Environmental Product Declaration

C-Crete Ultra Low Carbon Cement

C-Crete
TECHNOLOGIES

www.ccretetech.com

Study Applicant:
C-Crete Technologies LLC
14421 Catalina St
San Leandro, 94596 CA

Registration Date:
6/02/2026

Valid Until:
6/02/2031

Administration Information

Certified International Environmental Product Declaration

Declared Product	This Environmental Product Declaration (EPD) covers the cement product manufactured by C-Crete Technologies at San Leandro plant. Declared unit: One (1) metric ton of cement.	
EPD owner	C-Crete Technologies LLC 14421 Catalina St San Leandro, 94596 CA www.ccretetech.com	
LCA study concluded by:	C-Crete Technologies LLC	
Program operator:	National Ready Mixed Concrete Association (NRMCA) 66 Canal Center Plaza, Suite 250 Alexandria, VA 22314 https://www.nrmca.org	
Product Category Rule (PCR)	ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services Smart EPD Part B for Cement Products, 10000–010, Version 4.0, July 2025. Program Operator: Smart EPD	
Independent verification of the EPD and LCA:	Independent verification of the declaration, in accordance with ISO 14025:2006 Internal:___ External: __X___ Third-party verifier Denice V. Staaf, external verifier certified under Labeling Sustainability Program (www.labelingsustainability.com)	
Date of issue:	6/02/2026	
Validity period:	5 years. 6/02/2031	
EPD number:	20353	

COMPANY INFORMATION

EPD Owner:
C-Crete Technologies LLC

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Statement:
The EPD owner has sole ownership, liability, and responsibility for the EPD

Organization Description:
C-Crete Technologies is a leading materials science company committed to inventing, building, and scaling up the next generation of infrastructure materials with ultra-low or negative CO_2 footprints. We exist to revolutionize construction with sustainable materials that combat climate change while preserving strength, beauty, and affordability. Aligned with our mission, C-Crete delivers groundbreaking ultra-low carbon concrete that matches or surpasses the performance of conventional Portland cement concrete while dramatically reducing environmental impact. Our innovation brings together ultra-low CO_2 emissions, cost parity or lower, and uncompromising durability, enabling builders, developers, and communities to transition seamlessly toward a sustainable future without sacrificing reliability or affordability.

Plant location:
1767 Timothy Dr, San Leandro, CA 94577

GOAL OF THE STUDY

The purpose of this type III Environmental Product Declaration (EPD) is to clearly, quantitatively, and verifiably communicate the environmental performance of 1 ton (1,000 kg) of cement produced by C-Crete Technologies. This declaration complies with the requirements established in the relevant Product Category Rule (PCR) for Portland, Blended, Masonry, Mortar and Plastic (Stucco) Cements v3.2 and with ISO 21930:2017 and ISO 14025:2006.

This EPD provides environmental information using a standardized and transparent methodology. It is intended to assist stakeholders in the construction sector—such as designers, builders, suppliers, institutional clients, and technical professionals in understanding the environmental impacts associated with C-Crete's products. This knowledge enables them to make more informed decisions throughout the life cycle of their projects.

This EPD is intended exclusively for business-to-business (B2B) communication and shall not be used for comparative assertions between products from different manufacturers unless such comparisons are made between EPDs developed under the same PCR, with the same declared unit and equivalent system boundaries, as required by ISO 14025.

PRODUCT INFORMATION

Product Identification

This Environmental Product Declaration (EPD) has been created for cements classified under ASTM C1157 (Standard Performance Specification for Hydraulic Cement). This standard outlines the performance requirements for hydraulic cement, including compressive strength, setting time, and durability characteristics, which are essential for both structural and non-structural construction applications. The products declared in this document correspond to the cement types produced by C-Crete, which meet the relevant ASTM C1157 standards.

Table 1. Declared products in this Environmental Product Declaration.

Name	Description	3-day Strength (psi)	28-day Strength (psi)	Technical Standard
C-Crete Ultra Law Carbon Cement	General use cement	3100	5200	ASTM C1157

Product Composition

Table 2 shows the approximate composition of the declared cement products. To maintain industrial confidentiality, the percentages have been randomized within acceptable industry ranges. None of the substances contained in the product are listed on the Candidate List of Substances of Very High Concern (SVHC) under European Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) above a concentration of 0.1% by mass.

