CONMIX

NON-SHRINK GROUTS

ENVIRONMENTAL PRODUCT DECLARATION

NANOGROUT SG

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

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-202603-124
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INTERNATIONAL CLIMATE INTELLIGENCE SYSTEM EPD VERIFIED

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INTERNATIONAL CLIMATE INTELLIGENCE SYSTEM EPD

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Leading the Middle East, Conmix
delivers innovative concrete and
plaster solutions.

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OVERVIEW

This Environmental Product Declaration (EPD) presents verified, transparent environmental performance data for NanoGrout SG, manufactured by Conmix Ltd. at its facility in Sharjah, United Arab Emirates, for the reporting period August 2024 to July 2025. The declared unit for this assessment is 1 kg of NanoGrout SG.

The 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 enables architects, engineers, contractors, and sustainability consultants to make informed material choices by providing consistent, third-party-verified environmental information suitable for certification schemes, embodied-carbon reporting, and procurement transparency.

PRODUCT INFORMATION

Product Name

NanoGrout SG

Product Type

Epoxy Based Segmental Construction Adhesive and Anchor Grout

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

Epoxy-based grouting system formulation

Recycled Content

Not intentionally added (inherent recycled content only)

Electricity Mix

UAE grid mix from Ecoinvent 3.11 (cut-off). Natural Gas (89.42%), Nuclear (7.06%), Oil (0.60%), Solar (0.18%) and others.

LCA Tool and Database

Air.e.LCA v3.20.1.0 and Ecoinvent v3.11 (Cut-Off)

Geographical Scope

United Arab Emirates

PRODUCT INFORMATION

Verification

International Climate Intelligence System
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Product Group Classification

UN CPC 3744 (Cement mortars & grouts)

Environmental Performance Summary (A1-A3)

Indicator	Result	Unit
Climate change (GWP) - total	2.06E+00	Kg CO_2e
Climate change (GWP) - fossil	1.95E+00	Kg CO_2e
Ozone Depletion (ODP)	5.48E-08	Kg CFC-11e
Abiotic depletion of fossil resources	3.24E+01	MJ

Hotspot Summary

Process	Share of Total GWP (%)
Raw Material Supply (A1)	90.05
Raw Material Transportation (A2)	0.16
Manufacturing (A3)	5.47
Remaining Modules (A4, C1-C4)	4.32

PRODUCT INFORMATION

Where This Adds Value

Scheme / Area	Relevance to NanoGrout SG
LEED v4.1 (USGBC) – MR Credit: EPDs (aligned with emerging LEED v5 requirements)	The Type III EPD for NanoGrout SG supports Material Disclosure credits and contributes toward whole-building embodied carbon reporting. Commonly used in UAE and Oman projects delivered under LEED certification.
Estidama Pearl Rating System (Abu Dhabi)	Provides verified environmental data required for LBo-6 and material transparency pathways. NanoGrout SG is used in anchor bolts, starter bars, base plates, bridge bearings, and segmental bonding on Pearl projects.
GSAS (Qatar)	Supports materials submittals requiring environmental documentation for QSAS/GSAS Material & Waste credits. NanoGrout SG's quantified impacts enable transparent comparison during material approval.
BREEAM (UK/UAE Adaptations)	EPD contributes to MAT 01 and MAT 02 credits for responsible sourcing and building LCA. Relevant for many UK-based consultants working on Dubai, Muscat, and Baghdad projects.
Whole-Building LCA Tools	The cradle-to-gate with options LCA model for NanoGrout SG can be directly used in digital LCA models for UAE, Oman, Iraq, and Tanzania infrastructure projects.
Government & Giga-Project Requirements	Major clients like ADNOC, PDO, and national infrastructure agencies increasingly require verified product-specific EPDs. NanoGrout SG's EPD enables acceptance during material pre-qualification.
Procurement Transparency (GCC Contractors)	Supports sustainability submissions for contractors, consultants, and material engineers who require documented environmental impacts to comply with tender specifications.

ABOUT CONMIX

Founded in 1975, Conmix Ltd. is one of the UAE's longest-established manufacturers of construction materials and has grown into a leading producer of ready-mix concrete, pre-mix plasters, mortars, grouts, coatings, and construction chemicals in the Middle East. Strategically headquartered in Sharjah, the company has supported regional infrastructure development for decades through its extensive range of high-performance, quality-certified products.

Conmix operates a fully integrated manufacturing network with multiple production facilities across the UAE, covering ready-mix concrete, dry-mix plasters, grouts, repair mortars, waterproofing systems, and specialty construction chemicals. Its products are supplied to major building and infrastructure projects across the GCC, Asia, and Africa.

The company's operations are supported by a skilled workforce of over 1,000 personnel, including engineers, lab technicians, QC specialists, production experts, and technical support teams.

Conmix promotes a culture of innovation, operational excellence, and customer service, with dedicated teams overseeing formulation development, sustainability initiatives, and project-specific technical support.

Conmix maintains a comprehensive portfolio, including:

- ISO 9001:2015 – Quality Management System
- ISO 14001:2015 – Environmental Management System
- ISO 45001:2018 – Occupational Health & Safety
- Dubai Central Laboratory (DCL) product conformity certifications covering plasters, grouts, and repair systems
- BS, ASTM, EN, and DIN compliance across multiple dry-mix and chemical product categories
- CE Marking for selected product lines exported to international markets

Conmix continues to enhance its manufacturing capabilities and quality systems to meet the evolving requirements of large-scale construction and infrastructure projects across the region.

