Environmental Product Declaration

CALPORTLAND®

CalPortland Company

Oro Grande Plant

- Type I/II/V cement
- Type III cement
- Plastic cement
- Advancement LT

NRMCA Certified Environmental Product Declaration

Independent verification of the declaration and data according to ISO 21930:2017and ISO 14025:2006

☐ Internal Verification ☒ External Verification

Declared Product:	This is a business-to-business Type III environmental product declaration for Type I/II/V, Type III, Plastic, and Advancement LT (Type IL) cement manufactured by CalPortland in Oro Grande, California.	
Declaration Owner:	**CalPortland Company** 2025 East Financial Way Glendora CA 91741 www.calportland.com	CALPORTLAND®
Program Operator:	**National Ready Mix Concrete Association** 66 Canal Center Plaza, Suite 250, Alexandria, VA 22314 703-706-4800 https://www.nrmca.org/association-resources/sustainability/ Lionel Lemay	NRMCA™ NATIONAL READY MIXED CONCRETE ASSOCIATION
LCA and EPD Developer:	**Athena Sustainable Materials Institute** 280 Albert Street, Suite 404 Ottawa, ON K1P 5G8 613-729-9996 www.athenasmi.org Matt Bowick Please contact NRMCA (https://www.nrmca.org/about-nrmca/nrmca-staff/) for LCA report inquiries	and ISI 14025:2006 Athena Sustainable Materials Institute
Independent Verifier:	**Sustainable Solutions Corporation** 155 Railroad Plaza # 203, Royersford, PA 19468, United States 610-569-1047 info@sustainablesolutionscorporation.com Cara Vought, LCACP, LEED AP+ ID+C	SustainableSolutions CORPORATION
Product Category Rule:	— 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 V2 (2020) serves as the subcategory PCR — Subcategory PCR review was conducted by: Chair of the Review Panel: Dr. Thomas P. Gloria. Please contact NSF for communication with the Chair.	
EPD Software:	SimaPro LCA Software v9.1.0.8, 2020	
Date of Issue:	November 24, 2020	
Period of Validity:	5 Years (until November 24, 2025)	
EPD Number:	NRMCAEPD:20038	

Description of Company

CalPortland Company is a major diversified building materials and construction solutions provider to the Western United States and Canada. Since 1891, we have reliably provided quality innovative and efficient solutions to your greatest construction challenges with our expertise in cement production and distribution, ready mixed concrete, construction aggregates, asphalt, construction services and other building materials. Our products provide solutions everywhere; in buildings for shelter; roads and bridges that transport and link us; systems that provide electricity, water, gas and waste treatment; and other necessary infrastructure like hospitals, schools, railways and airports. We are creating solid foundations through the use of sustainable materials and renewable technologies.

CalPortland Company is the industry leader for energy conservation and environmental quality. Our commitment to continuously improve our environmental performance and provide positive contributions to our company and to society is a product of not just our words but also our actions. Sustainable development is defined as a society meeting the needs of the present without compromising the ability of future generations to meet their own needs. CalPortland is committed to solving tomorrow's challenges today through the advancement of sustainable materials and renewable technologies.

Product Description

This EPD reports environmental transparency information for four cement products produced by CalPortland at its Oro Grande, CA plant. These cements are hydraulic binders and are manufactured by grinding cement clinker and other main or minor constituents into a finely ground, usually grey colored mineral powder. When mixed with water, cement acts as a glue to bind together the sand, gravel or crushed stone to form concrete, one of the most durable, resilient and widely used construction materials in the world. The Table below set out the products, their constituents and applicable standards.

Inputs kg per metric ton	**Type I/II/V Cement**[1)2)]	**Type III Cement**[2)]	**Plastic Cement**[3)]	**Advance-ment LT** (Type IL) [4)]
Clinker	905.0	893.5	752.0	794.5
Gypsum	58.0	82.0	52.5	75
Crushed limestone	30.0	24.0	170.0	130
Clinker kiln dust	6.50	0.0	25.0	0.0
Total	**1,000**	**1,000**	**1,000**	**1,000**

Notes:
[1)] Type I/II/V meets the specification requirements for ASTM C150 Type I, II, and V.
[2)] Applicable Standards: *ASTM C150 / C150M – 20*; *ASTM C1157 / C1157M*; *AASHTO M 85-20*.
[3)] Applicable Standards: *ASTM C1328*
[4)] Applicable Standards: *ASTM C595 / C595M – 20*; *ASTM C1157 / C1157M* – 20; *ASHTO M 240M/M 240 – 20*.

Declared Unit

The declared unit is the basic reference flow set by the NSF cement PCR: 2019 for the assessed products. The declared unit for this study is defined as one metric ton (1,000 kg).

