts, which are collected and managed as manufacturing waste in accordance with the plant's waste management protocols.
- Finishing and quality control: all products undergo dimensional and surface quality inspection to meet the applicable technical standards — SR EN 15435:2008 for fence body and pillar blocks, and SR EN 1339:2004/SR EN 1339:2004/AC:2006 for cladding elements and coping slabs — including declared performance levels for freeze-thaw resistance, bending strength and water absorption as specified in the respective Declarations of Performance.
Electricity modeling: the production facilities utilize a combination of self-generated solar power from the factories' on-site photovoltaic installations (0.0770 $kgCO_2e/kWh$) and purchased electricity mapped to the national grid residual mix (0.33 $kgCO_2e/kWh$).
Packaging: finished items are securely palletized using softwood pallets alongside protective films and securing bands to guarantee safe delivery and efficient vehicle loading from the regional production plants.
Waste management: materials lost during the manufacturing process, including concrete offcuts from the cutting of cladding elements, internal production losses, and ancillary streams, are strictly recorded. Manufacturing waste are collected, sorted and sent to authorized local partners for recycling, recovery or proper disposal in compliance with industrial environmental protocols.

System boundary and cut-off criteria
For modules A1–A3, the system boundary is established as Cradle-to-Gate, including all major extraction, transport, and manufacturing processes under the direct control of LEIER ROM S.R.L. Per the applied PCR and reference standards, the production of capital equipment, construction activities, infrastructure maintenance, and personnel-related operational energy or water flows are explicitly excluded from the inventory. Cut-off criteria ensure that no mandatory unit processes or major raw material and energy flows are omitted. There are no neglected unit processes exceeding 1% of the total mass or energy flows, and the cumulative neglected inputs

across the product stage do not exceed 5% of total energy or mass inventory.

Data quality and representativeness
The lifecycle inventory data utilized within this study reflect the actual production operations of LEIER ROM S.R.L. for the specific calendar year 2025. All specific foreground data, including material inputs, packaging weights, transport logistics, and site-specific energy profiles, were collected directly from the manufacturing plants in Câțcău village (Cluj County) and Iași (Iași County). Upstream background processes are modeled using high-quality data from recognized sources, primarily Ecoinvent v3.10.1/3.11/3.12, calculated via the One Click LCA EPD Generator tool. The plausibility and consistency of the combined plant data have been fully examined, ensuring high geographical, technological, and time-specific representativeness for the Romanian and wider EU context.

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 includes the transportation of the finished concrete fence elements from the designated manufacturing facilities to the construction or installation site. The average transport distance to the construction site is ~68 km. This representative value is derived directly from internal operational data, reflecting the distribution matrix from the regional manufacturing facilities in Câțcău (Cluj County) and Iași (Iași County) to installation sites across Romania.

A5 – Installation into the Building / Infrastructure
This stage covers the on-site handling, mortar preparation, and structural assembly of Leier concrete fence elements into enclosure and boundary configurations:
- On-site handling and placement: the installation process involves the manual positioning of fence body blocks, pillar blocks, cladding elements and coping slabs onto prepared foundations and previously assembled courses. Given the modular nature of the Arhitektur and Modern fence systems — comprising interlocking fence blocks, pillar blocks, split-face cladding elements, and Modus coping slabs — the installation sequence follows standard masonry assembly procedures, with elements bedded and jointed in mortar or dry-stacked depending on the specific structural configuration.

Auxiliary materials consumption: the on-site installation of 1 tonne of concrete fence elements requires the following auxiliary material inputs:
- Masonry mortar: 100 kg of ready-mix or site-prepared mortar, used for bedding joints between fence block courses, fixing cladding elements to the block substrate and positioning Modus coping slabs. This quantity reflects a conservative representative scenario applicable across the mixed product family covered by this EPD, accounting for the varying mortar consumption profiles of block elements, split-face cladding units, and coping slabs.
- Water: 20 litres, used for mortar preparation and on-site surface cleaning during installation.

