Product Specific

Environmental Product Declaration for Cement

Heidelberg Materials

PATHWAYS

Union Bridge, MD

Production Facility

Union Bridge Cement Plant and Terminal
675 Quaker Hill Road, Union Bridge, MD

Program Operator

ASTM International
100 Barr Harbor Drive, West
Conshohocken, PA 19428
www.astm.org

ASTM INTERNATIONAL

In accordance with ISO 21930, ISO 14025, ISO 14040, and ISO 14044

EPD Scope: A1-A3 (Cradle to Gate)

Issuance Date: May 3, 2026

Expiration Date: May 3, 2031

Declaration Number: EPD 1176

Environmental Impacts

Union Bridge Plant: Product-Specific EPD

Declared Cement Products: Masonry, Type I/II, Type IL, Type III

Declared Unit: One metric tonne of cement

	Cement Products			
	Masonry	Type I/II	Type IL	Type III
Total Global Warming Potential ($kg\ CO_2$-Eq)	**487**	**871**	**808**	**887**
Global Warming Potential, Fossil ($kg\ CO_2$ eq)	486	871	807	887
Global Warming Potential, Biogenic ($kg\ CO_2$ eq)	0.23	0.27	0.27	0.28
Global Warming Potential, Luluc ($kg\ CO_2$ eq)	0.01	0.02	0.02	0.02
Stratospheric Ozone Depl. Potential (kg CFC-11 eq)	4.55e-7	5.57e-7	5.38e-7	6.13e-7
Eutrophication Potential, Marine (kg N eq)	0.07	0.12	0.12	0.13
Eutrophication Potential, Freshwater (kg P eq)	0.08	0.14	0.13	0.14
Soil and Water Acidification Potential ($kg\ SO_2$ eq)	0.70	1.12	1.06	1.15
Tropospheric Ozone Formation Potential ($kg\ O_3$ eq)	18.9	31.6	29.6	31.9
Product Components				
Clinker	47.1%	90.4%	84.1%	90.1%
Limestone, Gypsum, and Others	52.9%	9.6%	15.9%	9.9%

Reference Standards	ISO 21930:2017 Sustainability in Building Construction-Environmental Declaration of Building Products: serves as the core PCR. Smart EPD Part A Product Category Rules for Building and Construction Products and Services: serves as the Part A PCR. Smart EPD (2025) Part B Product Category Rules for Cements for Construction Version 4.0. Standard 1000-010. Published July 2, 2025: serves as the Part B PCR.
Sub-Category PCR Reviewer	Dr Thomas Gloria (t.gloria@industrial-ecology.com) • Industry Ecology Consultants Garav Das (gd30gcc@gmail.com) • Independent Consultant Emily B Lorenz (emilyblorenz@gmail.com) • Independent Consultant
Internal/External	Independent verification of the declaration, according to ISO 21930:2017 and ISO 14025:2006: ☐ internal ☑ external
LCA Project Third Party Verifier	Dr Thomas Gloria • t.gloria@industrial-ecology.com • Industry Ecology Consultants
EPD Third Party Verifier	Dr Thomas Gloria • t.gloria@industrial-ecology.com • Industry Ecology Consultants
For Additional Material	Manufacturer Representative: Jeff Hook (jeff.hook@heidelbergmaterials.com) This LCA EPD was prepared by: Capucine Richard • Pathways (www.pathwaysai.co)

Limitations, Liability, and Ownership

The EPD owner has sole ownership, liability, and responsibility for the EPD.

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building or construction works level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences in results upstream or downstream of the life cycle stages declared.

The environmental impact results of products in this document are based on a declared unit and therefore do not provide sufficient information to establish comparisons. The results shall not be used for comparisons without knowledge of how the physical properties of the product impact the precise function at the construction level. The environmental impact results shall be converted to a functional unit basis before any comparison is attempted.

A manufacturer shall not make claims based on an industry-average EPD which leads the market to believe the industry-average is representative of manufacturer-specific or product-specific results.

Product Name	Masonry, Type I/II, Type IL, Type III Cements	**Declaration Number**	EPD 1176
Declared Unit	1 metric ton	**Date of Issue**	05/03/2026
EPD Scope	A1 - A3	**Expiration**	05/03/2031
Markets of Applicability	United States and Canada	**Last Updated**	05/01/2026

Company Description

Heidelberg Materials, a leading supplier of cementitious construction materials in North America, has been manufacturing cement in Maryland for more than 100 years, making us a pillar of the many communities around us and providing employment and economic benefit to small towns and cities. We now operate one cement plant in Union Bridge, a rural town in western Carroll County which went through a modernization phase in 2001. This modernization improved the environmental impacts through efficient and more sustainable production of clinker and cement. There is a packaging operation and warehouse at the Union Bridge plant. Heidelberg Materials' 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 Heidelberg Cement's vision of reducing greenhouse gas (GHG) emissions to have carbon neutral concrete by 2050, Union Bridge has developed product and plant specific EPDs as baselines for its embodied carbon for both bulk and packaged cement.

