ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Standard & Custom-made Solid Surface Sanitaryware - RECTOR by KUMA
KUMA ROMANIA SRL

EPD HUB, HUB-6034
Published on 17.04.2026, last updated on 17.04.2026, valid until 16.04.2031

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	KUMA ROMANIA SRL
Address	85B Stupini St., Banesti, 107050, Prahova County, Romania
Contact details	office@kumaromania.ro; retail@kumaromania.ro;project@kumaromania.ro
Website	www.kumaromania.ro;www.kumaromania.com

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.

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	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	Vera Durão, as an authorised verifier acting for EPD Hub Limited

PRODUCT

Product name	Standard & Custom-made Solid Surface Sanitaryware - RECTOR by KUMA
Additional labels	-
Product reference	-
Place(s) of raw material origin	Hungary, Italy, Denmark
Place of production	Romania, Banesti Village, Prahova County
Place(s) of installation and use	Romania, Denmark, other EU countries
Period for data	Calendar year 2025
Averaging in EPD	No grouping
Variation in GWP-fossil for A1-A3 (%)	-
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	16,3

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kilogram
Declared unit mass	1 kg
Mass of packaging	0,172 kg
GWP-fossil, A1-A3 (kgCO_2e)	3,13
GWP-total, A1-A3 (kgCO_2e)	2,88
Secondary material, inputs (%)	1,56
Secondary material, outputs (%)	0,14
Total energy use, A1-A3 (kWh)	14,2
Net freshwater use, A1-A3 (m^3)	0,02

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Company Overview
KUMA Romania was founded in 1998 as a subsidiary of KUMA A.S. Denmark; KUMA Romania is a leading manufacturer of premium composite concepts for bathrooms and kitchens. With over 40 years of expertise inherited from the KUMA Group, the Romanian facility combines minimalist Nordic design with advanced technology to create high-quality, durable products for residential and commercial projects across Europe.

Innovative Product Portfolio
KUMA specializes in custom-made and standard washbasins, countertops, and integrated bathroom solutions. Our products are crafted from high-performance composite materials.
This results in surfaces that are:
- Highly durable: resistant to impact, scratches, and stains, ideal for high-traffic environments.
- Easy to maintain: non-porous surfaces that ensure hygiene with minimal effort.
- Repairable: surfaces can be repolished and restored, significantly extending the product's lifecycle and reducing the need for replacements.
- Versatile for different shapes-design

Commitment to Sustainability & Circular Economy
Sustainability is at the core of KUMA's mission. We operate as a trendsetter in the industry by integrating circular economy principles into our production:
- Renewable Energy: our production facility uses 100% renewable electricity, with 25% currently generated by our own on-site photovoltaic plant.
- Waste Management: we are committed to a circular economy approach by minimizing waste throughout our production process. Where technically feasible, composite off-cuts are repurposed internally. All other manufacturing waste is strictly monitored and managed by certified partners for recovery or disposal, ensuring compliance with our ISO 14001 environmental objectives.
- Water Conservation: Through an internal recirculation system, we recover and reuse 43% of the water required for industrial cleaning.

Quality and Ethics
KUMA Romania operates under a robust Integrated Management System, holding international certifications for Quality (ISO 9001), Environment (ISO 14001), and Occupational Health and Safety (ISO 45001), certified by INTERTEK Group Plc

By choosing KUMA, customers invest in superior design and longevity while contributing to a greener, more responsible future.

PRODUCT DESCRIPTION

This Environmental Product Declaration covers the Kuma Rector product range, manufactured by KUMA Romania SRL.
This family consists of Standard BL washbasins, custom-made washbasins, bathroom tops, and specialized sanitary elements designed for high-end residential, commercial, and intensive-use public installations.
The Kuma Rector line is defined by a unique solid surface composition, offering a contemporary matte-satin finish and absolute structural homogeneity. As the chemical composition and manufacturing process are identical across the entire range—regardless of the product's final shape or dimensions—the environmental impact results are presented for 1 kg of finished product. This declared unit provides a precise environmental assessment for any configuration within the Rector line.

