CONMIX

CONCRETE ADMIXTURES

ENVIRONMENTAL PRODUCT DECLARATION

MEGAADD CGA

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 MegaAdd CGA, 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 MegaAdd CGA.

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

MegaAdd CGA

Product Type

Liquid Accelerator for
Fluid Cement 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

Aqueous sodium silicate
solution blending

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	1.06E+00	Kg CO_2e
Climate change (GWP) - fossil	1.05E+00	Kg CO_2e
Ozone Depletion (ODP)	1.76E-08	Kg CFC-11e
Abiotic depletion of fossil resources	1.18E+01	MJ

Hotspot Summary

Process	Share of Total GWP (%)
Raw Material Supply (A1)	86.65
Raw Material Transportation (A2)	0.19
Manufacturing (A3)	10.86
Remaining Modules (A4, C1-C4)	2.30

PRODUCT INFORMATION

Where This Adds Value

Scheme / Area	Relevance to MegaAdd CGA
LEED v4.1 (USGBC) – MR Credit: EPDs (aligned with emerging LEED v5 requirements)	The Type III EPD for MegaAdd CGA supports Material Disclosure credits and contributes toward whole-building embodied carbon reporting for UAE projects seeking LEED certification.
Estidama Pearl Rating System (Abu Dhabi)	Provides verified environmental data for material transparency pathways. MegaAdd CGA is used as a cementitious grout accelerator in tunnelling, backfilling, and repair works on Pearl-rated infrastructure and building projects.
GSAS (Qatar)	Supports consultant-led material benchmarking and sustainability assessments for projects in the UAE that reference GSAS/QSAS methodologies. MegaAdd CGA's quantified impacts support transparent material evaluation.
BREEAM (UK/UAE Adaptations)	EPD contributes to MAT 01 and MAT 02 credits related to building LCA and responsible material selection on UAE projects adopting BREEAM or BREEAM-aligned frameworks.
Whole-Building LCA Tools	The cradle-to-gate with options LCA model for MegaAdd CGA can be incorporated into digital building and infrastructure LCA tools used in the UAE.
Government & Giga-Project Requirements	UAE government entities and major infrastructure developers increasingly require product-specific EPDs. MegaAdd CGA's EPD supports material pre-qualification and approval processes.
Procurement Transparency (GCC Contractors)	Supports sustainability documentation for UAE-based contractors and consultants who require verified environmental data for tender submissions.

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

MegaAdd CGA is a high-performance, single-component, liquid alkaline accelerator formulated to provide rapid setting and early strength development in cementitious grouts, mortars, and slurries intended for injection and backfilling applications. Supplied as a ready-to-use liquid, it is introduced into fluid grout streams at the point of application, where it promotes rapid gel formation and controlled acceleration of cement hydration. Its formulation is dominated by sodium silicate solution and water, together with minor constituents that ensure stable performance, low viscosity, and consistent acceleration behaviour under varying site and ground conditions.

The product is designed for grouting and injection applications where fast setting, early strength gain, and secure filling are critical. MegaAdd CGA enables rapid work progress, improves the stability of injected grouts, and supports effective sealing and load transfer in underground and structural works. Typical uses include back-fill grouting behind precast tunnel segments, grouting and fixing operations, levelling of uneven substrates, concrete repair of water leaks in channels, and temporary pre-plugging of leaks in cracks, honeycombs, and other defects. The product is supplied in liquid form in drums for bulk delivery, allowing flexible use for both small-scale grouting works and large-volume infrastructure projects.

