

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 & EN 15804:2012+A2:2019/AC:2021

Multiple-product EPD based on worst-case LCA results

CEMENT RENDERS & PLASTERS



EPD Program	Title	Details
International Climate Intelligence System 71-75 Shelton Street Covent Garden, London, WC2H 9JQ United Kingdom office@climateintell.com	Registration Number	ICIS-202606-142
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Minotti Dry Mix Factory
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Where surfaces need a stronger start,
Minotti creates the key that holds.



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OVERVIEW

This Environmental Product Declaration (EPD) presents verified, transparent environmental performance data for Cement Renders & Plasters, manufactured by **Minotti Dry Mix Factory** at its production facility in Ras Al Khaimah, United Arab Emirates. The declaration covers multiple products within the Cement Renders & Plasters product group, as listed below:

- **MINO 200** - Render/plaster for internal/external concrete block walls.
- **MINO 201** - Lime free render/plaster for internal/external concrete block walls.
- **MINO 210** - Render/plaster for internal/external AAC/concrete block walls.
- **MINO 211** - Lime free render/plaster for internal/external AAC/concrete block walls.
- **MINO 230** - Render/plaster for internal/external concrete block walls where high strength (>10 MPa) is required.
- **MINO 240** - Render/plaster for high strength (>15 MPa) requirements.
- **MINO 250** - Fine thin coat plaster for ceilings and rough cement plaster surfaces.
- **MINO 255** - Fine thin coat plaster for direct application on concrete surfaces.

In accordance with ICIS PCR 2026:18 v1.2.6 (EN 15804 + A2 aligned), the LCA results are calculated and reported using the worst-case product scenario within the declared product group. The declared unit for this assessment is 1 kg of Cement Renders & Plasters.

The life cycle assessment (LCA) follows the requirements of ISO 14025 and EN 15804:2012 + A2:2019/AC:2021, covering all relevant life cycle stages within the defined system boundary. This EPD supports architects, engineers, contractors, and sustainability consultants in making informed material selections by providing consistent, third-party-verified environmental information for use in green building certifications, embodied carbon assessments, and procurement decisions.



PRODUCT INFORMATION



Product Name

Cement Renders & Plasters



Product Type

Cement-based dry-mix renders and plasters



Declared Unit

1 kilogram



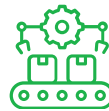
PCR & Version

ICIS PCR 2026:18 v1.2.6
(EN 15804 + A2 aligned)



Scope

Cradle-to-Gate with options (A1-A4, C1-D)



Production Route

Dry-mix blending



Recycled Content

Not intentionally added
(inherent recycled content only)



Electricity Mix

UAE grid mix from Ecoinvent 3.12 (cut-off). Natural Gas (69.32%), Hard Coal (18.70%), Nuclear (11.63%) and others.



LCA Tool and Database

Air.e.LCA v3.21.0.7 and Ecoinvent v3.12 (Cut-Off)



Geographical Scope

United Arab Emirates



PRODUCT INFORMATION



Verification

International Climate Intelligence System
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Product Group Classification

UN CPC Code: 37410 – Plasters

Environmental Performance Summary (A1-A3)

Indicator	Result	Unit
Climate change (GWP) - total	2.37E-01	Kg CO ₂ e
Climate change (GWP) - fossil	2.36E-01	Kg CO ₂ e
Ozone Depletion (ODP)	1.61E-09	Kg CFC-11e
Abiotic depletion of fossil resources	1.36E+00	MJ

Hotspot Summary

Process	Share of Total GWP (%)
Raw Material Supply (A1)	81.00
Raw Material Transportation (A2)	1.34
Manufacturing (A3)	5.84
Remaining Modules (A4, C1-C4)	11.82



PRODUCT INFORMATION

Where This Adds Value

Scheme / Area	Relevance to Cement Renders & Plasters
LEED v4.1 / v5 (USGBC) – MR Credit: EPDs	The Type III EPD supports MR credits for Environmental Product Declarations and contributes to whole-building life cycle assessment (LCA), enabling embodied carbon evaluation of cement renders and plasters used in UAE-based projects.
BREEAM International – Mat 01 / Mat 02	Provides third-party verified environmental data aligned with EN 15804, supporting Mat 01 life cycle impacts and Mat 02 responsible sourcing documentation for projects delivered in the UAE under BREEAM International schemes.
Estidama Pearl Rating System (Abu Dhabi) – SM Credit: Material Selection	Supports Estidama material transparency and LCA-based evaluation requirements, enabling informed selection of cement renders and plaster materials for Pearl-rated developments in Abu Dhabi.
Dubai Green Building Regulations (DGBR) – Materials & Resources Section	Supports material documentation and environmental performance reporting requirements under DGBR, facilitating approval of cement renders and plasters used in Dubai construction projects.
Infrastructure & Building Projects (UAE – DM, ADM, RAK Municipality)	Provides project-specific environmental data for cement renders and plasters used on masonry walls and concrete surfaces, supporting sustainable design, specification, and approval processes across UAE municipal authorities.
Procurement Transparency (UAE Contractors & Consultants)	Supports contractor and consultant requirements for verified environmental documentation in material submittals, technical approvals, and sustainability reporting across commercial and infrastructure projects in the UAE.

PRODUCT INFORMATION

UAE Net Zero 2050 &
National Climate
Reporting

Provides product-specific environmental data to support embodied carbon calculations and reduction strategies, enabling alignment with UAE Net Zero 2050 targets and national greenhouse gas reporting frameworks.



ABOUT MINOTTI

Minotti Dry Mix Factory is a UAE-based manufacturer specialising in premium cement and gypsum-based dry-mix products for building and construction applications. The company supplies factory-controlled dry-mix mortars in bags and mobile silos, supported by pneumatic conveying systems, automatic application machines, technical assistance, quality management, and reliable on-site performance across diverse project requirements.

Minotti Dry Mix Factory dry-mix products are widely used across building and construction projects in the United Arab Emirates, including residential, commercial, and infrastructure developments. Project outcomes include consistent material quality, reliable performance aligned with construction requirements, and efficient application using bagged supply, mobile silo systems, pneumatic conveying, and automatic application methods across diverse site conditions, supporting quality construction practices within modern building systems.

Key performance aspects include:

- Consistent material quality through controlled automated production.
- Reliable performance aligned with construction specifications.
- Compatibility with mobile silo and pneumatic conveying systems.
- Efficient site execution through automatic application machines.

-
- Application across diverse environments including residential and commercial projects.
 - Successful use across varying project scales and construction conditions.

Minotti Dry Mix Factory products are recognised within the UAE construction sector for dry-mix technology, site efficiency, and reliable performance, supporting adoption across building and infrastructure projects. The brand is associated with quality-focused manufacturing practices and supports contractors through mobile silo delivery, automatic application systems, and technical assistance.

Key recognition aspects include:

- Established presence within the UAE construction industry.
- Acceptance across contractor and consultant networks.
- Proven performance in dry-mix mortar applications.
- Industry confidence supporting continued project adoption.

PRODUCT DESCRIPTION

Minotti Dry Mix Factory's Cement Renders & Plasters are cement-based dry-mix render and plaster materials formulated to provide surface levelling, substrate protection, and uniform finishing performance over masonry walls and concrete surfaces. The product group includes the following products:

- **MINO 200** - Render/plaster for internal/external concrete block walls.
- **MINO 201** - Lime free render/plaster for internal/external concrete block walls.
- **MINO 210** - Render/plaster for internal/external AAC/concrete block walls.
- **MINO 211** - Lime free render/plaster for internal/external AAC/concrete block walls.
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- **MINO 240** - Render/plaster for high strength (>15 MPa) requirements.
- **MINO 250** - Fine thin coat plaster for ceilings and rough cement plaster surfaces.
- **MINO 255** - Fine thin coat plaster for direct application on concrete surfaces.

