Environmental Product Declaration

In accordance with ISO 14025 and 21930

Certification page

This document is a cradle-to-gate Environmental Product Declaration (EPD) for the **Portland Cement, Type IL** produced at **the Pueblo plant**. The Life Cycle Assessment (LCA) and this subsequent EPD follow the guidelines from ISO 21930 [4], ISO 14025 [6], ISO 14040 [7], and ISO 14044 [8]. This EPD is intended for business-to-business audiences.

Declaration Holder	**GCC of America** 600 S. Cherry Street, Suite 1000 Glendale CO 80246
Program Operator	**National Ready Mixed Concrete Association** 66 Canal Center Pl, Suite 250 Alexandria, VA 22314 www.nrmca.org/sustainability/
Declaration Number	NRMCAEPD: 20097
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EPD and LCA prepared by	GCC of America 600 S. Cherry Street, Suite 1000 Glendale CO 80246
Product Group and Name	Cement, UN CPC 3744
ISO 21930:2017 Sustainability in Building Construction — Environmental Declaration of Building Products: serves as the core PCR NSF PCR for Portland, Blended, Masonry, Mortar, And Plastic (Stucco) Cements V3.2 serves as the subcategory PCR [2]	
Subcategory PCR review was conducted by:	Thomas P. Gloria, Ph. D. Industrial Ecology Consultants 35 Bracebridge Rd. Newton, MA
Independent verification of the declaration and data, according to ISO 21930:2017 [4] and ISO 14025: 2006 [6]	☐ internal ☑external
Third-party verifier:	Denice Viktoria Staaf, Labeling Sustainability
Notes	The EPD results are computed using the N.A. version of the GCCA Industry EPD tool for Cement and Concrete (https://concrete-epd-tool.org) [1], [3].
For additional explanatory material:	Pierre-Vincent Certain pcertain@gcc.com

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Company presentation

GCC operates in the corridor extending from northern Mexico through the United States to Canada. GCC produces, markets, and distributes cement, ready-mix concrete, aggregates, and other construction materials.

In the United States, GCC successfully participates in the cement and ready-mix concrete markets. The Company owns five cement plants with an aggregate annual production capacity of approximately 3.5 million tons in Odessa, Texas; Pueblo, Colorado; Rapid City, South Dakota; Trident, Montana; and Tijeras, New Mexico. GCC also has 23cement distribution terminals and transferring stations in Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Wyoming, and West Texas. Furthermore, GCC is one of the leading ready-mix concrete producers, supplying regional markets in Texas, New Mexico, Iowa, South Dakota, Minnesota, and North Dakota. GCC has 49 ready-mix concrete plants, a fleet of 286 ready-mix concrete mixer trucks and 151 haul trucks, 3 aggregates plants, 3 asphalt plants, and approximately 2,587 railcars used to transport bulk cement.

Product Description, components, and Standards

The product under evaluation is **Portland Cement, Type IL, produced by GCC at its Pueblo, CO plant.** Cement is a fine material powder with hydraulic, aesthetic, and durability properties that are very useful for the construction industry. In addition, cement acts as a binding agent that produces ready-mix concrete when mixed with aggregates and water. Concrete is one of the most attractive construction materials because of its great compressive strength and its shape-ability. Aggregates are geological materials such as stone, sand, or gravel, essential for manufacturing concrete, mortar, and asphalt.

Input	Type IL
Clinker	80 - 90 %
Gypsum	4 - 6 %
Limestone	5 - 15 %
Other	< 1 %

The **Portland Cement, Type IL** meets the following standards:

- ASTM C595 / C595M – 21 Standard Specification for Blended Hydraulic Cement [9]
- ASTM C1157 / C1157M – 2Oa Standard Performance Specification for Hydraulic Cement [10].
- AASHTO M 240M/M 240-20 Standard Specification for Blended Hydraulic Cement (ASTM C595/C595M-20) [11]

Declared unit

The declared unit is one metric ton of **Portland Cement, Type IL.**

System boundary

Life cycle stages

This EPD is a cradle-to-gate EPD covering the production stage (A1-A3).

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END-OF-LIFE STAGE			
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / Demolition	Transport	Waste processing	Disposal of waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note: MND = module not declared; X = module included

Exclusion and cut-off criteria

Items excluded from the system boundary include:

- Production, manufacture, and construction of manufacturing capital goods and infrastructure.
- Production and manufacture of production equipment, delivery vehicles, and laboratory equipment.
- Personnel-related activities (travel, furniture, and office supplies).

- Energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

Allocation approach

Allocation follows the requirements and guidance of ISO 14044 Clause 4.3.4 [8], NSF PCR [2], and ISO 21930 section 7.2 [4]. Recycling and recycled content are modeled using the cut-off rule.

This subcategory PCR recognizes fly ash, silica fume, granulated blast furnace slag, cement kiln dust, flue gas desulfurization (FGD) gypsum, and post-consumer gypsum as recovered materials, and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a cement material input.

Data compilation

Data originated from the **Pueblo, CO** plant. They cover the activities of clinker production and cement manufacturing.

Secondary, non-GCC specific data originated from the ecoinvent v.3.5 databases for U.S. and global, 2018 and U.S. LCI Database [3].

The reference year of the data collected is 2021.

EPDs based on cradle-to-gate scope shall not be used for comparisons. Also, EPDs based on a declared unit shall not be used for comparisons.

