CONMIX

NON-SHRINK GROUTS

ENVIRONMENTAL PRODUCT DECLARATION

NANOGROUT CFG

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

EPD Program	Title	Details
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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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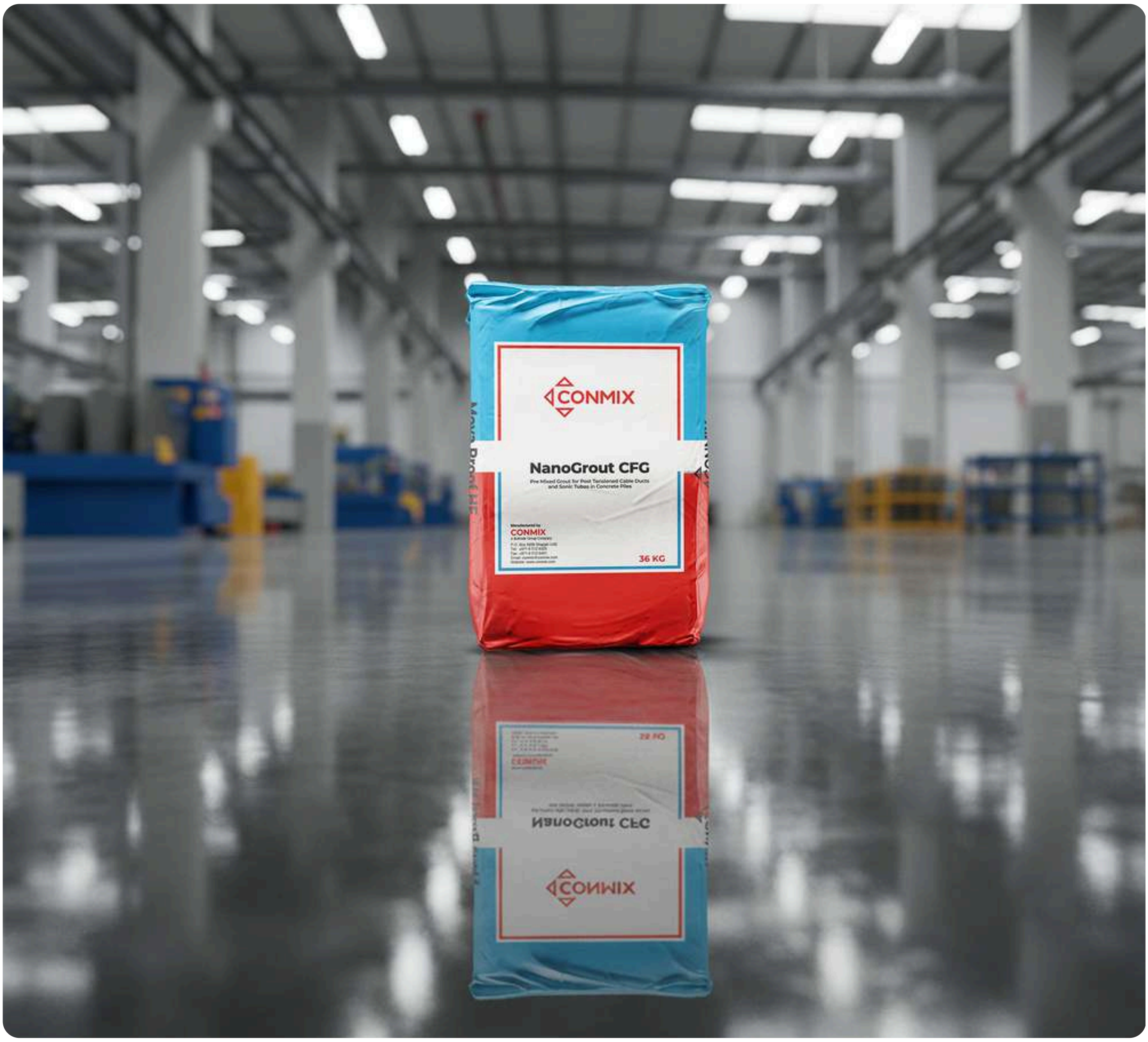
OVERVIEW

This Environmental Product Declaration (EPD) presents verified, transparent environmental performance data for NanoGrout CFG, 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 CFG.