Cement Renders & Plasters are applied as bonded render or plaster layers over prepared masonry walls and concrete surfaces in internal and external areas and are compatible with manual application and mechanised plastering spray systems. The formulations consist primarily of limestone fillers, Ordinary Portland Cement (OPC), hydrated lime, cellulose powder, propylene fibres, air-entraining agents, and other functional components that influence workability, adhesion performance, crack resistance, surface finish quality, durability, and stability. These Cement Renders & Plasters are designed for applications where consistent plastering performance, substrate compatibility, and surface uniformity are critical to overall system quality, supporting the development of smooth and durable surfaces suitable for subsequent finishing systems. Typical applications include internal and external wall plastering, surface levelling, rendering, finishing plaster, and direct application on concrete surfaces across residential, commercial, high-rise, and infrastructure projects. The products are supplied in bags or mobile silo systems and mixed with water prior to application, enabling reliable performance across large-scale and site-based construction activities.

Sectors & Corresponding Uses

Sector	Application / Use Case
Residential Construction	Use in internal and external wall plastering to provide smooth surfaces and consistent finish quality

PRODUCT DESCRIPTION

Commercial Buildings	Application in rendering, surface levelling, and plastering systems for uniform substrate preparation
Infrastructure Projects	Use in cement render and plaster applications for concrete and blockwork surfaces
High-Rise Developments	Application in manual or mechanised plastering systems to support fast execution and consistent surface quality
Refurbishment & Maintenance Projects	Use in re-plastering, surface restoration, and repair works to restore surface uniformity
AAC / Blockwork Applications	Use over AAC and concrete block walls for compatible render and plaster performance

Technical Specifications

Parameter	Details / Specification
Form	Powder, cement-based dry-mix render and plaster
Mixing Method	Mixed with water at site prior to application
Application Thickness	Applied as render or plaster layer over prepared substrates
Workability	Designed for easy application by manual or mechanised methods
Adhesion Performance	Provides reliable adhesion to prepared concrete, masonry, and blockwork surfaces
Application Method	Manual application or mechanised plastering spray systems
Surface Function	Provides surface levelling, substrate protection, and finish preparation
Standards Compliance	Cementitious plaster as per BS EN 998-1 and ASTM C 926
Storage Conditions	Store in dry conditions in original sealed packaging, protected from moisture
Shelf Life	Typically 12 months under recommended storage conditions
Packaging	Supplied in 25 kg and 50 kg bags

MANUFACTURING DETAILS

The production of Cement Renders & Plasters is based on a controlled dry-mix manufacturing process using cementitious and mineral-based raw materials. The process begins with raw material handling, where key inputs such as limestone fillers, Ordinary Portland Cement (OPC), hydrated lime, cellulose powder, propylene fibres, air-entraining agents, and other functional components are received, inspected, and verified for quality and conformity with internal specifications. Where required, mineral materials undergo crushing to achieve the required particle size, followed by screening to ensure a consistent and controlled particle size distribution suitable for render and plaster applications.

Processed materials are then transferred to dedicated storage silos or bins under dry, moisture-controlled conditions to maintain stability prior to production. During manufacturing, each raw material is accurately measured through automated dosing systems in accordance with the defined formulation and transferred to high-efficiency mixers. Controlled mixing is carried out to produce a homogeneous dry powder with uniform distribution of cementitious binders, mineral fillers, hydrated lime, fibres, and functional additives required to support workability, adhesion performance, crack resistance, surface finish quality, and durability.

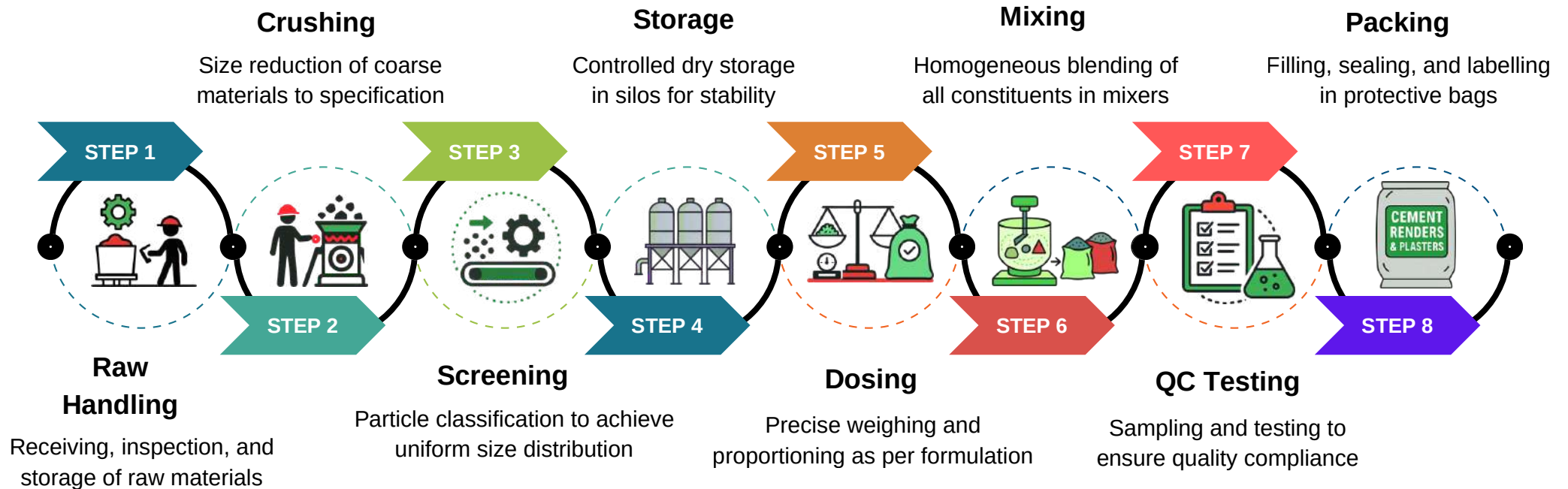
Representative samples are collected during and after mixing for quality control testing to verify consistency, workability, adhesion performance, and compliance with product specifications. Following successful verification, the finished Cement Renders & Plasters product is transferred to the packing stage, where it is filled into bags or prepared for bulk silo dispatch, sealed, labelled, and made ready for delivery to site. The manufacturing process consists primarily of physical operations, including material handling, dosing, blending, quality control, and packing, with no intended chemical reactions occurring during production.

For a visual representation of the full manufacturing workflow, refer to the illustrated flowchart on the next page. A screenshot of the process flow for a representative Cement Render & Plaster product, **MINO 200**, as modelled in the LCA software, is provided on the following page.