Sectors & Corresponding Uses

Sector	Application / Use Case
Tunnelling & Underground Works	Back-fill grouting behind precast tunnel segments to achieve rapid setting, early strength, and secure annular gap filling
Building Construction	Grouting and fixing of anchors, baseplates, and structural elements where fast setting and early load transfer are required
Precast & Segmental Construction	Injection grouting of joints, voids, and interfaces to ensure rapid gel formation and dimensional stability
Infrastructure & Transport Projects	Grouting of pavements, culverts, retaining structures, and repair zones requiring quick sealing and early strength
Water Control & Repair Works	Temporary pre-plugging and repair of water leaks in cracks, honeycombs, and channels using fast-setting cementitious grouts

PRODUCT DESCRIPTION

Technical Specifications

Parameter	Details / Specification
Form	Liquid
Mixing Method	Ready-to-use; added by metered dosing into the grout stream (at nozzle with non-return valve) prior to injection
Component	Single-component alkaline accelerator (sodium silicate–based solution)
Colour	Transparent
Specific Gravity	1.30 ± 0.02 kg/ltr @ 25°C (ASTM C494)
pH	9 – 11 (ASTM C494)
Chloride Content	< 0.1% (BS EN 480-10)
Viscosity	30 – 70 mPas
Solubility in Water	Completely soluble
Typical Dosage	2.5 – 5% by volume of grout (general use); 5 – 10% by volume for TBM back-filling, depending on setting-time requirements
Pack Size	260 kg drum / 1300 kg container / Bulk supply