The health and well-being of our employees, communities and the natural environment are vital to our success, so we work hard to give back to surrounding areas. We also maintain constant communication with local governments and councils to preserve a neighborly relationship, which we take very seriously. Through donations and participation in local events and charities, Heidelberg Materials continues to raise awareness of conservation and community development.

Product Information

Masonry

Product Type	Masonry Cement	**Standard Designation**	Type S, N
Applicable Standards	ASTM C91	**Supply-Chain Specificity of Product**	95.59%
UNSPSC Code	30111506	**UNCPC Code**	3744

Type I/II

Product Type	Portland Cement	**Standard Designation**	Type I/II
Applicable Standards	ASTM C150, AASHTO M85	**Supply-Chain Specificity of Product**	97.30%
UNSPSC Code	30111504	**UNCPC Code**	3744

Type IL (GUL)

Product Type	Portland Limestone Cement	**Standard Designation**	Type IL (GUL)
Applicable Standards	ASTM C595, AASHTO M240	**Supply-Chain Specificity of Product**	97.10%
UNSPSC Code	30111504	**UNCPC Code**	3744

Type III (HE)

Product Type	Portland Cement	**Standard Designation**	Type III (HE)
Applicable Standards	ASTM C150, AASHTO M85	**Supply-Chain Specificity of Product**	97.27%
UNSPSC Code	30111504	**UNCPC Code**	3744

Product Description

This EPD reports environmental transparency information for four cement products, produced and packaged by Heidelberg Materials at the Union Bridge, MD 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 or mortar, 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 EcoCemPLC™ 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.

Materials and Composition

Product	Product components
Masonry	Clinker, Limestone, Gypsum, Grinding Aids, Air Plasticizer
Type I/II	Clinker, Limestone, Gypsum, Grinding Aids
Type IL (GUL)	Clinker, Limestone, Gypsum, Grinding Aids
Type III (HE)	Clinker, Limestone, Gypsum, Grinding Aids

Hazardous Materials
No hazardous substances are contained in the products according to the normative requirements of the US and Canadian EPD markets per the Smart EPD Part A PCR. Wastes classifications have been assessed per the US waste classification: Resource Conservation and Recovery Act (RCRA), Subtitle C.

EPD Representativeness

Primary Data Year	2023	
Manufacturing Specificity	X	Industry average
	X	Manufacturer average
	✓	Facility-specific
	✓	Product-specific
	X	Product-average

System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	
	A5	Assembly / install	
Use	B1	Use	
	B2	Maintenance	
	B3	Repair	
	B4	Replacement	
	B5	Refurbishment	
	B6	Operational energy use	
	B7	Operational water use	
End of Life	C1	Deconstruction	
	C2	Transport	
	C3	Waste processing	
	C4	Disposal	
Benefits & Loads Beyond System Boundary	D	Recycling, reuse, recovery potential	