Energy consumption: the installation of fence elements relies predominantly on manual labour and light-duty hand tools for element positioning, jointing and finishing. No powered mechanical compaction or heavy machinery energy input is considered within the declared system boundary for this product stage.
Installation losses: material flows account for a product installation loss rate of 5% to accurately reflect on-site breakage and fitting waste generated during the construction process, consistent with the lower cutting and shaping losses expected for modular fence block systems compared to paving applications. The environmental treatment of the concrete waste is fully modeled.

Waste Management of Packaging: accounts for the collection and environmental treatment of all packaging materials removed during the site installation phase. Based on the unified core environmental indicators, the end-of-life treatment for the packaging material mass is modeled through a verified system scenario:
- Wood Packaging: the processing matrix covers the management of the 4.2 kg of wood packaging material, where waste handling and specific output routes are tracked under a split recovery approach: 32% recycling, 30% incineration, and 38% landfill.
- Plastic Packaging: 0.2 kg of plastic packaging tracked as: 40% recycling, 37% incineration, and 23% landfill.

System Boundary and Cut-Off Criteria
For Modules A4–A5, the system boundary encompasses all downstream activities from the dispatch of finished fence elements at the manufacturer's gate until the elements are fully positioned and jointed within the enclosure or boundary structure. The auxiliary material inputs of mortar and water consumed during installation are included within the A5 system boundary. Per the reference standards and the applied PCR, any external structural foundation works, reinforcement steel placed within pillar cavities, concrete infill poured into pillar cores or other infrastructure layers not directly constituting part of the declared fence element product are excluded from the boundaries. Cut-off criteria dictate that no mandatory processes or known hazardous materials are excluded, ensuring that any neglected energy or mass flows do not exceed 1% of total flows for any single unit process and do not exceed 5% of the cumulative inventory for the entire product stage.

Data Quality and Representativeness
The data used reflect the logistics and structural installation profiles recorded for Leier operations during the calendar year 2025:
- Foreground data: logistics indicators, specific packaging mass, auxiliary material quantities, and transport parameters are based on direct operational parameters and representative installation scenario assumptions validated against standard masonry construction practice in Romania. Transport to the building site is modeled using standard heavy-duty vehicles, specifically Euro 5 freight lorries with a gross vehicle weight exceeding 32 metric tons.
- Background data: environmental data sources and upstream database indicators are sourced from recognized sources, primarily Ecoinvent v3.10.1/3.11/3.12, utilizing characterization factors according to EN 15804:2012+A2:2019/AC:2021.
- Scenario assumptions: all logistical and installation calculations — including transport distances, auxiliary material consumption quantities, and packaging waste treatment parameters — are verified for strict technological, temporal, and geographical representativeness for the Romanian market context. The mortar and water inputs declared for Module A5 represent a conservative representative scenario applicable to the mixed product family covered by this EPD, reflecting the typical installation practice for modular concrete fence systems in Romania.

PRODUCT END OF LIFE (C1-C4, D)

C1 – Deconstruction / Demolition
At the end of its reference service life (RSL of 50 years), the concrete fence elements are disassembled from their installed enclosure or boundary configuration. The deconstruction process for fence systems is primarily manual involving the sequential removal of Modus coping slabs, split-face cladding elements and fence body blocks from their mortar-bedded or dry-stacked courses, followed by the dismantling of pillar structures. Given the modular nature of the Arhitektur and Modern fence systems, individual elements can in many cases be carefully removed and recovered intact for direct reuse, without requiring powered demolition equipment. It is noted that residual mortar adhering to the element surfaces and within the bedding joints is not separated from the concrete units at the

deconstruction stage and is carried forward together with the fence elements through the subsequent end-of-life modules. As the concrete block and slab matrix — together with the residual mortar fraction — is fully cured and chemically inert, no volatile organic compounds or hazardous emissions are released during deconstruction.

C2 – Transport to Waste Processing Facilities
Following deconstruction, the discarded concrete fence elements together with the residual mortar adhering to their surfaces are loaded and transported to authorized regional collection points, recycling facilities or final disposal yards. For the LCA model, the transport distance to waste processing and final treatment facilities is defined as 50 km. The transport module covers the direct exhaust emissions of the transport vehicles, fuel production impacts, and associated infrastructure burdens, modeled using standard heavy-duty transport datasets from the Ecoinvent database to ensure regional technological representativeness.