Application Method	Injected as part of a two-component grouting system; accelerator is introduced at the nozzle just before injection into cementitious grout or slurry for back-filling, grouting, and repair works

MANUFACTURING DETAILS

The production of MegaAdd CGA at Conmix begins with material inspection of key raw materials, primarily sodium silicate solution and water, which constitute the main components of the alkaline accelerator formulation. All incoming materials are visually checked and verified against internal specifications for appearance, density, and documentation before being transferred to appropriate storage tanks or containers based on their physical form and handling requirements.

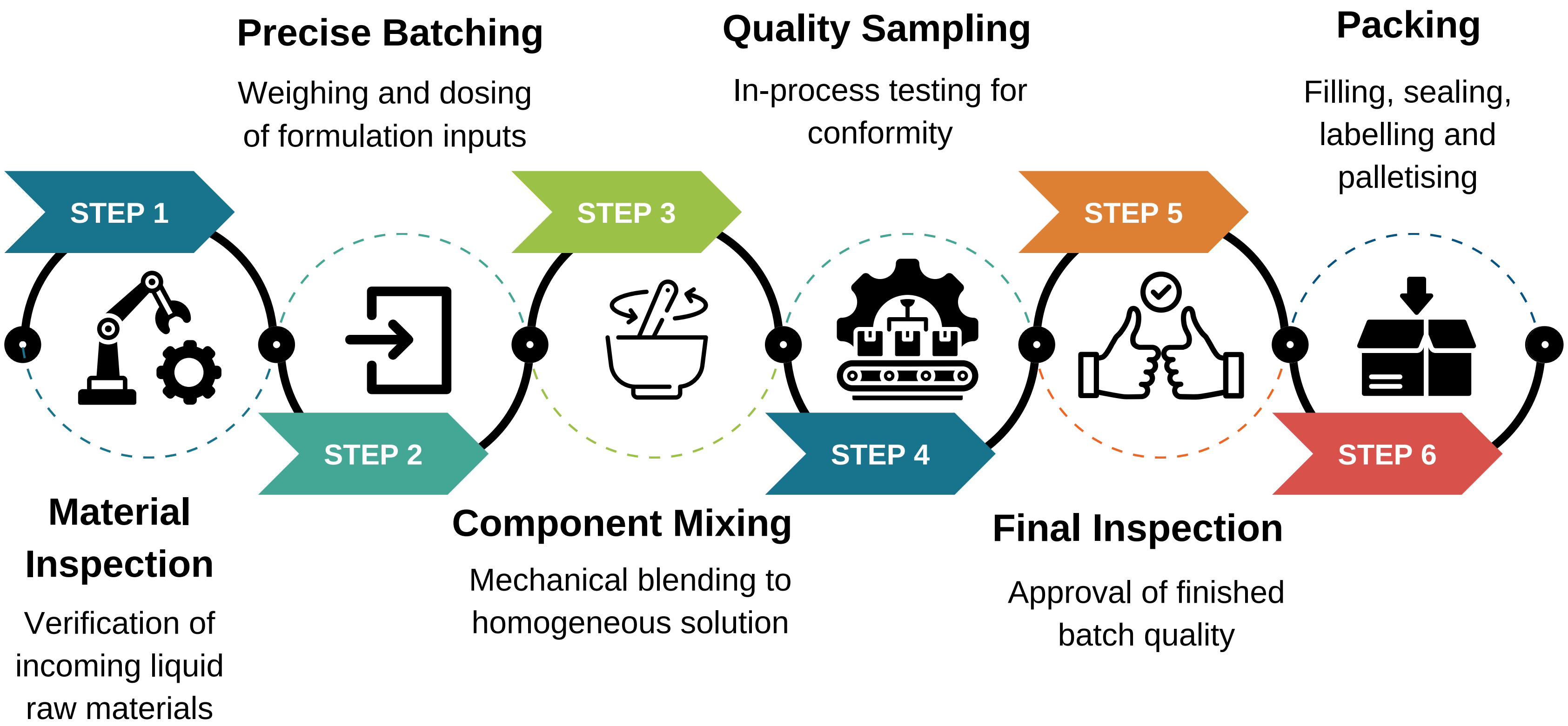
During precise batching, each liquid raw material is accurately metered and dosed according to the defined formulation to ensure consistent product composition. The batched materials are then subjected to component mixing in dedicated mixing vessels, where mechanical agitation is applied to obtain a homogeneous alkaline solution with uniform pH and viscosity. This stage ensures thorough dispersion of the sodium silicate and stabilisation of the formulation, contributing to MegaAdd CGA's reliable acceleration performance and consistent behaviour in cementitious grout systems. No chemical reaction or synthesis takes place during manufacturing; the process consists solely of physical blending.

