

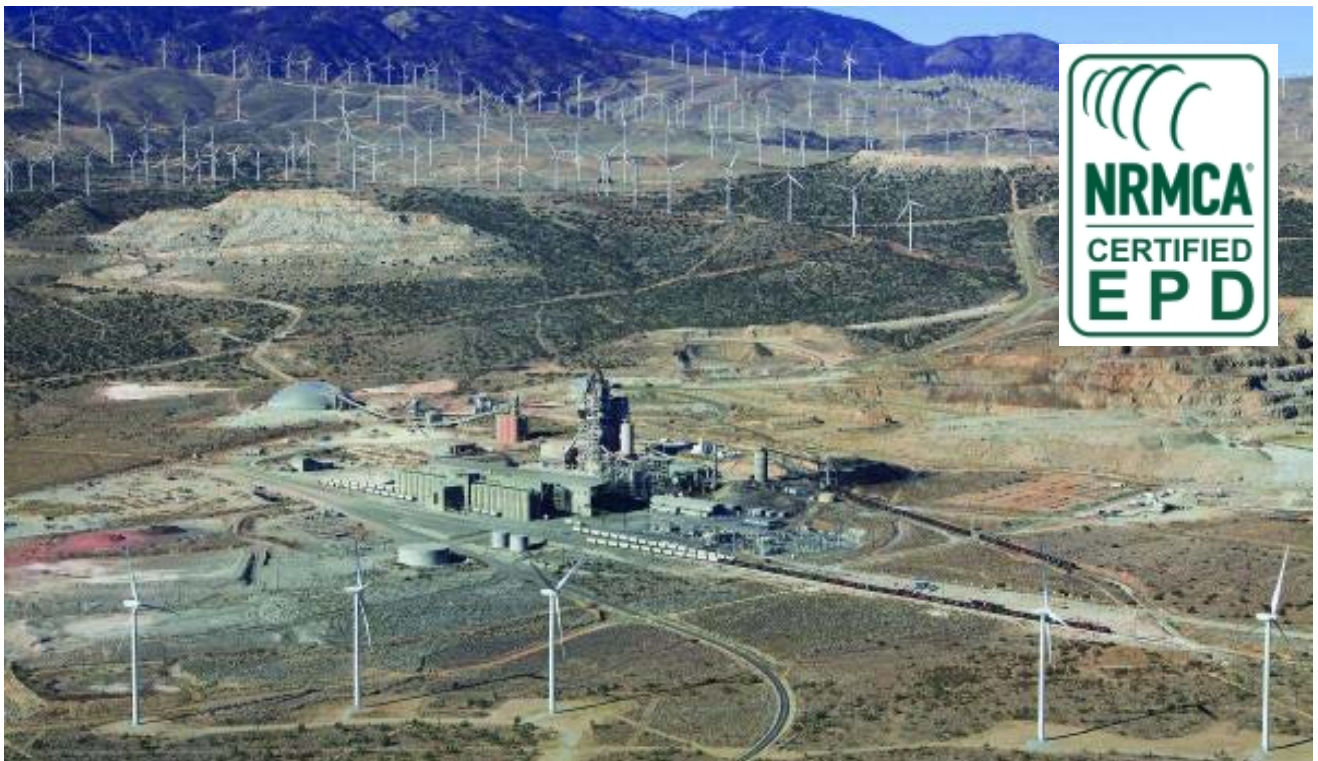
Environmental Product Declaration



CalPortland Company

Mojave Plant

- Type I/II/V cement
- Advancement HS



NRMCA Certified Environmental Product Declaration

Independent verification of the declaration and data according to ISO 21930:2017 and 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 and Advancement HS cement manufactured by CalPortland in Mojave, California. | |
| Declaration Owner: | CalPortland Company 2025 East Financial Way Glendora CA 91741 www.calportland.com |  |
| 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 |  |
| 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. |  |
| Independent Verifier: | Sustainable Solutions Corporation 155 Railroad Plaza # 203, Royersford, PA 19468, United States info@sustainablesolutionscorporation.com Cara Vought, LCACP, LEED AP+ ID+C |  |
| 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:20039 | |

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 two cement products produced by CalPortland at its Mojave, 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⁾ | Advance- ment HS (Type IL) ³⁾ |
|-----------------------------|---------------------------------------|--|
| Clinker | 903 | 815 |
| Gypsum | 57.6 | 55.0 |
| Limestone | 39.3 | 130 |
| Grinding aids | 0.218 | 0.389 |
| Total | 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 – 20; AASHTO M 85-20.*