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 CFG

Product Type

High-flow, non-shrink cementitious 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

Dry-mix cementitious 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	1.02E+00	Kg CO_2e
Climate change (GWP) - fossil	1.02E+00	Kg CO_2e
Ozone Depletion (ODP)	8.97E-09	Kg CFC-11e
Abiotic depletion of fossil resources	8.07E+00	MJ

Hotspot Summary

Process	Share of Total GWP (%)
Raw Material Supply (A1)	85.92
Raw Material Transportation (A2)	0.34
Manufacturing (A3)	11.26
Remaining Modules (A4, C1-C4)	2.48

PRODUCT INFORMATION

Where This Adds Value

Scheme / Area	Relevance to NanoGrout CFG
LEED v4.1 (USGBC) – MR Credit: EPDs (aligned with emerging LEED v5 requirements)	The Type III EPD for NanoGrout CFG supports Material Disclosure credits and contributes toward whole-building embodied carbon reporting. Commonly used in UAE and KSA projects delivered under LEED certification.
Estidama Pearl Rating System (Abu Dhabi)	Provides verified environmental data required for LBo-6 and material transparency pathways. NanoGrout CFG is frequently used in foundations, machine bases, and duct grouting on Pearl projects.
GSAS (Qatar)	Supports materials submittals requiring environmental documentation for QSAS/GSAS Material & Waste credits. CFG'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 and Riyadh projects.
Whole-Building LCA Tools	The cradle-to-gate with options LCA model for CFG can be directly used in digital LCA models for GCC mega-projects (airports, metros, mixed-use developments).
Government & Giga-Project Requirements	Major clients like NEOM, Red Sea Global, Diriyah Gate, ADNOC, DEWA increasingly require verified product-specific EPDs. CFG'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 CFG is a ready-to-use, high-strength, non-shrink cementitious grout formulated for precision grouting applications in post-tensioned cable ducts, sonic tubes in concrete piles, and specialized anchoring works. The product is supplied as a single-component grey powder, requiring only the addition of potable water at site to achieve high flowability and controlled expansion at a low water-to-cement ratio. Its composition incorporates Ordinary Portland Cement (OPC) and performance-enhancing additives that provide excellent fluidity retention, no bleeding, and superior stability during pumping.

The grout is engineered for demanding civil and geotechnical applications where consistent flow, full duct encapsulation, and long-term durability are critical. It delivers high compressive and flexural strength, positive expansion, high density, and negligible chloride content, making it suitable for structural anchorage, crack injection, micropile grouting, and critical pile integrity testing systems. NanoGrout CFG is available in 25 kg and 50 kg bags, offering flexibility across project scales and site conditions.

Sectors & Corresponding Uses

Sector	Application / Use Case
Post-Tensioning Works	Grouting of post-tensioned cable ducts to ensure corrosion protection and complete encapsulation
Geotechnical Engineering	Grouting of rock anchors, micropiles, and sheet pile anchors
Deep Foundation Testing	Filling of sonic tubes in concrete piles for integrity testing
Structural Repair & Rehabilitation	Injection into non-moving concrete cracks and intricate voids
Marine / Infrastructure Projects	Long-term durable grouting in aggressive exposure environments

Technical Specifications

Parameter	Details / Specification
Form	Single component grey powder
Mixing Water	Max 9 L per 25 kg bag

PRODUCT DESCRIPTION

Fresh Wet Density	2.00 ± 0.05 kg/L (BS EN 445)
Flow (Marsh Cone)	10–25 sec initial; <25 sec after 30 minutes (depending on W/P ratio)
Compressive Strength	55–65 MPa at 28 days (varies by mix ratio)
Flexural Strength	>8 MPa at 28 days
Expansion	0-3% positive expansion
Bleeding	Max 0.3%
Chloride Content	Nil (to BS EN 934-4)
Pack Size	25 kg & 50 kg bags
Yield	17 L per 25 kg bag (at W/P = 0.36)
Application Method	Pumped through vents (ducts, tubes) or injected in cracks

MANUFACTURING DETAILS

The production of NanoGrout CFG at Conmix begins with the receipt and inspection of key raw materials, including Ordinary Portland Cement (OPC), graded mineral fillers, and specialised non-shrink and flow-retention additives. Each incoming material undergoes quality verification to ensure compliance with internal specifications and consistency across batches. Approved materials are transferred to dedicated storage silos, bins, or sealed containers depending on their sensitivity to moisture and handling requirements.