System Boundary

This is a cradle-to-gate EPD covering the production stage (A1-A3) as depicted in the figure below. The production stage includes extraction of raw materials (cradle) through the manufacture of cements ready for shipment (gate).

PRODUCT STAGE			CONST. 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.

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); 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.

Cut-off Criteria

The cut-off criteria as per NSF PCR, Section 7.1.8 and ISO 21930, Section 7.1.8 were followed. Per ISO 21930, all input/output data required were collected and included in the LCI modelling. No substances with hazardous and toxic properties that pose a concern for human health and/or the environment were identified in the framework of this EPD. Any plant-specific data gaps for the reference year 2019 e.g. amount of lubricants and refractory were filled in with industry data (secondary data).

Allocation

Allocation follows the requirements and guidance of ISO 14044, Clause 4.3.4; NSF PCR; and ISO 21930 section 7.2. Recycling and recycled content is modeled using the cut-off rule. The sub-category PCR recognizes fly ash, silica fume, granulated blast furnace slag, cement kiln dust, mill scale, 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.

Life Cycle Inventory Data Sources

The table below summarizes the most pertinent secondary life cycle inventory (LCI) datasets used for this EPD.

Item	LCI Process Name	Time Period[1)]
ecoinvent 3.6 database		
Limestone	Limestone, crushed, for mill {CA-QC}| production | Cut-off, U (adjusted to CA)	2012-2019
Clay	Clay {RoW}| clay pit operation | Cut-off, S	1992-2019
Bauxite	Bauxite {GLO}| bauxite mine operation | Cut-off, S	2015-2019
Iron Ore	Iron ore, beneficiated, 65% Fe {GLO}| iron ore beneficiation to 65% Fe | Cut-off, S	1998-2018
Hydrated lime	Lime, hydrated, loose weight {RoW}| production | Cut-off, S	2000-2019
Grinding aids	Diethylene glycol {RoW}| ethylene glycol production | Cut-off, U & Glycine {RoW}| production | Cut-off, U	1997-2019
Electricity	Electricity, medium voltage {WECC, US only}| market for | Cut-off, S	2014-2019
Water	Tap water {CA-QC}| tap water production, underground water without treatment | Cut-off, U (adjusted to CA)	2014-2019
US LCI database		
Rail transport	Transport, train, diesel powered/US	2003-2008
Truck, short-haul	Transport, combination truck, short-haul, diesel powered, West/tkm/RNA	2010-2011
Truck, long-haul	Transport, combination truck, long-haul, diesel powered, West/tkm/RNA	2010-2011
Ocean transport	Transport, ocean freighter, average fuel mix/US	2006-2008
Bituminous coal	Bituminous coal, at mine/US	2003-2008
Natural gas	Natural gas, processed, at plant/US	2003-2008
Diesel	Diesel, combusted in industrial equipment/US	2003-2008
Gasoline	Gasoline, combusted in industrial equipment/US	2003-2008
Athena LCI database		
Slag Cement	Slag cement, at plant/US (Slag Cement Association)	2015
Gypsum, natural	Gypsum at quarry/mine/US (Gypsum Association)	2011-2012

[1)] "Time Period" is the period between the initiation of data (if known) and its final update and/or validation.

Life Cycle Assessment

This EPD supports 25 life cycle impact assessment indicators and inventory metrics as listed in the tables that follow (next two pages). Note that EPDs are comparable only if they comply with this document, use the same sub-category PCR, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

LCA Results (A1-A3) – 1 metric ton cement	Unit	Type I/II/V Cement	Type III Cement
Impact category and inventory indicators			
Global warming potential, GWP 100[1], AR5	kg CO_2 eq	876	866
Ozone depletion potential, ODP[2]	kg CFC-11 eq	5.61E-06	5.57E-06
Smog formation potential, SFP[2]	kg O_3 eq	35.9	35.8
Acidification potential, AP[2]	kg SO_2 eq	1.23	1.23
Eutrophication potential, EP[2]	kg N eq	0.111	0.111
Abiotic depletion potential for non-fossil mineral resources, ADP elements[3] *	kg Sb eq	3.01E-04	2.99E-04
Abiotic depletion potential for fossil resources, ADP fossil[3]	MJ LHV	4,774	4,735
Renewable primary resources used as an energy carrier (fuel), RPR_E*	MJ LHV	173	172
Renewable primary resources with energy content used as material, RPR_M[4] *	MJ LHV	0	0
Non-renewable primary resources used as an energy carrier (fuel), $NRPR_E$*	MJ LHV	4,989	4,949
Non-renewable primary resources with energy content used as material, $NRPR_M$[4] *	MJ LHV	0	0
Secondary materials, SM[4] *	kg	23.78	23.47
Renewable secondary fuels, RSF[4] *	MJ LHV	0	0
Non-renewable secondary fuels, NRSF[4] *	MJ LHV	0	0
Recovered energy, RE[4] *	MJ LHV	0	0
Consumption of freshwater, FW[4]	m^3	0.752	0.744
Hazardous waste disposed, HWD[4] *	kg	0.0500	0.0494
Non-hazardous waste disposed, NHWD[4] *	kg	0.434	0.434
High-level radioactive waste, conditioned, to final repository, HLRW[4] *	m^3	6.64E-08	6.60E-08
Intermediate- and low-level radioactive waste, conditioned, to final repository, ILLRW[4] *	m^3	8.55E-07	8.49E-07
Components for re-use, CRU[4] *	kg	N/A	N/A
Materials for recycling, MR[4] *	kg	0.0145	0.0144
Materials for energy recovery, MER[4] *	kg	0	0
Recovered energy exported from the product system, EE[4] *	MJ LHV	0	0
Additional inventory parameters for transparency			
Emissions from calcination	kg CO_2 eq	462	456
Biogenic CO_2, reporting the removals and emissions associated with biogenic carbon content contained within biobased products	kg CO_2 eq	0	0