³⁾ Applicable Standards: *ASTM C595 / C595M – 20; ASTM C1157 / C1157M – 20; AASHTO 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 |
| Silica Sand | Silica sand {RoW} production Cut-off, S | 1998-2019 |
| Iron Ore | Iron ore, beneficiated, 65% Fe {GLO} iron ore beneficiation to 65% Fe Cut-off, S | 1998-2018 |
| Foundry sand | Silica sand {RoW} production Cut-off, S, Clay {RoW} clay pit operation Cut-off, S, Anthracite coal, at mine/RNA (US LCI) | 1992-2019 |
| Ammonia | Ammonia, liquid {RoW} ammonia production, steam reforming, liquid Cut-off, S | 2000-2019 |
| 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, 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 |
| Bituminous coal | Bituminous coal, at mine/US | 2003-2008 |
| Natural gas | Natural gas, processed, at plant/US | 2003-2008 |
| Petroleum coke | Petroleum coke, at refinery/kg/US | 2003-2008 |
| Diesel | Diesel, combusted in industrial equipment/US | 2003-2008 |
| Gasoline | Gasoline, combusted in industrial equipment/US | 2003-2008 |
| Athena LCI database | | |
| Gypsum, natural | Gypsum at quarry/mine/US (Gypsum Association) | 2011-2012 |

Notes: 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 table that follows (next page). 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 | Advance-ment HS |
|--|-----------------------|-------------|-----------------|
| Impact category and inventory indicators | | | |
| Global warming potential, GWP 100 ¹⁾ , AR5 | kg CO ₂ eq | 824 | 746 |
| Ozone depletion potential, ODP ²⁾ | kg CFC-11 eq | 6.62E-06 | 6.35E-06 |
| Smog formation potential, SFP ²⁾ | kg O ₃ eq | 36.5 | 33.2 |
| Acidification potential, AP ²⁾ | kg SO ₂ eq | 1.60 | 1.45 |
| Eutrophication potential, EP ²⁾ | kg N eq | 0.107 | 0.100 |
| Abiotic depletion potential for non-fossil mineral resources, ADP elements ³⁾ * | kg Sb eq | 3.04E-04 | 2.84E-04 |
| Abiotic depletion potential for fossil resources, ADP fossil ³⁾ | MJ LHV | 4,692 | 4,274 |
| Renewable primary resources used as an energy carrier (fuel), RPR _E * | MJ LHV | 139 | 133 |
| 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 | 4,904 | 4,475 |
| Non-renewable primary resources with energy content used as material, NRPR _M ⁴⁾ * | MJ LHV | 0 | 0 |
| Secondary materials, SM ⁴⁾ * | kg | 0 | 0 |
| 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 | 0.702 | 0.644 |
| Hazardous waste disposed, HWD ⁴⁾ * | kg | 0.0137 | 0.0124 |
| Non-hazardous waste disposed, NHWD ⁴⁾ * | kg | 0.0211 | 0.0191 |
| High-level radioactive waste, conditioned, to final repository, HLRW ⁴⁾ * | m ³ | 5.37E-08 | 5.17E-08 |
| Intermediate- and low-level radioactive waste, conditioned, to final repository, ILLRW ⁴⁾ * | m ³ | 1.01E-06 | 9.60E-07 |
| Components for re-use, CRU ⁴⁾ * | kg | N/A | N/A |
| Materials for recycling, MR ⁴⁾ * | kg | 0.0032 | 0.0029 |
| 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 | 425 | 384 |
| 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 CO₂ 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.

References

ASTM C150 / C150M – 20 Standard Specification for Portland 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.

ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework.

ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines.

NSF International, Product Category Rule Environmental Product Declarations, PCR for Portland, Blended, Masonry, Mortar, and Plastic (Stucco) Cements, May 2020.

NRMCA, General Program Instructions for Environmental Product Declarations (EPD) National Ready Mixed Concrete Association Version 2.0 June 1, 2019 – May 31, 2024.

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ISO 14021:2016 Environmental labels and declarations -- Self-declared environmental claims (Type II environmental labelling).

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ACLCA 2019, Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017. The American Centre for Life Cycle Assessment. May, 2019.

LEED v4, Building Design and Construction Guide (BD+C), MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Option 2 Multi-attribute optimization (1 point).

LEED v4.1 July 2019, Building Design and Construction Guide (BD+C), Getting started guide for beta participant, MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Option 2 Multi-attribute optimization (1 point), pg.170.

WBCSD, CO2 and Energy Accounting and Reporting Standard for the Cement Industry, May 2011.

MIT CSHub, Variation in the Life Cycle Inventory of Portland Cement Production in the US, 2010

NSF International, Product Category Rule for Environmental Product Declarations PCR for Concrete, February 2019.