Following mixing, representative samples are taken for quality sampling and tested for key parameters such as appearance, specific gravity, pH, and viscosity to confirm compliance with the technical datasheet. The finished batch undergoes final inspection prior to filling. Conforming material is then packaged into HDPE drums or supplied in bulk, sealed, labelled, batch-coded, palletised, stretch-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.

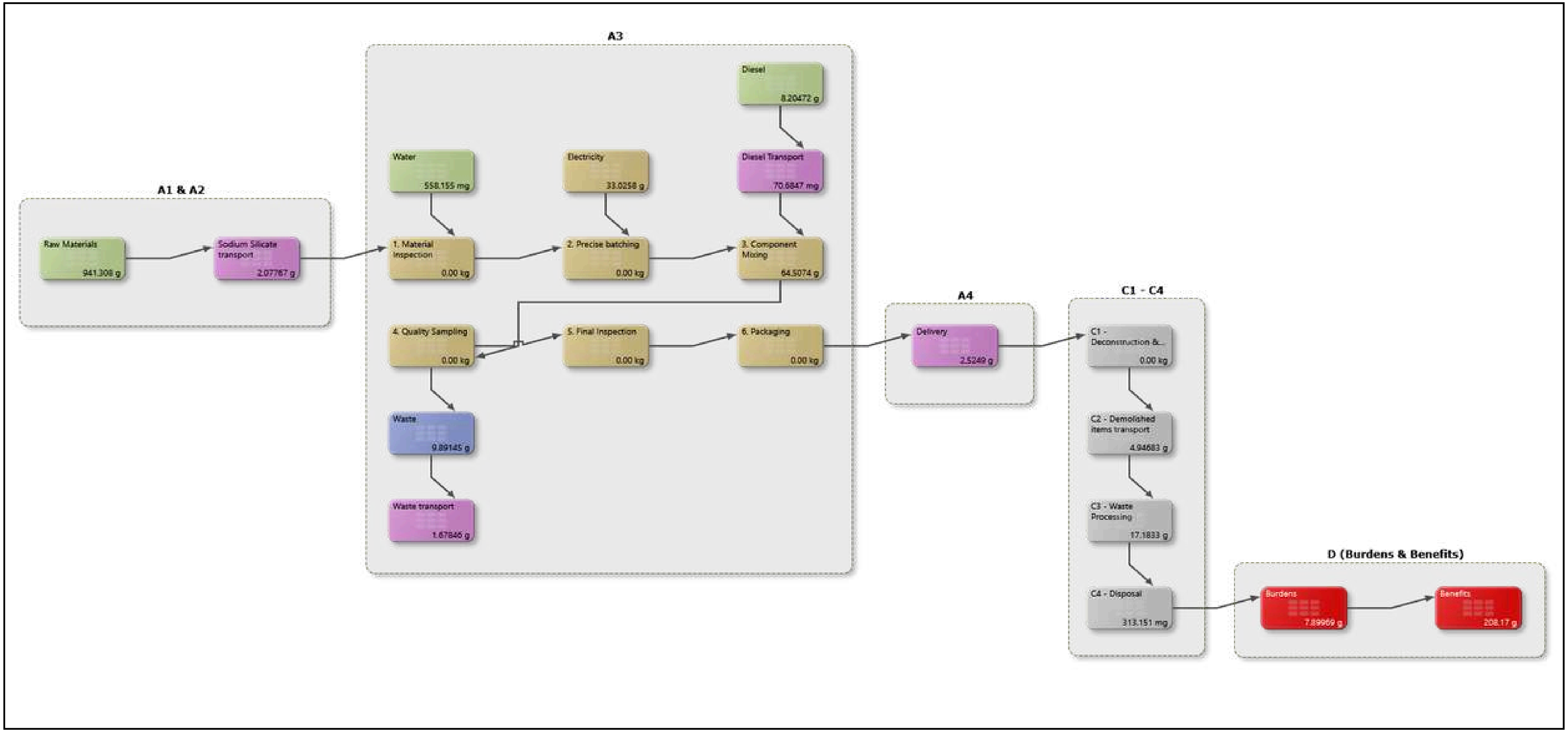
MANUFACTURING DETAILS

Schematic overview of MegaAdd CGA manufacturing process



MANUFACTURING DETAILS

Screenshot of MegaAdd CGA LCA model from LCA software



CONTENT DECLARATION

The content declaration provides a transparent breakdown of all raw materials used in the formulation of MegaAdd CGA, expressed per 1 kg of product. The formulation is primarily composed of sodium silicate solution and water, supported by small quantities of minor constituents that ensure stable performance, low viscosity, and consistent acceleration behaviour in cementitious systems. 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)
Sodium Silicate	0.70	0	0	0	0
Water	0.29	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, MegaAdd CGA 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—primarily sodium silicate solution and water—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 MegaAdd CGA include wooden pallets, HDPE containers, and LDPE stretch wrap. These materials serve distinct functions within the product supply chain—wooden pallets provide stability during handling and transport, HDPE containers securely contain the liquid product, and LDPE stretch wrap protects and stabilises palletised loads. 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; contains no biogenic carbon

Wooden pallets contain significant biogenic carbon because they originate from biomass; HDPE containers and LDPE stretch wrap 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	41.72	1.25E-02	Reuse / Recycle / Energy Recovery
HDPE Containers	3.47E-02	57.85	0.00E+00	Recycle / Energy Recovery
LDPE Stretch Wrap	2.59E-04	0.43	0.00E+00	Recycle / Energy Recovery
Total	**5.99E-02**	**100**	**1.25E-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 MegaAdd CGA 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 MegaAdd CGA 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 MegaAdd CGA 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, ensuring geographical relevance of the final results.

Technological Representativeness: The manufacturing process modelled for MegaAdd CGA accurately reflects the actual production technology used at Conmix Ltd.'s Sharjah facility. The product is produced through controlled batching and physical blending of sodium silicate solution and water using industrial mixing and dosing equipment, followed by quality control and packaging operations. No chemical reactions, synthesis, or curing occur during manufacturing, and no heating or high-temperature 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.