General Cement System Boundary Diagram

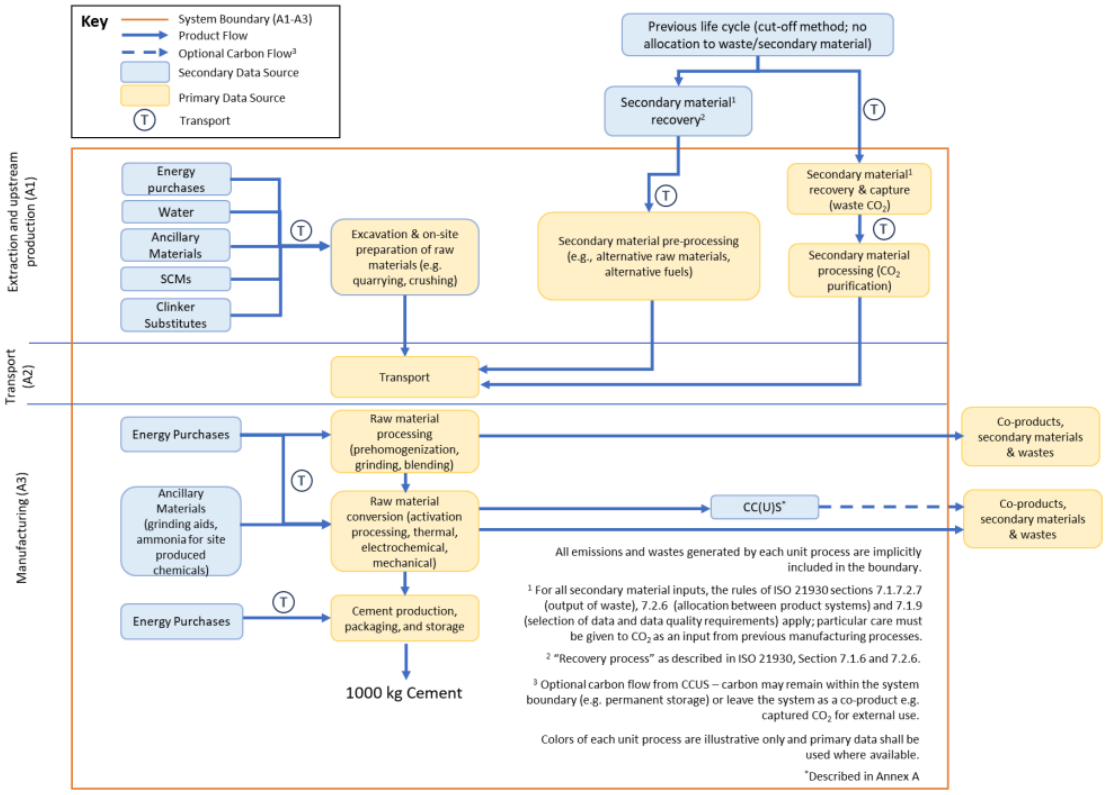

Diagram from Smart EPD (2025) Part B Product Category Rules for Cements for Construction Version 4.0. Standard 1000-010

Manufacturing Info

Plant Name	Address
Union Bridge	675 Quaker Hill Road, Union Bridge, Maryland

Manufacturing Process Description

Masonry

Masonry cement manufacturing uses clinker as a main cementitious input; additional raw materials include gypsum, limestone, and air plasticizer. These materials are ground together using electricity to produce Masonry cement.

Type I/II

Type I/II cement manufacturing uses clinker as a main cementitious input; additional raw materials include gypsum, limestone, and grinding aids. These materials are ground together using electricity to produce Type I/II cement.

Type IL

Type IL cement manufacturing uses clinker as a main cementitious input; additional raw materials include gypsum, limestone, and grinding aids. These materials are ground together using electricity to produce Type IL Cement.

Type III

Type III cement manufacturing uses clinker as a cementitious input; additional raw materials include gypsum, limestone, and grinding aids. These materials are ground together using electricity to produce Type III Cement.

Software and Data

Software

LCA Software	Pathways v1.0

Data Quality

Indicator	**Definition**		**Data Quality Score Meaning**	**Data Quality Score** (1=highest; 5=lowest)
Temporal representativeness	Indicates the temporal difference between the date of data generation and the date the data are supposed to represent based on the PCR		Previous calendar or financial year (3 year)	3
Geographical representativeness	Indicates how well the geographical area from which data for a unit process are collected satisfies the goal of the study		Site-specific data	1
Technological representativeness	Indicates technical representativeness based on four categories: process design, operating conditions, material quantity/type and process scale		Site-specific data	1
Reliability (Precision, Accuracy, Verification)	Indicates quality of data generation method and verification of data collection methods	Combustion emissions		1
		Calcination emissions		1
		Thermal energy quantity by source type	Site-specific data	1
		Electricity quantities	Site-specific data	1
		Raw material quantities	Site-specific data	1
		Waste quantities	Site-specific data	1
		Inbound transport distance	Site-specific data	1
		Outbound transport distances from A3	Default values	2
		Raw material quantities	Site-specific data	1
		Waste quantities	Site-specific data	1

Data Sources

Material/ Process Category	**Module**	**Material/ Process Name**	**Inventory Dataset Name**	**Dataset Geographic Region**	**Reporting Period/Year Dataset Represents**	**Reference**
Material/ Product	A1	Activated Carbon	Activated carbon production, granular from hard coal	Rest of World	2005-2025	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.