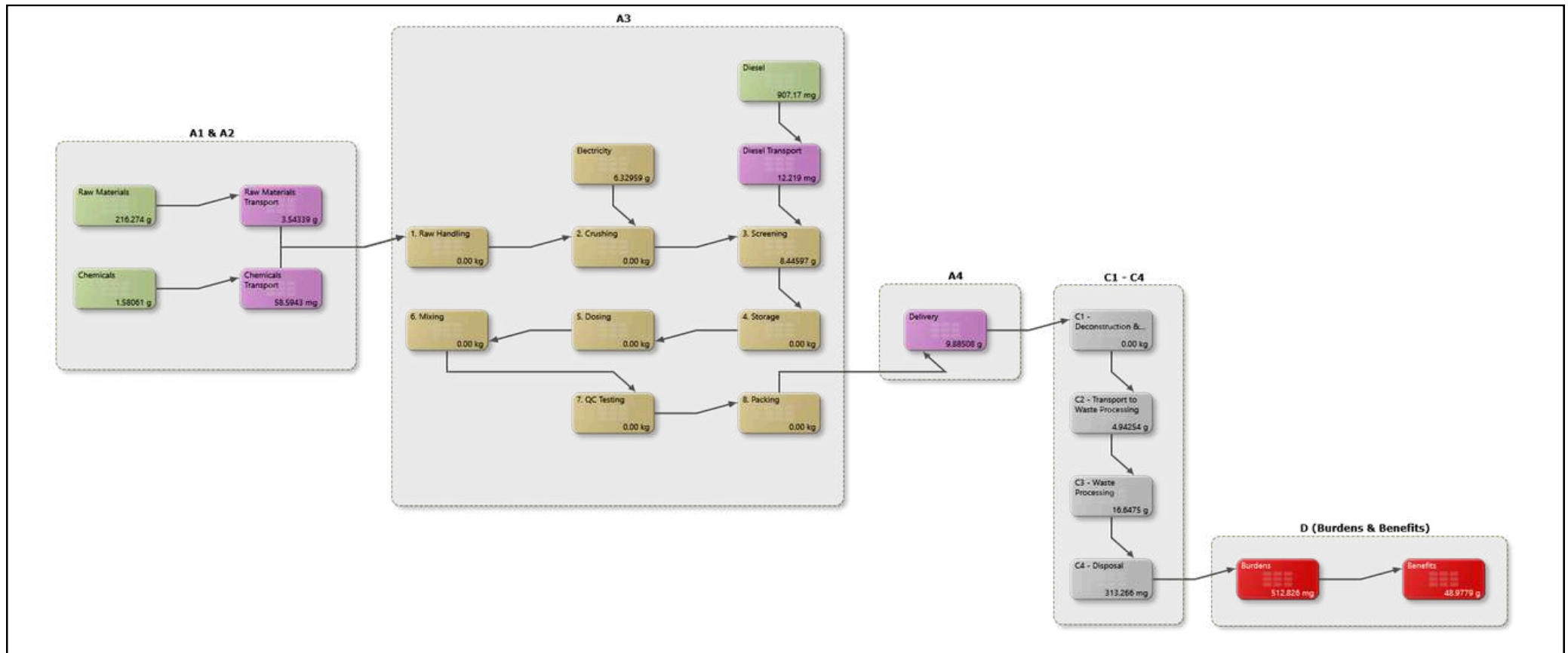
MANUFACTURING DETAILS

Schematic overview of Minotti's Cement Renders & Plasters manufacturing process



MANUFACTURING DETAILS

Screenshot of MINO 200 LCA model from LCA software



CONTENT DECLARATION

The content declaration provides a transparent breakdown of all raw materials used in the formulation of Cement Renders & Plasters, expressed per 1 kg of product. The formulation is primarily composed of limestone fillers, Ordinary Portland Cement (OPC), and hydrated lime, supported by air entraining agents, cellulose powder, propylene fibres, and small quantities of other functional components that influence workability, adhesion performance, crack resistance, durability, and stability. The total of all listed components equals 1 kg, matching the declared unit and ensuring complete material accounting in line with EN 15804 and ISO 14025 requirements.

Component	Weight (kg/Declared unit)	Post-consumer recycled (%)	Pre-consumer recycled (%)	Biogenic Content (%)	Biogenic Carbon (kg C/DU)
Limestone	0.81	0	0	0	0
OPC	0.16	0	0	0	0
Hydrated Lime	0.02	0	0	0	0
Cellulose Powder	0.0004	0	0	0	0
Propylene Fiber	0.0001	0	0	0	0
Air Entraining Agents	0.0001	0	0	0	0
Total	1	0	0	0	0

Substances of Very High Concern (SVHC)

According to the requirements of the ECHA Candidate List, Cement Renders & Plasters contain no substances of very high concern (SVHCs) above the 0.1% (w/w) threshold in the final product or its ancillary materials.

All raw materials used in the formulation—primarily limestone fillers, Ordinary Portland Cement (OPC), hydrated lime, air entraining agents, cellulose powder, propylene fibres, and minor functional components—were reviewed against the latest published SVHC list at the time of reporting. Based on manufacturer declarations and available safety data, no SVHCs are present above the applicable threshold.

Packaging Material Declaration

Packaging materials used for Cement Renders & Plasters products include wooden pallets and paper bags. These materials serve distinct functions within the product supply chain—wooden

CONTENT DECLARATION

pallets provide stability during handling and transport, while paper bags securely contain the dry-mix product and facilitate safe delivery to site. All packaging components are included in the life cycle assessment because they contribute to upstream manufacturing impacts and generate recoverable material streams at end-of-life.

Packaging Material	Biogenic Content (%)	Biogenic Carbon Fraction (kg C/kg material)	Notes & References
Wooden Pallet	~100% biogenic (solid wood)	0.50 kg C per kg wood (approx. 50% of dry mass is carbon)	Wood carbon fraction widely documented in forestry & IPCC (2006) guidelines — wood contains 50% carbon by dry weight
Paper Bags	~100% biogenic (paper fibre)	0.44 kg C per kg paper (44% carbon content)	Paper/pulp industry data and IPCC default values for lignocellulosic biomass

Wood and paper bags contain significant biogenic carbon because they originate from biomass. These biogenic fractions are reported for transparency and to reflect the renewable carbon temporarily stored in packaging materials. Their treatment in the LCA model follows EN 15804+A2 guidance, with flows presented in the Packaging Composition and Biogenic Carbon table below.

Packaging Material	Weight (kg/Declared Unit)	Share of Packaging (%)	Biogenic Carbon (kg C/DU)	End-of-Life Handling
Wooden Pallet	6.22E-03	67.47	3.11E-03	Reuse / Recycle / Energy Recovery
Paper Bags	3.00E-03	32.53	1.32E-03	Recycle
Total	9.22E-03	100	4.43E-03	-

Note - Biogenic content in packaging materials **exceed the 5% threshold** of the total packaging weight as stated in **ICIS PCR 2026:18**. Hence, these biogenic emissions are added in **module A3 and balanced out in module A5**.

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Declared Unit

The declared unit for this EPD is 1 kg of Cement Renders & Plasters at the factory gate. All material inputs, energy use, emissions, transportation, packaging, and end-of-life modelling are quantified relative to this unit. This ensures consistent comparison across life cycle stages and aligns with EN 15804+A2 requirements for construction products. No functional performance is assigned to the product in this declaration, as the EPD is based on a declared unit rather than a functional unit.

Temporal, Geographical and Technological Representativeness

Temporal Representativeness: Primary data for Cement Renders & Plasters reflects the reporting period January 2025 to December 2025, in line with EN 15804+A2 requirements that primary manufacturing data must be no older than five years. All on-site information, including raw material consumption, energy use, water use, and waste generation, represents current operational conditions at the Ras Al Khaimah facility during the defined reporting year. Background data used in the study are consistent with the temporal validity provided in their respective datasets to ensure alignment with the modelling year.

Geographical Representativeness: The LCA model for Cement Renders & Plasters reflects the actual manufacturing and supply conditions of **Minotti's** Ras Al Khaimah facility in the United Arab Emirates, where all primary data was collected. The study represents production and operations within UAE, with UAE-specific or GCC-specific conditions applied wherever available — particularly for raw material sourcing patterns, electricity grid characteristics, water production, and end-of-life treatment routes.

Where UAE-specific datasets or regional factors were not available, GCC-appropriate or globally representative datasets were used. All transport distances, energy consumption figures, and end-of-life scenarios are based on realistic practices in the UAE, ensuring geographical relevance of the final results.

Technological Representativeness: The manufacturing process modelled for Cement Renders & Plasters accurately reflects the actual production technology used at the Ras Al Khaimah facility. The products are produced through controlled batching and physical dry mixing of limestone fillers, Ordinary Portland Cement (OPC), hydrated lime, air entraining agents, cellulose powder, propylene fibres, and other functional components using industrial dosing and mixing equipment, followed by quality control and packaging operations. No intended chemical reactions, thermal processing, or high-temperature treatment occur during manufacturing. The technological

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assumptions used in the LCA are therefore representative of real operations at the plant, ensuring that the results reflect site-specific production conditions.

LCA Software & Database

The life cycle model for Cement Renders & Plasters was developed using Air.e.LCA v3.21.0.7, with all background inventory data sourced from Ecoinvent v3.12 (Allocation, cut-off by classification). The software was used to structure process flows, assign datasets, calculate environmental indicators, and perform all module-by-module inventory tracking. The database provides consistent, peer-reviewed life cycle inventories for raw materials, energy supply, transportation, and waste management processes. All datasets selected reflect technologies and supply chains relevant to the product and regional context, ensuring reliable integration of foreground data with established international life cycle inventories.

System Boundary

This EPD covers all product stages from “cradle to gate with options”, i.e. this LCA covers Production stage A1-A3, Transportation A4, End-of-life stages C1-C4 and Resource recovery stage D according to EN 15804:2012 + A2:2019 / AC:2021.

The procedures that are not controlled by the company, but are included in this environmental study, are:

- The extraction and production of fuels and electricity.

All related direct and indirect environmental impacts related to these elements have been calculated and were included in the LCA and this EPD. Personnel-related processes, such as transportation of employees to and from work is excluded. Also, the production and end-of-life processes of infrastructure or capital goods used in the product system are excluded.