LCA KNOWLEDGE

LCA Software and Database

The life cycle model for MegaAdd CGA 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 MegaAdd CGA. The primary constituents—sodium silicate solution and water—are procured from established suppliers within the United Arab Emirates, ensuring consistent quality and suitability for use in cementitious grout accelerator formulations. Any minor constituents are likewise sourced 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 sodium silicate solution and water—are sourced from suppliers within the UAE, reflecting a fully localised supply chain for MegaAdd CGA. All inbound movements are modelled using >32-ton Euro 6–equivalent road transport, representing typical logistics for bulk liquids and packaged chemical materials. 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 MegaAdd CGA product at the Conmix facility in Sharjah. Production follows a controlled formulation workflow comprising six sequential steps: Material Inspection, Precise Batching, Component Mixing, Quality Sampling, Final Inspection, and Packaging. Each stage ensures accurate dosing, homogeneous blending of liquid components, consistent batch quality, and compliance with internal technical specifications.

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

Module A4 - Delivery

Module A4 accounts for the transportation of finished MegaAdd CGA from the Conmix manufacturing facility in Sharjah to customer locations. As MegaAdd CGA is supplied exclusively to projects within the United Arab Emirates, outbound transport is modelled using domestic road freight only. All deliveries are assumed to be carried out by heavy-duty diesel trucks operating on typical UAE road networks, representing realistic logistics for distribution to construction sites, tunnelling projects, and infrastructure works.

Packaged in HDPE drums 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 building projects, underground works, and infrastructure sites across the UAE. Environmental impacts in this module therefore include diesel consumption, tailpipe emissions, and load-dependent fuel use associated with outbound road deliveries from the manufacturing facility to customer sites.

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. MegaAdd CGA is used as a liquid alkaline accelerator in cementitious grouts and slurries, where it becomes physically and chemically bound within the hardened grout matrix after curing. Once the grout has set, MegaAdd CGA does not exist as a separate or detachable component and cannot be distinguished from the surrounding cementitious material.

At the end of the service life of the structure, demolition is performed on the grouted or concrete element using conventional mechanical methods such as hydraulic breakers, excavators, or crushing equipment. The hardened grout containing MegaAdd CGA undergoes the same mechanical fragmentation as the surrounding concrete and remains part of the mixed mineral rubble generated during demolition. No additional tools, time, fuel, or labour are required specifically to remove or manage the accelerator.

For example, when tunnels, slabs, foundations, or other elements containing cementitious grout with MegaAdd CGA are demolished, contractors treat the material as ordinary concrete or mortar, with no differentiation based on the presence of the accelerator. The demolition process is therefore unchanged by the use of MegaAdd CGA, and it does not introduce any additional resource consumption. As no distinct demolition activities 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, MegaAdd CGA remains incorporated within the hardened cementitious grout and consequently becomes part of the mixed mineral construction and demolition (C&D) waste generated from breaking concrete or grouted elements in which the accelerator has been used. As MegaAdd CGA is manufactured in the UAE and supplied exclusively to projects within the UAE, all associated demolition waste is assumed to be managed entirely within the UAE waste management system.

Across the UAE, authorised C&D recycling facilities operated by Dubai Municipality, Tadweer (Abu Dhabi), BEEAH (Sharjah), and other emirates routinely handle large volumes of concrete and masonry waste, with diversion rates commonly reported in the range of approximately 90% to 97% for mineral construction waste. For LCA modelling purposes, a harmonised national end-of-life transport and processing scenario is therefore applied.