Technical Characteristic	Value / Property	Standards
Declared Unit	1 kg of average cast product	PCR Standard
Load resistance	1.50 kN	EN 14688
Cleanability	Passed	EN 14688
Resistance to chemicals	Passed	EN 14688
Durability	Passed	EN 14688
Surface Repairability	High (sandable and polishable)	Internal Standard
Water Absorption	< 0.5%	ISO 19712

Construction and materials
KUMA Rector elements are engineered using a premium, single-recipe solid-surface technology. The material features a consistent, homogeneous structure throughout its entire thickness:
- Natural minerals: approximately 53% Aluminum Trihydrate (ATH), providing fire-retardant properties and a fine structural finish.
- Binding agents: approximately 45% Rector Resin, a high-performance resin ensuring superior cohesion and thermal stability.
- Surface finish: naturally non-porous matte texture, achieved directly through the material's structural composition without additional coatings or glazes.

Manufacturing and Sustainability
The production process takes place at the KUMA facility in Banesti, county Prahova, Romania, following strict sustainability protocols:
- Energy Profile: 100% of the electricity used is from renewable sources, with 25% produced internally via an on-site photovoltaic system.
- Circular Economy: composite waste is pulverized and reintegrated into the production cycle to manufacture secondary components (e.g., brackets), supporting a zero-waste future objective.
- Resource Efficiency: an internal filtration system enables the recirculation of 43% of the water used in technical processes.
- Emission Reduction: between 2022 and 2024, KUMA achieved a 31% reduction in CO_2 emissions per kilogram of product through optimized energy and material management.

Product Benefits
- Longevity & Repairability: the ability to repolish and repair the surface significantly extends the product's life, reducing the need for replacement.
- Hygienic Design: the non-porous surface prevents bacterial growth, meeting the highest standards for public and medical environments.
- Environmental Transparency: KUMA enables architects and developers to accurately calculate the environmental footprint of specific project configurations for BREEAM or LEED certifications.
- Finished products are delivered in protective, recyclable packaging, optimized for weight and transport efficiency.

Reference Service Life (RSL) for KUMA composite products is declared as 20 years. This value is based on recognized European benchmarks for sanitary appliances as BBSR (Germany) and BRE Global (UK).

Further information can be found at:
www.kumaromania.ro; www.kumaromania.com

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	0,16	FR, IT
Minerals	50,31	EU
Fossil materials	48,79	Romania, other EU countries
Bio-based materials	0,72	Romania

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0,000398
Biogenic carbon content in packaging, kg C	0,071

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kilogram
Mass per declared unit	1 kg
Functional unit	-
Reference service life	20

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 Kuma Rector solid surface products. The formulation is based on a high-purity composition consisting of 53% Aluminum Trihydrate (ATH) as a mineral filler and 45% specialized Rector (acrylic) resin. It also includes pigments, catalysts, and auxiliary components such as sanitary fittings (composed of brass and/or steel). The environmental burdens of all material inputs are tracked and allocated to the declared unit of 1 kg of finished product, 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 the suppliers to the KUMA Romania manufacturing plant in Bănești, Prahova County, Romania. It includes inbound logistics for resins, minerals, and packaging components. The raw materials with the highest volume share, namely marble powder and polyester resins, are sourced from domestic suppliers within Romania. Transport distances are derived directly from the company's internal logistics records, while vehicle types, load factors, and fuel consumption are defined based on actual operational data to ensure the highest level of accuracy. Assumptions on empty-return trips and consolidation of loads are specified for the LCA modelling to reflect the regional transport infrastructure.

A3 – Manufacturing, Finishing and Packaging
In this stage, the raw materials are transformed into finished cast marble and solid surface products. Key processes at KUMA Romania include:
- Preparation and Mixing: precise dosing of resins, fillers, and catalysts followed by vacuum mixing to ensure a homogeneous composition.
- Casting and Curing: the mixture is poured into specialized molds, often utilizing specific tooling resins for mold maintenance, where the chemical curing process occurs.
- Finishing and Assembly: products are de-molded, sanded, and polished to achieve the final texture. Sanitary fittings are assembled where applicable.
- Emission Control: monitoring and treatment of Volatile Organic Compounds (VOCs), primarily styrene, resulting from the curing process. Data is derived from official air emission tests which monitor specific stacks across the production facility.