	A1	Aggregate- Sand (Natural)	gravel and sand quarry operation:	Rest of World	1997-2025	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Coal- Kiln	market for hard coal:	North America	2014-2025	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Spent Catalyst	treatment of spent catalyst base from ethylene oxide production, residual material landfill:	Rest of World	2010-2025	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Air Plas	alkylbenzene sulfonate production, linear, petrochemic al:	Rest of World	1992-2025	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Ammonia	Ammonia, steam reforming, liquid, at plant	North America	2011-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Ponded/ bottom ash	Treatment of bottom ash, MSWI-WWT-SLF, hard coal ash, slag compartment	Global	2012-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Mill scale	Treatment of mill scale, residual material landfill - GLO (Ecoinvent 3.10)	Global	2010-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Grinding aids	Alkylbenzene sulfonate production, linear, petrochemic al RoW (Ecoinvent 3.10)	Rest of World	1992-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Synthetic gypsum	Market for gypsum, mineral - RoW (Ecoinvent 3.10)	Rest of World	2017-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Explosives	Market for blasting	Global	2011-2023	ecoinvent Association. (2023). *ecoinvent*

						database, version 3.10. Zurich, Switzerland: ecoinvent Association.
Transportation	A2	Truck Transport (short-haul)	USLCI 2024: Transport, combination truck, short-haul, diesel powered (Adjusted Petroleum For Diesel Coproduct):	United States	2025	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search
	A2	Truck Transport (long-haul)	Transport, combination truck, long-haul, diesel powered, Northeast (adjusted petroleum for diesel coproduct):	United States	2025	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search
Electricity	A3	Electricity	RFCE EPD Power Profile 2023 (eGRID)	United States	2023	U.S. Environmental Protection Agency. *Power Profiler – eGRID*. Washington, DC: U.S. EPA, last updated Oct. 1, 2025: https://www.epa.gov/egrid/power-profiler
Energy	A3	Diesel - quarry	Diesel, combusted in industrial equipment	North America	2003	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search
	A3	Fuel Oil	Residual fuel oil, combusted in industrial boiler	North America	1997-2000	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search
	A3	Gasoline - quarry	Gasoline, combusted in equipment	North America	1995-2002	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search
	A3	Propane - quarry	Liquefied petroleum gas, combusted in industrial boiler	North America	2000	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommo

						ns.gov/nrel/search
Waste/Other	A1-A3	Non- hazardous waste	Treatment of inert waste, sanitary landfill - RoW (Ecoinvent 3.10)	Rest of World	2012-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1-A3	wastewater	Treatment of wastewater, average, wastewater treatment - RoW (Ecoinvent 3.10)	Rest of World	2010-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.

LCA Discussion

Allocation Procedure

Allocation follows the requirements and guidance of ISO 14044:2006, Clause 4.3.4; ISO 21930:2017 section 7.2 and Smart EPD (2025) Part B Product Category Rules for Cements for Construction Version 4.0. Recycling and recycled content is modeled using the cut-off rule.

This sub-category PCR recognizes coal combustion products, other combustion ashes, granulated blast-furnace slag, silica fume, off-spec lime, mine tailings, recycled concrete fines, ponded/washed fines from grinding or crushing of aggregates, metallurgical slag, flue gas desulfurization gypsum, lime kiln dust, and cement kiln dust 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.

Cut-Off Procedure

All known energy and material flow data were included in accordance with the system boundary. Proxy data were used as needed in the model to capture all considered life cycle impacts, aligning with ISO requirements for data completeness.

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.

Results: Masonry

Impact Assessment	Unit	A1	A2	A3	A1-A3
Global warming potential - total (GWP-total)	kg CO_2 eq	11.5	3.34	472	487
Global warming potential – fossil (GWP-fossil)	kg CO_2 eq	11.5	3.34	472	486
Global warming potential – biogenic (GWP-biogenic)	kg CO_2 eq	0.02	8.33e-4	0.21	0.23

Global warming potential – luluc (GWP-luluc)[1]	kg CO_2 eq	6.73e-3	9.70e-20	6.40e-3	0.01
Global warming potential – cc (GWP-cc)	kg CO_2 eq	0	0	0	0
Global warming potential – s (GWP-s)	kg CO_2 eq	0	0	0	0
Global warming potential – u (GWP-u)	kg CO_2 eq	0	0	0	0
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	1.70e-7	2.41e-8	2.60e-7	4.55e-7
Eutrophication potential - marine (EP-marine)	kg N eq	0.01	3.10e-3	0.06	0.07
Eutrophication potential - freshwater (EP-freshwater)	kg P eq	3.28e-3	2.50e-6	0.08	0.08
Acidification potential of soil and water sources (AP)	kg SO2 eq	0.16	0.01	0.52	0.70
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	3.40	0.49	15.0	18.9
Abiotic depletion potential - fossil (ADP-fossil)	MJ	189	9.91e-16	1353	1572
Abiotic depletion potential - non-fossil mineral resources (ADP-elements)	kg Sb-eq	7.15e-5	2.56e-21	1.70e-5	8.85e-5
Resource Use					
Use of renewable primary energy resources (RPR_E)	MJ	5.63	0	10.3	15.9
Use of renewable primary energy resources used as raw materials (RPR_M)	MJ	0	0	0	0
Total use of renewable primary energy resources (RPR_T)	MJ	5.63	0	10.3	15.9
Use of non-renewable primary energy resources ($NRPR_E$)	MJ	119	0	12.1	131
Use of non-renewable primary energy resources used as raw materials ($NRPR_M$)	MJ	0	0	0	0
Total use of non-renewable primary energy resources ($NRPR_T$)	MJ	119	0	12.1	131
Use of secondary material (SM)	kg	90.8	0	3.38e-3	90.8
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0
Use of net fresh water (FW)	m^3	0.78	0	0.05	0.83
Use of recovered energy (RE)	MJ	0	0	0	0
Waste & Output Flows					
Hazardous waste disposed	kg	18.2	0	22.4	40.6
Non-hazardous waste disposed	kg	115	0	3,111	3,226
High-level radioactive waste	kg	1.64e-5	0	3.54e-5	5.18e-5
Intermediate and low-level radioactive waste	kg	3.95e-5	0	7.80e-5	1.18e-4
Components for reuse	kg	0	0	0	0
Materials for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Recovered Energy Exported from the Product System	MJ	0	0	0	0