Notes:

[1] Calculated as per U.S EPA TRACI v2.1, with IPCC 2013 (AR 5), SimaPro v 9.

[2] Calculated as per U.S EPA TRACI v2.1, SimaPro v 9. [3] Calculated as per CML-IA Baseline V3.05, SimaPro v 9.

[4] Calculated as per ACLCA ISO 21930 Guidance. Not all LCA datasets for upstream materials include these impact categories and thus results may be incomplete. Use caution when interpreting data in these categories.

[5] Calcination emissions were calculated based on the Cement CO_2 and Energy Protocol detailed output method (B2).

*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.

LCA Results (A1-A3) – 1 metric ton cement	Unit	Plastic Cement	Advance-ment LT
Impact category and inventory indicators			
Global warming potential, GWP 100[1)], AR5	kg CO_2 eq	733	774
Ozone depletion potential, ODP[2)]	kg CFC-11 eq	5.19E-06	5.31E-06
Smog formation potential, SFP[2)]	kg O_3 eq	30.3	32.1
Acidification potential, AP[2)]	kg SO_2 eq	1.04	1.10
Eutrophication potential, EP[2)]	kg N eq	0.097	0.102
Abiotic depletion potential for non-fossil mineral resources, ADP elements[3)] *	kg Sb eq	2.70E-04	2.79E-04
Abiotic depletion potential for fossil resources, ADP fossil[3)]	MJ LHV	4,034	4,254
Renewable primary resources used as an energy carrier (fuel), RPR_E*	MJ LHV	160	164
Renewable primary resources with energy content used as material, RPR_M[4)] *	MJ LHV	0	0
Non-renewable primary resources used as an energy carrier (fuel), $NRPR_E$*	MJ LHV	4,231	4,457
Non-renewable primary resources with energy content used as material, $NRPR_M$[4)] *	MJ LHV	0	0
Secondary materials, SM[4)] *	kg	19.76	20.87
Renewable secondary fuels, RSF[4)] *	MJ LHV	0	0
Non-renewable secondary fuels, NRSF[4)] *	MJ LHV	0	0
Recovered energy, RE[4)] *	MJ LHV	0	0
Consumption of freshwater, FW[4)]	m^3	0.648	0.677
Hazardous waste disposed, HWD[4)] *	kg	0.0419	0.0441
Non-hazardous waste disposed, NHWD[4)] *	kg	0.434	0.434
High-level radioactive waste, conditioned, to final repository, HLRW[4)] *	m^3	6.18E-08	6.31E-08
Intermediate- and low-level radioactive waste, conditioned, to final repository, ILLRW[4)] *	m^3	7.94E-07	8.11E-07
Components for re-use, CRU[4)] *	kg	N/A	N/A
Materials for recycling, MR[4)] *	kg	0.0135	0.0138
Materials for energy recovery, MER[4)] *	kg	0	0
Recovered energy exported from the product system, EE[4)] *	MJ LHV	0	0
Additional inventory parameters for transparency			
Emissions from calcination	kg CO_2 eq	384	405
Biogenic CO_2, reporting the removals and emissions associated with biogenic carbon content contained within biobased products	kg CO_2 eq	0	0

Notes:

[1)] Calculated as per U.S EPA TRACI v2.1, with IPCC 2013 (AR 5), SimaPro v 9.

[2)] Calculated as per U.S EPA TRACI v2.1, SimaPro v 9. [3)] Calculated as per CML-IA Baseline V3.05, SimaPro v 9.

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References

ASTM C150 / C150M – 20 Standard Specification for Portland Cement.

ASTM C1328 / C1328M – 19 Standard Specification for Plastic (Stucco) Cement.

ASTM C595 / C595M – 20 Standard Specification for Blended Hydraulic Cements.

ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.

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