Electricity modeling: The environmental impact of electricity consumption during the manufacturing stage (A3) is calculated using the market-based approach, as mandated by EPD Hub PCR 1.2. The facility operates on 100% renewable electricity: self-generated solar power from the factory's photovoltaic system and purchased renewable energy.
Packaging: Includes the use of wood pallets, cartonboard and protective films to ensure safe delivery and handling.
Waste Management: Manufacturing waste, including resin off-cuts, mineral dust, and used solvents, is recorded and sent for recycling or disposal in accordance with internal environmental procedures. Waste streams consist primarily of ancillary materials and packaging waste (e.g., wood pallets, plastic films, and cardboard). These materials are collected and transported to authorized local treatment facilities for recovery and recycling. All transport distances for waste do not exceed 50 km from the facility, utilizing standard road transport.
System boundary and cut-off criteria
For modules A1–A3, the system boundary includes all processes under KUMA Romania's control up to the factory gate (Cradle-to-Gate). Processes excluded include the manufacture of capital goods (machinery, buildings) and indirect overheads. Cut-off criteria ensure that neglected mass, energy, or environmental flows do not exceed 5% of each inventory module.

Data quality and representativeness
The data used reflect the actual production period of KUMA Romania's operations. Foreground data, including specific electricity mix and VOC emission concentrations, are collected from internal monitoring and certified laboratory reports. Background data are derived from recognized LCA databases. The representativeness of the data is verified, and all assumptions regarding transport volumes and allocation are documented. 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.

A4 – Transport to Building Site
This stage includes the transportation of the finished Kuma Rector products from the manufacturing facility in Bănești to the construction or installation site. For KUMA Romania, based on 2025 operational data, this involves:
- Loading and securing: finished washbasins and countertops are loaded onto transport vehicles at the factory gate. Given the high-end nature of the Rector solid surface, products are secured using specialized packaging to prevent surface scratches or structural damage during transit.
- Logistics and volume: transport is modeled based on the bulk volume of the products. For the declared unit of 1 kg, a representative specific volume is used to account for the product geometry and the necessary protective air space within the vehicle.
- Transport distances: the average transport distance is defined as 1600 km. This value is a weighted average calculated from KUMA Romania's internal logistics records for 2025, reflecting a mix of domestic deliveries and significant export routes to European markets (Central and Northern Europe).

- Delivery: the transport stage ends when the products reach the site or distribution center. All packaging materials (wood pallets, plastic film, and cardboard) associated with the product are included in this stage.

A5 – Installation into the Building / Infrastructure
This stage covers the on-site installation of Kuma Rector products. The installation scenario is defined as follows:
- On-site handling: the process is primarily manual, involving unpacking and positioning the units into their final location. Due to the high mineral content (53% ATH), the products are stable and durable during handling.
- Energy consumption: energy use during installation (e.g., for light power tools) is considered negligible and has been excluded from the system boundary.
- Auxiliary materials: while some silicone or fasteners may be used, their mass is below the cut-off criteria (less than 1% of the product mass) and is not accounted for in this stage.
- installation losses: based on 2025 field reports, it is assumed that there are no product losses or breakages during the installation process; therefore, no material waste from the Rector product itself is recorded.
Waste Management of Packaging: accounts for the collection and processing of all packaging materials removed during installation (wood pallets, cardboard, and plastic films). The end-of-life treatment for these materials is modeled using a split scenario to reflect regional waste management practices and infrastructure:
- Wood packaging: 32% is recycled, 30% is directed to energy recovery (incineration), and 38% is landfilled;
- Plastic packaging: 40% is recycled, 37% is directed to energy recovery (incineration), and 23% is landfilled;
- Cardboard and paper: 83% is recycled, 8% is directed to energy recovery (incineration), and 9% is landfilled.