Table 2. Composition of C-Crete Ultra Low Carbon Cement.

Materials	Value (%)
Fly Ash F	60-80
Slag (GGBFS)	20-40
Inorganic Compounds	Proprietary
Total	100

Life Cycle Assessment (LCA)

Declared Unit

This Environmental Product Declaration is based on 1 metric ton (1000 kg) of cement as the declared unit.

Temporal Representativeness

The primary data used reflect C-Crete's actual operations from January to December 2025 (12 months) and demonstrate the technologies, raw materials, and operating practices implemented during the 2025 production cycle.

Independent Verification of Documented Data

The life cycle inventory (LCI) data in this study were developed by C-Crete Technologies. Supporting documentation and the Environmental Product Declaration were validated by an independent third-party verifier.

LCA Database and Software Used

The Life Cycle Assessment (LCA) was modeled using openLCA shown on page 10. Life cycle inventory (LCI) data were compiled from a combination of sources, including publicly available

databases and datasets aligned with ecoinvent v3.10 and European Environmental Footprint (EF 3.1) factors, where applicable. Environmental impacts were calculated using the TRACI v2.2 methodology.

System Boundaries

This Environmental Product Declaration (EPD) covers modules A1–A3 under a cradle-to-gate scope, in accordance with the Smart EPD PCR Part B for cements. It is important to note that A4–D modules are not declared (MND). The following diagram and description illustrate the system boundaries included in this study.

Figure 1. System Diagram for Cement Production (A1–A3)

This EPD covers modules **A1–A3:**

A1 - Raw Materials Supply: fly ash, GGBFS and inorganic chemicals
A2 - Transport: transportation of raw materials via truck and sea freight
A3 – Manufacturing: raw materials handling, blending/mixing and packaging
The system boundary follows ISO 21930 and the applicable Part B PCR for cement, including modules

Figure 2. System Boundary Description for Cement Production (A1–A3) (X=included, MND=module not declared)

Product Stage			Construction Installation Stage		Use Stage							End of Life Stage				Beyond the System Boundaries
RAW MATERIALS	TRANSPORT	MANUFACTURING	TRANSPORT	ASSEMBLY	USE	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	OPERATIONAL ENERGY USE	OPERATIONAL WATER USE	DECONSTRUCTION DEMOLITION	TRANSPORT	WASTE TREATMENT	DISPOSAL	REUSE, RECOVERY, RECYCLING POTENTIAL
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	**X**	**X**	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

The PCR subcategory considers the following as recovered materials: fly ash, granulated blast furnace slag (GGBFS). Consequently, the environmental impact assigned to these materials is limited solely to the treatment and transportation processes required for their incorporation as raw materials in cement production.

It is important to note that not all upstream life cycle assessment (LCA) datasets include all impact categories, which means the resulting data may be partial or incomplete. Consequently, these results should be interpreted with caution.

Additionally, in accordance with the applicable Product Category Rules (PCR), this study excludes the following aspects:

- The production, manufacturing, and construction of concrete, buildings, capital goods, and infrastructure.
- The production and manufacturing of industrial equipment, transport vehicles, earth-moving machinery, and laboratory equipment.
- Personnel-related activities such as commuting, office furniture, or office supplies.
- Energy consumption related to corporate management and commercial activities.

PROCESS DESCRIPTION

A1–A2 Raw Material Supply and Transportation

Modules A1–A2 cover the processing and transportation of the raw materials used in the production of C-Crete's binder. The primary constituents—including ground granulated blast furnace slag and Class F/C fly ash — are sourced from external suppliers and undergo minimal pre-processing, such as drying, grinding, or classification, as required to meet product specifications. These materials are then transported to the production facility and stored in designated silos or bulk storage systems prior to use.