C3 – Waste Processing
This stage involves the sorting, crushing and physical preparation of the discarded concrete fence elements — inclusive of the residual mortar fraction — destined for material recovery. The mortar fraction is not separated prior to crushing and is processed together with the concrete elements as a combined mineral waste stream, consistent with standard practice for mortar-bonded concrete masonry waste. Per the life-cycle inventory data and the applied end-of-life scenario, 70% of the combined product and residual mortar mass is directed toward recycling pathways. The concrete elements and associated mortar residues are crushed into recycled concrete aggregates (RCA) to be prepared for secondary applications in road construction sub-base layers or new concrete formulations, supporting a low-waste circular economy model.

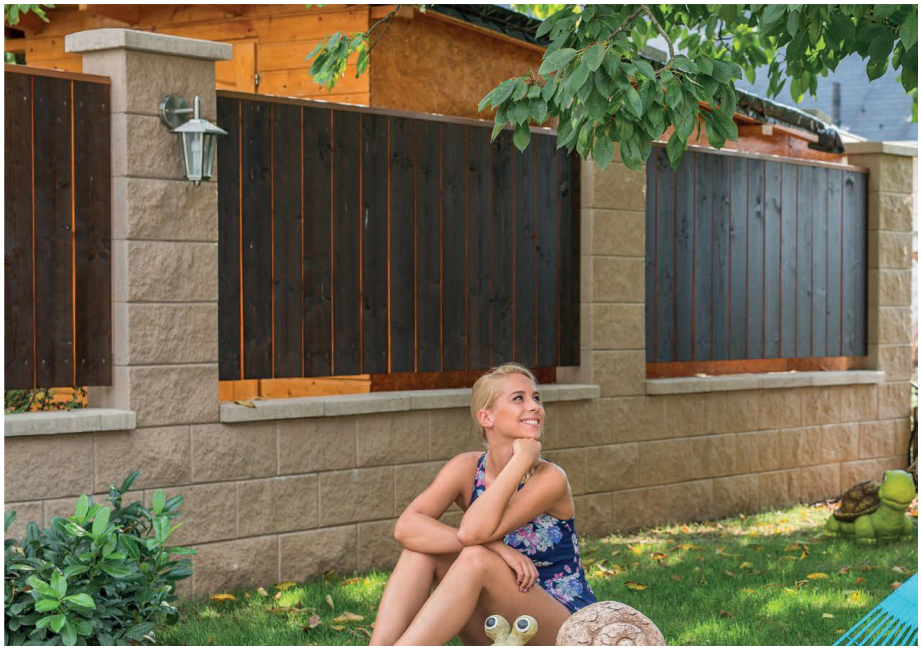
C4 – Final Disposal
The final disposal scenario accounts for the remaining fraction of the combined concrete and residual mortar waste stream that cannot be recovered or recycled through secondary streams. According to the specific end-of-life parameters established for this product family, 30% of the combined material mass is sent to compliant non-hazardous landfills for inert waste. The combined waste stream is a non-leaching, structurally stable mineral material that does not contain any REACH SVHC substances, ensuring it does not generate dangerous landfill gases or environmental leaching contamination during final disposal.

Module D – Benefits and Loads Beyond the System Boundary
The recycling of concrete fence elements and the associated recovery of packaging materials at the end of life provide significant environmental benefits beyond the system boundary, which are reported as negative environmental impacts (credits) in Module D.
Net Flow Calculation: Net flows for recycling are determined from the total end-of-life waste recovery flows. No secondary material inputs were utilized during the raw material supply stage (A1–A3); consequently, no deduction is applied to the end-of-life recovery credits, and the full recycling and recovery flows are credited within Module D.
Material Recycling Credits: The structural recovery of concrete aggregates originating from the 70% recycled product fraction replaces the demand for virgin, primary mineral aggregates in the regional construction market, significantly reducing the abiotic depletion of natural mineral resources. Given the relatively high aggregate content of both the fence block and coping slab product types, the volume of recovered secondary aggregate per declared unit is meaningful within the regional construction material supply chain.
Packaging Recovery Benefits: Module D also incorporates the net benefits generated by the recycling and energy recovery of packaging materials collected during the installation stage (Module A5). This includes credits from exported energy generated during controlled thermal processing,