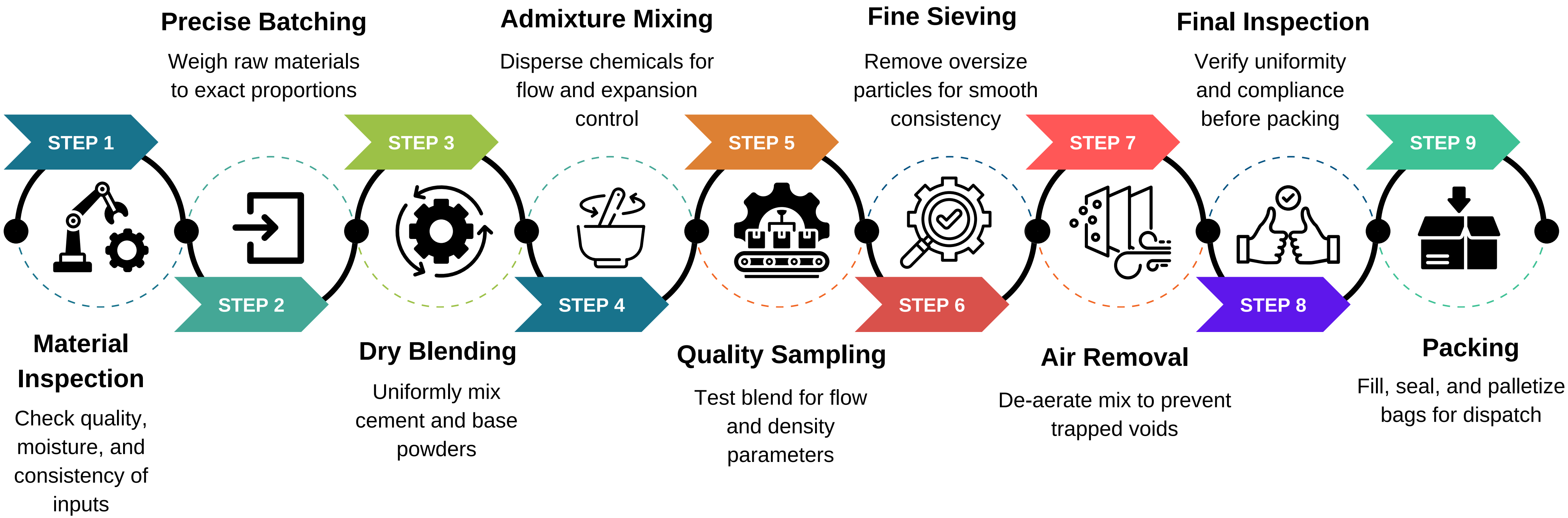
During batching, raw materials are metered in precise proportions using automated dosage systems to ensure controlled formulation. These weighed components enter the dry-mix blending unit, where high-efficiency industrial mixers homogenize the cementitious base with the flow enhancers and expansion agents. The process is designed to achieve uniform distribution of fine powders and additives, which is essential to the product's high flowability, non-shrink characteristics, and stable performance at low water-to-cement ratios. No chemical reactions occur during manufacturing; the process is strictly physical blending.

Following homogenization, the mix undergoes secondary refinement steps such as fine sieving and air removal, which help eliminate agglomerates and ensure smooth pumpability during site application. Samples from each batch are tested for flow, density, and moisture content to validate conformity with the technical datasheet (e.g., Marsh cone flow and density per BS EN 445). Conforming batches are transferred to the automated packing line, where NanoGrout CFG is filled into moisture-resistant 25 kg and 50 kg bags, batch-coded, and palletized. The packaged product is then wrapped, labelled, and prepared for distribution from the Sharjah 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.

