



CEMEX Brooksville South Cement Plant

Environmental Product Declaration



This cradle to gate Environmental Product Declaration covers bulk and bagged cement products produced at the Brooksville Cement Plant. The Life Cycle Assessment (LCA) was prepared in conformity with ISO 21930, ISO 14025, ISO 14040, and ISO 14044.

This EPD is intended for business-to-business (B-to-B) audiences.

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LCA/EPD DEVELOPER

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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 sub-category PCR
Sub-category PCR review was conducted by Thomas P. Gloria, PhD. (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants
Independent verification of the declaration, according to ISO 21930:2017 and ISO 14025:2006.: <input type="checkbox"/> internal <input checked="" type="checkbox"/> external
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For additional explanatory material Manufacture Representative: Anand Krishnan (anand.krishnan@cemex.com) This LCA EPD was prepared by: Melissa Díaz Segura, LCA and EPD Project Manager • Climate Earth (www.climateearth.com)
EPDs are comparable only if they comply with ISO 21930 (2017), 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

PRODUCER

CEMEX is one of the largest building materials companies in the world with operations in the Americas, the Caribbean, Europe, Africa, Middle East, and Asia. CEMEX employs over 41,000 employees worldwide and is committed to sustainable practices and CO₂ reduction goals in the communities in which it operates. CEMEX Brooksville South cement plant has been producing high quality products since 1986 and employs nearly 150 people. The plant has an annual cement production capacity of 1.5 million metric tonnes and provides cement for the construction needs in Florida.

PRODUCT

The cement products covered in this EPD meet UN CPC 3744 classification and the following standards:

Product Type	Applicable Standard	Standard Designation
Portland Limestone Cement	ASTM C595, C1157, AASHTO M240	Type IL
Portland Cement	ASTM C150, C1157, AASHTO M85	Type I/II, Type III
Stucco Cement	ASTM C1328	Stucco
Masonry Cement	ASTM C91	Masonry

This EPD reports environmental information for five cement products produced by CEMEX at its Brooksville South, FL facility. Type I/II cement is used as the key ingredient in many products such as ready-mix concrete and in a wide array of applications such as concrete pipes, pre-stressed concrete, roads, foundations, bridges, soil stabilization, roof tile and more. Type III cement provides higher early strengths relative to Type I/II cement and is produced by grinding the cement finer. It is typically used in prestress & precast applications. Type IL cement is a general use cement engineered to reduce the carbon footprint by inter grinding a higher ground limestone content than permitted in Type I/II cement. It is typically used in all applications in which Type I/II cement is used. Stucco cement refers to Portland cement-based plasters used for exterior and interior application in structures in a wide range of environments. Masonry cements are formulated to produce masonry mortar which is used in brick, concrete block, and stone masonry construction. Stucco and Masonry cements are produced by inter grinding Portland cement with a high limestone content along with additives that provide water repellency and air entrainment.

PRODUCT COMPONENTS

Inputs	Type IL	Type I/II	Type III	Stucco S	Masonry M
Clinker	86%	91%	95%	66%	68%
Limestone, Gypsum & other	14%	9%	5%	34%	32%

DECLARED UNIT

The declared unit is one metric tonne of Type IL, I/II, III, Stucco S, and Masonry M cement.

SYSTEM BOUNDARY

This EPD is a cradle-to-gate EPD covering A1-A3 stages of the life cycle.

PRODUCTION Stage (Mandatory)			CONSTRUCTION Stage		USE STAGE					END-OF-LIFE Stage			
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	De-construction/ Demolition	Transport to waste processing or disposal	Waste processing	Disposal of waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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

CUT-OFF

Items excluded from 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); and
- 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 PROCEDURE

Allocation follows the requirements and guidance of ISO 14044:2006, Clause 4.3.4; NSF PCR:2021; and ISO 21930:2017 section 7.2. Recycling and recycled content is modeled using the cut-off rule.

This study recognizes fly ash, silica fume, granulated blast furnace slag, cement kiln dust, flue gas desulfurization (FGD) gypsum, post-consumer gypsum, and sawdust 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. Recycled and recovered materials with fuel content and used as fuels, such as refused derived fuels (RDF), scrap tires and agricultural waste, are considered nonrenewable or renewable secondary fuels. Impacts allocated to these fuels are limited to the treatment and transport required for their use from point of generation along with all emissions from combustion.

LIFE CYCLE INVENTORY (LCI)

Primary Sources of LCI Data:

Coal: ecoinvent 3.8 (2021): "Hard coal {RNA}| hard coal mine operation and hard coal preparation"

Electricity: US-EI (2021) "Electricity, high voltage, at grid, eGrid (2019), SERC/US US-EI U"

Limestone: Manufacture specific primary data (2021)

Petroleum Coke: US-EI (2021) "Petroleum coke, at refinery US"

Truck transport: USLCI (2015) "Transport, combination truck, long-haul, diesel powered, Southeast /tkm/RNA"

Truck transport: USLCI (2015) "Transport, combination truck, short-haul, diesel powered, Southeast /tkm/RNA"

Barge Transport: USLCI (2015) Transport, barge, diesel powered/US

Electricity grid mix includes: 46.28% Natural Gas, 3.09% Hydro, 21.96% Coal, 0.42% Wind, 24.05% Nuclear, 1.21% Solar, 0.0% Geothermal, 2.16% Biomass, 0.43% oil, 0.21% Other Fossil, with a global warming potential of 0.624 kg CO₂eq per /kWh.