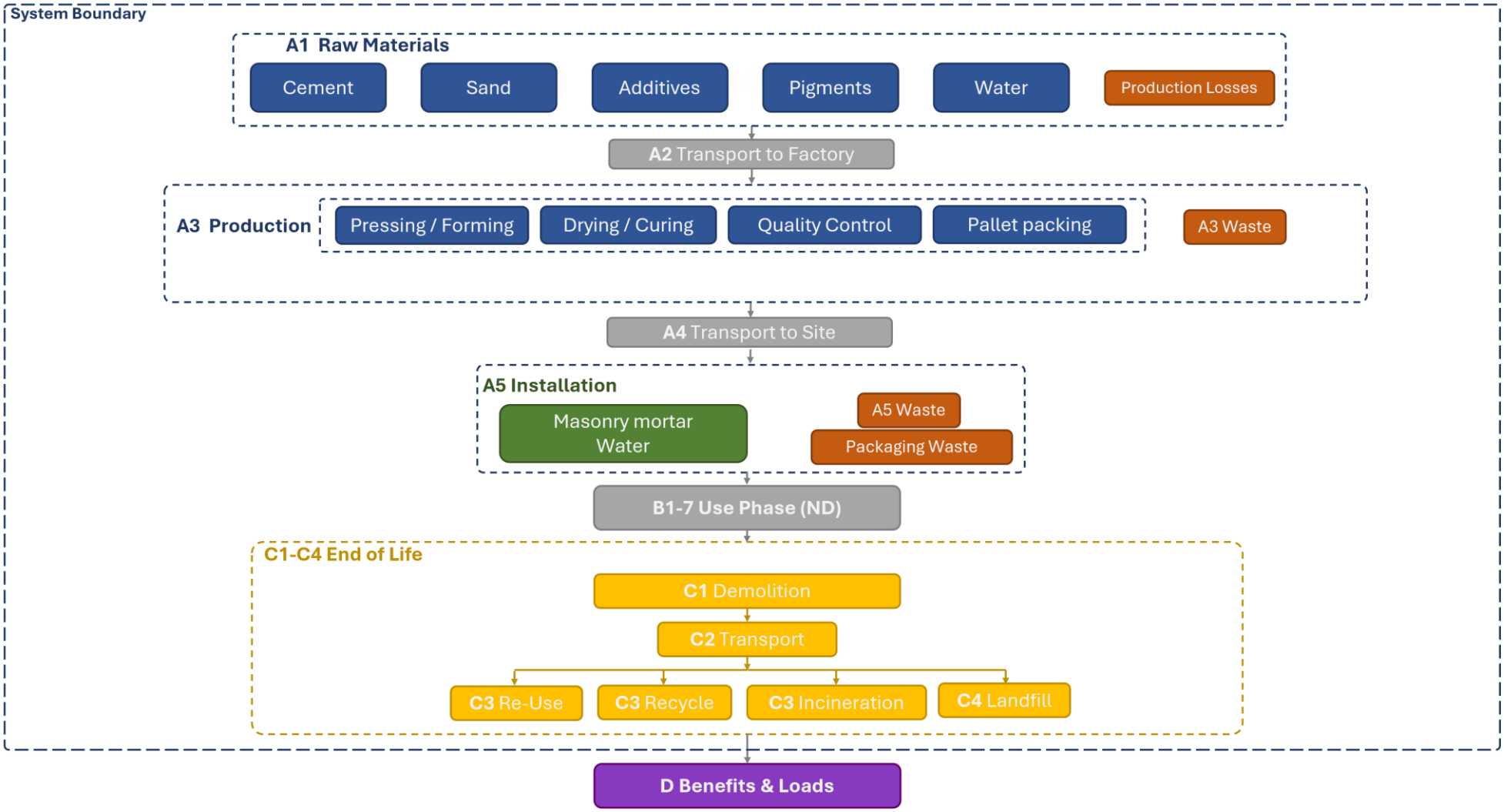
substituting the need for primary grid energy and fossil fuels.