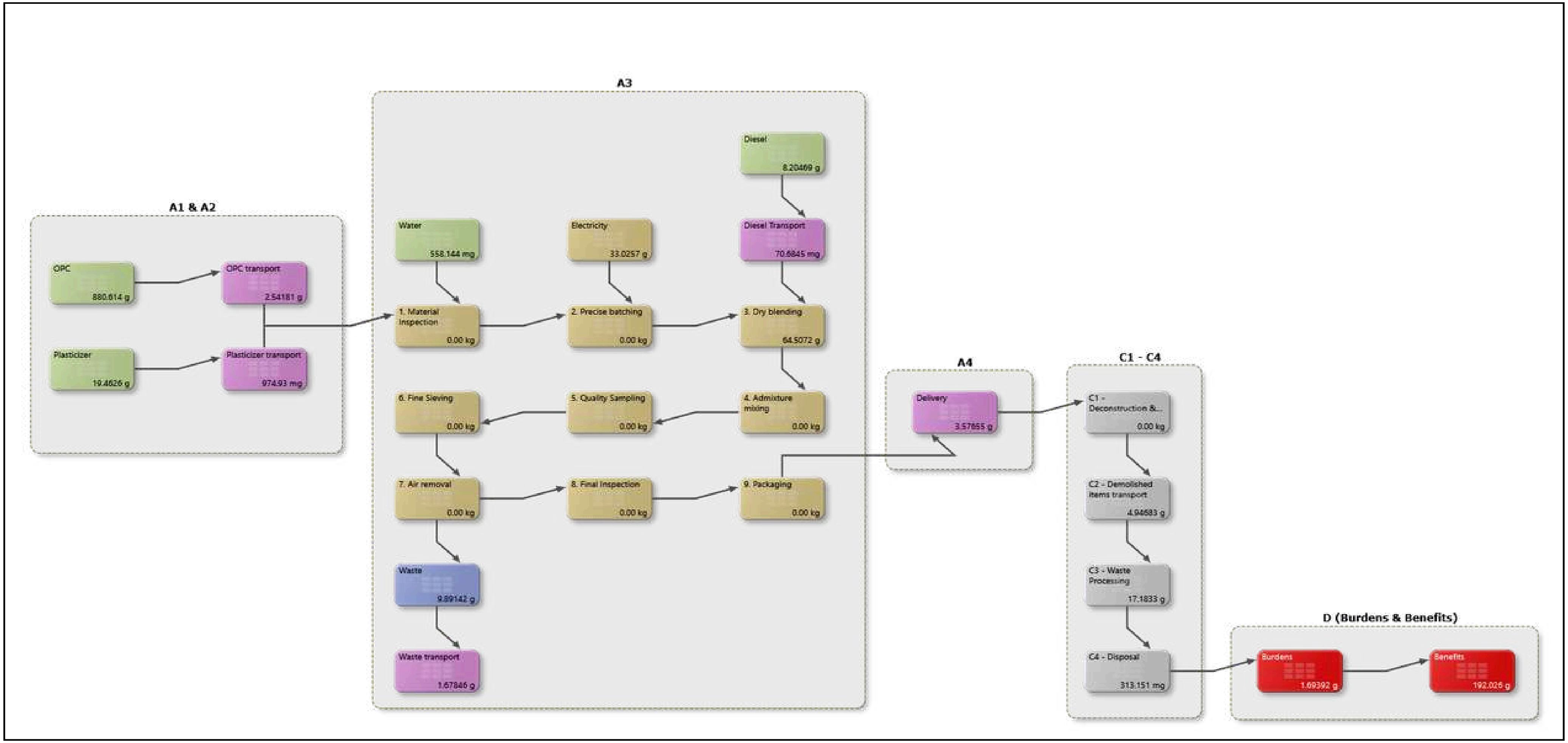
MANUFACTURING DETAILS

Schematic overview of NanoGrout CFG manufacturing process



MANUFACTURING DETAILS

Screenshot of NanoGrout CFG LCA model from LCA software



CONTENT DECLARATION

The content declaration provides a transparent breakdown of all raw materials used to produce 1 kg of NanoGrout CFG, expressed per 1 kg of product. The formulation consists of Ordinary Portland Cement (OPC) as the primary component, complemented by small quantities of superplasticizer and performance-enhancing additives and fillers. 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)
Ordinary Portland Cement (OPC)	0.98	0	0	0	0
Super Plasticizer	0.01	0	0	0	0
Additives and 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 CFG 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—Ordinary Portland Cement, superplasticizer, additives, and fillers—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 CFG include wooden pallets, multi-wall kraft cement bags, and LDPE liners. These materials serve distinct functions within the product supply chain—wooden pallets provide structural stability during handling and transport, kraft cement bags protect the dry powder product during storage, and LDPE liners prevent moisture ingress and preserve flowability. 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
Cement 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
LDPE Liners	0% biogenic	0 kg C/kg	Petroleum-based plastic; contains no biogenic carbon

Wood and cement bags contain significant biogenic carbon because they originate from biomass; LDPE does 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	82.24	1.25E-02	Reuse / Recycle / Energy Recovery
LDPE Liners	1.40E-03	4.60	0.00E+00	Recycle / Energy Recovery
Cement Bags	4.00E-03	13.16	1.76E-03	Recycle
Total	**3.04E-02**	**100**	**1.43E-02**	**-**
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.**				

LCA KNOWLEDGE

Declared Unit

The declared unit for this EPD is 1 kg of NanoGrout CFG 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 CFG 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 CFG 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 UAE and GCC practice, ensuring geographical relevance of the final results.

Technological Representativeness: The manufacturing process modelled for NanoGrout CFG accurately reflects the actual production technology used at Conmix Ltd.'s Sharjah facility. The product is produced through a dry-mix blending process, incorporating OPC, graded fillers, and performance additives using industrial mixers, controlled batching systems, and automated sieving equipment. No chemical reactions, heating, or wet processes occur during production, and no by-products are generated. The technological assumptions used in the LCA are therefore fully representative of real operations at the plant, ensuring that the results reflect true site-specific conditions.