All packaging waste is assumed to be transported over a representative distance of 50 km from the installation site to the authorized waste management or disposal facilities, utilizing standard heavy-duty vehicles

System Boundary and Cut-Off Criteria

For Modules A4–A5, the system boundary includes all processes from the dispatch of finished products at the KUMA factory until the unit is fully installed. Excluded processes include plumbing work or secondary infrastructure integration. Cut-off criteria ensure that neglected flows do not exceed the 5% threshold of each inventory module, according to EN 15804+A2.

Data Quality and Representativeness

The data used reflect the logistics and installation conditions recorded by KUMA Romania in 2025.

- Foreground data: transport distances, vehicle types (primarily Euro 5 lorries), and installation methods are based on internal logistics records and documented site assumptions.
- Background data: emission factors for transport and waste treatment processes for packaging are sourced from the Ecoinvent database, ensuring compliance with current LCA standards.
- Scenario assumptions: all assumptions regarding the 1600 km average distance and manual installation are documented and verified for geographical and temporal representativeness.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.

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

PRODUCT END OF LIFE (C1-C4, D)

C1 – Deconstruction / Disassembly

At the end of its service life, the Kuma Rector product is removed from its installation point primarily through manual operations. Using basic hand tools, the unit is disconnected from the drainage system and sanitary fittings. The energy demand for this stage is considered negligible. As the solid surface material is chemically stable and fully cured, no hazardous emissions or volatile compounds are released during disassembly.

C2 – Transport to Waste Processing Facilities

Following disassembly, the waste products are transported to authorized collection points or treatment facilities. For the LCA model, transport is assumed to occur via standard trucks (Euro 5) over a representative average distance of 100 km. Fuel consumption and emissions are calculated based on the mass of the product, utilizing transport datasets from Ecoinvent to reflect regional logistics infrastructure.

C3 – Waste Processing

This stage involves the sorting and preparation of discarded units. For products sold in the Scandinavian market (95% of the total volume), the material is directed towards high-efficiency municipal Waste-to-Energy (WtE) plants. Here, the material is prepared for thermal treatment. The remaining 5% of the product volume is handled as inert construction waste, requiring minimal processing before final disposal.

C4 – Final Disposal

The disposal scenario is split according to market-specific practices recorded in 2025:

- Incineration (95%): applied to the fraction exported to Scandinavia. The 45% resin content of the Rector material acts as a fuel source during controlled thermal treatment. Due to the chemical nature of the 53% mineral filler (ATH), this fraction remains as inert bottom ash after the process.

- Landfill (5%): for the remaining fraction, the product is sent to compliant non-hazardous landfills for inert waste. Kuma Rector is a non-leaching, stable material that does not generate significant greenhouse gas emissions or environmental contamination when landfilled.