PRODUCT DESCRIPTION

NanoGrout SG is a high-performance, two-component, epoxy-based structural adhesive and anchor grout formulated for segmental bonding, anchoring, and precision structural fixing applications. Supplied in paste and pourable grades, it is mixed on site to produce a dense, cohesive epoxy grout with excellent adhesion, gap-filling capability, and strong bonding to concrete and steel substrates. Its formulation is dominated by calcium carbonate fillers, epoxy resin, amine and polyamide hardeners, and modifiers that provide controlled rheology, low water absorption, and high chemical resistance performance.

The grout is designed for demanding structural and civil engineering applications where high mechanical strength, bond reliability, and durability are essential. NanoGrout SG develops high early and long-term strength, exhibits non-sag behaviour on vertical and overhead surfaces, and maintains performance under static and dynamic loading conditions. Typical uses include anchor bolts, starter bars, base plate bolt pockets, bridge bearings, segmental precast bonding, and structural strengthening works. The product is supplied in pre-measured 1 litre, 3 litre, 6 litre, and 12 litre sets, with 390 ml cartridge available on request, providing flexibility for both small-scale anchoring and large structural bonding operations.

Sectors & Corresponding Uses

Sector	Application / Use Case
Industrial & Plant Installations	Precision anchoring of machinery bases, base plates, and anchor bolts for secure fixing, load transfer, and vibration resistance
Structural Steel & Anchoring Works	Securing anchor bolts, starter bars, and base plate connections requiring high bond strength and chemical resistance
Repair & Strengthening	Reinstating anchorage zones, bonding steel plates, and filling high-stress structural voids
Infrastructure & Transport Projects	Anchoring bridge bearings, segmental precast elements, and fixings exposed to dynamic loads and harsh conditions
Energy & Heavy-Duty Facilities	Durable anchoring and bonding of equipment foundations, supports, and embedded components in power, oil, and industrial facilities

PRODUCT DESCRIPTION

Technical Specifications

Parameter	Details / Specification
Form	Two-component epoxy-based structural adhesive and anchor grout, available in paste and pourable grades
Mixing Method	On-site mixing of Part A (Base) and Part B (Hardener) to achieve uniform consistency
Component	Two: Part A – Base, Part B – Hardener
Colour	Grey when mixed
Compressive Strength	1 Day – up to 60 N/mm², 7 Days – up to 80 N/mm² (ASTM C579 / BS 6319-2)
Flexural Strength	7 Days – up to 35 N/mm² (BS EN 196-1 / BS 6319-3)
Tensile Strength	7 Days – >20 N/mm² (BS 6319-7)
Slant Shear Bond Strength	7 Days – up to 20 N/mm² (ASTM C882)
Surface Temperature for Application	5–50 °C (depending on grade)
Pot Life	45–70 minutes (2 kg mixed material)
Minimum Open Time	45–60 minutes
Thixotropy	Non-sag in paste grades (no sag at 3 mm)
Water Absorption	<0.3–0.5 %
Water Penetration	Nil (BS EN 12390-8)
Chemical Resistance	Resistant to mild alkalis, fuels, and oils (ASTM D543)
Pack Size	1 L, 3 L, 6 L, and 12 L pre-measured sets; 390 ml cartridge available on request
Application Method	Bonding and anchoring of anchor bolts, starter bars, base plates, bridge bearings, segmental precast elements, and structural strengthening works

MANUFACTURING DETAILS

The production of NanoGrout SG at Conmix begins with material inspection of key raw materials, primarily calcium carbonate fillers, followed by epoxy resins, polyamide- and amine-based hardeners, silica, pigments, and performance additives that control adhesion, rheology, and durability. All incoming materials undergo quality verification to ensure conformity with internal specifications before being transferred to dedicated storage areas, sealed containers, or controlled environments based on chemical sensitivity and handling requirements.

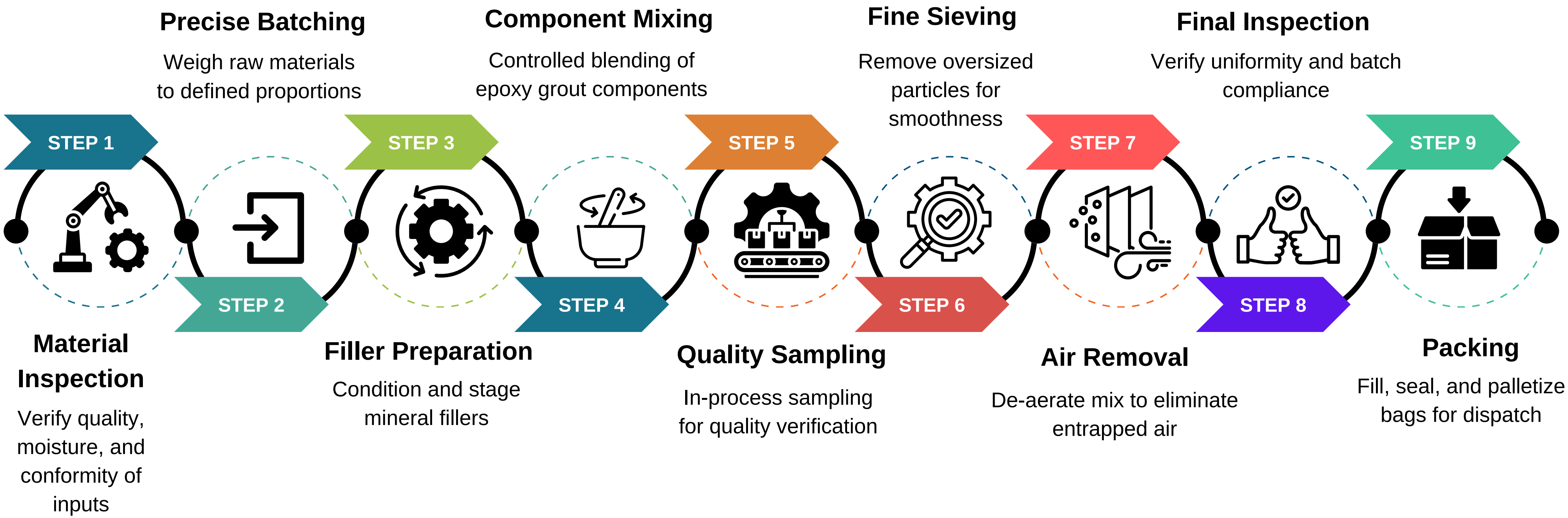
During precise batching, each component is measured accurately through controlled dosing procedures to ensure correct formulation and stoichiometry of the two-component system. Filler preparation and component mixing are carried out under controlled conditions to achieve homogeneous base and hardener components. This processing stage ensures uniform distribution of fillers and additives and contributes to SG’s high bond strength, gap-filling capability, and stable application properties. Chemical curing reactions occur only after site mixing; no curing takes place during manufacturing.