In addition, inorganic compounds are sourced from both regional and international suppliers. Depending on the source, these materials are delivered via a combination of ocean freight and road transportation. Upon arrival, they are handled and stored in accordance with standard industrial practices to ensure safety, material integrity, and consistency in production.

All raw and auxiliary materials are transported to the facility primarily by truck for domestic supply and by ocean freight for international shipments, consistent with typical logistics practices for bulk materials. Transportation distances and modes are modeled in accordance with the applicable Product Category Rules (PCR) and return trips were accounted for using a backhaul factor where applicable

Unlike conventional Portland cement systems, no clinker production or high-temperature calcination processes are involved. Instead, the received materials are directly utilized in the formulation of the final binder, significantly reducing energy demand and associated emissions in the upstream stages.

A3 Cement Production

Module A3 covers the manufacturing stage of C-Crete's binder at the production facility. In this

phase, the previously stored raw materials—including supplementary cementitious materials and inorganic compounds —are proportioned and blended to achieve the required formulation and performance characteristics. As the process does not involve clinker production or high-temperature treatment, manufacturing consists primarily of controlled mixing operations using electricity available in California by the Western Electricity Coordinating Council (WECC), eGRID subregion CAMX.

The blended product is then transferred to storage systems or directly to packaging lines, where it is prepared for distribution in bulk or bagged formats. The weight of the supersack packaging is less than 0.5 kg, and its contribution is minimal, which is below the cutoff. The process is designed to ensure consistency, quality, and efficient handling of materials throughout production. Environmental controls are implemented during this stage, including dust collection and particle capture systems, as well as efficient use of electricity. These measures support proper management of emissions and operational inputs while maintaining product quality.

CUT-OFF CRITERIA

- The life cycle assessment includes the product stage (A1–A3), in accordance with applicable Product Category Rules (PCR) and ISO 21930:2017.
- No modules or processes required under ISO 21930:2017 have been excluded.
- The study includes all relevant raw material and energy inputs associated with the unit processes under consideration.
- All available and relevant data collected over a 12-month period in 2025 were included in the calculations.
- The total of excluded input and output flows does not exceed 5% of the total energy use or mass of the product, and any excluded flows are considered environmentally insignificant.

ALLOCATION, ESTIMATION, AND ASSUMPTIONS

Allocation in this study follows the principles defined in ISO 14044:2006:

1. Allocation is avoided wherever possible.
2. Where allocation cannot be avoided, it is based on physical relationships such as mass or energy content.
3. If physical relationships cannot be established, allocation may be based on other relationships such as economic value.

The production of C-Crete's binder does not generate marketable co-products. All input materials, including supplementary cementitious materials (e.g., slag and fly ash) and chemicals, are fully incorporated into the final product. As no clinkerization or transformation processes generating by-products occur, allocation of environmental burdens within the manufacturing stage (A3) is not required beyond distribution of inputs on a mass basis relative to total product output.

Electricity, and water used during mixing, handling, and packaging are allocated to the product based on total production volume (mass of binder produced). Where available, equipment-specific energy consumption data were used; otherwise, average consumption values were applied.

No on-site fuel combustion or thermal processing is involved in the manufacturing process. Upstream energy use and emissions associated with raw material production (e.g., slag processing, fly ash

generation, and chemical production) are accounted for within Modules A1–A2 using background datasets. Biogenic carbon accounting is not considered relevant for the materials used in this system.

Waste generated during the mixing and packaging process is minimal and primarily consists of dust or packaging-related residues. These flows are either recycled internally where feasible or managed according to standard waste treatment practices. No significant environmental burdens are assigned to internally recycled materials.

Where primary data were unavailable, conservative assumptions were applied. These include the use of secondary data from databases such as ecoinvent v3.10 and datasets

Module A2 includes both domestic road transportation and international ocean freight. Transportation distances were determined based on supplier information, logistics data, or standard mapping tools where necessary. Diesel-powered trucks were assumed for road transport when specific vehicle data were unavailable. Ocean freight was modeled using appropriate bulk cargo vessel datasets. In line with common practice and PCR guidance,
For low-relevance flows, a cut-off criterion of 1% was applied at the unit process level, ensuring that total exclusions do not exceed 5% of overall mass or energy flows, in accordance with ISO 14044:2006 and applicable PCR requirements.

