NATIONAL CEMENT

A Vicat Company

"The Cement of Choice for Building Success"

National Cement Company of Alabama, Inc.

Environmental Product Declaration (EPD) for Cement Produced at Ragland, Alabama Operation

GENERAL INFORMATION

This cradle-to-gate Environmental Product Declaration covers cement products produced at the Ragland Production 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.

NATIONAL CEMENT COMPANY OF ALABAMA, INC.

Ragland Operation

Ragland, AL 35131

EPD 635
February 14, 2024
Valid for 5 years

PROGRAM OPERATOR

ASTM International
100 Barr Harbor
West Conshohocken, PA 19428
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610-832-9500

ENVIRONMENTAL IMPACTS

Ragland Plant:
Product-Specific Type III EPD **Declared Cement**
Product:
Type I, Type IL, Mortar Type N (CMC), Mortar Type N Buff, (CBM), Type S
Declared Unit: One metric Tonne of cement

IMPACT CATEGORIES	Type I	Type 1L	Type N (CMC)	Type N Buff (CBM)	Type S
Global Warming Potential, kg CO_2 eq	911	844	447	444	634
Ozone Depletion Potential kg CFC-11 eq	5.**33E**-06	5.16E-06	4.02E-06	3.98E-06	4.76E-06
Eutrophication Potential kg N eq	3.32E-01	3.15E-01	2.11E-01	2.08E-01	2.66E-01
Acidification Potential kg SO2 eq	1.70	1.57	0.91	0.90	1.23
Photochemical Ozone Formation Potential kg O_3eq	36.2	33.5	38.3	17.9	17.9
Abiotic Depletion, non-fossil kg Sb eq	1.52E-05	1.51E-05	9.00E-06	1.03E-05	1.17E-05
Abiotic Depletion, fossil MJ, NCV	4,532	4,221	2,488	2,460	3,339

Clinker Percent	93%	85%	42%	42%	62%
Limestone, Gypsum and others percent	7%	15%	58%	58%	38%

LIFE CYCLE ASSESSMENT

PRODUCER

National Cement Company of Alabama, Inc. (NCCAL), a subsidiary of National Cement Company, Inc. (NCC), is an innovative and dynamic manufacturer of artificial cement and ready-mix concrete serving markets in Southeast United States. NCC is a proud, wholly-owned subsidiary of the Vicat Group based in France. Vicat is an international group of companies and a French, family-run business founded in 1817 by Louis Vicat who mastered the production of artificial cement during construction of the Souillac Bridge in southwestern France.

The Ragland plant has been in operation since 1908 with several iterations of technical abilities for cement production. Its latest, in 2022, with the investment in a new pyroprocessing line using state-of-the-art technology in emission control equipment with 100% capability of consuming alternative fuels in lieu of nobles fuels.

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 C150, C595, C1157, AASHTO M240	Type I, Type 1L
Masonry Cement	ASTM C91	Mortar Type N (CMC), Mortar Type N Buff (CBM), Mortar Type S

PRODUCT DESCRIPTION

This EPD reports environmental information for five cement products produced by NCCAL at their Ragland, AL facility. These cements are used as the key ingredient in many products, such as ready-mix concrete, mortar, grout, masonry units, and in a wide array of applications such as concrete pipes, pre-stressed concrete, roads, foundations, bridges, soil stabilization, and more.

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.: ☐ internal ☑ external

Third party verifier Thomas P. Gloria, PhD. (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants

For additional explanatory material
Manufacture Representative: Pascal Lamontagne (plamontagne@natcem.com) (pascal.lamontagne@natcem.com)
This LCA EPD was prepared by: Melissa Diaz 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.

DECLARED UNIT

The declared unit is one metric tonne of Type I, Type 1L, Mortar Type N (CMC), Mortar Type N Buff (CBM), Mortar Type S cement.

SYSTEM BOUNDARY

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

PRODUCTION STAGE			CONSTRUCTION STAGE		USE STAGE							END-OF-LIFE STAGE			
Extraction and upstream production	Tansport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational eater use	Deconstruction / Demolition	Transport	Waste Procesing	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.

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 sub-category 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. Recycled and recovered materials with fuel content and used as fuels, such as scrap tires, residual wood chips and used oils, are considered nonrenewable or renewable secondary fuels. Impacts allocated to these fuels are limited to the treatment and transport required for their use from the point of generation along with all emissions from combustion.

LIFE CYCLE INVENTORY (LCI)

Primary Sources of LCI Data:

Diesel: US-EI (2021) “Diesel, combusted in industrial equipment/US”
Electricity: US-EI (2021) “Electricity, high voltage, at grid, eGrid (2021), SERC/US US-EI U”
Limestone: Manufacture specific primary data (2019)
Natural Gas: ecoinvent 3.8 (2021) “market for natural gas, high pressure 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”

Electricity grid mix includes: 45.83% Natural Gas, 3.21% Hydro, 20.64% Coal, 0.73% Wind, 24.36% Nuclear, 2.31% Solar, 0.0% Geothermal, 1.95% Biomass, 0.46% oil, 0.34% Other Fossil, with a global warming potential of 0.606 kg CO_2eq/kWh.

LIFE CYCLE IMPACT ASSESSMENT RESULTS

Ragland Cement bulk Products[1]: Type I, Type 1L, Mortar Type N, Mortar Type N (buff), and Mortar Type S; per 1 metric tonne.