Following component preparation, fine sieving removes oversized particles and supports smooth paste or pourable consistency. Air removal is achieved through controlled handling to minimise entrapped air and support consistent density and performance. Quality sampling and checks—including appearance, viscosity, density, and visual inspection—are performed on each batch to ensure compliance with SG’s technical datasheet requirements. Conforming batches undergo final inspection before packaging into rigid plastic containers or cartridges, batch-coded, palletised, wrapped, and prepared for dispatch from the Sharjah manufacturing facility.

For a visual representation of the full manufacturing workflow, refer to the illustrated flow chart on the next page. A screenshot of the process flow as modeled in the LCA software is provided on the page that follows.

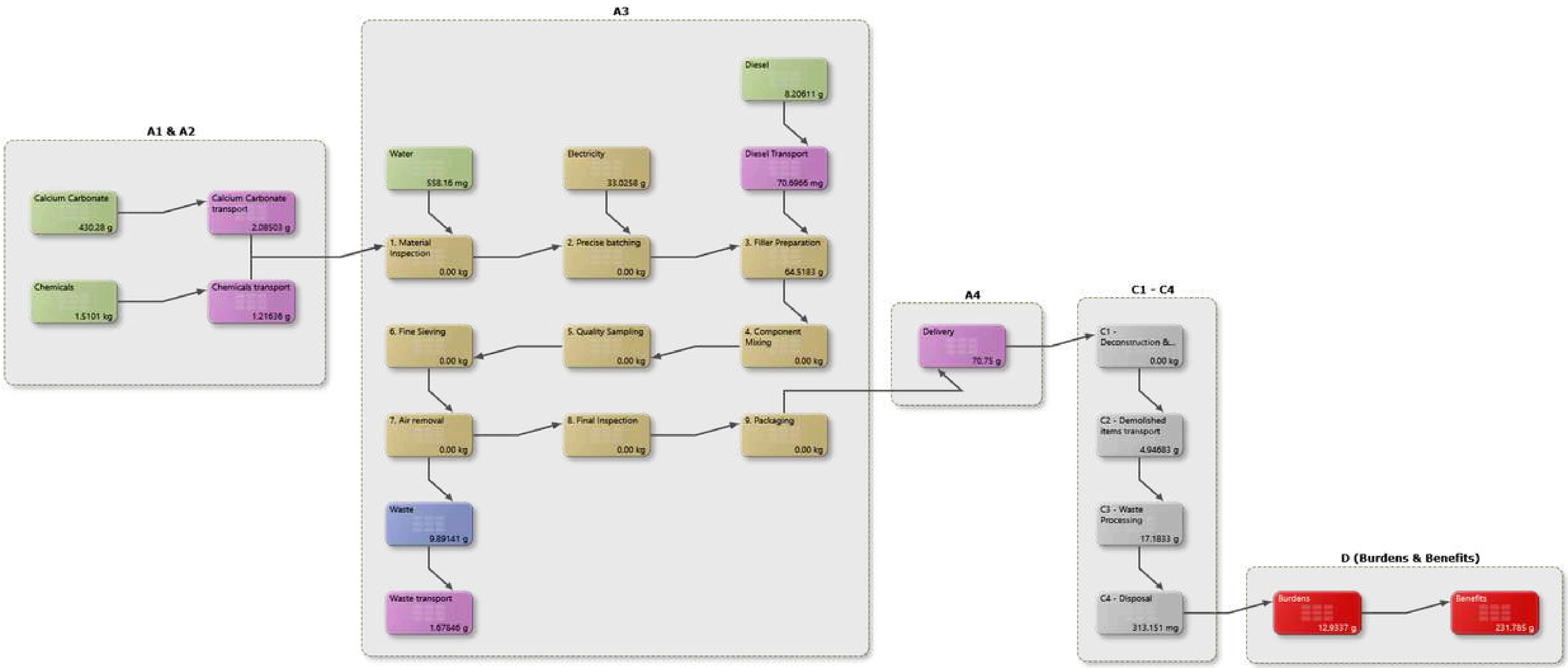
MANUFACTURING DETAILS

Schematic overview of NanoGrout SG manufacturing process



MANUFACTURING DETAILS

Screenshot of NanoGrout SG LCA model from LCA software



CONTENT DECLARATION

The content declaration provides a transparent breakdown of all raw materials used in the formulation of NanoGrout SG, expressed per 1 kg of product. The formulation is primarily composed of calcium carbonate fillers, epoxy resin, polyamide and amine-based hardeners, fumed silica, and pigments, supported by small quantities of reactive diluents and performance-enhancing additives that provide adhesion, controlled rheology, and high chemical resistance. 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)
Calcium Carbonate	0.70	0	0	0	0
Epoxy Resin	0.24	0	0	0	0
Polyamide Resin	0.05	0	0	0	0
Additives & Fillers	0.01	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, NanoGrout SG contains 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—calcium carbonate fillers, epoxy resin, polyamide and amine-based hardeners, fumed silica, and pigments—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.