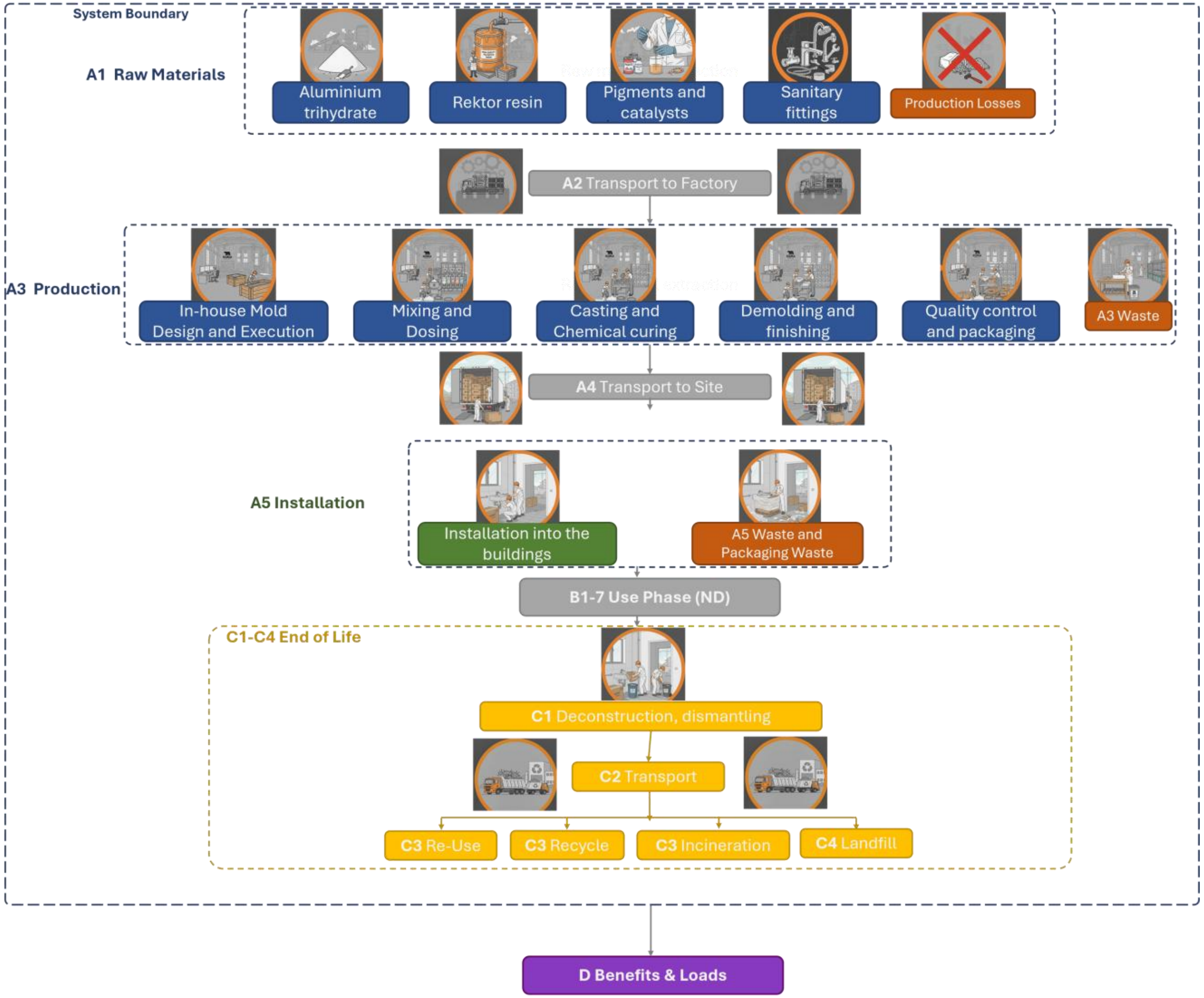
Module D – Benefits and Loads Beyond the System Boundary
The recovery of energy and materials at the end-of-life provides net benefits beyond the system boundary, reported as negative impacts in Module D.
Net Flow Calculation: Net flows for recycling and energy recovery are determined by subtracting any secondary material inputs used in the production stage (A1-A3) from the total waste flows. As KUMA products consist primarily of virgin raw materials (mineral fillers and resins), the energy recovery flows are considered net flows.

- Energy Recovery: The recovery process is modeled based on R1-certified, high-efficiency Waste-to-Energy (WtE) plants in Scandinavia. The high thermal efficiency of these facilities (exceeding the 65% threshold as documented by regional authorities such as the Danish Energy Agency) justifies the energy credits reported in Module D. The incineration of 0.95 kg of product (95% of the declared unit) generates exported energy. The calculation is based on the product’s specific LHV of approx. 12.6 MJ/kg (derived from the 45% resin content). Applying efficiency rates of 25% for electricity recovery and 45% for thermal energy recovery, the process replaces the need for primary fossil fuels in regional energy and heating grids.

- Packaging recycling: benefits are also accounted for the recycling of packaging materials collected during the installation stage (Module A5). Credits are calculated for the avoided production of virgin materials, based on the following recovery rates: plastic - 37% incineration, 40% recycling and 23% landfill ; wood - 30% incineration, 32% recycling and 38% landfill; cardboard - 8% incineration, 83% recycling and 9% landfill.