Module A1 - Raw Material Supply

Module A1 encompasses all upstream processes related to the sourcing and preparation of raw materials used in the manufacture of Cement Renders & Plasters. The primary constituents—limestone fillers, Ordinary Portland Cement (OPC), and hydrated lime—are sourced locally from Ras Al Khaimah within the United Arab Emirates, ensuring consistent quality and suitability for cement-based dry-mix formulations. Additional components such as cellulose powder are sourced from Germany, air entraining agents from India, and propylene fibres from Belgium and the United Kingdom in accordance with technical specifications and availability. Packaging materials including wooden pallets and paper bags are sourced within Dubai. All upstream activities such as raw material extraction, intermediate processing, and packaging of inputs are included within this module.

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Module A2 - Raw Material Transportation

Module A2 covers the transportation of all raw and packaging materials to **Minotti's** facility in Ras Al Khaimah, United Arab Emirates. The primary raw materials—limestone fillers, Ordinary Portland Cement (OPC), and hydrated lime—are sourced locally within Ras Al Khaimah and transported to the facility using >32-ton Euro 6 lorries, representative of bulk material transport within the region. Packaging materials including wooden pallets and paper bags are sourced from Dubai and delivered via similar road transport. Additional components such as cellulose powder, air entraining agents, and propylene fibres are imported from Germany, India, Belgium, and the United Kingdom and transported via sea freight in containerised shipments to the UAE, followed by road transport to the manufacturing facility.

Environmental impacts in this module arise from fuel consumption associated with sea freight transport and domestic heavy-duty road transport. Transport distances, load factors, and logistics modelling reflect realistic supply chain conditions for both imported and locally sourced materials, ensuring representative accounting of inbound transport to the Ras Al Khaimah facility.

Module A3 - Manufacturing

Manufacturing impacts cover all processes required to convert raw materials into finished Cement Renders & Plasters at the Ras Al Khaimah production facility. Production follows a controlled drymix process comprising sequential stages: Raw Handling, Crushing, Screening, Storage, Dosing, Mixing, Quality Control, and Packing. These stages ensure accurate proportioning of cementitious and mineral constituents, homogeneous blending, and consistent product quality to achieve the specified bonding performance and durability characteristics required for construction applications.

Environmental loads in this module include electricity consumption for dosing, mixing, and packing operations; diesel use for internal material handling via forklifts and mobile equipment; and minor emissions associated with material transfer and handling. Additional impacts include negligible solid waste generation from packaging and routine operational activities, with waste streams managed through recycling practices. All direct emissions from electricity use, fuel combustion, on-site equipment operation, and material handling are included within the A3 system boundary.

Module A4 - Delivery

Module A4 accounts for the transportation of finished Cement Renders & Plasters from the Ras Al Khaimah manufacturing facility to customer locations. Since the products are supplied exclusively within the United Arab Emirates, all outbound transport occurs via road freight. Deliveries are modelled using Euro 6, >32-ton trucks consistent with Ecoinvent v3.12 cut-off system model

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assumptions, reflecting typical heavy-duty vehicles used for bulk construction materials in the average delivery routes within the UAE, covering distribution to construction sites, contractors, and infrastructure projects. Environmental impacts in this module include diesel consumption, tailpipe emissions, and load-dependent fuel use associated with outbound transport.

Scenario details	Description
Vehicle used for transport	Euro 6, >32 ton truck
Vehicle capacity	>32 tons
Fuel type and consumption	Diesel, 0.38 liters per km
Capacity utilization	100% as assumed in Ecoinvent v3.12
Bulk transportation	Mass of the transported product



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C1 - Deconstruction and Demolition

Module C1 covers the impacts associated with the deconstruction and demolition stage at end-of-life. **Minotti's** Cement Renders & Plasters are cement-based materials applied as bonded render or plaster layers over masonry walls, concrete block walls, AAC blocks, ceilings, and concrete surfaces. During use, the material becomes fully adhered to the host substrate or finishing system and does not remain as a separate recoverable component.

At the end of the service life, demolition activities are carried out using standard mechanical methods applied to the building element, such as breaking, removal, or crushing of concrete, blockwork, plastered surfaces, rendered walls, or ceiling assemblies. The presence of Cement Renders & Plasters does not influence the demolition process in terms of equipment selection, energy demand, labour intensity, or operational requirements.

Consequently, no additional environmental burdens can be attributed specifically to Cement Renders & Plasters during deconstruction. The impacts associated with Module C1 are therefore considered negligible and are not assigned to the declared unit.

C2 - Transport to Waste Processing

Module C2 covers the transport of end-of-life materials from the demolition site to waste management facilities. Following demolition, **Minotti's** Cement Renders & Plasters remain adhered to the host substrate and become part of mixed construction and demolition (C&D) waste generated from masonry walls, concrete blockwork, AAC blockwork, plaster/render systems, ceilings, or concrete surfaces.

As the products are manufactured and used within the United Arab Emirates, the resulting demolition waste is managed within the national waste management system. The UAE has a well-developed network of C&D recycling facilities operated by entities such as Dubai Municipality, Tadweer in Abu Dhabi, and BEEAH in Sharjah, where mineral construction waste is processed into recycled aggregates. Across these systems, diversion rates for concrete, blockwork, masonry, and mineral plaster waste typically range between 90% and 97%, supported by regulatory requirements and demand for recycled aggregates in infrastructure and civil works.

These recovery levels are consistent with those observed in countries with advanced C&D waste management systems, such as the Netherlands, Denmark, Belgium, Japan, and Singapore, where recycling rates commonly reach 90–99%. These international values are provided for contextual benchmarking only; the modelling approach is based on UAE-specific waste management practices.

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Reflecting the established recycling performance in the UAE, it is assumed that 95% of the mixed demolition waste containing Cement Renders & Plasters is transported to C&D recycling facilities, while the remaining 5% is transported to inert landfill sites due to contamination, sorting limitations, or non-recoverable fractions. A one-way transport distance of 50 km is applied for both routes, representing typical distances between demolition sites and authorised waste management facilities within the UAE.

Transport is modelled using heavy-duty diesel trucks with a capacity greater than 32 tonnes, Euro 6 equivalent, consistent with standard life cycle inventory datasets for bulk mineral waste transport. Load utilisation and fuel consumption reflect typical operational conditions for construction waste logistics in the region.

Module C2 therefore accounts exclusively for the environmental impacts associated with fuel consumption and emissions arising from the transportation of mixed demolition waste to recycling and disposal facilities.

Type	Capacity utilization	Type of vehicle	Average distance
Truck	92%	Euro 6, >32 ton truck	50 kms

C3 - Waste Processing

Module C3 covers the processing of construction and demolition (C&D) waste before final disposal or recovery. At end-of-life, Cement Renders & Plasters remain adhered to the host masonry walls, concrete blockwork, AAC blockwork, plaster/render systems, ceilings, or concrete surfaces and therefore enter the waste stream as part of mixed demolition rubble rather than as separately recoverable products.

Within the United Arab Emirates, C&D waste is processed through established recycling infrastructure. In Sharjah, BEEAH's C&D recycling facility processes around 500,000 tonnes of construction and demolition waste annually into certified recyclable products, while in Abu Dhabi, Tadweer operates dedicated C&D materials recovery and crushing facilities that divert demolition waste from landfill and recover reusable materials for reintegration into infrastructure applications. In parallel, the UAE's Ministry of Climate Change and Environment has issued national requirements supporting the use of recycled aggregates from construction and demolition waste in roads and other infrastructure works, subject to quality verification.

In practice, the recycling route for this waste stream consists of mechanical treatment steps such

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as acceptance, sorting, crushing, and screening to produce recycled aggregate and fines suitable for further use. Hardened Cement Renders & Plasters follow this same mineral processing route and do not require any separate handling, treatment, or recovery operation of their own. This is because their contribution is minor relative to the host concrete, blockwork, masonry, plaster, render, or mixed demolition waste stream and does not alter the configuration or efficiency of the recycling process. The description of crushing-based recovery is consistent with the UAE facilities cited above and with the country's regulatory framework promoting recycled aggregate use.