**modifications have been made to datasets sourced from the Ecoinvent database, Version 3.10 to account for negative PERE and PENRE indicator values*

Additional Carbon Emissions and Removals: Masonry

Parameter	Value, kg CO_2 eq
Biogenic Carbon Removal from Product	0
Biogenic Carbon Emission from Product	0
Biogenic Carbon Removal from Packaging	0
Biogenic Carbon Emission from Packaging	0
Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	0
Calcination Carbon Emissions	262
Carbonation Carbon Removals	0
Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes	0
Global Warming Potential - Carbon Capture	0
Global Warming Potential - Sequestration	0
Global Warming Potential - Utilization	0
Global Warming Potential - Carbon Capture, Utilization, and Sequestration	Same as GWP-total for all products

GWP Impact Reporting for Different Processes: Masonry

Impact Category		Unit	Primary Fuels Combustion	Alternative Fuels Combustion	Calcination	Other	GWP-CC	GWP-S	GWP-U	GWP-CC US
GWP	Fossil	kg CO2 eq	143.0	0	262	0	0	0	0	0
	Biogenic	kg CO2 eq	0	0	0	0	0	0	0	0
	Total	kg CO2 eq	143.0	0	262	0	0	0	0	0

Results: Type I/II

Impact Assessment	Unit	A1	A2	A3	A1-A3
Global warming potential - total (GWP-total)	kg CO_2 eq	13.6	5.60	852	871
Global warming potential – fossil (GWP-fossil)	kg CO_2 eq	13.6	5.60	852	871
Global warming potential – biogenic (GWP-biogenic)	kg CO_2 eq	0.03	1.40e-3	0.24	0.27
Global warming potential – luluc (GWP-luluc)*	kg CO_2 eq	7.12e-3	1.60e-19	0.01	0.02
Global warming potential – cc (GWP-cc)	kg CO_2 eq	0	0	0	0
Global warming potential – s (GWP-s)	kg CO_2 eq	0	0	0	0
Global warming potential – u (GWP-u)	kg CO_2 eq	0	0	0	0
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	1.18e-7	4.04e-8	3.99e-7	5.57e-7
Eutrophication potential - marine (EP-marine)	kg N eq	0.01	5.19e-3	0.11	0.12
Eutrophication potential - freshwater (EP-freshwater)	kg P eq	4.69e-3	4.19e-6	0.13	0.14

Acidification potential of soil and water sources (AP)	kg SO2 eq	0.17	0.02	0.93	1.12
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	3.90	0.81	26.9	31.6
Abiotic depletion potential - fossil (ADP-fossil)	MJ	127	1.63e-15	2582	2708
Abiotic depletion potential - non-fossil mineral resources (ADP-elements)	kg Sb-eq	4.54e-5	4.22e-21	2.92e-5	7.45e-5
Resource Use					
Use of renewable primary energy resources (RPR_E)	MJ	4.67	0	18.9	23.6
Use of renewable primary energy resources used as raw materials (RPR_M)	MJ	0	0	0	0
Total use of renewable primary energy resources (RPR_T)	MJ	4.67	0	18.90	23.60
Use of non-renewable primary energy resources ($NRPR_E$)	MJ	112	0	13.5	126
Use of non-renewable primary energy resources used as raw materials ($NRPR_M$)	MJ	0	0	0	0
Total use of non-renewable primary energy resources ($NRPR_T$)	MJ	112	0	13.5	126
Use of secondary material (SM)	kg	174	0	2.25e-4	174
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0
Use of net fresh water (FW)	m^3	1.44	0	0.08	1.52
Use of recovered energy (RE)	MJ	0	0	0	0
Waste & Output Flows					
Hazardous waste disposed	kg	34.1	0	42.7	76.8
Non-hazardous waste disposed	kg	209	0	3,725	3,934
High-level radioactive waste	kg	1.52e-5	0	6.34e-5	7.87e-5
Intermediate and low-level radioactive waste	kg	3.53e-5	0	1.40e-4	1.76e-4
Components for reuse	kg	0	0	0	0
Materials for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Recovered Energy Exported from the Product System	MJ	0	0	0	0