LIFE CYCLE ASSESSMENT

LIFE CYCLE IMPACT ASSESSMENT RESULTS

Brooksville Cement Products¹, bulk shipped: Type I/L, Type I/II; Type III, Stucco S, Masonry M per 1 metric tonne.**

Impact Assessment	Unit	Type I/L	Type I/II	Type III	Stucco S	Masonry M
Global warming potential (GWP) ²	kg CO ₂ eq	758	814	858	614	632
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	6.34E-06	7.25E-06	7.81E-06	6.40E-06	6.55E-06
Eutrophication potential (EP)	kg N eq	0.74	0.80	0.85	0.62	0.64
Acidification potential of soil and water sources (AP)	kg SO ₂ eq	2.00	2.15	2.26	1.68	1.73
Formation potential of tropospheric ozone (POCP)	kg O ₃ eq	53.1	56.1	58.22	42.7	43.9
Resource Use						
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	3.46E-05	3.22E-05	2.98E-05	2.11E-05	2.18E-05
Abiotic depletion potential for fossil resources (ADPfossil)	MJ, NCV	5,253	5,722	6,071	4,488	4,662
Renewable primary energy resources as energy (fuel), (RPRE ³) *	MJ, NCV	45.4	59.2	67.4	55.7	57.0
Renewable primary resources as material, (RPRM ²) *	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable primary resources as energy (fuel), (NRPRE ²) *	MJ, NCV	5,611	6,203	6,627	4,949	5,133
Non-renewable primary resources as material, (NRPRM ²) *	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Consumption of fresh water, (FW ²)	m ³	1.43	1.79	2.00	1.74	1.85
Secondary Material, Fuel and Recovered Energy						
Secondary Materials, (SM ²) *	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels, (RSF ²) *	MJ, NCV	143	151	158	110	113
Non-renewable secondary fuels (NRSF ²) *	MJ, NCV	143	151	158	110	113
Recovered energy, (RE ²) *	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Waste & Output Flows						
Hazardous waste disposed, (HW ²) *	kg	6.01E-04	6.16E-04	6.31E-04	5.37E-04	5.42E-04
Non-hazardous waste disposed, (NHWD ²) *	kg	1.32	1.36	1.39	1.18	1.19
High-level radioactive waste, (HLRW ²) *	m ³	1.94E-07	2.61E-07	3.01E-07	2.49E-07	2.53E-07
Intermediate and low-level radioactive waste, (ILLRW ²) *	m ³	1.03E-06	1.35E-06	1.54E-06	1.26E-06	1.28E-06
Components for reuse, (CRU ²) *	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling, (MR ²) *	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery, (MER ²) *	kg	3.76E-02	3.86E-02	3.94E-02	3.36E-02	3.39E-02
Recovered energy exported from the product system, (EE ²) *	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Additional Inventory Parameters for Transparency						
CO ₂ emissions from calcination and uptake from carbonation ⁴	kg CO ₂ eq	450	475	498	346	354.99

* Emerging 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. The following optional indicators are not reported and also have high levels of uncertainty: Land use related impacts, toxicological aspects, and emissions from land use change.

Only EPDs prepared from cradle-to-grave life-cycle results and based on the same function, quantified by the same functional unit, and taking account of replacement based on the product reference service life (RSL) relative to an assumed building service life, can be used to assist purchasers and users in making informed comparisons between products.

¹ These products contain no materials that are considered hazardous as defined by the PCR.

² GWP 100; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

CO₂ from biogenic secondary fuels used in kiln are climate-neutral (CO₂ sink = CO₂ emissions), ISO 21930, 7.2.7.

³ Calculated per ACLCA ISO 21930 Guidance.

⁴ Calcination emissions were calculated based on the Cement CO₂ and Energy Protocol detailed output method (B2) published by the World Business Council for Sustainable Development (WBCSD) Cement Sustainability Initiative (CSI).