Packaging Material Declaration

Packaging materials used for NanoGrout SG include wooden pallets, HDPE containers, and LDPE stretch wrap. These materials serve distinct functions within the product supply chain—wooden pallets provide structural stability during handling and transport, HDPE containers securely contain the grout components during storage, and LDPE stretch wrap stabilises pallet loads and protects from moisture. 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.

CONTENT DECLARATION

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
HDPE Containers	0% biogenic	0 kg C/kg	Petroleum-based plastic (polyethylene); contains no biogenic carbon
LDPE Stretch Wrap	0% biogenic	0 kg C/kg	Petroleum-based plastic film; contains no biogenic carbon

Wood contains significant biogenic carbon because it originates from biomass; HDPE and LDPE do not. 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	2.50E-02	29.07	1.25E-02	Reuse / Recycle / Energy Recovery
HDPE Containers	6.02E-02	70.05	0.00E+00	Recycle / Energy Recovery
LDPE Stretch Wrap	7.53E-04	0.88	0.00E+00	Recycle / Energy Recovery
Total	**8.60E-02**	**100**	**6.26E-04**	**-**
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 NanoGrout SG 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 NanoGrout SG reflects the reporting period August 2024 to July 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 Sharjah plant 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 NanoGrout SG reflects the actual manufacturing and supply conditions of Conmix Ltd.'s Sharjah 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, Oman, Iraq, and Tanzania, ensuring geographical relevance of the final results.

Technological Representativeness: The manufacturing process modelled for NanoGrout SG accurately reflects the actual production technology used at Conmix Ltd.'s Sharjah facility. The product is produced through controlled batching, filler preparation, and formulation processes, incorporating calcium carbonate fillers, epoxy resin, polyamide and amine-based hardeners, silica, and pigments using industrial mixing equipment, dosing systems, and automated sieving. No curing or polymerisation reactions occur during manufacturing, and no heating or wet processing steps are applied. The technological assumptions used in the LCA are therefore representative of real operations at the plant, ensuring that the results reflect site-specific production conditions.

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LCA Software and Database

The life cycle model for NanoGrout SG was developed using Air.e.LCA v3.20.1.0, with all background inventory data sourced from Ecoinvent v3.11 (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 NanoGrout SG. The primary constituents—calcium carbonate fillers, epoxy resin, and polyamide resin—are procured from established suppliers within the United Arab Emirates, ensuring reliable quality, consistent grading, and compatibility with local construction project requirements. Additional components such as amine-based hardeners, silica, pigments, reactive diluents, and other performance additives are likewise sourced fully from UAE-based suppliers according to technical specifications and availability. All upstream activities such as raw material extraction, intermediate processing, and packaging of inputs are included within this module.

Module A2 - Raw Material Transportation

Module A2 covers the transportation of all raw materials from their respective suppliers to the Conmix manufacturing facility in Sharjah, United Arab Emirates. Key inputs—including calcium carbonate fillers, epoxy resin, polyamide resin, amine-based hardeners, silica, pigments, and performance additives—are sourced from suppliers within the UAE, reflecting a fully localised supply chain for NanoGrout SG. All inbound movements are modelled using >32-ton Euro 6–equivalent road transport, representing typical logistics for bulk mineral inputs, bagged powders, and palletized chemical components. The environmental impacts in this stage arise from fuel consumption, tailpipe emissions, and transport distances associated with the delivery of each material. Load efficiencies and realistic supplier-to-plant distances used in the LCA model reflect actual UAE logistics conditions and are applied consistently across all raw materials in the product system.

Module A3 - Manufacturing

Manufacturing impacts cover all processes required to convert raw materials into the finished NanoGrout SG product at the Conmix facility in Sharjah. Production follows a controlled formulation workflow comprising nine sequential steps: Material Inspection, Precise Batching, Filler Preparation, Component Mixing, Quality Sampling, Fine Sieving, Air Removal, Final Inspection, and Packing. Each stage ensures accurate dosing, uniform dispersion of fillers and additives, consistent batch quality, and compliance with internal technical specifications.

Environmental loads in this module include electricity use for mixing, sieving, and material handling; fuel use from internal forklift movement; water used for equipment wash-down; and solid waste generated during fine sieving (primarily inert mineral residues). Wastewater from cleaning operations is directed to appropriate treatment. This module also accounts for all ancillary inputs used on-site, including packaging materials (HDPE containers, LDPE stretch wrap, and wooden pallets). All emissions from equipment operation, internal transport, dust handling, and waste processing are included within the A3 boundary.

Module A4 - Delivery

Module A4 accounts for the transportation of finished NanoGrout SG from the Conmix manufacturing facility in Sharjah to customer locations. As NanoGrout SG is supplied to projects within the United Arab Emirates, Oman, Iraq, and Tanzania, outbound transport is modelled using domestic road freight for UAE deliveries and a combined road–sea–road logistics chain for exports. International shipments are assumed to be transported by containerised maritime freight, together with road transport legs for delivery to port, onward distribution from port of entry, and final delivery to customer sites.

Packaged in rigid containers or cartridges and palletised for shipment, the product is transported as consolidated loads with high capacity utilisation. Transport distances are based on representative average delivery routes covering construction sites, contractors, industrial

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facilities, and infrastructure projects across the countries of use. Environmental impacts in this module include marine fuel consumption and related emissions for sea freight, together with diesel consumption, tailpipe emissions, and load-dependent fuel use associated with outbound road deliveries.