Data Quality and Representativeness
The scenarios for Modules C and D reflect representative waste management practices in KUMA Romania's primary markets.
Foreground data: Market split (96/5), resin energy content, and packaging recovery rates are based on internal records and 2025 market analysis.
Background data: Impact factors for incineration, landfilling, and energy substitution are sourced from the Ecoinvent database, ensuring technological and geographical relevance for the European market.

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

For the RECTOR composite material, a weighted average formulation was used based on the consumption records of the reference year. The ratio between the unsaturated polyester resin binder and the mineral fillers (ATH) is based on precise production recipes. Minor additives (e.g., catalysts, pigments, and accelerators) were modeled using the most chemically representative datasets available in the Ecoinvent 3.10 or newer and Federal LCA Commons databases

PRODUCT & MANUFACTURING SITES GROUPING

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

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 Process Certification v3.2.4. 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'.

The LCA for KUMA products is modeled in compliance with EN 15804:2012+A2:2019/AC:2021 and the EPD Hub Core PCR Version 1.2. The following sources and references underpin the modeling of life cycle stages:
A. Core Databases and Primary Data:
- Ecoinvent 3.10 or newer: primary source for upstream and downstream processes (raw materials, transport, and waste treatment).
- KUMA Sustainability Report (Rev. 25.04.2025): source for company-specific sustainability targets, energy transition data, and environmental management practices.
- Primary Manufacturing Data (2024-2025): internal production records from KUMA Romania for material consumption, energy use (A3), and waste generation.

B. Industry Averages and Proxies:
- Industry Averages: representative geographical datasets were used for specific raw materials where primary supplier data was unavailable, specifically for brass products and softwood, ensuring alignment with regional technological standards.
- Federal LCA Commons: utilized for specialized chemical precursor datasets.

C. Scenario-Specific References:
- Module A4 & C2 (Transport): load factors and fuel consumption rates are based on Ecoinvent 3.10 or newer data. Distances are calculated using regional logistics routing specific to KUMA's distribution network.
- Module A5 (Installation & Packaging Waste): material loss during installation is based on internal manufacturing tolerances. Packaging waste distribution (Recycling/Energy Recovery) is derived from EUROSTAT (Waste Statistics), following the integrated scenarios in One Click LCA.
- Module C1 (Deconstruction): energy demand for manual disassembly is justified as negligible based on industry-standard demolition protocols for interior fixtures.
- Module C3, C4 & D (End-of-Life):Distribution by waste routes (incineration/landfill) is based on European statistics for composite and plastic-based construction waste.
- Energy Recovery: Benefits in Module D are modeled using regional process datasets for electricity and heat production, reflecting the substitution of the national energy mix.
- Renewable Energy: 100% renewable energy certificates and on-site PV monitoring records as detailed in the KUMA Sustainability Report (A3).