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LCA Software and Database

The life cycle model for NanoGrout CFG 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 covers the upstream processes involved in sourcing and preparing all raw materials used to produce NanoGrout CFG. The main constituents—Ordinary Portland Cement (OPC), mineral fillers, and performance additives—are procured from established suppliers within the United Arab Emirates, ensuring consistent quality and compatibility with regional construction requirements. Additional components such as superplasticizers are sourced from Dammam, Saudi Arabia, while performance additives and fillers are obtained from a combination of local and international suppliers depending on 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 Ordinary Portland Cement (OPC), additives, fillers, and superplasticizer—are sourced exclusively from suppliers within the UAE while the superplasticizer is imported from Dammam, Saudi Arabia, reflecting the mixed local–regional nature of supply for CFG. All inbound movements are modelled as heavy-duty road transport using >32-ton Euro 6–equivalent trucks, representing typical logistics used for bulk powders, bagged materials, and palletized inputs. 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 actual supplier-to-plant road distances used in the LCA model reflect realistic UAE logistics conditions and are applied consistently across all raw materials included in the product system.

Module A3 - Manufacturing

Manufacturing impacts cover all processes required to convert raw materials into the finished NanoGrout CFG product at the Conmix facility in Sharjah. Production follows a controlled dry-mix workflow comprising nine sequential steps: Material Inspection, Precise Batching, Dry Blending, Admixture Mixing, Quality Sampling, Fine Sieving, Air Removal, Final Inspection, and Packing. Each stage ensures accurate dosing, uniform dispersion of additives, consistent mix 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 (LDPE liners, cement bags, 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 CFG from the Conmix manufacturing facility in Sharjah to customer locations. Since NanoGrout CFG is 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 v3.11 cut-off system model assumptions, reflecting typical heavy-duty vehicles used for bulk construction materials in the region.

As a dry powder packaged in bags and palletised for shipment, the product is transported as consolidated loads with full capacity utilisation. Transport distances are based on representative average delivery routes within the UAE, covering distribution to construction sites, contractors, and infrastructure projects. Environmental impacts in this module include diesel consumption

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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 v3.11
Bulk transportation	Mass of the transported product

Module C1 - Deconstruction and Demolition

Module C1 addresses the environmental impacts associated with deconstruction or demolition of the product at end-of-life. NanoGrout CFG is applied in voids, ducts, joints, or anchor zones where it hardens and becomes fully bonded within the surrounding concrete. Once cured, it no longer exists as a separate layer or component that can be removed on its own.

During end-of-life demolition, the entire concrete element is broken using standard demolition equipment (e.g., hydraulic breakers or crushers). The grout simply follows the same mechanical breakup as the concrete around it. No additional time, tools, fuel, or handling effort is required specifically for the grout.

For example, if a beam or slab containing grout is demolished, the contractor does not identify, target, or treat the grout differently; the teardown process remains unchanged whether the grout is present or not. This means the presence of NanoGrout CFG does not influence the demolition method or increase the resources consumed during deconstruction. Because no distinct or measurable demolition activities are attributable to NanoGrout CFG alone, the environmental burdens in 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 CFG becomes part of the mixed mineral rubble generated from breaking concrete elements. Since the product is supplied and used exclusively within the UAE, the demolition waste remains entirely within the national waste management system, which is characterised by high diversion rates for concrete and masonry rubble.

Across the UAE, construction-and-demolition (C&D) recycling facilities operated by Dubai Municipality, Tadweer (Abu Dhabi), BEEAH (Sharjah), and other emirates typically achieve diversion rates between 90% and 97%, driven by regulatory requirements and the strong demand for recycled aggregate in infrastructure works. These values are consistent with performance observed in countries with advanced C&D recycling systems—such as the Netherlands, Denmark, Belgium, Japan, and Singapore—which frequently achieve recovery rates in the 90–99% range. These international rates are included for context only; the modelling relies solely on UAE-specific practices.

Reflecting the UAE's established recycling performance, 95% of the mixed demolition rubble containing NanoGrout CFG is assumed to be transported to a C&D recycling facility, while the remaining 5% is sent directly to an inert landfill due to contamination, sorting limitations, or unsuitable loads. A one-way distance of 50 km is assumed for both routes, representing typical transport distances between demolition sites and authorised facilities within the UAE. Transport is modelled using a >32-ton EURO 6 lorry commonly used for bulk mineral waste transport in the region.

Module C2 therefore includes only the emissions associated with transporting the mixed demolition rubble to the respective recycling and landfill sites within the UAE.

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 CFG is demolished together with the concrete element, it forms part of the mixed mineral waste stream typically comprising concrete, masonry, mortar, and similar construction materials. Since the product is used only within the UAE, the recycled fraction is routed through local C&D recycling facilities such as those operated by Dubai Municipality, Tadweer, BEEAH, and private-sector operators across the emirates.