EPDs are comparable only if they use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

Life Cycle Assessment Results

Core environmental impact indicators **for 1 metric ton of cement**		
Global warming potential	760.8 *	kg CO_2 eq.
Global warming potential, biogenic	0.4357 *	kg CO_2 eq.
Depletion potential of the stratospheric ozone layer	1.10E-05	kg CFC 11 eq.
Acidification potential of soil and water sources	1.155	kg SO_2 eq.
Eutrophication potential [1]	0.9806	kg N eq.
Photochemical oxidant creation potential	26.78	kg O_3 eq.

Abiotic depletion potential for non-fossil mineral resources	1.16E-04	kg Sb eq.
Abiotic depletion potential for fossil resources	2971	MJ surplus
Additional Environmental Impact Indicators for 1 metric ton of cement		
Potential incidence of disease due to pm emissions	0.331	kg PM2.5 eq.
Potential comparative toxic unit for ecosystems	109.5	CTUe
Potential comparative toxic unit for humans - cancer	1793	CTUh
Potential comparative toxic unit for humans - non-cancer	2.66E-05	CTUh
Potential soil quality index	984.5	dimensionless
Parameters Describing Resource Use for 1 metric ton of cement		
Use of renewable primary energy excluding renewable primary energy resources used as raw materials [1]	202.9	MJ, net calorific value
Use of renewable primary energy resources used as raw materials [1]	0	MJ, net calorific value
Total use of renewable primary energy resources [1]	202.9	MJ, net calorific value
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials [1]	2971	MJ, net calorific value
Use of non-renewable primary energy resources used as raw materials [1]	0	MJ, net calorific value
Total use of non-renewable primary energy resources [1]	2971	MJ, net calorific value
Use of secondary materials [1]	59.27	kg
Use of renewable secondary fuels [1]	270.2	MJ, net calorific value
Use of non-renewable secondary fuels [1]	251.2	MJ, net calorific value
Net use of fresh water	0.4894	m^3
Other environmental information describing waste categories for 1 metric ton of cement		
Hazardous waste disposed [1]	0	kg
Non-hazardous waste disposed [1]	16.18	kg
Radioactive waste disposed [1]	ND	kg
Environmental information describing output flows for 1 metric ton of cement		
Components for re-use	0	kg
Materials for recycling	0.9635	kg
Materials for energy recovery	0	kg
Exported energy	0	MJ per energy carrier
Extra Indicators for 1 metric ton of cement		
Emissions from calcination and removals from carbonation	453.9	kg CO_2 eq.
Emissions from combustion of secondary fuels from renewable sources used in production processes	0.1055	kg CO_2 eq.

Emissions from combustion of secondary fuels from non-renewable sources used in production processes	32.06	kg CO_2 eq.
Removals and emissions associated with biogenic carbon content of the bio-based product	0	kg CO_2
Removals and emissions associated with biogenic carbon content of the bio-based packaging	0	kg CO_2

* The indicated values (net values) do not include the greenhouse gas emissions from the incineration of secondary fuels at clinker production. The gross GWP-tot (including the emissions from the incineration of secondary fuels at clinker production) is 793.0 kg CO_2–eq. The gross GWP-fos is 0 kg CO_2-eq. The gross GWP-bio is 0.5412 kg CO_2-eq.

[1] The following LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in these categories.

Additional environmental information

GCC's Science Based Targets initiative (SBTi) CO2 target for 2027 is based well below the two-degree curve and is 605 gross kgCO2/ ton cementitious material for scope 1. This target must be achieved by 2027 to ensure validation for the next five years on the 1.5-degree curve. GCC's SBTi 2030 target of 538 gross kgCO2/ton cementitious material considers a CO2 reduction roadmap focusing on four key levers: blended cement, fuel switching, energy efficiency, and biogenic fuels. Transformational technology will get us to the 2050 goal.

To reach our 2030 and 2050 targets, GCC will shift to 100% Portland limestone cement (PLC) by 2024. Most of our plants are shifting production, and plant upgrades will allow us to reach 100% production capacity. GCC has committed more than $25 million for capital expenditure to meet market needs. Planned upgrades will build on our four levers, reducing our CO2 emissions and enabling us to reach our 2030 target.

References

[1] GCCA Industry EPD Tool for Cement and Concrete. Version 3.2. User Guide, North American version. 21 November 2022. https://demo.gcca.quantis.solutions/us

[2] NSF International, Product Category Rule Environmental Product Declarations, PCR for Portland, Blended, Masonry, Mortar, and Plastic (Stucco) Cements, V3.2, September 2021.

[3] GCCA's Industry EPD Tool for Cement and Concrete (v3.2). LCA Database, International + North American versions. 21 November 2022.

[4] ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.
[5] ISO 14020:2000 Environmental labels and declarations — General principles
[6] ISO 14025:2006 Environmental labeling and declarations - Type III environmental declarations – Principles and procedures.
[7] ISO 14040:2006/Amd1:2020 Environmental management - Life cycle assessment - Principles and framework.
[8] ISO 14044:2006/Amd1:2017/Amd2:2020 Environmental management - Life cycle assessment - Requirements and guidelines.
[9] ASTM C595 / C595M – 21
[10] ASTM C1157 / C1157M – 20a Standard Performance Specification for Hydraulic Cement
[11] AASHTO M 240M/M 240-20 Standard Specification for Blended Hydraulic Cement (ASTM C595/C595M-20)