Consistent with the scenario defined in Module C2, 95% of the mixed demolition waste containing Cement Renders & Plasters is assumed to enter recycling and waste-processing operations, while the remaining 5% bypasses recovery and proceeds directly to disposal in Module C4. Module C3 therefore includes the environmental burdens associated with the mechanical processing of the recyclable mineral fraction of the demolition waste.

C4 - Disposal

Module C4 covers the final disposal of materials that are not recovered through recycling processes. For Cement Renders & Plasters, this corresponds to the fraction of mixed construction and demolition (C&D) waste that is not suitable for recycling due to contamination, segregation limitations, or material quality constraints.

It is assumed that 5% of the mixed demolition waste containing Cement Renders & Plasters is directed to inert landfill facilities within the United Arab Emirates. This reflects typical outcomes in C&D waste management systems where a small residual fraction cannot be recovered through recycling or material recovery routes.

The disposed material consists primarily of inert mineral waste derived from crushed concrete, blockwork, AAC blocks, plaster, render, mortar, masonry, and ceiling assemblies depending on the application. Once cured, Cement Renders & Plasters behave similarly to hardened cementitious materials and exhibit negligible biodegradability, no potential for landfill gas generation, and very low chemical reactivity.

Inert landfill operations in the UAE involve standard activities such as placement, spreading, compaction, and dust control. As the material is non-hazardous and largely non-reactive after curing, environmental impacts associated with disposal are limited to operational activities at the landfill site.

Module C4 therefore includes only the environmental burdens associated with the handling and

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disposal of the non-recyclable fraction of mixed construction and demolition waste, with no additional emissions attributable specifically to Cement Renders & Plasters.

D - Reuse, Recovery & Recycling Potential

Module D reports the net environmental burdens and benefits associated with materials leaving the system boundary at end-of-life. These outcomes reflect the substitution of primary materials with secondary materials recovered through recycling, reuse, or energy recovery routes. For Cement Renders & Plasters, benefits arise from the recovery of the mineral fraction of demolition waste as well as from the recovery of associated packaging materials.

At end-of-life, 95% of the mixed mineral demolition waste containing Cement Renders & Plasters is assumed to be processed at construction and demolition (C&D) recycling facilities, where it is converted into recycled aggregates that substitute natural aggregates on a mass-equivalent 1:1 basis. In the United Arab Emirates, facilities operated by entities such as BEEAH in Sharjah and Tadweer in Abu Dhabi process concrete, mortar, plaster, render, blockwork, and masonry waste into reusable aggregates for infrastructure applications. Reported recovery rates for mineral C&D waste in the UAE typically exceed 90–95%, supported by regulatory frameworks and demand for recycled materials.

These recovery levels are consistent with international best practices observed in countries with advanced C&D recycling systems, such as the Netherlands, Denmark, Belgium, Japan, and Singapore, where recycling rates for concrete and masonry waste commonly reach 90–99%. These benchmarks are provided for contextual reference only, while the modelling is based on UAE-specific practices.

Packaging materials are also considered under end-of-life recovery scenarios. Wooden pallets are assumed to achieve a 95% recovery rate, reflecting established industry practices of reuse, repair, and recycling. Studies on pallet lifecycle management, including work by the Virginia Tech and USDA Forest Service, report that approximately 95% of wooden pallets are diverted from landfill through reuse, repair, recycling, or energy recovery routes, supporting this assumption.

Paper-based packaging, including multi-wall kraft cement bags, is assumed to be collected and directed to recycling or energy recovery under controlled waste management conditions. According to industry guidance from organisations such as the American Forest & Paper Association and global paper recycling statistics, paper and paperboard recovery rates commonly exceed 65–70%, with higher recovery achievable in industrial or segregated waste streams.

LCA KNOWLEDGE

Module D therefore captures the net environmental burdens and benefits associated with these recovery routes. Recycled mineral aggregates displace primary crushed aggregates; recovered wooden pallets offset virgin wood production or fossil fuel use when directed to energy recovery; and recovered paper materials substitute virgin paper fibre or contribute to energy generation.

The reported results in Module D represent the combined effect of the environmental burdens of recycling processes and the avoided impacts associated with the substitution of primary materials. These benefits arise from the broader waste management system and not from the Cement Renders & Plasters themselves, which are present as a minor fraction within the overall demolition waste stream.

Process	Unit (kilogram)
Collection process specified by type	
Cement Renders & Plasters in concrete collected as mixed mineral C&D waste	1
Recovery system specified by type	
Mineral demolition rubble sent for reuse / recycling as aggregate	0.95 (95%)
Mineral demolition rubble sent for energy recovery	Not applicable
Disposal specified by type	
Mineral demolition rubble sent to inert landfill	0.05 (5%)
Transportation assumptions	
Transport to recycling and landfill sites	50 km transport by Euro 6, >32 ton truck



LCA KNOWLEDGE

System Boundaries Illustration

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage	
	Raw material supply	Transport	Manufacturing	Transport	Construction / installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction & Demolition	Transport	Waste Processing	Disposal		Reuse, Recovery & Recycling potential
Module	A1	A2	A3	A4	A5*	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Modules Declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X	
Geography	UAE	UAE	UAE	UAE	-	-	-	-	-	-	-	-	UAE	UAE	UAE	UAE	UAE	
Share of specific data	GWP > 90%				-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

X - Included, ND - Modules not declared.

*Module A5 is included to balance out biogenic emissions from packaging.



LCA KNOWLEDGE

Cut-Off Rules

All relevant material and energy flows contributing to the manufacture of Cement Renders & Plasters have been included in the LCA model. More than 99% of the total mass, energy use, and environmental relevance is captured. Negligible flows—those that do not influence the overall results—are excluded.

The Polluter Pays Principle and the Modularity Principle are applied to ensure that impacts are assigned to the processes where they occur and that each life cycle stage is reported independently. No known data gaps or exclusions are expected to influence the robustness of the results.

Allocation

Allocation was applied only where shared energy inputs were used across multiple product lines at **Minotti's** manufacturing facility. Electricity consumption, diesel use for internal handling, and water use were allocated using a mass-based approach, reflecting each product's proportional share of total annual production at the Ras Al Khaimah facility.

Raw materials—including limestone fillers, Ordinary Portland Cement (OPC), hydrated lime, air entraining agents, cellulose powder, propylene fibres, and other functional components—and all associated transport flows were modelled using product-specific primary data, as these inputs are directly dosed for Cement Renders & Plasters and do not require allocation. No economic allocation was applied, as the manufacturing process does not generate co-products.

Electricity

Electricity consumption in the LCA model is based on the UAE grid mix as represented in Ecoinvent v3.12 (Allocation, cut-off by classification). The UAE electricity supply is predominantly generated from natural gas, supplemented by coal, nuclear power, oil, and solar energy. The modelled grid composition is as follows:

Energy Source	Share (%)
Natural Gas - Combined Cycle Power Plant	39.78
Natural Gas - Conventional Power Plant	29.54
Hard Coal	18.70
Nuclear - Pressure Water Reactor	11.63

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Oil	0.18
Solar Thermal (Parabolic Trough), 50 MW	0.17

The climate impact associated with this electricity mix is 5.19E-01 kg CO₂e per kWh, and this factor is applied consistently to all electricity use across modules A1–A3 and relevant downstream stages. This approach ensures that electricity-related impacts accurately reflect UAE operational conditions and the energy landscape relevant to **Minotti**'s Ras Al Khaimah facility.

Calculation Rules

The LCA model for Cement Renders & Plasters uses foreground data collected directly from the Ras Al Khaimah manufacturing facility, combined with background datasets sourced from Ecoinvent v3.12 (allocation, cut-off by classification). These datasets provide emission factors for key inputs, including limestone fillers, Ordinary Portland Cement (OPC), hydrated lime, air entraining agents, cellulose powder, propylene fibres, and other functional components, electricity consumption, diesel for internal handling, packaging materials, and transportation. Regionally representative conditions—such as UAE electricity mixes, supplier distances, and UAE-specific end-of-life practices—were incorporated where relevant to ensure representativeness.

Transport activities for raw material supply, packaging procurement, and finished product delivery are included based on actual supplier-to-plant and plant-to-customer distances. Road distances were measured using Google Maps, while sea freight transport is included for imported materials from Europe and Asia. Exclusions are limited to items of negligible relevance (<1%), such as administrative activities, office utilities, and capital equipment maintenance. Transport flows are therefore fully represented within the defined geographical scope.