Data Quality and Representativeness

The scenarios modeled for Modules C and D fully reflect verified concrete waste management and circular economy practices within the targeted European and Romanian construction markets. Environmental impact factors for mechanical processing, material recycling, landfilling, and primary energy substitution are derived from the Ecoinvent v3.10.1/3.11/3.12 databases using the 'Cut-Off, EN 15804+A2' allocation method, calculated via the One Click LCA EPD Generator tool.



SYSTEM 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 EN 15804+A2 and the EPD Hub PCR, the following flows and processes have been excluded from the system boundaries of this study as they fall below the 1% mass/energy cut-off threshold or are outside the product system control:
Personnel-related impacts: Employee commuting, business travel, and daily office-administrative activities (e.g., office electricity, heating, and administrative paper waste) within the four manufacturing plants.
Capital goods, maintenance, and infrastructure: The environmental manufacturing impacts associated with production machinery, factory buildings, storage infrastructure, and transport vehicles. This explicitly includes machine spare parts and general equipment maintenance lubricants/greases, as their environmental load is distributed over long operational lifespans and falls outside the product system boundary.
On-site installation auxiliary exceptions: Infrastructure bedding elements, secondary drainage integrations, or external road-laying works that are not under the direct technical formulation control of the Leier concrete pavers themselves (Module A5).
No hazardous materials or known regulated substances under the REACH SVHC candidate list have been deliberately excluded from the inventory.

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

-

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	Multiple factories
Grouping method	Based on average results of product group - by total mass
Variation in GWP-fossil for A1-A3, %	-3.6%; +2.9%

This multi-site EPD represents the production-share-weighted average of concrete fences products manufactured by LEIER ROM S.R.L. across two distinct production facilities located in Romania: Câțcău (Cluj county) and Iași (Iași county).
Geographical Coverage: 100% of the manufacturing data is sourced from production plants located within Romania, ensuring comprehensive regional representativeness for the Romanian and broader Eastern/Central European infrastructure markets.
Technical and Product Description: The EPD covers a standardized group of precast concrete elements for fences. The assessed product family shares a similar raw material matrix (consisting of cement, mineral aggregates, water, and performance admixtures) with a standard concrete bulk density profile of approximately 1550 kg/m³.
Sampling and Data Quality: No sampling was applied; 100% of the relevant manufacturing sites under the manufacturer's operational control provided primary inventory data. The foreground data collected covers the complete calendar year 2025, ensuring high temporal representativeness.
Impact Variation: The environmental impacts across the different facilities are highly consistent. The specific Global Warming Potential (GWP) variation between the individual production sites and the calculated weighted average is strictly between -3.6% and +2.9%, which is well below the ±10% threshold. To maintain absolute transparency, a factory-specific GWP breakdown table is included in the final section of this EPD document.

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 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
2. EN 16757:2023 - Sustainability of construction works - Environmental product declarations - Product Category Rules for precast concrete products.
3. ISO 14025:2006 - Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
4. EN 15435:2008 — Precast concrete products — Normal weight and lightweight concrete shuttering blocks
5. EN 1339:2003 - Concrete paving flags - Requirements and test methods.
6. Primary operational data from Leier Rom S.R.L. for the calendar year 2025 (internal bills of materials, energy logs, transport and waste records for Câțcău and Iași plants).

