Environmental Product Declaration (EPD) for Cement

GENERAL INFORMATION

This cradle to gate Environmental Product Declaration covers two cement products produced at the Leeds 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.

Heidelberg Materials

Leeds Cement Plant and Terminal
8401 Second Avenue
Leeds, AL 35094

PROGRAM OPERATOR

National Ready Mixed Concrete Association
900 Spring Street
Silver Spring, MD 20910
https://www.nrmca.org/

NRMCA EPD #: 20070

DATE OF ISSUE

November 11, 2022 (valid for 5 years until November 11, 2027)

Environmental Impacts

Leeds Plant: Product-Specific Type III EPD

Declared Cement Products (four):
Type IL; Type I-II

Declared Unit: One metric tonne of cement

	Cement Products	
	Type IL	Type I-II
Global Warming Potential (kg CO_2-eq)	**867**	**920**
Ozone Depletion Potential (kg CFC-11-eq)	2.76E-05	2.88E-05
Eutrophication Potential (kg N-eq)	0.94	0.98
Acidification Potential (kg SO^2eq)	2.60	2.74
Photochemical Ozone Creation Potential (kg O_3-eq)	60.4	63.9
Abiotic Depletion, nonfossil (kg Sb-eq)	1.6-E-04	1.65E-04
Abiotic Depletion, fossil (MJ)	676	710
Product Components:		
Clinker	84%	93%
Limestone, Gypsum and Others	16%	7%

Additional detail and impacts are reported on page 5

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

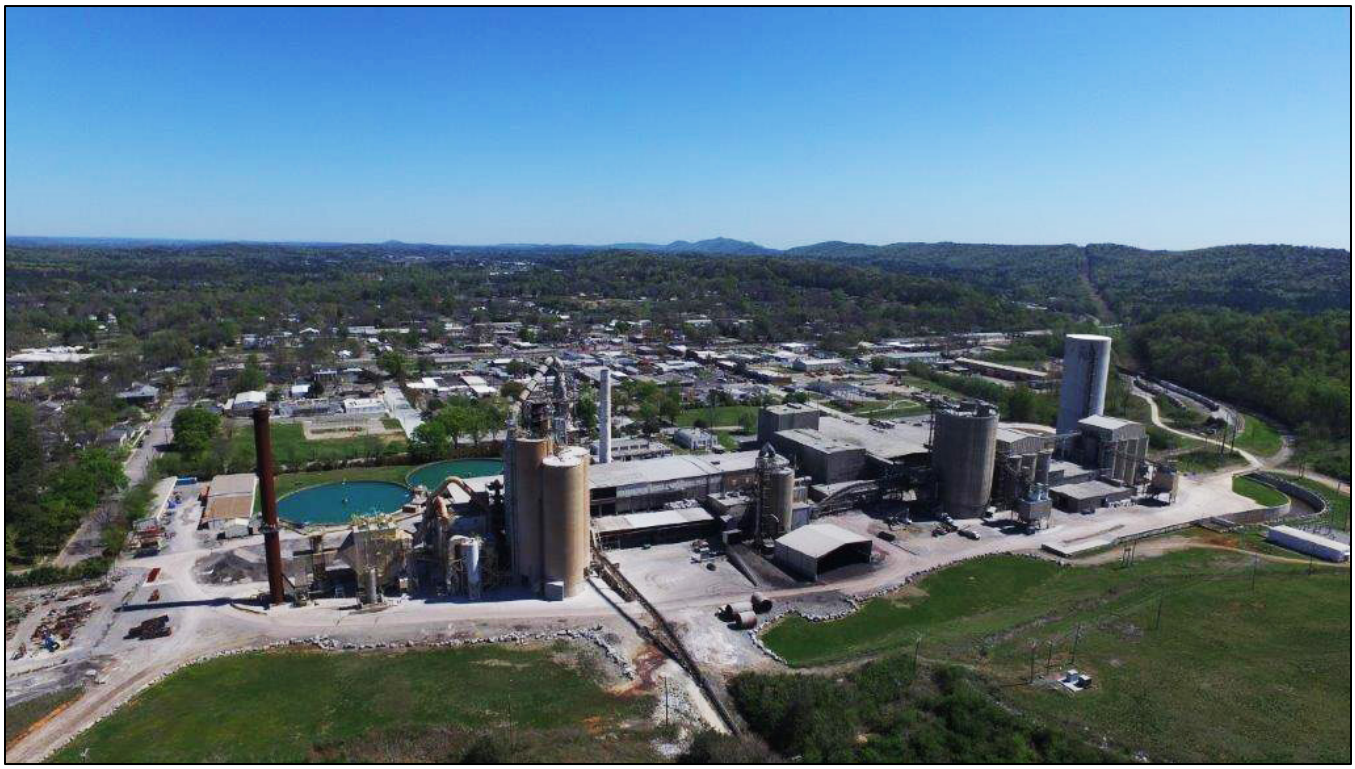
Third party verifier • Joseph Geibig. • EcoForm Consulting