LIMITATIONS

This Environmental Product Declaration (EPD) is developed in accordance with ISO 14025 and ISO 21930:2017 and reports environmental information based on a life cycle assessment (LCA). It does not constitute an endorsement of the product nor a claim of environmental superiority.

Life Cycle Impact Assessment (LCIA) results are relative expressions of environmental performance and do not predict actual impacts, exceedance of environmental thresholds, safety margins, or specific risks to human health or ecosystems.

The LCA underlying this EPD considers a broad range of environmental indicators; however, only those impact categories required by the applicable PCR are reported. Additional environmental impacts not included in this EPD may be relevant.

In addition to the reported impact indicators, this document includes metrics related to resource use and waste generation. These indicators provide supplementary information but do not in themselves constitute measures of environmental impact.

DATA SOURCES

The primary data used in this study correspond to the actual operational performance of the production facility during the reference period. These data include electricity consumption, raw material inputs (including supplementary cementitious materials such as slag and fly ash), inorganic compounds, process water use, and waste generation and management associated with mixing and packaging operations. The data were collected directly from internal production records and represent typical operating conditions of the facility.

Secondary data were used to model processes outside the operational control of the facility, including the

production of raw materials (e.g., slag processing, fly ash generation, and chemical production of inorganic compounds), transportation (road and ocean freight), electricity generation, and waste treatment. These data were primarily sourced from databases such as ecoinvent v3.10.

Transportation modeling is based on primary data for distances and modes, reflecting actual supply routes. Secondary data were used only for transport emission factors.

Data selection followed a hierarchical approach consistent with ISO 14044:2006 and applicable Product Category Rules (PCR), prioritizing recent primary data, followed by supplier-specific or regionally representative secondary data, and finally generic datasets where no other data were available.

All data used in the study demonstrate appropriate:

- Temporal representativeness: based on 2025 operational data
- Geographical representativeness: reflecting the location of the production facility and relevant supply chains
- Technological representativeness: consistent with the current mixing-based production process

Data quality is considered to meet the requirements for completeness, consistency, and accuracy as defined in the applicable PCR and relevant standards

Table 3. Data Disclosure – Sources of Primary and Secondary Data.

Material/ Process Category.	Module	Material/Process Name	Inventory Dataset Name	Dataset Geographic Region	Year Dataset Represent	Reference
Material/Product	A1	Fly Ash (Class F)	Fly ash from a coal power plant	US	2025	ecoinvent v3.10
	A1	Slag (GGBFS)	Blast furnace slag processing, grinding	US / Global	2025	ecoinvent v3.10
	A1	Inorganic Compounds	Inorganic chemical production	Global/China	2025	ecoinvent v3.10
Transport	A2	Ocean Freight	Transport, freight, sea, bulk carrier	Global (China to the US)	2025	ecoinvent v3.10
	A2	Truck (heavy-duty)	Transport, freight, lorry <32 metric ton, EURO4/US equivalent	US (California)	2025	USLCI
Energy	A3	Electricity	Electricity, medium voltage, market for electricity	US (California)	2025	USLCI
Manufacturing	A3	Mixing/Blending	Specific data on electricity consumption for the mixing process	US (California)	2025	Primary data
	A3	Packing	Specific data on electricity consumption for the packing process	US (California)	2025	Primary data

DATA QUALITY ASSESSMENT

The quality of the data used in modules A1–A3 was evaluated in accordance with Section 10 of the Smart EPD Part B PCR for Construction Cements (v4). The assessment considers temporal, geographical, and technological representativeness, as well as data reliability, using a scale from 1 to 5, where 1 represents the highest quality and 5 a non-permitted value.

Primary data were obtained directly from the operational records of the manufacturing facility in California, United States, for the reference period (the most recent 12-month production data). These data include raw material consumption, energy use, mixing and packaging operations, and outbound logistics from the plant. Since the production process does not involve clinkerization, no calcination emissions are present in this system. Process-related emissions are therefore limited to upstream material production and energy use.