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 v3.11
Bulk transportation	Mass of the transported product

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Module C1 - Deconstruction and Demolition

Module C1 addresses the environmental impacts associated with deconstruction or demolition of the product at end-of-life. NanoGrout SG is applied as a structural epoxy adhesive and anchor grout within concrete elements, where it cures and becomes integrally bonded to the surrounding concrete or steel–concrete interface. Once hardened, the material forms part of the structural assembly and does not exist as a separate or detachable component that can be removed independently.

At the end of the service life of the structure, demolition is carried out on the entire concrete or composite element using standard mechanical methods such as hydraulic breakers or crushing equipment. The cured epoxy grout undergoes the same mechanical breakup as the surrounding concrete during demolition activities. No additional tools, time, fuel, or labour are required specifically to remove or handle the grout.

For example, when an anchored base plate, starter bar, or bonded concrete element is demolished, the contractor does not distinguish between the original concrete and the epoxy grout; the demolition process remains unchanged regardless of its presence. Consequently, the use of NanoGrout SG does not alter demolition practices or increase resource consumption. As no distinct demolition processes are attributable solely to the product, the environmental impacts associated with Module C1 are considered zero.

Module C2 - Transport to Waste Processing

Module C2 covers the transport of end-of-life material from the demolition site to waste management facilities. After demolition, NanoGrout SG becomes part of the mixed mineral construction and demolition (C&D) waste generated from breaking concrete or composite structural elements in which the epoxy grout has been used. As NanoGrout SG is manufactured in the UAE and supplied to projects within the UAE, Tanzania, and Baghdad (Iraq), demolition waste is assumed to be managed within the respective national waste management systems of the country where the building or structure is located.

Across the UAE, authorised C&D recycling facilities operated by Dubai Municipality, Tadweer (Abu Dhabi), BEEAH (Sharjah), and other emirates routinely process large volumes of concrete and masonry waste, achieving diversion rates typically ranging from 90% to 97%. In Tanzania, formal C&D waste recycling infrastructure is less developed, and mixed demolition rubble is primarily handled through municipal solid waste systems, with informal reuse of crushed mineral material for non-structural fill or road base applications. In Iraq, construction and demolition waste is typically transported to authorised waste facilities or inert landfill, with some local reuse of mineral rubble as general fill material. For the purpose of LCA modelling, a single harmonised end-of-life transport and processing scenario is applied across regions.

Reflecting typical regional waste management performance, 95% of the mixed demolition rubble containing NanoGrout SG is assumed to be transported to a C&D recycling facility, with the remaining 5% directed to inert landfill due to contamination, processing constraints, or unsuitable material fractions. A one-way transport distance of 50 km is assumed for both recycling and landfill routes, representing typical haulage distances between demolition sites and authorised waste facilities. Transport is modelled using a >32-ton EURO 6 lorry, representative of vehicles commonly used for bulk mineral waste transport.

Module C2 therefore accounts exclusively for the environmental impacts associated with transporting mixed demolition rubble containing NanoGrout SG from the demolition site to the respective recycling and landfill facilities in the country of use.

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

Module C3 - Waste Processing

Module C3 covers the processing of demolition rubble that enters recycling. Once NanoGrout SG is demolished together with the concrete or composite structural element, it becomes part of the mixed mineral construction-and-demolition (C&D) waste stream, typically comprising concrete, mortar, masonry, and associated mineral-based materials. As the product is manufactured in the UAE and supplied to projects within the UAE, Tanzania, and Baghdad (Iraq), the recyclable fraction is assumed to be processed through local C&D recycling or aggregate processing facilities in the country where demolition occurs.

At these facilities, waste processing generally begins with coarse sorting to remove oversized debris and non-mineral contaminants, followed by primary crushing of the mineral rubble. Magnetic separation is used to recover embedded reinforcing steel or metallic fragments, which are diverted to metal recycling streams. The remaining mineral fraction undergoes secondary crushing and multi-stage screening to produce graded recycled aggregates and fines. No dedicated processing steps are required for NanoGrout SG, as the hardened epoxy grout remains embedded within the concrete matrix and exhibits mechanical behaviour comparable to conventional concrete during crushing and screening operations.

Recycled aggregates generated from C&D processing are commonly utilised in applications such as road base and sub-base layers, utility trench backfilling, embankments, footpaths, and general fill, supporting circular economy and landfill diversion objectives. For the purpose of LCA modelling, these reuse pathways are represented through a harmonised recycling scenario applicable across the regions of use.

Module C3 therefore accounts for the environmental impacts associated with the crushing, sorting, and screening of the 95% of mixed mineral demolition waste containing NanoGrout SG that is assumed to be directed to recycling. Material fractions that cannot be recovered are addressed under Module C4.

Module C4 - Disposal

Module C4 covers the disposal of the portion of demolition waste that does not enter the recycling route. For NanoGrout SG, 5% of the mixed mineral demolition rubble is assumed to be transported from the demolition site to an inert construction-and-demolition (C&D) landfill in the country of use. This assumption reflects prevailing regional waste management practices, where the majority of concrete and masonry waste is directed to recycling or reuse, and only a limited fraction that is contaminated or unsuitable for processing is disposed of.

The disposed material consists predominantly of inert mineral waste originating from broken concrete and structural elements containing hardened epoxy grout. Once cured, NanoGrout SG forms a solid, crosslinked polymer matrix embedded within the mineral substrate, which does not biodegrade, does not generate landfill gas, and exhibits very low chemical reactivity under landfill conditions. Any potential leaching from this inert composite material is expected to be minimal, and landfill operations primarily involve placement, spreading, compaction, and routine dust control measures.