Impact Assessment	Unit	Type I	Type IL	Mortar Type N (CMC)	Mortar Type N Buff (CBM)	Mortar Type S
Global warming potential (GWP)[2]	kg CO_2 eq	911	844	447	444	634
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	5.33E-06	5.16E-06	4.02E-06	3.98E-06	4.76E-06
Eutrophication potential (EP)	kg N eq	3.32E-01	3.15E-01	2.11E-01	2.08E-01	2.66E-01
Acidification potential of soil and water sources (AP)	kg SO_2 eq	1.70	1.57	0.91	0.90	1.23
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	36.2	33.5	17.9	17.9	25.2
Resource Use						
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	1.52E-05	1.51E-05	9.00E-06	1.03E-05	1.17E-05
Abiotic depletion potential for fossil resources (ADPfossil)	MJ, NCV	4,532	4,221	2,488	2,460	3,339
Renewable primary energy resources as energy (fuel), (RPRE[3]) *	MJ, NCV	80.8	77	61.8	60.4	72.2
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	5,170	4,843	2,985	2,944	3,915
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])	m3	6.19	5.68	3.40	3.37	4.58
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	2.08E-01	1.92E-01	9.38E-02	9.38E-02	1.39E-01
Non-renewable secondary fuels (NRSF[2]) *	MJ, NCV	8.01E-01	7.39E-01	3.61E-01	3.61E-01	5.34E-01
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed, (NHWD[2]) *	kg	7.51E-01	7.23E-01	5.53E-01	5.53E-01	6.31E-01
High-level radioactive waste, (HLRW[2]) *	kg	3.46E-07	3.37E-07	2.69E-07	2.62E-07	3.12E-07
Intermediate and low-level radioactive waste, (ILLRW[2]) *	kg	1.70E-06	1.65E-06	1.31E-06	1.28E-06	1.53E-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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	472	436	213	213	315

* 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

Ragland Cement bagged Products[5]: Type I, Type 1L, Mortar Type N, Mortar Type N (buff), and Mortar Type S; per 1 metric tonne.

Impact Assessment	Unit	Type I	Type IL	Mortar Type N (CMC)	Mortar Type N Buff (CBM)	Mortar Type S
Global warming potential (GWP)[6]	kg CO_2 eq	919	852	454	452	641
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	5.69E-06	5.52E-06	4.38E-06	4.33E-06	5.12E-06
Eutrophication potential (EP)	kg N eq	3.46E-01	3.29E-01	2.25E-01	2.22E-01	2.80E-01
Acidification potential of soil and water sources (AP)	kg SO_2 eq	1.74E+00	1.61E+00	9.44E-01	9.40E-01	1.27E+00
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	36.7	34.0	18.5	18.4	25.7
Resource Use						
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	1.67E-05	1.66E-05	1.05E-05	1.18E-05	1.32E-05
Abiotic depletion potential for fossil resources (ADPfossil)	MJ, NCV	4,633	4,322	2,590	2,562	3,441
Renewable primary energy resources as energy (fuel), (RPRE[7]) *	MJ, NCV	180	177	161	160	172
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	5,310	4,982	3,124	3,084	4,055
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])	m3	6.53	6.03	3.75	3.72	4.93
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	2.08E-01	1.92E-01	9.38E-02	9.38E-02	1.39E-01
Non-renewable secondary fuels (NRSF[2]) *	MJ, NCV	8.01E-01	7.39E-01	3.61E-01	3.61E-01	5.34E-01
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed, (NHWD[2]) *	kg	7.51E-01	7.23E-01	5.53E-01	5.53E-01	6.31E-01
High-level radioactive waste, (HLRW[2]) *	kg	3.66E-07	3.57E-07	2.89E-07	2.82E-07	3.32E-07
Intermediate and low-level radioactive waste, (ILLRW[2]) *	kg	1.79E-06	1.75E-06	1.41E-06	1.37E-06	1.62E-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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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[8]	kg CO_2 eq	472	436	213	213	315

* 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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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).

ADDITIONAL ENVIRONMENTAL INFORMATION

NCCAL is part of the Vicat Group, a global innovator of construction materials across 12 countries worldwide. The Vicat Group's sustainability initiatives include implementation of new, less energy-intensive organizational methods, integration of new technologies derived from its research and development projects and a focus on the use of new materials for the construction of housing and transportation infrastructures. Vicat is a member of the Natural Capital Accounting workshop of the Business and Biodiversity platform stemming from the European Union's Strategic Plan for Biodiversity 2011–2020. To learn more about the Vicat Group's sustainability initiatives, visit https://www.vicat.com/commitments/respecting-environment.

REFERENCES

ACLCA 2019, Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017. The American Centre for Life Cycle Assessment, May 2019
Climate Earth 2023: National Cement – LCA Project Report, Ragland Plant
ecoinvent v3.8: 2021 The Swiss Centre for Life Cycle Inventories
ISO 14020:2000 Environmental labels and declarations – General principles
ISO 14025:2006 Environmental labeling and declarations – Type III environmental declarations – Principles and procedures
ISO 14040:2006 Environmental Management - Life Cycle Assessment - Principles and Framework
ISO 14044:2006/Amd 1:2017/Amd2:2020 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
ISO 21930:2017 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
NSF 2021: PCR for Portland, Blended, Masonry, Mortar and Plastic (Stucco) Cements v3.2, September 2021
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).