For additional explanatory material
Manufacture Representative: Wayne Wilson (Wayne.Wilson@HeidelbergMaterials.com)
This EPD was prepared using the pre-verified GCCA Tool by: Athena Sustainable Materials Institute

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



Heidelberg Materials' Leeds, Alabama, plant first started producing cement in 1906 with four small dry kilns, this plant formerly known as the Standard Portland Cement Company. The Plant was converted to two long wet kilns in 1938 and later converted to a more environmentally friendly dry process pre-heater kiln system in 1974. The Leeds plant became a part of Lehigh Cement Company LLC in 1980 and is now known as Heidelberg Materials. It is recognized as the oldest continuously operating cement plant in the State of Alabama.

Heidelberg Materials' Leeds plant resides two blocks from City Hall in downtown Leeds, AL. The Leeds Plant is an integral part of the local economy contributing millions annually in property and payroll taxes, buying local goods and services, and support several local charitable organizations. Accordingly, Heidelberg Materials commitment to environmental sustainability and reducing its carbon footprint by responsibly manufacturing and marketing our cement products throughout the Southeastern US area remains a top priority.

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

PRODUCT DESCRIPTION

This EPD reports environmental transparency information for two cement products, produced by Heidelberg Materials at their Leeds, AL facility. 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. Cement is just one ingredient in the mixture that creates concrete, but it is the most chemically active ingredient and crucial to the quality of the final product. 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. Our Type IL is branded as **EcoCem®*PLC*** and was developed to be more environmentally friendly by reducing its carbon footprint (reduction measured through GWP). This product is a general use product for concrete and mortar as well as all the other various applications for cement**,** including engineered soils and solidification/stabilization of materials and wastes.

DECLARED UNIT

The declared unit is one metric tonne of Type I-II and Type IL 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	Transport To Factory	Manufacturing	Transport To Factory	Installation	Use	Maitenance	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.

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.

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.

DATA COLLECTION AND SOURCES

Gate-to-gate input/output flow data were collected for the following processes for the reference year 2020:

Limestone quarry, clinker production and cement manufacture – Leeds, AL

All applicable North American background LCI data are publicly available in the GCCA LCA Database [4].

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 [5].

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.

REFERENCES

1. ASTM C150 / C150M – 20 Standard Specification for Portland Cement.
2. ASTM C595 / C595M – 21 Standard Specification for Blended Hydraulic Cements
3. Global Cement and Concrete Association (GCCA) 2021. N.A. version of Industry EPD tool for Cement and Concrete – v3.1. https://concrete-epd-tool.org/
4. Global Cement and Concrete Association (GCCA) 2021. LCA Database, North American version – v3.1, Prepared by Quantis. https://demo.gcca.quantis.solutions/
5. Global Cement and Concrete Association (GCCA) 2021. LCA Model, North American version – v3.1, Prepared by Quantis https://demo.gcca.quantis.solutions/
6. ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
7. ISO 14044:2006 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
8. ISO 14040:2006 Environmental Management - Life Cycle Assessment - Principles and Framework
9. NSF 2020: PCR for Portland, Blended, Masonry, Mortar and Plastic (Stucco) Cements v3.2, September 2021
10. USLCI: 2015 The U.S. Life Cycle Inventory Database
11. WBCSD CSI 2013: CO2 and Energy Protocol Version 3.1 of 9 December 2013; https://www.cement-co2-protocol.org/en/
12. WCI: 2010 WCI, Final Essential Requirements of Mandatory Reporting

CEMENT TYPES

For portland cement types, ASTM C150 describes:

Cement Type	Description
Type I	Normal
Type II	Moderate Sulfate Resistance

For blended hydraulic cements – specified by ASTM C595 – the following nomenclature is used:

Cement Type	Description
Type IL	Portland-Limestone Cement

LIFE CYCLE IMPACT ASSESSMENT RESULTS – Leeds Bulk Cement Products: Type IL named EcoCem®PLC and Type I-II Cement per metric tonne