Inert C&D landfills in the UAE, Tanzania, and Iraq operate as engineered disposal sites managed in accordance with national or municipal waste regulations, employing practices comparable to those used for inert construction waste internationally. Module C4 therefore includes only the environmental burdens associated with the disposal of this 5% non-recycled fraction, while the remaining 95% of the demolition waste containing NanoGrout SG is addressed under Module C3 and contributes to recovery pathways considered in Module D.

Module D - Reuse, Recovery & Recycling Potential

Module D reports the net environmental burdens and benefits associated with the recovery of materials that leave the system boundary at end-of-life. As NanoGrout SG is applied as a structural epoxy adhesive and anchor grout that becomes permanently embedded within concrete or composite structural elements, its contributions in Module D arise from the recovery of mixed mineral demolition rubble and from the recovery of associated packaging materials.

At end-of-life, 95% of the mixed mineral rubble containing NanoGrout SG is assumed to be processed at authorised construction-and-demolition (C&D) recycling facilities in the country of use, where it is crushed and screened into recycled aggregate that substitutes virgin crushed aggregate on a 1:1 mass basis. This assumption reflects prevailing regional practice, where the majority of concrete and masonry waste is diverted to recycling and reuse applications such as road sub-base, trench backfilling, embankments, landscaping layers, and infrastructure works. Comparable recovery outcomes are reported in regions with mature C&D recycling systems such as the Netherlands, Denmark, Belgium, Japan, and Singapore, which frequently achieve recovery rates above 90% for mineral construction waste; these international benchmarks are cited for contextual reference only, while modelling applies a harmonised scenario consistent with typical regional performance.

Packaging materials also contribute to Module D. Wooden pallets used for the transport of NanoGrout SG are modelled with a 95% recovery rate, supported by the Landfill Avoidance Study conducted by Virginia Tech and the USDA Forest Service (2018), which reports that approximately 95% of pallets are reused, repaired, recycled, or recovered for energy at end-of-life. HDPE containers used for packaging the base and hardener components are assigned a 95% recycling rate, reflecting the high recovery performance of rigid industrial plastic packaging reported by PlasticsEurope and supported by European Commission circular economy guidance for source-separated commercial plastics. LDPE stretch wrap used for pallet stabilisation is similarly modelled with a 95% recycling rate, consistent with recycling performance reported for clean industrial film streams by organisations such as WRAP (UK) and corroborated by plastics recycling industry data for post-industrial LDPE films.

Module D therefore includes the additional environmental burdens associated with the recycling or treatment of these recovered materials, together with the avoided impacts from substituting virgin crushed aggregate, virgin HDPE, virgin LDPE, and recovered wood products. The results reported for Module D represent the net combined effect of these burdens and benefits occurring beyond the system boundary.

LCA KNOWLEDGE

Process	Unit (kg)
Collection process specified by type	
NanoGrout SG in concrete collected as mixed construction 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

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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	GLO	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
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 NanoGrout SG 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 inputs were used across multiple product lines. Electricity consumption, water use, diesel for internal handling, and non-hazardous waste generation were allocated using a mass-based approach, reflecting each product's proportional share of total annual production at the Sharjah facility.

Raw materials, admixtures, additives, and all associated transport flows were modelled using product-specific primary data, as these inputs are dosed exclusively for NanoGrout SG and do not require allocation. No economic allocation was needed, as the plant does not generate co-products during manufacturing.

Electricity

Electricity consumption in the LCA model is based on the UAE grid mix as represented in Ecoinvent v3.11 (Allocation, cut-off by classification). The UAE electricity supply is predominantly generated from natural gas, supplemented by nuclear power, oil, solar energy, and minor imports from neighbouring GCC countries. The modelled grid composition is as follows:

Energy Source	Share (%)
Natural Gas - Combined Cycle Power Plant	51.31%
Natural Gas - Conventional Power Plant	38.11%
Nuclear - Pressure Water Reactor	7.06%
Hard Coal	2.09%

Oil	0.60%
Import from Saudi Arabia	0.44%
Import from Oman	0.20%
Solar Thermal (Parabolic Trough)	0.18%
Wind (<1 MW, Onshore)	0.00003%

The climate impact associated with this electricity mix is 5.81E-01 kg CO_2e 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 Conmix's Sharjah facility.

Calculation Rules

The LCA model for NanoGrout SG uses foreground data collected directly from Conmix's Sharjah manufacturing facility, combined with background datasets sourced from Ecoinvent v3.11 (Allocation, cut-off by classification). These datasets provide emission factors for major inputs, including calcium carbonate fillers, epoxy resin, hardeners, additives, packaging materials, fuel production, electricity generation, and transportation. Regionally representative conditions—such as electricity mixes, supplier distances, international shipping routes, and country-level end-of-life practices for the UAE, Oman, Iraq, and Tanzania—were incorporated where applicable to improve representativeness.

All transport activities related to raw material supply and finished product delivery are included, based on actual supplier-to-plant and plant-to-customer road distances and representative international shipping routes. Road distances were measured using Google Maps, while maritime distances for export shipments were calculated using portdistance.com. Exclusions are limited to items with negligible relevance (typically <1%), such as administrative activities, office utilities, and maintenance of capital equipment. Both road and sea transport are therefore represented within the geographical scope of product distribution.

Byproducts Assignment

No by-products are generated during the manufacturing of NanoGrout SG. The process involves controlled batching and formulation of epoxy grout components, with no co-products formed at any stage. The only outputs are the packaged finished product and normal manufacturing residues treated as waste. Therefore, no allocation for by-products is required.