Reflecting typical UAE waste management performance, 95% of the mixed demolition rubble containing MegaAdd CGA is assumed to be transported to a C&D recycling facility, while the remaining 5% is directed to inert landfill due to contamination, processing limitations, 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 MegaAdd CGA from the demolition site to authorised recycling and landfill facilities 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 MegaAdd CGA is demolished together with the concrete or grouted element in which it has been used, it becomes part of the mixed mineral construction-and-demolition (C&D) waste stream, typically comprising concrete, mortar, grout, and other mineral-based materials. As the product is manufactured in the UAE and supplied exclusively to projects within the UAE, the recyclable fraction is assumed to be processed through authorised C&D recycling and aggregate processing facilities within the country.

LCA KNOWLEDGE

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 then undergoes secondary crushing and multi-stage screening to produce graded recycled aggregates and fines. No dedicated processing steps are required for MegaAdd CGA, as the accelerator is chemically bound within the hardened cementitious matrix and becomes mechanically incorporated into the mineral rubble, exhibiting behaviour comparable to ordinary cementitious materials 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 in the UAE. For the purpose of LCA modelling, these reuse pathways are represented through a harmonised recycling scenario.

Module C3 therefore accounts for the environmental impacts associated with the crushing, sorting, and screening of the 95% of mixed mineral demolition waste containing MegaAdd CGA 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 MegaAdd CGA, 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 within the UAE. This assumption reflects prevailing national waste management practices, where the majority of concrete, mortar, and grout 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 grouted elements that contained MegaAdd CGA. As MegaAdd CGA is used as an accelerator in cementitious systems, it becomes chemically and physically bound within the hardened cement matrix after curing. The accelerator does not exist as a separate phase and does not exhibit biodegradation or gas-forming behaviour. Any potential leaching from the composite mineral 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 operate as engineered disposal sites managed in accordance with municipal and national 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 MegaAdd CGA 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 MegaAdd CGA is used as a liquid alkaline accelerator in cementitious grouts and becomes chemically and physically bound within the hardened cement matrix, 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 MegaAdd CGA is assumed to be processed at authorised construction-and-demolition (C&D) recycling facilities in the UAE, where it is crushed and screened into recycled aggregate that substitutes virgin crushed aggregate on a 1:1 mass basis. This assumption reflects prevailing UAE practice, where the majority of concrete, mortar, and grout 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 UAE performance.

Packaging materials also contribute to Module D. Wooden pallets used for the transport of MegaAdd CGA are modelled with a 95% recovery rate, supported by the Landfill Avoidance Study conducted by Virginia Tech in collaboration with the USDA Forest Service (2018), which reports that approximately 95% of wooden pallets are reused, repaired, recycled, or recovered for energy at end-of-life. HDPE containers used for product packaging 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 WRAP (UK) and corroborated by plastics recycling industry data for post-industrial LDPE films.

LCA KNOWLEDGE

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.

Process	Unit (kg)
Collection process specified by type	
MegaAdd CGA 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 MegaAdd CGA 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 MegaAdd CGA 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%

LCA KNOWLEDGE

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 MegaAdd CGA 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 sodium silicate solution, water, minor constituents, packaging materials, fuel production, electricity generation, and transportation. Regionally representative conditions—such as electricity mixes, supplier distances, and country-level end-of-life practices for the United Arab Emirates—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. Road distances were measured using Google Maps. Exclusions are limited to items with negligible relevance (typically <1%), such as administrative activities, office utilities, and maintenance of capital equipment. Road transport is therefore fully represented within the geographical scope of product distribution.