**modifications have been made to datasets sourced from the Ecoinvent database, Version 3.10 to account for negative PERE and PENRE indicator values*

Additional Carbon Emissions and Removals: Type I/II

Parameter	Value, kg CO_2 eq
Biogenic Carbon Removal from Product	0
Biogenic Carbon Emission from Product	0
Biogenic Carbon Removal from Packaging	0
Biogenic Carbon Emission from Packaging	0
Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	0

Calcination Carbon Emissions	501
Carbonation Carbon Removals	0
Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes	0
Global Warming Potential - Carbon Capture	0
Global Warming Potential - Sequestration	0
Global Warming Potential - Utilization	0
Global Warming Potential - Carbon Capture, Utilization, and Sequestration	Same as GWP-total for all products

GWP Impact Reporting for Different Processes: Type I/II

Impact Category		Unit	Primary Fuels Combustion	Alternative Fuels Combustion	Calcination	Other	GWP-CC	GWP-S	GWP-U	GWP-CC US
GWP	Fossil	kg CO2 eq	274.0	0	501	0	0	0	0	0
	Biogenic	kg CO2 eq	0	0	0	0	0	0	0	0
	Total	kg CO2 eq	274.0	0	501	0	0	0	0	0

Results: Type IL

Impact Assessment	Unit	A1	A2	A3	A1-A3
Global warming potential - total (GWP-total)	kg CO_2 eq	15.9	5.07	787	808
Global warming potential – fossil (GWP-fossil)	kg CO_2 eq	15.9	5.07	786	807
Global warming potential – biogenic (GWP-biogenic)	kg CO_2 eq	0.03	1.27e-3	0.24	0.27
Global warming potential – luluc (GWP-luluc)*	kg CO_2 eq	6.97e-3	1.46e-19	0.01	0.02
Global warming potential – cc (GWP-cc)	kg CO_2 eq	0	0	0	0
Global warming potential – s (GWP-s)	kg CO_2 eq	0	0	0	0
Global warming potential – u (GWP-u)	kg CO_2 eq	0	0	0	0
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	1.24e-7	3.66e-8	3.77e-7	5.38e-7
Eutrophication potential - marine (EP-marine)	kg N eq	0.01	4.70e-3	0.10	0.12
Eutrophication potential - freshwater (EP-freshwater)	Kg P eq	4.59e-3	3.80e-6	0.12	0.13
Acidification potential of soil and water sources (AP)	kg SO2 eq	0.17	0.02	0.87	1.06
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	3.89	0.74	25.0	29.6
Abiotic depletion potential - fossil (ADP-fossil)	MJ	136	1.49e-15	2390	2526
Abiotic depletion potential - non-fossil mineral resources (ADP-elements)	kg Sb-eq	5.81e-5	3.85e-21	2.72e-5	8.53e-5
Resource Use					
Use of renewable primary energy resources (RPR_E)	MJ	4.57	0	17.6	22.1

Use of renewable primary energy resources used as raw materials (RPR_M)	MJ	0	0	0	0
Total use of renewable primary energy resources (RPR_T)	MJ	4.57	0	17.6	22.1
Use of non-renewable primary energy resources ($NRPR_E$)	MJ	108	0	13.2	121
Use of non-renewable primary energy resources used as raw materials ($NRPR_M$)	MJ	0	0	0	0
Total use of non-renewable primary energy resources ($NRPR_T$)	MJ	108	0	13.2	121
Use of secondary material (SM)	kg	161	0	6.91e-4	161
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0
Use of net fresh water (FW)	m^3	1.34	0	0.08	1.42
Use of recovered energy (RE)	MJ	0	0	0	0
Waste & Output Flows					
Hazardous waste disposed	kg	31.6	0	39.5	71.2
Non-hazardous waste disposed	kg	194	0	3,619	3,813
High-level radioactive waste	kg	1.47e-5	0	5.90e-5	7.37e-5
Intermediate and low-level radioactive waste	kg	3.41e-5	0	1.31e-4	1.65e-4
Components for reuse	kg	0	0	0	0
Materials for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Recovered Energy Exported from the Product System	MJ	0	0	0	0

**modifications have been made to datasets sourced from the Ecoinvent database, Version 3.10 to account for negative PERE and PENRE indicator values*