Byproducts Assignment

No by-products are generated during the manufacturing of Cement Renders & Plasters. The process is a dry-mix operation involving physical blending of raw materials, with the only outputs being the finished product and minor process emissions associated with electricity use, internal material handling, and dust during transfer operations. As no co-products or secondary outputs are produced, allocation is not required within the manufacturing system boundary.



From modern routes to lasting finishes,
Minotti builds the bond beneath.



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In the following tables, the environmental performance of the declared unit “1 kilogram of Cement Renders & Plasters” is presented for **Minotti Dry Mix Factory**. This EPD covers multiple products (MINO 200, MINO 201, MINO 210, MINO 211, MINO 230, MINO 240, MINO 250 and MINO 255) and is based on a worst-case scenario approach, with results corresponding to the product with the highest environmental impact, identified as **MINO 200**. Environmental impacts are calculated using EF 3.1 (ILCD), ensuring consistency with the applied life cycle impact assessment methodology.



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Core Environmental impact indicators

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

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change (GWP) - fossil	Kg CO ₂ e	2.17E-01	3.60E-03	1.57E-02	2.36E-01	9.88E-03	0.00E+00	0.00E+00	4.94E-03	1.66E-02	3.13E-04	-4.80E-02
Climate change (GWP) - biogenic	Kg CO ₂ e	0.00E+00	0.00E+00	1.62E-02	1.62E-02	0.00E+00	-1.62E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Climate change (GWP) - LULUC	Kg CO ₂ e	1.67E-04	1.70E-06	2.29E-06	1.71E-04	4.65E-06	0.00E+00	0.00E+00	2.32E-06	2.07E-05	1.77E-07	-1.41E-04
Climate change (GWP) - total	Kg CO ₂ e	2.18E-01	3.60E-03	1.57E-02	2.37E-01	9.89E-03	0.00E+00	0.00E+00	4.94E-03	1.66E-02	3.13E-04	-4.85E-02
Ozone depletion	Kg CFC-11e	1.25E-09	5.00E-11	3.10E-10	1.61E-09	1.40E-10	0.00E+00	0.00E+00	7.00E-11	2.80E-10	9.14E-12	-6.24E-10
Acidification	mol H+e	7.70E-04	9.46E-06	1.20E-04	8.99E-04	2.00E-05	0.00E+00	0.00E+00	1.00E-05	1.30E-04	2.16E-06	-3.18E-04
Eutrophication, aquatic freshwater	kg PO ₄ ³⁻ eq	8.34E-05	8.33E-07	2.44E-06	8.67E-05	2.30E-06	0.00E+00	0.00E+00	1.15E-06	2.43E-05	8.47E-08	-4.66E-05
Eutrophication, aquatic freshwater	Kg P eq	2.72E-05	2.71E-07	7.96E-07	2.82E-05	7.50E-07	0.00E+00	0.00E+00	3.75E-07	7.93E-06	2.76E-08	-1.52E-05
Eutrophication, aquatic marine	Kg N eq	2.35E-04	2.80E-06	4.88E-05	2.86E-04	6.59E-06	0.00E+00	0.00E+00	3.29E-06	4.68E-05	8.60E-07	-9.69E-05
Eutrophication, terrestrial	mol N eq	2.59E-03	3.00E-05	5.30E-04	3.15E-03	7.00E-05	0.00E+00	0.00E+00	3.00E-05	5.00E-04	9.29E-06	-1.01E-03
Photochemical ozone formation	Kg NMVOC eq	7.90E-04	1.50E-05	1.64E-04	9.69E-04	3.82E-05	0.00E+00	0.00E+00	1.91E-05	1.61E-04	3.36E-06	-3.51E-04
Abiotic depletion, minerals & metals	Kg Sb eq	5.44E-07	1.08E-08	3.61E-08	5.91E-07	2.98E-08	0.00E+00	0.00E+00	1.49E-08	3.43E-08	4.70E-10	-7.80E-06
Abiotic depletion of fossil resources	MJ	1.15E+00	4.44E-02	1.65E-01	1.36E+00	1.22E-01	0.00E+00	0.00E+00	6.12E-02	2.29E-01	6.96E-03	-4.79E-01
Water use	m ³ depr.	3.44E-02	2.88E-04	1.10E-03	3.58E-02	7.97E-04	0.00E+00	0.00E+00	3.99E-04	5.78E-02	3.39E-04	-3.56E-02

The results of the environmental impact indicators — Abiotic depletion, Water use, and all optional indicators except Particulate matter and Ionizing radiation, human health — shall be used with care, as the uncertainties on these results are high or there is limited experience with the indicator. Reading example: 1.57E-03 = 1.57 × 10⁻³ = 0.00157.

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Additional environmental impact indicators

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter	Incidence	1.21E-08	3.64E-10	2.77E-10	1.27E-08	1.01E-09	0.00E+00	0.00E+00	5.05E-10	9.84E-09	5.06E-11	-7.66E-09
Ionizing radiation, human health	Kbq U-235 eq	2.86E-03	4.52E-05	1.30E-03	4.20E-03	1.25E-04	0.00E+00	0.00E+00	6.26E-05	2.62E-04	4.41E-06	-1.81E-03
Ecotoxicity (freshwater)	CTUe	5.22E-01	8.93E-03	2.29E-02	5.54E-01	2.47E-02	0.00E+00	0.00E+00	1.23E-02	9.73E-02	9.50E-04	-2.79E-01
Human toxicity, cancer effects	CTUh	3.21E-10	5.80E-13	1.60E-12	3.23E-10	1.58E-12	0.00E+00	0.00E+00	7.91E-13	3.48E-12	5.48E-14	-2.84E-10
Human toxicity, non-cancer effects	CTUh	1.31E-09	3.41E-11	4.73E-11	1.39E-09	9.47E-11	0.00E+00	0.00E+00	4.73E-11	1.42E-10	1.33E-12	-4.70E-10
Land use related impacts/soil quality	Dimensionless	2.84E+01	5.58E-02	1.39E-02	2.85E+01	1.55E-01	0.00E+00	0.00E+00	7.77E-02	2.73E-01	1.51E-02	-2.69E+01

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, or radioactive waste disposal in underground facilities. Potential ionizing radiation from soil, radon, and some construction materials is also not measured by this indicator.

GWP-GHG Indicators

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	Kg CO ₂ e	2.18E-01	3.60E-03	-5.05E-04	2.21E-01	9.89E-03	1.62E-02	0.00E+00	4.94E-03	1.66E-02	3.13E-04	-4.85E-02

This indicator includes all greenhouse gases, excluding biogenic carbon dioxide uptake and emissions, as well as biogenic carbon stored in the product, as defined by IPCC AR6 (2021). The indicator aligns closely with the Global Warming Potential (GWP) outlined in EN 15804:2012+A2:2019, incorporating updated characterization factors and environmental impact indicators.

Resource Use Indicators

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Renewable PER used as energy	MJ	3.97E+00	7.51E-04	1.59E-03	3.97E+00	2.08E-03	0.00E+00	0.00E+00	1.04E-03	5.55E-03	7.19E-05	-3.73E+00
Renewable PER used as materials	MJ	3.47E-04	0.00E+00	1.08E-05	3.58E-04	0.00E+00	-3.58E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.51E-04

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Total use of renewable PER	MJ	3.97E+00	7.51E-04	1.60E-03	3.97E+00	2.08E-03	-3.58E-04	0.00E+00	1.04E-03	5.55E-03	7.19E-05	-3.73E+00
Non-renewable PER used as energy	MJ	1.15E+00	4.44E-02	1.65E-01	1.36E+00	1.22E-01	0.00E+00	0.00E+00	6.12E-02	2.29E-01	6.96E-03	-4.79E-01
Non-renewable PER used as materials	MJ	1.16E-06	0.00E+00	2.32E-09	1.16E-06	0.00E+00	-1.16E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.02E-06
Total use of non-renewable PER	MJ	1.15E+00	4.44E-02	1.65E-01	1.36E+00	1.22E-01	-1.16E-06	0.00E+00	6.12E-02	2.29E-01	6.96E-03	-4.79E-01
Use of secondary materials	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m ³	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Waste Indicators

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-02	0.00E+00
Radioactive waste	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output Flow Indicators

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Components for reuse	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.59E-01
Materials for recycling	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E-01	0.00E+00	9.59E-01

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Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy - thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic carbon content

Details	Unit	A1-A3
Biogenic carbon content in product	Kg C	0.00E+00
Biogenic carbon content in accompanying packaging	Kg C	0.00443

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂. "Reading example: 1.57E-03 = 1.57*10⁻³ = 0.00157"

Disclaimer: "According to the **EN 15804:2012+A2:2019** standard, the LCIA results are relative expressions translating impacts into environmental themes such as climate change, ozone depletion, etc. (midpoint impact categories). Thus, the LCIA results do not predict impacts on category endpoints such as impact on the extinction of species or human health. In addition, the results do not provide information about exceeding thresholds, safety margins or risks".