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	1,72E+02	2,53E+01	1,20E+00	1,98E+02	7,59E+00	3,26E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,13E+00	2,07E-01	2,16E+00	-1,36E+01
GWP – fossil	kg CO_2e	1,72E+02	2,52E+01	7,56E+00	2,04E+02	7,59E+00	2,60E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,69E+00	2,00E-01	2,16E+00	-1,19E+01
GWP – biogenic	kg CO_2e	-2,91E-01	5,79E-03	-6,37E+00	-6,65E+00	1,74E-03	6,57E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,41E-01	6,40E-03	9,68E-04	-1,69E+00
GWP – LULUC	kg CO_2e	1,97E-01	1,12E-02	7,70E-03	2,16E-01	3,38E-03	1,73E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,01E-01	5,72E-04	1,24E-03	-1,15E-02
Ozone depletion pot.	kg $CFC\text{-}_{11}$e	3,97E-06	3,67E-07	1,83E-07	4,52E-06	1,10E-07	1,12E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,99E-07	3,25E-09	6,01E-08	-1,04E-07
Acidification potential	mol H^+e	4,53E-01	8,78E-02	4,27E-02	5,83E-01	2,64E-02	1,06E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,48E-02	9,88E-04	1,51E-02	-7,39E-02
EP-freshwater[2)]	kg Pe	2,54E-03	2,74E-03	1,48E-03	6,76E-03	8,22E-04	6,60E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,31E-04	1,78E-04	1,89E-04	-4,23E-03
EP-marine	kg Ne	1,23E-01	2,90E-02	1,41E-02	1,66E-01	8,72E-03	2,71E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,10E-02	1,77E-04	5,80E-03	-1,73E-02
EP-terrestrial	mol Ne	1,41E+00	3,14E-01	1,52E-01	1,88E+00	9,43E-02	3,00E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,32E-02	1,54E-03	6,34E-02	-2,08E-01
POCP ("smog")[3)]	kg NMVOCe	4,25E-01	1,29E-01	5,57E-02	6,10E-01	3,87E-02	8,71E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,58E-02	5,05E-04	2,29E-02	-5,84E-02
ADP-minerals & metals[4)]	kg Sbe	5,52E-04	7,22E-05	3,25E-05	6,57E-04	2,17E-05	8,83E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,00E-05	4,82E-07	3,22E-06	-6,84E-05
ADP-fossil resources	MJ	5,16E+02	3,60E+02	1,45E+02	1,02E+03	1,08E+02	1,84E+02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,11E+02	4,57E+00	5,29E+01	-1,54E+02
Water use[5)]	m^3e depr.	1,71E+02	2,10E+00	4,74E+00	1,78E+02	6,32E-01	1,29E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,19E-01	1,20E-01	2,32E+00	-1,76E+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	3,57E-06	2,47E-06	7,60E-07	6,80E-06	7,43E-07	1,19E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,39E-07	4,50E-09	3,48E-07	-1,13E-06
Ionizing radiation[6)]	kBq U235e	2,70E+00	3,02E-01	2,36E+00	5,36E+00	9,08E-02	8,66E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,69E-02	1,26E-01	3,16E-02	-1,17E+00
Ecotoxicity (freshwater)	CTUe	3,74E+02	7,48E+01	7,16E+01	5,20E+02	2,25E+01	2,64E+02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,35E+02	5,08E+00	3,53E+01	-3,43E+02
Human toxicity, cancer	CTUh	9,97E-08	3,96E-09	7,80E-09	1,11E-07	1,19E-09	9,52E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,77E-09	6,56E-11	3,92E-10	-3,18E-09
Human tox. non-cancer	CTUh	1,07E-06	2,24E-07	4,96E-08	1,34E-06	6,73E-08	2,01E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,54E-08	3,16E-09	8,80E-09	-9,48E-08
SQP[7)]	-	7,21E+02	3,59E+02	5,77E+02	1,66E+03	1,08E+02	3,49E+02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,17E+02	6,63E-01	1,04E+02	-1,32E+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	1,07E+02	5,01E+00	6,39E+01	1,76E+02	1,50E+00	-4,34E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,40E+00	1,01E+00	4,94E-01	-1,42E+00
Renew. PER as material	MJ	1,57E+00	0,00E+00	6,33E+01	6,49E+01	0,00E+00	-6,33E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-1,10E+00	-4,72E-01	1,68E+01
Total use of renew. PER	MJ	1,09E+02	5,01E+00	1,27E+02	2,41E+02	1,50E+00	-1,07E+02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,40E+00	-9,48E-02	2,23E-02	1,54E+01
Non-re. PER as energy	MJ	5,04E+02	3,60E+02	1,28E+02	9,92E+02	1,08E+02	1,74E+02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,13E+02	4,57E+00	5,29E+01	-1,54E+02
Non-re. PER as material	MJ	3,30E+00	0,00E+00	1,32E+01	1,65E+01	0,00E+00	-1,32E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-2,31E+00	-9,89E-01	4,75E+00
Total use of non-re. PER	MJ	5,07E+02	3,60E+02	1,41E+02	1,01E+03	1,08E+02	1,61E+02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,13E+02	2,26E+00	5,19E+01	-1,49E+02
Secondary materials	kg	6,41E+00	1,51E-01	2,68E-01	6,83E+00	4,53E-02	3,49E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,23E-02	2,79E-03	1,31E-02	-6,60E-02
Renew. secondary fuels	MJ	3,52E+01	1,97E-03	2,14E+00	3,74E+01	5,91E-04	1,87E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,93E-04	2,98E-06	2,75E-04	-1,14E-03
Non-ren. secondary fuels	MJ	4,22E+01	0,00E+00	0,00E+00	4,22E+01	0,00E+00	2,11E+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	2,15E+00	5,17E-02	1,10E-01	2,31E+00	1,55E-02	6,54E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,88E-02	2,78E-03	5,47E-02	-4,07E-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	6,16E-01	2,30E+00	6,71E-01	3,59E+00	6,92E-01	7,07E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,46E-01	1,18E-02	6,02E-02	-1,16E+00
Non-hazardous waste	kg	2,44E+01	4,55E+01	4,75E+01	1,17E+02	1,37E+01	2,79E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,69E+00	8,81E-01	1,39E+00	-2,47E+01
Radioactive waste	kg	4,59E-03	7,22E-05	7,29E-04	5,39E-03	2,17E-05	7,67E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,35E-05	3,22E-05	7,71E-06	-2,85E-04