Additional Carbon Emissions and Removals: Type IL

Parameter	Value, kg CO_2 eq
Biogenic Carbon Removal from Product	0
Biogenic Carbon Emission from Product	0
Biogenic Carbon Removal from Packaging	0
Biogenic Carbon Emission from Packaging	0
Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	0
Calcination Carbon Emissions	466
Carbonation Carbon Removals	0
Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes	0
Global Warming Potential - Carbon Capture	0
Global Warming Potential - Sequestration	0
Global Warming Potential - Utilization	0

Global Warming Potential - Carbon Capture, Utilization, and Sequestration	Same as GWP-total for all products

GWP Impact Reporting for Different Processes: Type IL

Impact Category		Unit	Primary Fuels Combustion	Alternative Fuels Combustion	Calcination	Other	GWP-CC	GWP-S	GWP-U	GWP-CC US
GWP	Fossil	kg CO2 eq	254.7	0	466	0	0	0	0	0
	Biogenic	kg CO2 eq	0	0	0	0	0	0	0	0
	Total	kg CO2 eq	254.7	0	466	0	0	0	0	0

Results: Type III

Impact Assessment	Unit	A1	A2	A3	A1-A3
Global warming potential - total (GWP-total)	kg CO_2 eq	15.6	5.89	865	887
Global warming potential – fossil (GWP-fossil)	kg CO_2 eq	15.6	5.89	865	887
Global warming potential – biogenic (GWP-biogenic)	kg CO_2 eq	0.04	1.47e-3	0.24	0.28
Global warming potential – luluc (GWP-luluc)[1]	kg CO_2 eq	8.36e-3	1.73e-19	0.01	0.02
Global warming potential – cc (GWP-cc)	kg CO_2 eq	0	0	0	0
Global warming potential – s (GWP-s)	kg CO_2 eq	0	0	0	0
Global warming potential – u (GWP-u)	kg CO_2 eq	0	0	0	0
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	1.73e-7	4.25e-8	3.98e-7	6.13e-7
Eutrophication potential - marine (EP-marine)	kg N eq	0.01	5.47e-3	0.11	0.13
Eutrophication potential - freshwater (EP-freshwater)	kg P eq	5.09e-3	4.41e-6	0.13	0.14
Acidification potential of soil and water sources (AP)	kg SO2 eq	0.19	0.02	0.94	1.15
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	4.02	0.87	27.0	31.9
Abiotic depletion potential - fossil (ADP-fossil)	MJ	188	1.77e-15	2587	2775
Abiotic depletion potential - non-fossil mineral resources (ADP-elements)	kg Sb-eq	6.78e-5	4.57e-21	2.92e-5	9.70e-5
Resource Use					
Use of renewable primary energy resources (RPR_E)	MJ	6.11	0	19.0	25.1
Use of renewable primary energy resources used as raw materials (RPR_M)	MJ	0	0	0	0
Total use of renewable primary energy resources (RPR_T)	MJ	6.11	0	19.0	25.1
Use of non-renewable primary energy resources ($NRPR_E$)	MJ	141	0	13.4	155
Use of non-renewable primary energy resources used as raw materials ($NRPR_M$)	MJ	0	0	0	0

Total use of non-renewable primary energy resources ($NRPR_T$)	MJ	141	0	13.4	155
Use of secondary material (SM)	kg	174	0	1.53e-4	174
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0
Use of net fresh water (FW)	m^3	1.46	0	0.08	1.54
Use of recovered energy (RE)	MJ	0	0	0	0
Waste & Output Flows					
Hazardous waste disposed	kg	34.3	0	42.8	77.1
Non-hazardous waste disposed	kg	212	0	3,706	3,918
High-level radioactive waste	kg	1.93e-5	0	6.35e-5	8.28e-5
Intermediate and low-level radioactive waste	kg	4.54e-5	0	1.40e-4	1.86e-4
Components for reuse	kg	0	0	0	0
Materials for recycling	kg	0	0	0	0
Materials for energy recovery	kg	0	0	0	0
Recovered Energy Exported from the Product System	MJ	0	0	0	0

**modifications have been made to datasets sourced from the Ecoinvent database, Version 3.10 to account for negative PERE and PENRE indicator values*

Additional Carbon Emissions and Removals: Type III

Parameter	Value, kg CO_2 eq
Biogenic Carbon Removal from Product	0
Biogenic Carbon Emission from Product	0
Biogenic Carbon Removal from Packaging	0
Biogenic Carbon Emission from Packaging	0
Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	0
Calcination Carbon Emissions	502
Carbonation Carbon Removals	0
Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes	0
Global Warming Potential - Carbon Capture	0
Global Warming Potential - Sequestration	0
Global Warming Potential - Utilization	0
Global Warming Potential - Carbon Capture, Utilization, and Sequestration	Same as GWP-total for all products

