Environmental Product Declaration (EPD) for Cement Produced at Glens Falls Cement Plant

GENERAL INFORMATION

This cradle to gate Environmental Product Declaration covers four cement products produced at the Glens Falls 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.

LEHIGH CEMENT

Glens Falls Cement Plant and Terminal
313 Warren St, Glens Falls, NY 12801

PROGRAM OPERATOR

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

NRMCAEPD: 20067

DATE OF ISSUE

October 7, 2022 (valid for 5 years until October 7, 2027)

ENVIRONMENTAL IMPACTS

Lehigh Glenn Falls Plant: Product-Specific Type III EPD

Declared Cement Products (four):
Type IL; Type II; Type III; Masonry S

Declared Unit: One metric tonne of cement

	CEMENT PRODUCTS			
	Type IL	Type II	Type III	Masonry S
Global Warming Potential (kg CO_2-eq)	644	686	691	474
Ozone Depletion Potential (kg CFC-11-eq)	2.81E-05	2.81E-05	2.98E-05	2.35E-05
Eutrophication Potential (kg N-eq)	0.21	0.22	0.23	0.18
Acidification Potential (kg SO^2-eq)	2.50	2.65	2.68	1.90
Photochemical Ozone Creation Potential (kg O_3-eq)	28.3	30.1	30.2	21.6
Abiotic Depletion, nonfossil (kg Sb-eq)	1.33E-04	1.30E-04	1.39E-04	1.18E-04
Abiotic Depletion, fossil (MJ)	766	805	817	589
Product Components:				
Clinker	85%	91.5%	91.5%	61%
Limestone, Gypsum and Others	15%	8.5%	8.5%	39%

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 V2: 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 • Joeseph Geibig. • EcoForm Consulting

For additional explanatory material
Manufacture Representative: Jeff Hook (jeff.hook@lehighhanson.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

Known formerly as Glens Falls Portland Cement Company, Lehigh's Glens Falls, New York, plant became a part of Lehigh Cement Company LLC in 2006. It is recognized as the oldest continuously operating gray cement plant in North America. Since its incorporation in 1893, the Glens Falls cement plant has continuously evolved to incorporate newer advances in technology. The Glens Falls plant and the thousands of workers it has employed have supported the local community through two major World Wars, The Great Depression and more recently, The Great Recession.

Lehigh's Glens Falls plant resides directly in the southern foothills of the 6-million-acre Adirondack National Park. Within the Adirondack Region is the largest publicly protected area in the contiguous United States. Accordingly, Lehigh's commitment to environmental sustainability and reducing its carbon footprint by responsibly manufacturing and marketing our cement products throughout the New England area remains a top priority.

Lehigh Cement's commitment to sustainable construction includes actively working to create lower carbon cements through supplementary cementitious materials (SCMs) and alternative raw materials and fuels. Consistent with the vision of its global parent company, HeidelbergCement, to achieve carbon neutral concrete by 2050, Lehigh has developed product and plant specific EPDs as baselines for its embodied carbon.

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 II
Portland Cement	ASTM C150, C1157, AASHTO M85	Type III
Masonry	ASTM C91	Type S

PRODUCT DESCRIPTION

This EPD reports environmental transparency information for four cement products, produced by Lehigh Cement at their Glenn Falls NY 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 II, Type IL, Type III and Masonry S

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 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.

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 2021: Limestone quarry, clinker production and cement manufacture – Glens Falls, NY

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:2020; 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

LIFE CYCLE IMPACT ASSESSMENT RESULTS – Glens Falls Bulk Cement

Products: Type IL named EcoCem®*PLC*, Type II, Type III and Masonry Cement per metric tonne