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	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	1,82E-02	0,00E+00	0,00E+00	1,82E-02	0,00E+00	1,42E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	8,05E+02	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	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	7,93E+00	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	3,34E+00	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	4,59E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

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	1,72E+02	2,53E+01	7,57E+00	2,05E+02	7,59E+00	2,60E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,99E+00	2,01E-01	2,16E+00	-1,19E+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. Heat production, natural gas, Ecoinvent, 0.0757 kgCO2e/MJ
2. Electricity, medium voltage, residual mix, Romania, Ecoinvent, 0.33 kgCO2e/kWh
3. Market for diesel, burned in building machine, Ecoinvent, 0.10 kgCO2e/MJ
4. Electricity production, photovoltaic, Romania, Ecoinvent, 0.0770 kgCO2e/kWh

Transport scenario documentation - A4 (Transport resources)

1. Market for transport, freight, lorry, >32 metric ton, diesel, EURO 5, 68.0 km

Transport to the building site (A4) - Scenario documentation

Scenario parameter	Value
Capacity utilization (including empty return) %	85
Bulk density of transported products	1550
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)	0.02 m3
Ancillary materials: type and mass (kg)	masonry mortar - 100 kg
Waste materials: type and mass (kg)	4.185 kg wood pallets 0.103 kg - plastic foil 0.110 kg - PP strips
Waste materials: output routes	wood packaging: 1.34 kg recycled, 1.26 kg incinerated, 1.59 kg landfilled plastic packaging: 0.085 kg recycled, 0.08 kg incinerated, 0.05 kg landfilled concrete waste: 35 kg recycled, 15 kg landfilled
Direct emissions (kg)	-

End of life (C1-C4) - Scenario documentation

Scenario information	Value
Collection process: collected separately (kg)	collected separately: 1150 kg
Collection process: Mixed waste (kg)	mixed waste: 0
Recovery: re-use (kg)	0
Recovery: recycling (kg)	805
Recovery: energy recovery (kg)	0
Disposal (kg)	0
Scenario assumptions e.g. transportation (mode, km) & other	Landfill: 50 km, Recycling: 50 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 19.06.2026

ANNEX 1 – GWP VARIATION ACROSS PRODUCTION PLANTS

PLANT	GWP TOTAL (KG CO2E / 1000 KG)	VARIATION
CATCAU, CLUJ COUNTY	190.85	-3.6%
IASI, IASI COUNTY	203.7	+2.9%

LEIER ROM plants: Catcau (county Cluj), Iasi (county Iasi)