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	2,39E+00	1,39E-01	3,48E-01	2,88E+00	3,65E-01	2,64E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,56E-02	1,00E+00	1,12E-03	-5,00E-01
GWP – fossil	kg CO_2e	2,39E+00	1,39E-01	5,99E-01	3,13E+00	3,65E-01	7,20E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,56E-02	5,26E-01	4,88E-04	-4,78E-01
GWP – biogenic	kg CO_2e	-1,49E-03	2,79E-05	-2,56E-01	-2,58E-01	7,23E-05	2,56E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,54E-06	4,76E-01	6,35E-04	-2,21E-02
GWP – LULUC	kg CO_2e	1,54E-03	5,06E-05	5,37E-03	6,97E-03	1,29E-04	5,20E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,99E-06	1,13E-05	1,24E-07	-1,05E-04
Ozone depletion pot.	kg $CFC_{11}e$	8,57E-08	2,74E-09	4,12E-06	4,21E-06	7,26E-09	6,65E-11	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,31E-10	8,81E-10	1,64E-11	-3,38E-09
Acidification potential	mol H^+e	1,29E-02	4,33E-04	1,22E-03	1,45E-02	1,14E-03	2,89E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,33E-05	4,06E-04	5,49E-06	-3,62E-03
EP-freshwater[2)]	kg Pe	7,01E-04	9,52E-06	1,13E-04	8,24E-04	2,42E-05	1,50E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,22E-06	3,40E-05	8,37E-07	-3,26E-04
EP-marine	kg Ne	2,05E-03	1,45E-04	5,79E-04	2,77E-03	3,85E-04	2,97E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,75E-05	9,07E-04	1,37E-06	-4,68E-04
EP-terrestrial	mol Ne	2,13E-02	1,57E-03	3,73E-03	2,66E-02	4,18E-03	1,00E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,90E-04	1,94E-03	1,48E-05	-4,65E-03
POCP ("smog")[3)]	kg NMVOCe	1,14E-02	6,75E-04	1,79E-03	1,38E-02	1,79E-03	3,67E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,85E-05	5,07E-04	5,35E-06	-1,47E-03
ADP-minerals & metals[4)]	kg Sbe	2,86E-05	4,73E-07	2,59E-06	3,17E-05	1,19E-06	3,33E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,36E-08	1,08E-07	8,47E-10	-2,89E-07
ADP-fossil resources	MJ	4,86E+01	1,95E+00	8,73E+00	5,93E+01	5,12E+00	6,31E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,27E-01	4,79E-01	1,15E-02	-5,86E+00
Water use[5)]	m^3e depr.	6,31E-01	9,80E-03	1,28E-01	7,69E-01	2,52E-02	1,95E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,12E-03	5,56E-02	5,44E-04	-1,24E-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	1,35E-07	1,07E-08	1,17E-08	1,57E-07	2,87E-08	1,00E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,56E-09	3,35E-09	8,36E-11	-3,37E-08
Ionizing radiation[6)]	kBq U235e	1,72E-01	2,61E-03	2,55E-02	2,00E-01	6,53E-03	1,81E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,97E-04	8,54E-04	1,45E-05	-8,76E-02
Ecotoxicity (freshwater)	CTUe	1,39E+02	2,69E-01	7,96E+00	1,47E+02	6,73E-01	1,58E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,21E-02	2,27E+00	6,16E-01	-1,12E+00
Human toxicity, cancer	CTUh	2,80E-09	2,39E-11	1,01E-09	3,84E-09	6,22E-11	6,85E-12	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,58E-12	1,75E-10	1,96E-13	-9,85E-11
Human tox. non-cancer	CTUh	2,49E-08	1,22E-09	3,40E-09	2,96E-08	3,22E-09	3,17E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,47E-10	6,60E-09	1,23E-11	-4,45E-09
SQP[7)]	-	6,53E+00	1,15E+00	1,15E+01	1,92E+01	3,05E+00	5,17E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,28E-01	2,98E-01	2,85E-02	-3,05E+00

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	2,09E+00	3,52E-02	3,17E+00	5,29E+00	8,86E-02	-2,60E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,11E-03	-1,12E+01	2,22E-04	-9,68E-01
Renew. PER as material	MJ	1,29E-01	0,00E+00	2,29E+00	2,42E+00	0,00E+00	-2,29E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-1,22E-01	-6,43E-03	1,99E-01
Total use of renew. PER	MJ	2,22E+00	3,52E-02	5,46E+00	7,71E+00	8,86E-02	-4,89E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,11E-03	-1,14E+01	-6,21E-03	-7,69E-01
Non-re. PER as energy	MJ	3,75E+01	1,95E+00	6,36E+00	4,58E+01	5,12E+00	5,23E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,27E-01	-1,08E+01	1,15E-02	-5,86E+00
Non-re. PER as material	MJ	1,11E+01	0,00E+00	1,12E-01	1,12E+01	0,00E+00	-1,12E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-1,05E+01	-5,53E-01	3,60E-02
Total use of non-re. PER	MJ	4,86E+01	1,95E+00	6,47E+00	5,70E+01	5,12E+00	-1,07E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,27E-01	-2,13E+01	-5,41E-01	-5,83E+00
Secondary materials	kg	1,56E-02	9,14E-04	1,27E-01	1,44E-01	2,35E-03	8,17E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,65E-05	4,11E-04	3,70E-06	5,93E-04
Renew. secondary fuels	MJ	2,45E-03	1,13E-05	3,52E-02	3,77E-02	2,96E-05	5,53E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,23E-06	7,61E-06	6,98E-08	1,07E-05
Non-ren. secondary fuels	MJ	6,44E-03	0,00E+00	0,00E+00	6,44E-03	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	1,40E-02	2,70E-04	2,95E-03	1,72E-02	6,90E-04	-8,20E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,35E-05	7,64E-04	-1,37E-04	-4,82E-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	5,88E-01	2,85E-03	1,93E-02	6,10E-01	7,35E-03	8,56E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,84E-04	5,49E-02	1,83E-05	-3,72E-02
Non-hazardous waste	kg	4,61E+00	6,11E-02	3,00E+00	7,67E+00	1,55E-01	1,10E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,11E-03	1,99E+00	1,62E-01	-1,60E+00
Radioactive waste	kg	6,60E-05	6,49E-07	6,50E-06	7,32E-05	1,62E-06	4,44E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,83E-08	2,18E-07	3,50E-09	-2,65E-05