Transportation data for A2 were modeled based on actual supply chain information. The majority of raw materials are sourced domestically within the United States (primarily California), while one key inorganic compound is sourced from China and transported via ocean freight followed by truck transport to the facility. Distances and modes of transport were selected to reflect realistic logistics conditions.

Secondary data were used to model upstream processes not controlled by the manufacturer, including raw material production, electricity generation, and transportation. These datasets were

primarily sourced from the ecoinvent 3.10 database and implemented through OpenLCA. Environmental impact indicators were calculated using TRACI 2.2, supplemented where required by EF 3.1 indicators in accordance with reporting requirements.

Table 4. Data Quality Assessment by Process

Indicator	Score
Temporal representativeness (plant data)	1
Geographical representativeness	2
Technological representativeness	1
Reliability – primary operational data	1
Reliability – upstream (ecoinvent datasets)	2
Reliability – transportation modeling (A2 & A3)	2

Overall, the data used meet the quality requirements established by the PCR for the preparation of this EPD. The combination of site-specific primary data and high-quality secondary datasets ensures a robust and representative assessment of the environmental impacts associated with the product system.

ENVIRONMENTAL INDICATORS

In accordance with Product Category Rule Part A: Program Operator Life Cycle Assessment Calculation Rules, the results derived from the product's LCA shall be reported as follows:

- Life cycle impact assessment indicators
- Resource use indicators
- Output flows and waste category indicators
- Carbon emissions and removals

RESULTS

Environmental impact indicators are calculated and reported in accordance with International Organization for Standardization ISO 21930 and the applicable Part B PCR requirements for construction cements. The life cycle impact assessment (LCIA) results are based on the system boundaries defined for modules A1–A3, covering raw material supply, transportation, and manufacturing processes.

LCIA results are expressed as relative indicators and do not predict impacts at the category endpoint level, nor do they indicate exceedance of environmental thresholds, safety margins, or risks. These results are intended to support comparative assessments only when products fulfill the same function, use the same declared unit, and are evaluated under identical system boundaries and methodological assumptions in accordance with PCR requirements.

Life Cycle Impact Assessment

Key environmental indicators	Unit	Cradle to gate (A1 - A3)
Global warming (GWP total)	kg CO2 eqv	43.1
Total energy consumption	MJ	488.8
Share of recycled materials	%	96.0

Core environmental impact indicators

Indicator	Unit	A1	A2	A3
GWPtotal	kg CO2 -eq	3.31E+01	8.85E+00	1.19E+00
GWPfossil	kg CO2 -eq	3.25E+01	8.84E+00	1.19E+00
GWPbiogenic	kg CO2 -eq	5.58E-01	1.88E-03	1.50E-03
GWPluluc	kg CO2 -eq	1.67E-02	1.81E-03	6.18E-04
ODP	kg CFC11 -eq	1.77E-07	1.10E-08	7.74E-08
AP	mol H+ -eq	2.28E-01	1.06E-01	4.17E-03
EP	kg N -eq	2.86E-02	2.71E-02	5.29E-04
POCP	kg NMVOC -eq	9.40E-02	1.35E-01	1.77E-03
ADPE	kg Sb-eq	6.63E-04	3.26E-06	5.61E-06
ADPF	MJ	2.71E+02	1.62E+02	1.86E+01

In accordance with the requirements of the Smart EPD Part B PCR for cements, in addition to the main environmental results table for modules A1–A3, the Global Warming Potential (GWP) indicator is disaggregated by process.

Given that the declared product system does not include clinker production, there are no calcination emissions. Furthermore, the manufacturing process consists of mixing and packaging operations, with no direct combustion of primary or alternative fuels at the plant.

The following tables present this disaggregated GWP profile for the declared product(s), in accordance with Section 9.5.1 of the PCR.