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Interpretation

The life cycle results for **Minotti's** Cement Renders & Plasters demonstrate a strongly raw-material-dominated environmental profile, with Module A1 accounting for 81.00% of total GWP. This distribution is primarily driven by the use of Ordinary Portland Cement (OPC) and hydrated lime, which remain the principal sources of emissions in cement-based dry-mix render and plaster formulations due to energy-intensive binder production and process-related CO₂ emissions. Given the cementitious nature of Cement Renders & Plasters and the limited transformation during manufacturing, the environmental profile is fundamentally governed by upstream material inputs used to achieve workability, adhesion performance, crack resistance, surface finish quality, and durability.

Module A3 (5.84%) and A2 (1.34%) remain significantly lower than A1, confirming that the product's environmental profile is not manufacturing-intensive. Manufacturing consists primarily of controlled dry-mix operations involving material handling, dosing, blending, quality control, and packing, with no thermal processing or intended chemical reactions. The relatively low contribution from A2 indicates that inbound logistics are limited compared with the dominant upstream burden of cementitious and mineral raw materials. Key inputs such as limestone-based fillers, OPC, hydrated lime, cellulose powder, propylene fibres, air-entraining agents, and other functional components contribute to product performance; however, their transport-related influence remains secondary compared with the upstream impact of binder-based raw materials.

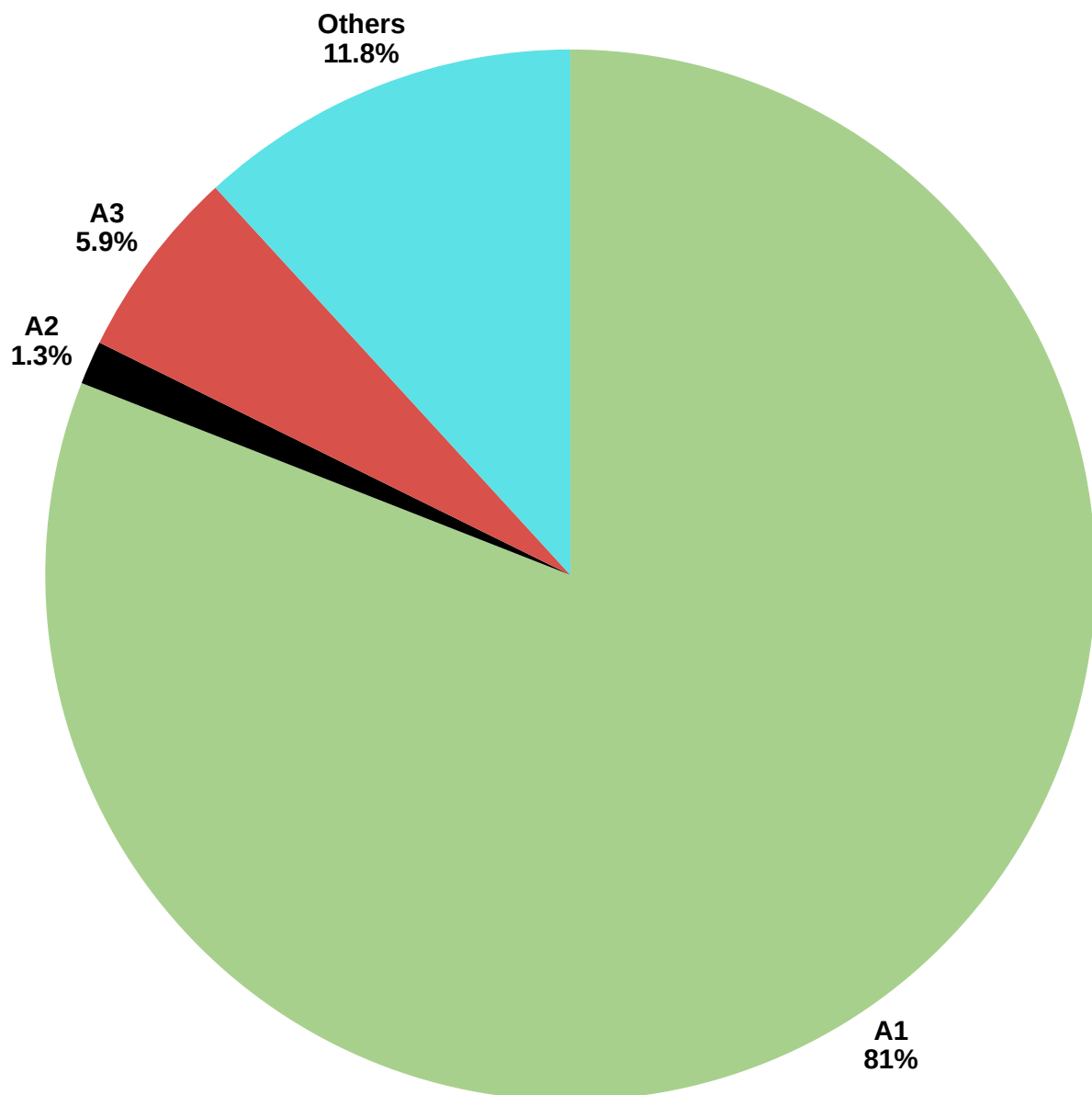
Module A4 (3.68%) represents a moderate share of total GWP, reflecting the distribution of Cement Renders & Plasters within the United Arab Emirates. As outbound logistics are based mainly on domestic road transport to construction sites, distribution-related impacts remain significantly lower than those typically associated with export-driven supply chains. Although the product may be supplied in bags or through mobile silo-based delivery systems, representative delivery distances and efficient load utilisation help contain the overall contribution of this module.

End-of-life modules show a visible contribution, consistent with the behaviour of cementitious renders and plasters integrated into masonry walls, concrete blockwork, AAC blockwork, plaster/render systems, ceilings, or concrete surfaces. C1 is zero, as the material becomes fully adhered to the host substrate and does not generate separate demolition burdens. C2 (1.84%) reflects transport of demolition waste to recycling and landfill facilities within the UAE, while C3 (6.19%) accounts for mechanical processing of mineral waste through crushing, separation, and screening operations at authorised facilities. C4 (0.12%) remains negligible, as cured cementitious material behaves as inert mineral waste and does not undergo biodegradation or generate landfill emissions. Overall, the impact distribution confirms a highly material-driven upstream profile with

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limited but visible influence from manufacturing, distribution, and end-of-life stages, reinforcing the representativeness of the model for UAE-based construction applications.

Life Cycle Stage Contribution to GWP (kg CO₂e per 1 kilogram of Cement Renders & Plasters)



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Mandatory Statements

Explanatory materials are available from the EPD Owner and/or LCA Author. The verifier and Program Operator make no claims and bear no responsibility regarding the legality of the study. Sole ownership, liability, and responsibility for the EPD lie with the EPD Owner. The LCA Author is not liable for manufacturer-provided information, life cycle data, or supporting evidence.

EPDs within the same product category, but issued by different EPD programs, may not be comparable. For valid comparison, both EPDs must be based on the same PCR (including version number), or on fully-aligned PCRs. Products must have identical function, technical performance, and use cases (e.g. the same declared or functional unit); share equivalent system boundaries, data descriptions, and data quality standards; use comparable collection methods and allocation rules; include matching content declarations; and be valid at the time of comparison.