At these facilities, processing normally begins with coarse sorting to remove oversized fragments and contaminants, followed by primary crushing of the rubble. Magnetic separation extracts reinforcing steel, which is diverted for metal recycling. The mineral fraction is then subjected to secondary crushing and multi-stage screening to produce graded recycled aggregates and fines. These mechanical processes do not require any special treatment for NanoGrout CFG, as the hardened grout behaves identically to concrete during crushing.

Recycled aggregates produced in UAE plants are widely used for road base, sub-base, utility trench bedding, backfilling, embankments, footpath layers, and landscaping fill, supporting the country's circular economy targets. These uses align with applications seen internationally in regions with advanced C&D recycling practices such as the Netherlands, Denmark, Belgium, Japan, and Singapore. International examples are provided for context only; modelling assumptions remain fully UAE-centric.

Module C3 therefore includes the environmental burdens associated with crushing, sorting, and screening the 95% of mixed mineral demolition waste containing NanoGrout CFG that is directed to recycling. Material that cannot be recovered proceeds to Module C4 for disposal.

Module C4 - Disposal

Module C4 covers the disposal of the portion of demolition waste that does not enter the recycling route. For NanoGrout CFG, 5% of the mixed mineral rubble is assumed to be sent directly from the demolition site to an inert construction-and-demolition (C&D) landfill within the UAE. This assumption reflects the country's well-established system where most of the concrete and masonry rubble is directed to C&D recycling plants, while only a small contaminated or non-recoverable portion is disposed of.

The disposed material consists entirely of inert mineral waste derived from broken concrete containing the hardened grout. These materials do not generate landfill gas, do not biodegrade, and exhibit extremely low chemical reactivity. In inert landfill operations, any leachate from such mineral fractions is typically negligible, and landfill management focuses mainly on placement, spreading, compaction, and dust suppression.

UAE C&D landfills operate as engineered inert disposal sites managed under municipal waste regulations, with similar operational practices to inert landfills used internationally. Module C4 therefore includes only the operational burdens associated with the disposal of this 5% non-recycled mineral fraction, while the remaining 95% is handled in C3 and contributes to recovery benefits 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. Since NanoGrout CFG becomes part of the concrete element in service, its contributions in Module D arise solely from the recovery of mixed mineral demolition rubble and the recovery of packaging materials.

At end-of-life, 95% of the mineral rubble containing NanoGrout CFG is processed at a UAE C&D recycling facility, where it is crushed into recycled aggregate that substitutes virgin crushed gravel on a 1:1 mass basis. This reflects actual performance in the UAE, where government-regulated C&D recycling plants commonly divert the majority of concrete waste into recycled aggregate used for road sub-base, backfilling, trench bedding, landscaping layers, and infrastructure works. These recovery outcomes are consistent with international benchmarks from regions with mature recycling systems such as the Netherlands, Denmark, Belgium, Japan, and Singapore.

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Packaging materials also contribute to Module D. Wooden pallets are modelled with a 95% recovery rate, supported by the Landfill Avoidance Study (Virginia Tech & USDA Forest Service, 2018), which found that approximately 95% of pallets are reused, repaired, or recovered for energy. LDPE liners are assigned a 95% recycling rate, achievable in clean industrial environments and supported by plastics recycling industry data (e.g., RecycledPlastic.com). Multi-wall kraft cement bags are similarly modelled with 95% recovery, representing source-separated industrial collection streams where paper fibre is recycled or used as energy recovery feedstock.

Module D therefore includes the additional burdens associated with the recycling or treatment of these recovered materials, along with the avoided impacts of substituting virgin crushed aggregate, virgin LDPE, virgin kraft paper fibre, and recovered wood products. The results represent the net combined effect of these burdens and benefits.

Process	Unit (kg)
Collection process specified by type	
NanoGrout CFG 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

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 NanoGrout CFG 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 dry-mix 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 CFG 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 CFG 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 all major inputs, including cement, additives, packaging materials, fuel production, electricity generation, and transportation. UAE-specific conditions—such as regional electricity mix, local supplier distances, and national end-of-life practices—were incorporated wherever 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 within the UAE. Distances were measured using Google Maps to reflect realistic logistics routes. Exclusions are limited to items with negligible relevance (typically <1%), such as administrative activities, office utilities, and maintenance of capital equipment. No maritime transport is involved, as the product is supplied exclusively within the UAE.

Byproducts Assignment

No by-products are generated during the manufacturing of NanoGrout CFG. The production process involves only the transformation and blending of raw materials into a dry grout mixture, with no secondary materials or co-products formed at any stage. Since there are no outputs other than the final product and normal manufacturing residues (which are treated as waste), allocation for by-products is not required.