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	8,50E-05	0,00E+00	0,00E+00	8,50E-05	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	6,42E-04	0,00E+00	0,00E+00	6,42E-04	0,00E+00	1,16E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	1,40E-03	0,00E+00	0,00E+00
Materials for energy rec	kg	2,01E-04	0,00E+00	0,00E+00	2,01E-04	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	8,72E-05	0,00E+00	0,00E+00	8,72E-05	0,00E+00	1,30E-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	5,46E-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 – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,59E-02	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	2,39E+00	1,39E-01	6,04E-01	3,13E+00	3,65E-01	7,21E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,56E-02	5,26E-01	4,88E-04	-4,78E-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

Scenario parameter	Value
Electricity data source and quality	Electricity, medium voltage, supplied by Engie Romania SA; wind 63.76% - 0.0235 kgCO2e/kWh, hydro power 33.30% - 0.0044 kgCO2e/kWh, photovoltaic 2.94% - 0.0060 kgCO2e/kWh Electricity production, photovoltaic, slanted-roof installation, multi-Si, panel Romania, 0.077 kgCO2e/kWh Transformation and transmission losses 9% according to national estimations
Heat production, natural gas	natural gas, at boiler atm. low-NOx condensing non-modulating <100kW, Romania, Ecoinvent, 0.0764 kgCO2e/MJ
Diesel	Market for diesel, burned in building machine, Ecoinvent, 0.10 kgCO2e/MJ

Transport scenario documentation - A4 (Transport resources)

Scenario parameter	Value
Fuel and vehicle type	EURO5 truck 16-32 ton, diesel 0.25 litri/km
Average transport distance, km	1610 km
Capacity utilization (including empty return) %	85%
Bulk density of transported products (kg/m^3)	1,47E+02
Volume capacity utilization factor	<1

Installation scenario documentation - A5 (Installation waste)

Scenario information	Value		
Waste materials on the building site before waste processing, generated by the product's installation (specified by type) / kg	Wood packaging	0.046	
	Plastic packaging	0.00143	
	Paper/Cardboard packaging	0.1209	
Output materials as result of waste processing at the building site e.g. collection for recycling, for energy recovery, disposal / kg		Wood packaging	Plastic packaging
	Recycling	0.015	0.00057
	Energy recovery	0.014	0.00053
	Disposal	0.018	0.00033
Direct emissions to ambient air, soil and water / kg	0		

End of Life – Scenario documentation – C1-C4

Scenario information	Value
Collection process – kg collected separately	0.0014
Collection process – kg collected with mixed waste	0.99925
Recovery process – kg for re-use	0
Recovery process – kg for recycling	0.0014
Recovery process – kg for energy recovery	0.949
Disposal (total) – kg for final deposition	0.05025
Scenario assumptions: Waste processing scenario based on 95% incineration with energy recovery and 5% inert waste landfill. Average transport to waste processing: 50 km by 7.5-16t truck (Euro 5). Energy recovery efficiency: 20% for electricity and 40% for thermal energy.	

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

Vera Durão, as an authorised verifier acting for EPD Hub Limited

17.04.2026

Vera Durão

EPD Hub
VERIFIED ISO 14025