Additional environmental impact indicators

Indicator	Unit	A1	A2	A3
PM	Disease incidence	3.04E-06	5.20E-07	1.94E-08
IRP	kgBq U235 -eq	7.69E-01	2.51E-02	1.57E-01
ETPfw	CTUe	5.25E+02	6.49E+00	1.86E+01
HTPc	CTUh	9.55E-09	0.00E+00	3.78E-10
HTPnc	CTUh	4.41E-07	1.38E-06	1.09E-08
SQP	Pt	2.13E+02	3.14E+00	3.17E+00

Resource use indicators

Indicator	Unit	A1	A2	A3
RPEE	MJ	3.45E+01	3.12E-01	1.70E+00
RPEM	MJ	0.00E+00	0.00E+00	0.00E+00
TPE	MJ	3.45E+01	1.22E+02	1.70E+00
NRPE	MJ	2.71E+02	1.62E+02	1.86E+01
NRPM	MJ	0.00E+00	0.00E+00	0.00E+00
TRPE	MJ	2.71E+02	1.62E+02	1.86E+01
SM	kg	9.79E+02	0.00E+00	0.00E+00
RSF	MJ	1.95E-02	4.21E-05	5.25E-02
NRSF	MJ	0.00E+00	1.21E+02	1.92E-02
W	m3	3.69E-01	1.36E-01	6.76E-03

Waste category indicators

Indicator	Unit	A1	A2	A3
HW	kg	2.35E+00	5.41E-02	1.01E-02
NHW	kg	4.24E+01	7.35E-01	5.50E-02
RW	kg	1.92E-04	0.00E+00	8.96E-05

Output flows indicators

Indicator	Unit	A1	A2	A3
CR	kg	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	0.00E+00	0.00E+00	0.00E+00

Biogenic carbon content indicators

Indicator	Unit	A1	A2	A3
BCCproduct	kg C	0.00E+00	0.00E+00	0.00E+00
BCCpackaging	kg C	0.00E+00	0.00E+00	0.00E+00

ADDITIONAL ENVIRONMENTAL INFORMATION

The company operates in the construction materials sector with a strong focus on sustainability, innovation, and responsible growth. From its inception, sustainability has been a core pillar of its strategy, guiding product development, operational decisions, and long-term value creation for stakeholders.

The organization recognizes that carbon footprint reduction and climate change mitigation are critical priorities for the construction industry and key expectations from clients, regulatory authorities, and broader stakeholders. In response, the company continuously develops and refines its technology platform to deliver low-carbon construction materials that reduce greenhouse gas emissions compared to conventional cement systems.

Unlike traditional cement production, the company's process does not involve clinkerization, thereby avoiding process-related calcination emissions. Its manufacturing system is based on the blending and activation of alternative raw materials, contributing to a significantly lower environmental footprint. This approach aligns with global decarbonization pathways and supports the transition toward more sustainable construction practices.

The company actively pursues innovation-driven initiatives to improve both environmental and operational performance. These include:

- optimization of raw material selection and sourcing
- reduction of energy consumption during production
- development of advanced binder systems with improved environmental performance
- continuous evaluation of supply chain impacts, including transportation and imported materials.

A key aspect of the company's strategy is the integration of circular economy principles, including the use of industrial by-products and alternative materials where technically and environmentally appropriate. This contributes to resource efficiency and reduces reliance on conventional high-emission inputs.

From a climate perspective, the company focuses on:

- reducing life cycle CO_2 emissions of its products
- improving process efficiency at the plant level
- minimizing transportation-related impacts through optimized logistics
- supporting customers in lowering the embodied carbon of concrete and construction systems.

From a social and governance perspective, the company is committed to transparency, technical rigor, and responsible engagement with stakeholders. Operations are based in California, United States, with an emphasis on compliance with environmental regulations, responsible sourcing practices, and continuous improvement. The company also contributes to local economic activity and supports the development of sustainable supply chains.

Together, these initiatives demonstrate the company's commitment to delivering innovative, low-carbon, and resource-efficient construction materials, embedding sustainability across its operations and throughout the life cycle performance of its products.

Contact Information

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Program operator:	National Ready Mixed Concrete Association (NRMCA) 66 Canal Center Plaza, Suite 250 Alexandria, VA 22314 https://www.nrmca.org	
Third party verifier	Denice V. Staaf, external verifier certified under Labeling Sustainability Program (www.labelingsustainability.com)	

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