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ENVIRONMENTAL PERFORMANCE

In the following tables, the environmental performance of the declared unit “1 kilogram of NanoGrout CFG” 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	8.97E-01	3.51E-03	1.17E-01	1.02E+00	3.71E-03	0.00E+00	0.00E+00	4.94E-03	1.71E-02	3.13E-04	-1.88E-01
Climate change (GWP) - biogenic	Kg CO_2e	0.00E+00	0.00E+00	5.23E-02	5.23E-02	0.00E+00	-5.23E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Climate change (GWP) - LULUC	Kg CO_2e	6.59E-04	1.69E-06	3.11E-05	6.91E-04	1.78E-06	0.00E+00	0.00E+00	2.38E-06	2.44E-05	1.78E-07	-5.88E-03
Climate change (GWP) - total	Kg CO_2e	9.00E-01	3.52E-03	1.18E-01	1.02E+00	3.71E-03	0.00E+00	0.00E+00	4.95E-03	1.72E-02	3.13E-04	-1.90E-01
Ozone depletion	Kg CFC-11e	4.39E-09	5.00E-11	4.53E-09	8.97E-09	5.00E-11	0.00E+00	0.00E+00	7.00E-11	2.70E-10	8.71E-12	5.17E-06
Acidification	mol H+e	3.28E-03	8.33E-06	9.10E-04	4.20E-03	8.79E-06	0.00E+00	0.00E+00	1.00E-05	1.30E-04	2.19E-06	-1.25E-03
Eutrophication, aquatic freshwater	kg PO_4^{3-} eq	3.65E-04	8.22E-07	2.75E-05	3.93E-04	8.68E-07	0.00E+00	0.00E+00	1.17E-03	2.54E-05	8.41E-08	-1.66E-04
Eutrophication, aquatic freshwater	Kg P eq	1.19E-04	2.68E-07	8.95E-06	1.28E-04	2.83E-07	0.00E+00	0.00E+00	3.80E-04	8.28E-06	2.74E-08	-5.41E-05
Eutrophication, aquatic marine	Kg N eq	9.51E-04	2.23E-06	4.69E-04	1.42E-03	2.35E-06	0.00E+00	0.00E+00	3.13E-06	4.66E-05	8.44E-07	-3.57E-04
Eutrophication, terrestrial	mol N eq	1.04E-02	2.00E-05	4.09E-03	1.46E-02	3.00E-05	0.00E+00	0.00E+00	3.00E-05	5.00E-04	9.19E-06	-3.80E-03
Photochemical ozone formation	Kg NMVOC eq	3.32E-03	1.33E-05	1.26E-03	4.60E-03	1.40E-05	0.00E+00	0.00E+00	1.86E-05	1.61E-04	3.32E-06	-1.34E-03
Abiotic depletion, minerals & metals	Kg Sb eq	2.81E-06	1.05E-08	3.19E-07	3.14E-06	1.11E-08	0.00E+00	0.00E+00	1.48E-08	3.89E-08	4.60E-10	-8.74E-07
Abiotic depletion of fossil resources	MJ	6.10E+00	4.79E-02	1.92E+00	8.07E+00	5.06E-02	0.00E+00	0.00E+00	6.74E-02	2.64E-01	7.66E-03	-2.72E+00
Water use	m^3 depr.	1.27E-01	2.84E-04	2.07E+00	2.20E+00	2.99E-04	0.00E+00	0.00E+00	3.99E-04	5.75E-02	3.39E-04	-9.75E-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	5.07E-08	3.59E-10	3.05E-09	5.41E-08	3.78E-10	0.00E+00	0.00E+00	5.05E-10	9.84E-09	5.04E-11	-2.95E-08
Ionizing radiation, human health	Kbq U-235 eq	1.14E-02	4.60E-05	3.93E-03	1.53E-02	4.85E-05	0.00E+00	0.00E+00	6.47E-05	4.16E-04	4.59E-07	-7.40E-03
Ecotoxicity (freshwater)	CTUe	2.08E+00	6.57E-03	6.00E-01	2.69E+00	6.93E-03	0.00E+00	0.00E+00	9.24E-03	8.62E-02	5.50E-04	-1.04E+00
Human toxicity, cancer effects	CTUh	1.36E-09	5.88E-13	2.68E-11	1.39E-09	6.20E-13	0.00E+00	0.00E+00	8.26E-13	3.76E-12	5.68E-14	-1.14E-09
Human toxicity, non-cancer effects	CTUh	6.01E-09	3.49E-11	8.75E-10	6.92E-09	3.69E-11	0.00E+00	0.00E+00	4.91E-11	1.48E-10	1.28E-12	-1.82E-09
Land use related impacts/soil quality	Dimensionless	1.13E+02	5.51E-02	2.06E-01	1.13E+02	5.81E-02	0.00E+00	0.00E+00	7.75E-02	2.87E-01	1.51E-02	-1.06E+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	9.00E-01	3.52E-03	6.56E-02	9.69E-01	3.71E-03	5.23E-02	0.00E+00	4.95E-03	1.72E-02	3.13E-04	-1.90E-01