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ENVIRONMENTAL PERFORMANCE

In the following tables, the environmental performance of the declared unit “1 kilogram of NanoGrout SG” is presented for the Conmix Ltd. Environmental impacts are calculated using EF-3.1, (ILCD).

ENVIRONMENTAL PERFORMANCE

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_2e	1.83E+00	3.30E-03	1.17E-01	1.95E+00	7.07E-02	0.00E+00	0.00E+00	4.94E-03	1.71E-02	3.13E-04	-5.33E-03
Climate change (GWP) - biogenic	Kg CO_2e	0.00E+00	0.00E+00	4.58E-02	4.58E-02	0.00E+00	-4.58E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Climate change (GWP) - LULUC	Kg CO_2e	1.00E-01	1.59E-06	3.11E-05	1.00E-01	3.20E-05	0.00E+00	0.00E+00	2.38E-06	2.44E-05	1.78E-07	-5.33E-03
Climate change (GWP) - total	Kg CO_2e	1.94E+00	3.31E-03	1.18E-01	2.06E+00	7.08E-02	0.00E+00	0.00E+00	4.95E-03	1.72E-02	3.13E-04	-5.35E-03
Ozone depletion	Kg CFC-11e	5.02E-08	4.00E-11	4.53E-09	5.48E-08	7.80E-10	0.00E+00	0.00E+00	7.00E-11	2.70E-10	8.71E-12	-6.00E-11
Acidification	mol H+e	8.57E-03	7.82E-06	9.10E-04	9.49E-03	1.31E-03	0.00E+00	0.00E+00	1.00E-05	1.30E-04	2.19E-06	-4.00E-05
Eutrophication, aquatic freshwater	kg PO_4^{3-} eq	1.40E-03	7.72E-07	2.75E-05	1.43E-03	8.74E-06	0.00E+00	0.00E+00	1.17E-06	2.54E-05	8.41E-08	-5.52E-06
Eutrophication, aquatic freshwater	Kg P eq	4.58E-04	2.51E-07	8.95E-06	4.67E-04	2.85E-06	0.00E+00	0.00E+00	3.80E-07	8.28E-06	2.74E-08	-1.80E-06
Eutrophication, aquatic marine	Kg N eq	2.96E-03	2.09E-06	4.69E-04	3.43E-03	3.29E-04	0.00E+00	0.00E+00	3.13E-06	4.66E-05	8.44E-07	-9.68E-06
Eutrophication, terrestrial	mol N eq	2.03E-02	2.00E-05	4.09E-03	2.44E-02	3.64E-03	0.00E+00	0.00E+00	3.00E-05	5.00E-04	9.19E-06	-1.20E-04
Photochemical ozone formation	Kg NMVOC eq	7.74E-03	1.24E-05	1.26E-03	9.02E-03	1.03E-03	0.00E+00	0.00E+00	1.86E-05	1.61E-04	3.32E-06	-3.39E-05
Abiotic depletion, minerals & metals	Kg Sb eq	1.26E-05	9.86E-09	3.19E-07	1.30E-05	1.00E-07	0.00E+00	0.00E+00	1.48E-08	3.89E-08	4.60E-10	-5.09E-08
Abiotic depletion of fossil resources	MJ	3.05E+01	4.50E-02	1.92E+00	3.24E+01	8.01E-01	0.00E+00	0.00E+00	6.74E-02	2.64E-01	7.66E-03	-6.46E-02
Water use	m^3 depr.	6.13E-01	2.66E-04	2.07E+00	2.69E+00	3.01E-03	0.00E+00	0.00E+00	3.99E-04	5.75E-02	3.39E-04	-1.32E-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.

ENVIRONMENTAL PERFORMANCE

Additional environmental impact indicators

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter	Incidence	1.20E-07	3.37E-10	3.05E-09	1.23E-07	4.22E-09	0.00E+00	0.00E+00	5.05E-10	9.84E-09	5.04E-11	-6.67E-10
Ionizing radiation, human health	Kbq U-235 eq	8.06E-02	4.32E-05	3.93E-03	8.45E-02	5.04E-04	0.00E+00	0.00E+00	6.47E-05	4.16E-04	4.59E-07	-2.48E-04
Ecotoxicity (freshwater)	CTUe	3.02E+01	6.17E-03	6.00E-01	3.08E+01	7.94E-02	0.00E+00	0.00E+00	9.24E-03	8.62E-02	5.50E-04	-1.90E-02
Human toxicity, cancer effects	CTUh	3.24E-09	5.52E-13	2.68E-11	3.27E-09	1.16E-11	0.00E+00	0.00E+00	8.26E-13	3.76E-12	5.68E-14	-2.18E-12
Human toxicity, non-cancer effects	CTUh	1.53E-08	3.28E-11	8.75E-10	1.62E-08	4.00E-10	0.00E+00	0.00E+00	4.91E-11	1.48E-10	1.28E-12	-5.32E-11
Land use related impacts/soil quality	Dimensionless	1.20E+02	5.17E-02	2.06E-01	1.20E+02	5.23E-01	0.00E+00	0.00E+00	7.75E-02	2.87E-01	1.51E-02	-9.82E-02

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_2e	1.94E+00	3.31E-03	7.21E-02	2.02E+00	7.08E-02	4.58E-02	0.00E+00	4.95E-03	1.72E-02	3.13E-04	-5.35E-03

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	2.01E+01	6.94E-04	1.89E-02	2.01E+01	8.07E-03	0.00E+00	0.00E+00	1.04E-03	7.53E-03	7.24E-05	-1.47E+01
Renewable PER used as materials	MJ	5.65E-03	0.00E+00	1.08E-04	5.76E-03	0.00E+00	-5.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.96E-04