Byproducts Assignment

No by-products are generated during the manufacturing of MegaAdd CGA. The process involves controlled batching and formulation of a liquid alkaline accelerator based on sodium silicate solution and water, 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 MegaAdd CGA" 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	9.34E-01	2.08E-03	1.17E-01	1.05E+00	2.52E-03	0.00E+00	0.00E+00	4.94E-03	1.71E-02	3.13E-04	-2.00E-01
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	1.04E-03	9.97E-07	3.11E-05	1.07E-03	1.21E-06	0.00E+00	0.00E+00	2.38E-06	2.44E-05	1.78E-07	-5.90E-03
Climate change (GWP) - total	Kg CO_2e	9.41E-01	2.08E-03	1.18E-01	1.06E+00	2.52E-03	0.00E+00	0.00E+00	4.95E-03	1.72E-02	3.13E-04	-2.04E-01
Ozone depletion	Kg CFC-11e	1.31E-08	3.00E-11	4.53E-09	1.76E-08	3.00E-11	0.00E+00	0.00E+00	7.00E-11	2.70E-10	8.71E-12	-2.38E-09
Acidification	mol H+e	6.20E-03	4.92E-06	9.10E-04	7.11E-03	5.98E-06	0.00E+00	0.00E+00	1.00E-05	1.30E-04	2.19E-06	-1.32E-03
Eutrophication, aquatic freshwater	kg PO_4^{3-} eq	7.38E-04	4.86E-07	2.75E-05	7.66E-04	5.90E-07	0.00E+00	0.00E+00	1.17E-06	2.54E-05	8.41E-08	-1.71E-04
Eutrophication, aquatic freshwater	Kg P eq	2.40E-04	1.58E-07	8.95E-06	2.50E-04	1.92E-07	0.00E+00	0.00E+00	3.80E-07	8.28E-06	2.74E-08	-5.58E-05
Eutrophication, aquatic marine	Kg N eq	1.11E-03	1.32E-06	4.69E-04	1.58E-03	1.60E-06	0.00E+00	0.00E+00	3.13E-06	4.66E-05	8.44E-07	-3.72E-04
Eutrophication, terrestrial	mol N eq	1.41E-02	1.00E-05	4.09E-03	1.82E-02	2.00E-05	0.00E+00	0.00E+00	3.00E-05	5.00E-04	9.19E-06	-3.94E-03
Photochemical ozone formation	Kg NMVOC eq	3.82E-03	7.83E-06	1.26E-03	5.09E-03	9.52E-06	0.00E+00	0.00E+00	1.86E-05	1.61E-04	3.32E-06	-1.38E-03
Abiotic depletion, minerals & metals	Kg Sb eq	1.04E-05	6.21E-09	3.19E-07	1.08E-05	7.54E-09	0.00E+00	0.00E+00	1.48E-08	3.89E-08	4.60E-10	-9.63E-07
Abiotic depletion of fossil resources	MJ	9.84E+00	2.83E-02	1.92E+00	1.18E+01	3.44E-02	0.00E+00	0.00E+00	6.74E-02	2.64E-01	7.66E-03	-2.84E+00
Water use	m^3 depr.	3.76E-01	1.68E-04	2.07E+00	2.45E+00	2.04E-04	0.00E+00	0.00E+00	3.99E-04	5.75E-02	3.39E-04	-9.64E-02

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

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Additional environmental impact indicators

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter	Incidence	1.02E-07	2.12E-10	3.05E-09	1.05E-07	2.58E-10	0.00E+00	0.00E+00	5.05E-10	9.84E-09	5.04E-11	-3.13E-08
Ionizing radiation, human health	Kbq U-235 eq	2.40E-02	2.72E-05	3.93E-03	2.80E-02	3.30E-05	0.00E+00	0.00E+00	6.47E-05	4.16E-04	4.59E-07	-8.59E-03
Ecotoxicity (freshwater)	CTUe	1.07E+01	3.88E-03	6.00E-01	1.14E+01	4.72E-03	0.00E+00	0.00E+00	9.24E-03	8.62E-02	5.50E-04	-1.10E+00
Human toxicity, cancer effects	CTUh	1.42E-09	3.47E-13	2.68E-11	1.45E-09	4.22E-13	0.00E+00	0.00E+00	8.26E-13	3.76E-12	5.68E-14	-1.15E-09
Human toxicity, non-cancer effects	CTUh	1.05E-08	2.06E-11	8.75E-10	1.14E-08	2.51E-11	0.00E+00	0.00E+00	4.91E-11	1.48E-10	1.28E-12	-2.00E-09
Land use related impacts/soil quality	Dimensionless	1.15E+02	3.26E-02	2.06E-01	1.16E+02	3.96E-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	9.41E-01	2.08E-03	7.21E-02	1.02E+00	2.52E-03	4.58E-02	0.00E+00	4.95E-03	1.72E-02	3.13E-04	-2.04E-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	1.61E+01	4.37E-04	1.89E-02	1.61E+01	5.31E-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	1.95E-03	0.00E+00	1.08E-04	2.06E-03	0.00E+00	-2.06E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.10E-04