LIFE CYCLE IMPACT ASSESSMENT RESULTS

Brooksville Cement Products⁵, bagged shipped: Type I/II, Stucco S, Masonry M per 1 metric tonne

Impact Assessment	Unit	Type I/II	Stucco S	Masonry M
Global warming potential (GWP) ⁶	kg CO ₂ eq	834	624	642
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	8.18E-06	6.94E-06	7.09E-06
Eutrophication potential (EP)	kg N eq	0.84	0.64	0.66
Acidification potential of soil and water sources (AP)	kg SO ₂ eq	2.24	1.73	1.78
Formation potential of tropospheric ozone (POCP)	kg O ₃ eq	56.9	43.3	44.6
Resource Use				
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	3.53E-05	2.40E-05	2.47E-05
Abiotic depletion potential for fossil resources (ADPfossil)	MJ, NCV	5996	4,643	4,818
Renewable primary energy resources as energy (fuel), (RPRE ⁷) *	MJ, NCV	255.3	245.1	246.3
Renewable primary resources as material, (RPRM ²) *	MJ, NCV	0.00E+00	0.00E+00	0.00E+00
Non-renewable primary resources as energy (fuel), (NRPRE ²) *	MJ, NCV	6,586	5,153	5,337
Non-renewable primary resources as material, (NRPRM ²) *	MJ, NCV	0.00E+00	0.00E+00	0.00E+00
Consumption of fresh water, (FW ²)	m ³	3.43	3.20	3.31
Secondary Material, Fuel and Recovered Energy				
Secondary Materials, (SM ²) *	kg	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels, (RSF ²) *	MJ, NCV	150	110	113
Non-renewable secondary fuels (NRSF ²) *	MJ, NCV	150	110	113
Recovered energy, (RE ²) *	MJ, NCV	0.00E+00	0.00E+00	0.00E+00
Waste & Output Flows				
Hazardous waste disposed, (HW ²) *	kg	6.16E-04	5.37E-04	5.42E-04
Non-hazardous waste disposed, (NHWD ²) *	kg	1.36	1.18	1.19
High-level radioactive waste, (HLRW ²) *	m ³	3.18E-07	2.74E-07	2.78E-07
Intermediate and low-level radioactive waste, (ILLRW ²) *	m ³	1.62E-06	1.38E-06	1.40E-06
Components for reuse, (CRU ²) *	kg	0.00E+00	0.00E+00	0.00E+00
Materials for recycling, (MR ²) *	kg	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery, (MER ²) *	kg	3.86E-02	3.36E-02	3.39E-02
Recovered energy exported from the product system, (EE ²) *	MJ, NCV	0.00E+00	0.00E+00	0.00E+00
Additional Inventory Parameters for Transparency				
CO ₂ emissions from calcination and uptake from carbonation ⁸	kg CO ₂ eq	474	346	354.99

* Emerging 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. The following optional indicators are not reported and also have high levels of uncertainty: Land use related impacts, toxicological aspects, and emissions from land use change.

Only EPDs prepared from cradle-to-grave life-cycle results and based on the same function, quantified by the same functional unit, and taking account of replacement based on the product reference service life (RSL) relative to an assumed building service life, can be used to assist purchasers and users in making informed comparisons between products.

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⁶ GWP 100; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

CO₂ from biogenic secondary fuels used in kiln are climate-neutral (CO₂ sink = CO₂ emissions), ISO 21930, 7.2.7.

⁷ Calculated per ACLCA ISO 21930 Guidance.

⁸ Calcination emissions were calculated based on the Cement CO₂ and Energy Protocol detailed output method (B2) published by the World Business Council for Sustainable Development (WBCSD) Cement Sustainability Initiative (CSI).

REFERENCES

- ACLCA. (2019). *ACLCA Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017*.
- ASTM. (April 2020). *General Program Instructions*.
- ecoinvent. (2021). *The ecoinvent Database v.3.8*. Zurich, Switzerland: The Swiss Centre for Life Cycle Inventories.
- ISO 14020. (2000). *Environmental labels and declarations - General principles*.
- ISO 14025. (2006). *Environmental labels and declarations, Type III environmental declarations, Principles and procedures*.
- ISO 14040. (2006). *ISO 14040; Environmental Management - Life Cycle Assessment - Principles and Framework*.
- ISO 14044. (2006/Amd 1:2017/Amd 2:2020). *Environmental management - Life cycle assessment - Requirements and guidelines*.
- ISO 21930. (2017). *ISO 21930; Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services*.
- Long Trail Sustainability. (2021). *DATASMART (US-EI Database)*. Huntington, VT: Long Trail Sustainability.
- National Renewable Energy Laboratory. (2015). *U.S. Life-Cycle Inventory (LCI) database*.
- NSF International. (August 2021). *PCR for Concrete. v.2.1*
- NSF International. (Sept 2021). *PCR for Portland, Blended, Masonry, Mortar and Plastic (Stucco) Cements v.3.2*.
- PRé Sustainability. (2020). *SimaPro Vers. 9.1.0.8*. www.pre-sustainability.com/simapro.
- US EPA. (2014). *Tool for the Reduction of Assessment of Chemical and Other Environmental Impacts (TRACI)*.
- US EPA. (2022). *Emissions & Generation Resource Integrated Database (eGRID)*.

ADDITIONAL ENVIRONMENTAL INFORMATION

To learn more about the importance of sustainability at CEMEX, please visit www.cemex.com/sustainability/future-in-action and <https://www.cemexusa.com/sustainability>