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	1.57E+01	7.39E-04	1.89E-02	1.57E+01	7.80E-04	0.00E+00	0.00E+00	1.04E-03	7.53E-03	7.24E-05	-1.47E+01
Renewable PER used as materials	MJ	1.24E-03	0.00E+00	1.08E-04	1.35E-03	0.00E+00	-1.35E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.18E-04

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Total use of renewable PER	MJ	1.57E+01	7.39E-04	1.90E-02	1.57E+01	7.80E-04	-1.35E-03	0.00E+00	1.04E-03	7.53E-03	7.24E-05	-1.47E+01
Non-renewable PER used as energy	MJ	6.10E+00	4.79E-02	1.92E+00	8.07E+00	5.06E-02	0.00E+00	0.00E+00	6.74E-02	2.64E-01	7.66E-03	-2.72E+00
Non-renewable PER used as materials	MJ	1.45E-06	0.00E+00	4.07E-08	1.49E-06	0.00E+00	-1.49E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.13E-06
Total use of non-renewable PER	MJ	6.10E+00	4.79E-02	1.92E+00	8.07E+00	5.06E-02	-1.49E-06	0.00E+00	6.74E-02	2.64E-01	7.66E-03	-2.72E+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	9.79E-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	9.79E-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	1.43E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2. "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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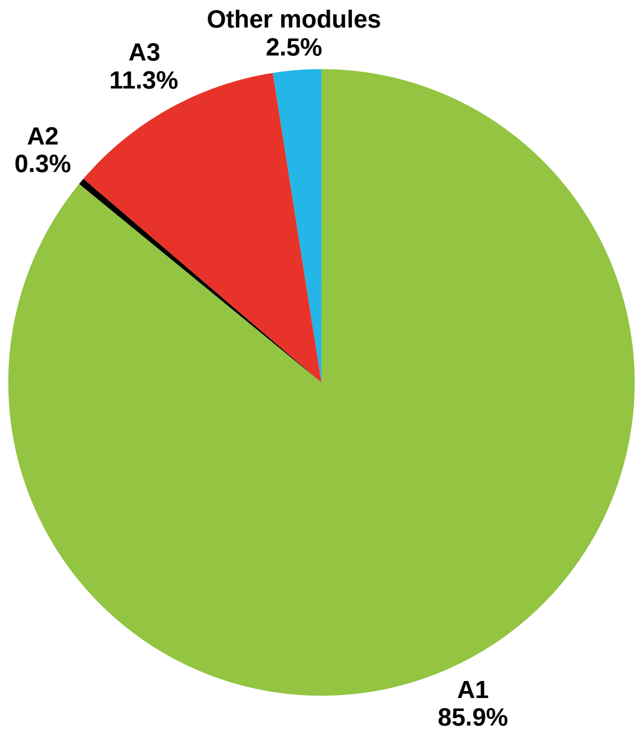
Interpretation

The results show that Modules A1–A3 dominate the total GWP, contributing about 98% of the overall environmental impact for NanoGrout CFG. This is mainly driven by raw material production—particularly Ordinary Portland Cement—along with manufacturing energy and packaging inputs. Module A4 contributes less than 1%, while end-of-life stages (C1–C4) together account for around 2%, reflecting the inert nature of the product and the high recycling rates of concrete rubble in UAE facilities. Overall, the main hotspot is clearly A1 raw materials, indicating that any future improvement efforts should target clinker substitution, supply-chain optimization, or lower-carbon binders. Manufacturing efficiency (A3) is the second-largest contributor and may benefit from energy optimisation and renewable electricity sourcing. Other modules contribute minimally.

Life cycle Stage Contribution to GWP (kg CO_2e per 1 kg NanoGrout CFG)



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-202603-118
Publication Date	20-03-2026
Valid Until	19-03-2031
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 – Used to calculate road transport distances for raw materials, diesel and finished product delivery.

End-of-Life & Recycling

- UAE Construction & Demolition Recycling Facilities – Dubai Municipality, Tadweer (Abu Dhabi), BEEAH (Sharjah).
- Oman Construction & Demolition Recycling Facilities – be'ah Oman.
- 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 – Plastics recycling industry data for LDPE recovery rates.


Building strength
with Conmix at
every step