Information related to EPD of multiple products

This EPD covers multiple products within the Cement Renders & Plasters product group, including **MINO 200**, **MINO 201**, **MINO 210**, **MINO 211**, **MINO 230**, **MINO 240**, **MINO 250**, and **MINO 255**. These products are grouped together because they share the same general function, similar cement-based dry-mix technology, comparable raw material families, common manufacturing process, and similar application route as render/plaster materials for masonry walls, concrete blockwork, AAC blockwork, ceilings, and concrete surfaces.

The declared results are based on a worst-case product scenario within the declared product group, represented by **MINO 200**. The worst-case approach ensures that the reported environmental performance is conservative and representative for all products covered under this EPD. Since the EPD reports worst-case results and does not claim ISO 21930 compliance, separate variation disclosure by product is not required.

Information related to Sector EPD

This is not a sector EPD.

Differences vs previous versions

This is the second version of the EPD. See next page for more details.



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EPD Version Information

Version	Date	Program Operator	Registration Number
Original Issue	20-05-2021	International EPD System	SP-03815
Revision 1	18-06-2026	International Climate Intelligence System	ICIS-202606-142

Total GWP Results Comparison (A1-A3)

Module	Previous LCA (ecoinvent v3.6) (kg CO ₂ e/kg)	Updated LCA (ecoinvent v3.12, cut-off) (kg CO ₂ e/kg)
A1	2.87E-01	2.18E-01
A2	5.85E-03	3.60E-03
A3	-5.62E-02	1.57E-02
A1-A3	2.37E-01	2.37E-01

The A1–A3 GWP remains effectively unchanged at 0.237 kg CO₂e/kg in both the previous LCA using Ecoinvent v3.6 and the updated LCA using Ecoinvent v3.12 cut-off. Although the total cradle-to-gate result is stable, the distribution of impacts between modules has changed significantly due to updated background datasets, revised system modelling, and more consistent allocation of process burdens. The updated result should therefore be interpreted as a redistribution of impacts across A1, A2, and A3 rather than a material increase in the overall environmental performance of **Minotti's** Cement Renders & Plasters.

The most significant variation occurs in Module A3, which changes from a negative value of -0.0562 kg CO₂e/kg in the previous model to a positive value of 0.0157 kg CO₂e/kg in the updated model. Under standard EN 15804 modelling practice, the manufacturing stage for cement-based dry-mix products is expected to show net positive emissions due to electricity use, internal material handling, dosing, mixing, packing, and other factory operations. The negative A3 value in the earlier model is therefore understood to result from differences in modelling assumptions, dataset structures, treatment of packaging-related biogenic flows, or allocation approaches in the previous database version, rather than representing actual physical manufacturing conditions. In the updated model, A3 reflects the direct manufacturing burdens more consistently, resulting in a

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more representative estimate of production-stage impacts.

Module A1 decreases from 0.287 to 0.218 kg CO₂e/kg, representing a reduction of approximately 0.069 kg CO₂e/kg. This decrease reflects updated upstream datasets for key raw materials used in Cement Renders & Plasters, including limestone fillers, Ordinary Portland Cement (OPC), hydrated lime, cellulose powder, propylene fibres, air-entraining agents, and packaging materials. The Ecoinvent v3.12 update includes revisions across multiple background sectors, including fuels, electricity, minerals, chemicals, plastics, and material production. These changes can affect life cycle impact results even when the foreground formulation remains unchanged, due to revised emission factors, updated activity links, improved regionalisation, and changes in supply-chain modelling assumptions.

Module A2 decreases from 0.00585 to 0.00360 kg CO₂e/kg, representing a reduction of approximately 0.00225 kg CO₂e/kg. This indicates that the updated inbound transport modelling for Cement Renders & Plasters results in slightly lower transport-related impacts than the previous model. The reduction may arise from revised transport datasets, updated vehicle emission factors, improved fuel supply-chain modelling, route assumptions, or changes in road and sea freight background data within the newer database. However, A2 remains very small compared with the dominant upstream raw material contribution from A1.

Overall, the updated A1–A3 result is technically justified and demonstrates that the cradle-to-gate GWP of **Minotti's** Cement Renders & Plasters remains stable despite significant changes in module-level modelling. The reduction in A1 and A2 offsets the correction of A3 from a negative value to a positive manufacturing burden, resulting in an overall A1–A3 value that remains effectively unchanged. The updated results therefore provide a more robust, transparent, and representative account of the product's cradle-to-gate environmental performance under the Ecoinvent v3.12 cut-off modelling framework. This should be interpreted as a database and modelling update effect, rather than evidence of a change in formulation, production efficiency, or factory operating conditions.



REVIEW AND VERIFICATION

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PCR review was conducted by: International Climate Intelligence System	
Independent verification of the declaration and data, according to ISO 14025:2006 and ISO 14040: <input type="checkbox"/> EPD Process Certification (internal) <input checked="" type="checkbox"/> EPD Verification (external)	
Third party verifier: Luis Manuel, International Climate Intelligence System	



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ACRONYMS

Acronym	Meaning
kg CO ₂ e	Kilograms of carbon-dioxide equivalent
kg CFC-11e	Kilograms of Chlorofluorocarbon-11 equivalent
mol H ⁺ e	Moles of hydrogen ion equivalent
kg PO ₄ ³⁻ eq	Kilograms of phosphate equivalent
kg P eq	Kilograms of phosphorus equivalent
kg N eq	Kilograms of nitrogen equivalent
mol N eq	Moles of nitrogen equivalent
kg NMVOC eq	Kilograms of non-methane volatile organic compound equivalent
kg Sb eq	Kilograms of antimony equivalent
MJ	Megajoules
m ³ depr.	Cubic meters of water deprived
incidence	Unit representing human health impact related to particulate matter exposure
Kbq U-235 eq	Kilo-becquerels of Uranium-235 equivalent
CTUe	Comparative Toxic Unit for ecosystems
CTUh	Comparative Toxic Unit for humans
dimensionless	Unitless characterization factor — used for land-use/soil quality impacts
kg C	Kilograms of biogenic carbon contained in product or packaging



STANDARDS & REFERENCES

Standards & Methodological Frameworks

- EN 15804:2012 + A2:2019 / AC:2021 – Sustainability of construction works – Core rules for environmental product declarations of construction products.
- ISO 14025:2006 – Environmental labels and declarations – Type III environmental declarations – Principles and procedures.
- ISO 14040:2006 – Life cycle assessment – Principles and framework.
- ISO 14044:2006 – Life cycle assessment – Requirements and guidelines.

PCR & Program Documents

- PCR 2026:18 Construction Products, Version 1.2.6 – International Climate Intelligence System (EN 15804+A2 aligned).
- EPD General Program Instructions (GPI) of International Climate Intelligence System, v2.0, 2023.
- ICIS Environmental Product Declaration Template – International Climate Intelligence System, 2026.

Databases, Tools & Modelling Sources

- Ecoinvent v3.12, system model: Allocation, cut-off by classification.
- Ecoinvent Centre (2025). Documentation of Changes Implemented in the ecoinvent Database v3.12. Swiss Centre for Life Cycle Inventories, St. Gallen.
- Air.e.LCA Software v3.20.1.0 by Solid Forest – Used for LCA modelling and impact calculations.
- IPCC AR6 (2021) Characterization Factors – Applied for GWP indicators (where relevant).
- EF 3.1 (Environmental Footprint 3.1 method) – Used for all midpoint impact indicators.

Transport Calculation Tools

- Google Maps – Road transport distance calculations.
- PortDistance.com – Maritime transport distance calculations.

Biogenic Carbon Basis

- Intergovernmental Panel on Climate Change (2006). IPCC Guidelines for National Greenhouse Gas Inventories.
- Food and Agriculture Organization (2010). Global Forest Resources Assessment.
- European Commission Joint Research Centre (2010). ILCD Handbook – General Guide for Life Cycle Assessment.
- Confederation of European Paper Industries (2022). Paper Industry Sustainability Reports.

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End-of-Life & Recycling

- Dubai Municipality (2022). Construction and Demolition Waste Management and Recycling Guidelines. Government of Dubai, UAE.
- Tadweer (Abu Dhabi Waste Management Center) (2023). Construction and Demolition Waste Recycling Operations. Abu Dhabi, UAE.
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Before landmarks rise in confidence,
Minotti prepares the surface to
perform.