Impact Assessment	Unit	Type IL	Type I-II
Global warming potential (GWP)[1]	kg CO_2 eq	**867**	**920**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	**2.76E-05**	**2.88E-05**
Eutrophication potential (EP)	kg N eq	**0.94**	**0.98**
Acidification potential of soil and water sources (AP)	kg SO_2 eq	**2.60**	**2.74**
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	**60.4**	**63.9**
Resource Use			
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	**1.60E-04**	**1.65E-04**
Abiotic depletion potential for fossil resources (ADPfossil)	MJ, NCV	**676**	**710**
Renewable primary energy resources as energy (fuel), (RPRE)*	MJ, NCV	**55**	**57**
Renewable primary resources as material, (RPRM)*	MJ, NCV	**0.00**	**0.00**
Non-renewable primary resources as energy (fuel), (NRPRE)*	MJ, NCV	**5698**	**6003**
Non-renewable primary resources as material (NRPRM)*	MJ, NCV	**0.00**	**0.00**
Consumption of fresh water	m3	**0.81**	**0.85**
Secondary Material, Fuel and Recovered Energy			
Secondary Materials, (SM)*	kg	**96**	**128**
Renewable secondary fuels, (RSF)*	MJ, NCV	**0.00**	**0.00**
Non-renewable secondary fuels (NRSF)*	MJ, NCV	**0.00**	**0.00**
Recovered energy, (RE)*	MJ, NCV	**0.00**	**0.00**
Waste & Output Flows			
Hazardous waste disposed*	kg	**0.00**	**0.00**
Non-hazardous waste disposed*	kg	**0.005**	**0.006**
High-level radioactive waste*	kg	**n/c**	**n/c**
Intermediate and low-level radioactive waste*	kg	**n/c**	**n/c**
Components for reuse*	kg	**0.00**	**0.00**
Materials for recycling*	kg	**0.00**	**0.00**
Materials for energy recovery*	kg	**0.00**	**0.00**
Recovered energy exported from the product system*	MJ, NCV	**0.00**	**0.00**
Additional Inventory Parameters for Transparency			
CO_2 emissions from calcination and uptake from carbonation	kg CO_2 eq	**456**	**486**
Biogenic CO_2, reporting the removals and emissions associated with biogenic carbon content contained within biobased products	kg CO_2 eq	**0.00**	**0.00**

* 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.

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] GWP 100; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).
CO2 from biomass secondary fuels (wood chips made from construction waste as well as whole wood construction waste) used in kiln are climate-neutral (CO2 sink = CO2 emissions), ISO 21930, 7.2.7.

ADDITIONAL ENVIROMENTAL INFORMATION

Environmental Management System (EMS)

The Leeds Plant has an EMS in place which identifies environmental impacts and ensures that control procedures are continually updated to reflect current environmental knowledge and regulations. The EMS includes reminders tied to routine inspections, sampling, monitoring, and reporting to ensure regulatory compliance is achieved. Environmental policies and procedures are communicated through training with operating personnel. The plant complies with Federal and AL State environmental storage of regulated substances and submits status reports as required by USEPA, ADEM, and JCDH:

- Clean Air Act
- Green House Gas 40 CFR Part 98
- Toxic Release Inventory 40 CFR Part 372
- National Emissions Standards for Hazardous Air Pollutants for the Portland Cement Industry 40 CFR Part 63 Subpart LLL
- Resource Conservation and Recovery Act
- Hazardous Substances and Chemicals, Environmental Response and Community Right to Know
- Toxic Substances Control Act
- Clean Water Act

Environmental Permits

- Title V operating permit 4-07-0290-06 issued by JCDH
- NPDES permit AL0003638 issued by ADEM

Used Oil, Residual Oil Products, Used Chemicals and spent Anti-Freeze:

The Leeds Plant stores these substances in appropriate storage bins and containers in areas with secondary containment. Certified third party waste haulers are used to remove these materials which are manifested for proper disposal as per USEPA, ADEM, and JCDH regulations.

Recycling Programs

The Leeds Plant utilizes vendors that pick up and recycle universal waste consisting of spent fluorescent bulbs, batteries and electronic hardware from the designated accumulation area in the Storeroom. Used vehicle batteries are recycled when new ones are purchased. Similarly, the Leeds Plant utilizes waste segregation bins to separate paper, carboard, wood, metals and recyclable materials from waste streams. Third-party contractors manage the waste / recycling haulage to local transfer stations.

Heidelberg Materials Sustainability Commitments 2030

The world needs smart, sustainable and resilient infrastructure, buildings, and public spaces. At Heidelberg Materials, we are transforming our business to address these challenges, and are placing sustainability at the core of what we do.

The United Nations Sustainable Development Goals (SDGs) shape our strategy and sustainability commitments. Our Sustainability Commitments 2030 support our vision to build a more sustainable future that is net zero, safe and inclusive, nature positive, and circular and resilient. Learn more at Sustainability Commitments 2030 (heidelbergmaterials.com).