GWP Impact Reporting for Different Processes: Type III

Impact Category		Unit	Primary Fuels Combustion	Alternative Fuels Combustion	Calcination	Other	GWP-CC	GWP-S	GWP-U	GWP-CC US
GWP	Fossil	kg CO2 eq	274.6	0	502	0	0	0	0	0
	Biogenic	kg CO2 eq	0	0	0	0	0	0	0	0
	Total	kg CO2 eq	274.7	0	502	0	0	0	0	0

Additional information for reporting transport from cement plant gate

Plant/Gate Location	Percent of Supply	Transport Mode (Leg 1)	Distance and Unit	End User or Terminal Location
Union Bridge, MD	100%	Truck	169 MI	Sparta NJ
Union Bridge, MD	100%	Truck	92 MI	Hamburg PA
Union Bridge, MD	89%	Rail	396 MI	Aliquippa PA
Union Bridge, MD	11%	Truck	182 MI	Aliquippa PA
Union Bridge, MD	100%	Truck	39 MI	Baltimore MD
Union Bridge, MD	100%	Truck	187 MI	Brooklyn NY
Union Bridge, MD	73%	Rail	331 MI	Cementon NY
Union Bridge, MD	27%	Truck	250 MI	Cementon NY
Union Bridge, MD	83%	Rail	276 MI	Chester VA
Union Bridge, MD	17%	Truck	153 MI	Chester VA
Union Bridge, MD	96%	Rail	436 MI	Durham NC
Union Bridge, MD	4%	Truck	263 MI	Durham NC
Union Bridge, MD	100%	Truck	295 MI	Smithfield NC
Union Bridge, MD	1%	Truck	188 MI	Norfolk VA
Union Bridge, MD	99%	Rail	415 MI	Norfolk VA
Union Bridge, MD	100%	Rail	549 MI	Palmer MA
Union Bridge, MD	100%	Rail	553 MI	Providence RI
Union Bridge, MD	31%	Rail	455 MI	Salisbury NC

Union Bridge, MD	69%	Truck	326 MI	Salisbury NC
Union Bridge, MD	11%	Rail	184 MI	Waynesboro VA
Union Bridge, MD	89%	Truck	137 MI	Waynesboro VA
Union Bridge, MD	100%	Rail	404 MI	Wellsboro PA
Union Bridge, MD	100%	Rail	231 MI	Youngwood PA
Union Bridge, MD	100%	Rail	632 MI	Brookhaven NY
Union Bridge, MD	100%	Rail	637 MI	New Haven CT
Union Bridge, MD	100%	Rail	613 MI	Deer Park NY
Union Bridge, MD	100%	Rail	659 MI	Middletown CT
Union Bridge, MD	39%	Truck	155 MI	Adrian PA
Union Bridge, MD	61%	Rail	394 MI	Adrian PA
Union Bridge, MD	100%	Rail	700 MI	Thomaston ME

Additional Environmental Information

Environmental Management System (EMS)

The Union Bridge Plant has an EMS in place. The EMS identifies environmental impacts, permit requirements and ensures that control procedures are continually updated to reflect current environmental knowledge and regulations. Environmental policies and procedures are written in the EMS manual and on Spectrac. Spectrac is a Microsoft Access Program that contains all air, water, waste and regulatory permit requirements. The program sends email notifications and updates to the appropriate listed designee on a monthly, quarterly, and annual timeframe. Environmental reporting complies with the U.S. EPA and the state of Maryland Department of Environmental Protection.

Air Permit

The Union Bridge Plant is a Title V facility. The Title V Air Permit lists all requirements for both State and Federal reporting requirements and emissions limits.

Recycling Programs

The Union Bridge Plant has instituted a recycling program to ensure that the following materials are recycled: Used Oil, waste oil filters, fluorescent bulbs, batteries, office, and cardboard paper and used anti-Freeze.

Sustainability Commitments

Company sustainability performance ratings and ranking are publicly available at https://www.heidelbergmaterials.com/en/company/annual-reports-sustainability-reports.

Heidelberg Materials' goal of a 30% carbon footprint reduction as compared to 1990, encourages the discovery of innovative approaches and thought processes to reduce environmental impacts and ensure a sustainable business model. Working to incorporate knowledge and practices learned from global resources for local applications, the Union Bridge Plant continuously innovates to improve services and products that increase efficiency on the jobsite. The Union Bridge Plant also strives for effective management of all processes and resources and works with the local communities to promote resilient infrastructure and provide increased transparency.

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