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Total use of renewable PER	MJ	2.01E+01	6.94E-04	1.90E-02	2.01E+01	8.07E-03	-5.76E-03	0.00E+00	1.04E-03	7.53E-03	7.24E-05	-1.47E+01
Non-renewable PER used as energy	MJ	3.05E+01	4.50E-02	1.92E+00	3.25E+01	8.09E-01	0.00E+00	0.00E+00	6.74E-02	2.64E-01	7.66E-03	-3.03E+00
Non-renewable PER used as materials	MJ	2.13E-06	0.00E+00	4.07E-08	2.17E-06	0.00E+00	-2.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.14E-06
Total use of non-renewable PER	MJ	3.05E+01	4.50E-02	1.92E+00	3.25E+01	8.09E-01	-2.17E-06	0.00E+00	6.74E-02	2.64E-01	7.66E-03	-3.03E+00
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	1.24E-04	1.24E-04	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	1.39E-01	1.39E-01	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	1.03E+00
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	1.03E+00

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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	1.25E-02

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

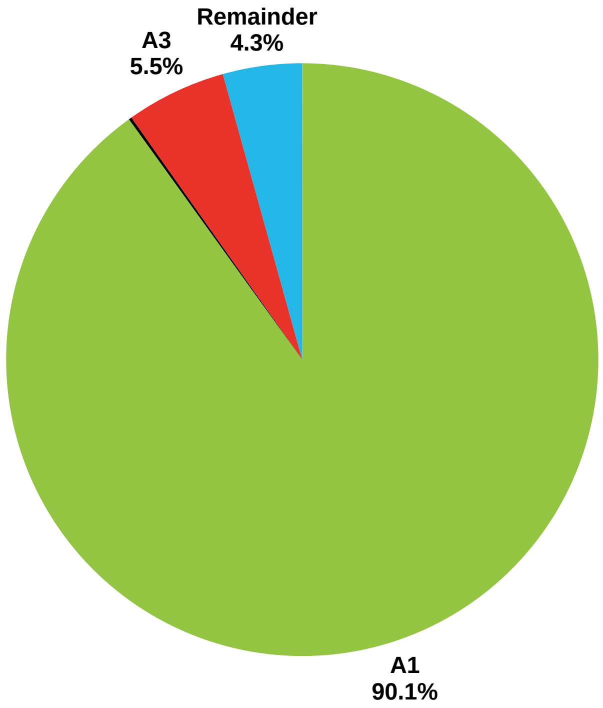
Disclaimer: “According to the **EN 15804:2012+A2:2019** standard, the LCIA results are relative expressions translating impacts into environmental themes such as climate change, ozone depletion, etc. (midpoint impact categories). Thus, the LCIA results do not predict impacts on category endpoints such 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”.

ENVIRONMENTAL PERFORMANCE

Interpretation

The results indicate that Modules A1–A3 are the primary contributors to the total GWP for NanoGrout SG, with A1 alone accounting for 90.05% driven mainly by epoxy resin and polyamide resin production. Manufacturing activities in A3 contribute a further 5.47%, reflecting electricity use, internal handling, and packaging into HDPE containers and palletised loads. Transport of raw materials and finished product (A2 and A4) together represent about 3.44% of total GWP, reflecting regional road distribution and export shipments. End-of-life stages (C1–C4) contribute only around 1.04%, as the cured epoxy grout follows mixed mineral demolition and recycling routes. Overall, epoxy resin is the dominant hotspot, clearly highlighting opportunities for formulation optimisation, increased mineral filler share, or lower-carbon resin sourcing. These insights guide targeted improvements for future environmental performance.

Life Cycle Stage Contribution to GWP (kg CO_2e per 1 kg NanoGrout SG)



ENVIRONMENTAL PERFORMANCE

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 is not an EPD of multiple products.

Information related to Sector EPD

This is not a sector EPD.

Differences vs previous versions

This is the first version of the EPD.

REVIEW AND VERIFICATION

Program Operator	International Climate Intelligence System 71-75 Shelton Street Covent Garden London, WC2H 9JQ United Kingdom
Registration Number	ICIS-202603-124
Publication Date	25-03-2026
Valid Until	24-03-2031
Geographical Scope	United Arab Emirates (UAE)
Product category rules (PCR): PCR 2026:18 Construction products (EN15804:2012+A2:2019/ AC:2021) Version 1.2.6 dated 21-Jan-2026	
PCR review was conducted by: International Climate Intelligence System	
Independent verification of the declaration and data, according to ISO 14025:2006 and ISO 14040: EPD Process Certification (internal) EPD Verification (external) ☑	
Third party verifier: Luis Manuel, International Climate Intelligence System (ICIS)	

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ACRONYMS

Acronym	Meaning
kg CO_2e	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 AND 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.

Databases, Tools & Modelling Sources

- Ecoinvent v3.11, system model: Allocation, cut-off by classification.
- 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.

End-of-Life & Recycling

- UAE Construction & Demolition Recycling Facilities – Dubai Municipality, Tadweer (Abu Dhabi), BEEAH (Sharjah), and other emirates.
- International Construction & Demolition Recycling Benchmarks – Netherlands, Denmark, Belgium, Japan, Singapore.
- Landfill Avoidance Study, Virginia Tech & USDA Forest Service, 2018 – Recovery rates for wooden pallets.
- RecycledPlastic.com & PE/PET Recycling Reports – Plastics recycling industry data for LDPE recovery rates.
- PlasticsEurope & European Commission Circular Economy Guidance – Recovery performance for rigid HDPE packaging.
- WRAP (UK) – Recycling performance for clean LDPE film streams.


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every step