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Total use of renewable PER	MJ	1.61E+01	4.37E-04	1.90E-02	1.61E+01	5.31E-04	-2.06E-03	0.00E+00	1.04E-03	7.53E-03	7.24E-05	-1.47E+01
Non-renewable PER used as energy	MJ	9.84E+00	2.83E-02	1.92E+00	1.18E+01	3.44E-02	0.00E+00	0.00E+00	6.74E-02	2.64E-01	7.66E-03	-2.84E+00
Non-renewable PER used as materials	MJ	1.49E-06	0.00E+00	4.07E-08	1.53E-06	0.00E+00	-1.53E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.13E-06
Total use of non-renewable PER	MJ	9.84E+00	2.83E-02	1.92E+00	1.18E+01	3.44E-02	-1.53E-06	0.00E+00	6.74E-02	2.64E-01	7.66E-03	-2.84E+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	1.01E+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	1.01E+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"

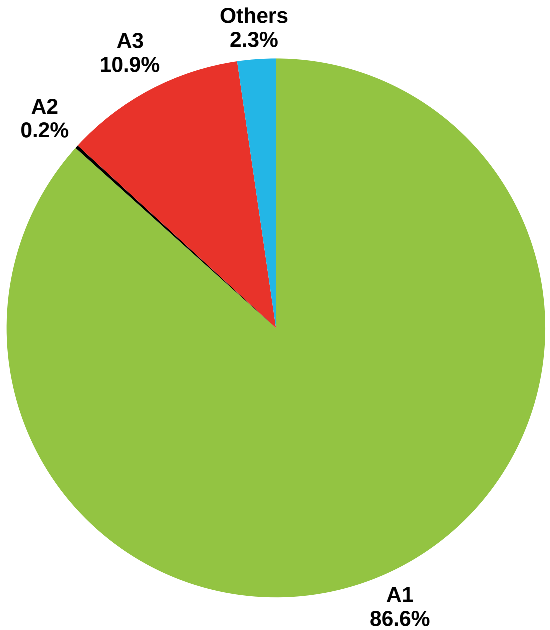
Disclaimer: “According to the **EN 15804:2012+A2:2019** standard, the LCIA results are relative expressions translating impacts into environmental themes such as climate change, ozone depletion, etc. (midpoint impact categories). Thus, the LCIA results do not predict impacts on category endpoints such 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 MegaAdd CGA, with A1 alone accounting for 86.65% driven mainly by sodium silicate solution and water production. Manufacturing activities in A3 contribute a further 10.86%, reflecting electricity use, internal handling, and packaging into HDPE drums and palletised loads. Transport of raw materials and finished product (A2 and A4) together represent about 0.42% of total GWP, reflecting regional road distribution within the UAE. End-of-life stages (C1–C4) contribute approximately 2.07%, as the hardened grout containing MegaAdd CGA follows mixed mineral demolition, recycling, and inert landfill routes. Overall, the sodium silicate fraction is the dominant hotspot, clearly highlighting opportunities for lower-carbon silicate sourcing, higher recycled or secondary raw material content, or improved formulation efficiency. These insights guide targeted improvements for future environmental performance.

Life Cycle Stage Contribution to GWP (kg CO_2e per 1 kg MegaAdd CGA)



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Mandatory Statements

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

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

Information related to EPD of multiple products

This 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-202603-123
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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