Impact Assessment	Unit	Type IL	Type II	Type III	Masonry S
Global warming potential (GWP)[1]	kg CO_2 eq	644	686	691	474
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	2.81E-05	2.81E-05	2.98E-05	2.35E-05
Eutrophication potential (EP)	kg N eq	0.21	0.22	0.23	0.18
Acidification potential of soil and water sources (AP)	kg SO_2 eq	2.5	2.65	2.68	1.90
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	28.3	30.1	30.2	21.6
Resource Use					
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	1.33E-04	1.3E-04	1.39E-04	2.16E-04
Abiotic depletion potential for fossil resources (ADPfossil)	MJ, NCV	766	805	817	589
Renewable primary energy resources as energy (fuel), (RPRE)*	MJ, NCV	121	114	127	111
Renewable primary resources as material, (RPRM)*	MJ, NCV	0.00	0.00	0.00	0.00
Non-renewable primary resources as energy (fuel), (NRPRE)*	MJ, NCV	5280	5490	5640	4090
Non-renewable primary resources as material (NRPRM)*	MJ, NCV	0.00	0.00	0.00	0.00
Consumption of fresh water	m3	0.91	0.91	0.96	0.75
Secondary Material, Fuel and Recovered Energy					
Secondary Materials, (SM)*	kg	207	222	222	148
Renewable secondary fuels, (RSF)*	MJ, NCV	0.00	0.00	0.00	0.00
Non-renewable secondary fuels (NRSF)*	MJ, NCV	0.00	0.00	0.00	0.00
Recovered energy, (RE)*	MJ, NCV	0.00	0.00	0.00	0.00
Waste & Output Flows					
Hazardous waste disposed*	kg	0.00	0.00	0.00	0.00
Non-hazardous waste disposed*	kg	84.2	90.7	90.7	60.5
High-level radioactive waste*	kg	n/c	n/c	n/c	n/c
Intermediate and low-level radioactive waste*[2]	kg	n/c	n/c	n/c	n/c
Components for reuse*	kg	0.00	0.00	0.00	0.00
Materials for recycling*	kg	2.41E-03	2.6E-03	2.6E-03	1.7E-03
Materials for energy recovery*	kg	0.00	0.00	0.00	0.00
Recovered energy exported from the product system*	MJ, NCV	0.00	0.00	0.00	0.00
Additional Inventory Parameters for Transparency					
CO_2 emissions from calcination and uptake from carbonation*	kg CO_2 eq	446	480	480	320
Biogenic CO_2, reporting the removals and emissions associated with biogenic carbon content contained within biobased products*	kg CO_2 eq	2.04	1.90	2.14	1.88

* 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 (agriculture waste) used in kiln are climate-neutral (CO2 sink = CO2 emissions), ISO 21930, 7.2.7.
[2] Not calculated by GCCA Tool

ADDITIONAL ENVIROMENTAL INFORMATION

Environmental Management System (EMS)

The Glens Falls 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 NY State environmental storage of regulated substances and submits status reports as required by USEPA and NYSDEC:

- 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
- Resource Conservation and Recovery Act
- Hazardous Substances and Chemicals, Environmental Response and Community Right to Know
- Toxic Substances Control Act
- Clean Water Act
- Chemical Bulk Storage
- Petroleum Bulk Storage

Environmental Permits

- Title V operating permit 5-5205-00013/0058 issued by NYSDEC
- SPDES permit NY0008150 issued by NYSDEC
- Mine Permit 5-5-5205-00013/00003 issued by NYSDEC

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

The Glens Falls 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 tracked for proper disposal as per NYSDEC regulations.

Recycling Programs

The Glens Falls 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 Store Room. Used vehicle batteries are recycled when new ones are purchased. Similarly, the Glens Falls 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.

Sustainability Commitments

Lehigh Cement, a Lehigh Hanson affiliated company, is a part of the HeidelbergCement Group, a leading construction materials company worldwide. HeidelbergCement's Sustainability Commitments 2030 define the key topics and core principles of Lehigh Cement's sustainability strategies, aligning with the UN Assembly Sustainable Development Goals (SDGs). Company sustainability performance ratings and ranking are publicly available at https://www.heidelbergcement.com/en/sustainability-report.

Lehigh Cement also strives for effective management of all processes and resources and works with the local communities to promote resilient infrastructure and provide increased transparency. Lehigh Cement aligns and works globally with HeidelbergCement to push toward carbon neutral concrete by 2050. To learn more about Lehigh Cement's sustainability commitment, visit https://www.lehighhanson.com/about/sustainability.