Product Specific

Environmental Product Declaration for Cement

Heidelberg Materials

Edmonton, AB

Production Facility
Edmonton Cement Plant and Terminal
12640 Inland Way
Edmonton, AB T5V 1K2

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: 12/17/2025

Expiration Date: 12/17/2030

Declaration Number: EPD 1104

PATHWAYS

Environmental Impacts

Edmonton Plant: Product-Specific Type III EPD

Declared Cement Products: EcoCemPLUS, OWG, GU/Type 10, HE/Type 30, HS/Type 50

Declared Unit: One metric tonne of cement

	Cement Products				
	EcoCem PLUS	OWG	GU/ Type 10	HE/ Type 30	HS/ Type 50
Total Global Warming Potential (kg CO_2 eq)	**573**	**796**	**740**	**801**	**693**
Global Warming Potential, Fossil (kg CO_2 eq)	569	791	735	795	687
Global Warming Potential, Biogenic (kg CO_2 eq)	4.05	5.57	5.37	5.59	5.23
Global Warming Potential, Luluc (kg CO_2 eq)	0.04	0.05	0.04	0.05	0.03
Stratospheric Ozone Depl. Potential (kg CFC-11 eq)	2.4e-6	3.1e-6	2.8e-6	3.2e-6	2.3e-6
Eutrophication Potential, Marine (kg N eq)	0.13	0.18	0.17	0.18	0.15
Eutrophication Potential, Freshwater (kg P eq)	1.0e-3	1.3e-3	6.2e-4	0	1.0e-3
Soil and Water Acidification Potential (kg SO2 eq)	1.42	1.95	1.80	1.93	1.48
Tropospheric Ozone Formation Potential (kg O_3 eq)	41.9	57.3	53.3	56.6	44.6
Product Components					
Clinker	67.4%	92.5%	88.9%	93.0%	87.5%
Limestone, Gypsum, and Others	12.6%	7.5%	11.1%	7.0%	12.5%
Fly Ash	20%	0%	0%	0%	0%

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 Consulting 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 Consulting
EPD Third Party Verifier	Dr Thomas Gloria • t.gloria@industrial-ecology.com • Industry Ecology Consulting
For Additional Material	Manufacturer Representative: Ignacio Cariaga (ignacio.cariaga@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	EcoCemPLUS, OWG, GU/Type 10, HE/Type 30, HS/Type 50	**Declaration Number**	EPD 1104
Declared Unit	1 metric ton	**Date of Issue**	12/17/2025
EPD Scope	A1-A3	**Expiration**	12/17/2030
Markets of Applicability	Canada and US	**Last Updated**	12/17/2025

Company Description

Heidelberg Materials, a leading supplier of cementitious materials in North America, has been manufacturing cement in Canada for more than 100 years. The company operates cement plants in Edmonton, Alberta; Delta, British Columbia; and Picton, Ontario; and is a pillar of its surrounding communities , providing employment and economic benefit to small towns and cities. The state-of-the-art Edmonton plant is located in the northwest portion of the city and has produced cement at that location since 1955. Heidelberg Materials' commitment to sustainable manufacturing practices includes actively working to develop low-carbon cement through the utilization of wastes, supplementary cementitious materials (SCMs), and alternative raw materials and fuels. Consistent with their vision of reducing greenhouse gas (GHG) emissions to produce net-zero cement by 2050, Heidelberg Materials has developed product and plant specific EPDs as baselines for its embodied carbon.

Heidelberg Materials is a founding and active member in the City of Edmonton Corporate Climate Leaders program and Alberta Capital Airshed (ACA) and works voluntarily with the community on environmental impacts and GHG management. The Edmonton plant has been fortunate to be called home by Peregrine Falcons since 1992. Falcons began roosting at the plant when the species was listed on Canada's Endangered Species List. The falcons raise chicks every year and, at times, adopt young falcons from nests in less successful sites in the province. The prosperous breeding success of the pair at the Edmonton site has helped the Peregrine's numbers recover and they are no longer considered an Endangered Species. The plant has also helped raise awareness of the importance of biodiversity through the development of a Conservation Easement at its Kinokamau Lake wetland located in the plant's clay quarry. The Cadomin Limestone Quarry works with researchers assessing grizzly bear and bat populations around the quarry. Both of these projects gained global recognition through Heidelberg Materials' Quarry Life Award program.

Product Information

EcoCemPLUS

Product Type	Ternary Blended Cement / General Use Limestone Blended (Portland) Cement	**Standard Designation**	HSLb-20F, GULb-20F (Type IT (P20)(L10))
Applicable Standards	ASTM C595, C1157, AASHTO M240, CSA A3001	**Supply-Chain Specificity of Product**	91.4%
UNSPSC Code	30111504	**UNCPC Code**	3744

OWG

Product Type	Oil Well Cement	**Standard Designation**	Oil Well Cement Class G (OWG)
Applicable Standards	API Spec 10A	**Supply-Chain Specificity of Product**	88.6%
UNSPSC Code	30111504	**UNCPC Code**	3744

GU/Type 10

Product Type	General Use (Portland) Cement	**Standard Designation**	GU/Type 10 (Type I)
Applicable Standards	CSA A3001, ASTM C150	**Supply-Chain Specificity of Product**	91.2%
UNSPSC Code	30111504	**UNCPC Code**	3744

HE/Type 30

Product Type	High Early Cement	**Standard Designation**	HE/Type 30 (Type III)
Applicable Standards	CSA A3001, ASTM C150	**Supply-Chain Specificity of Product**	91.5%
UNSPSC Code	30111504	**UNCPC Code**	3744

HS/Type 50

Product Type	Sulfate Resistant Cement	**Standard Designation**	HS/Type 50 (Type V)
Applicable Standards	CSA A3001, ASTM C150	**Supply-Chain Specificity of Product**	88.4%
UNSPSC Code	30111504	**UNCPC Code**	3744

Product Description

This EPD reports environmental transparency information for five cement products, produced by Heidelberg Materials at their Edmonton, Alberta, facility; EcoCem®PLUS, Oil Well, GU/Type 10 (Type I), HE/Type 30 (Type III), and HS/Type 50 (Type V) cements. 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. EcoCem®PLUS, an innovative blended Portland limestone cement (PLC) designed by Heidelberg Materials to provide strength and durability while significantly reducing the carbon footprint of the cement. This product is a general use limestone blended (GULb) and a high sulfate (HSLb) resistant product for concrete and mortar as well as all various applications for cement, including engineered soils and solidification/stabilization of materials and wastes. The Edmonton plant oil well cement conforms to an American Petroleum Institute (API) Spec 10A Class G. This cement is used for oil well grouting or cementing and is able to withstand high temperatures and pressures of deep wells.

Materials and Composition

Product	Product components
EcoCemPLUS	Clinker, Fly Ash, Limestone, Synthetic Gypsum, Grinding Aids
OWG	Clinker, Synthetic Gypsum
GU/Type 10	Clinker, Limestone, Synthetic Gypsum, Grinding Aids
HE/Type 30	Clinker, Synthetic Gypsum, Grinding Aids
HS/Type 50	Clinker, Limestone, Synthetic 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 Canadian waste classification: Transportation of Dangerous Goods (TDG) Regulations (SOR/2001-286); The Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2021-25).

EPD Representativeness

Primary Data Year	2024	
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

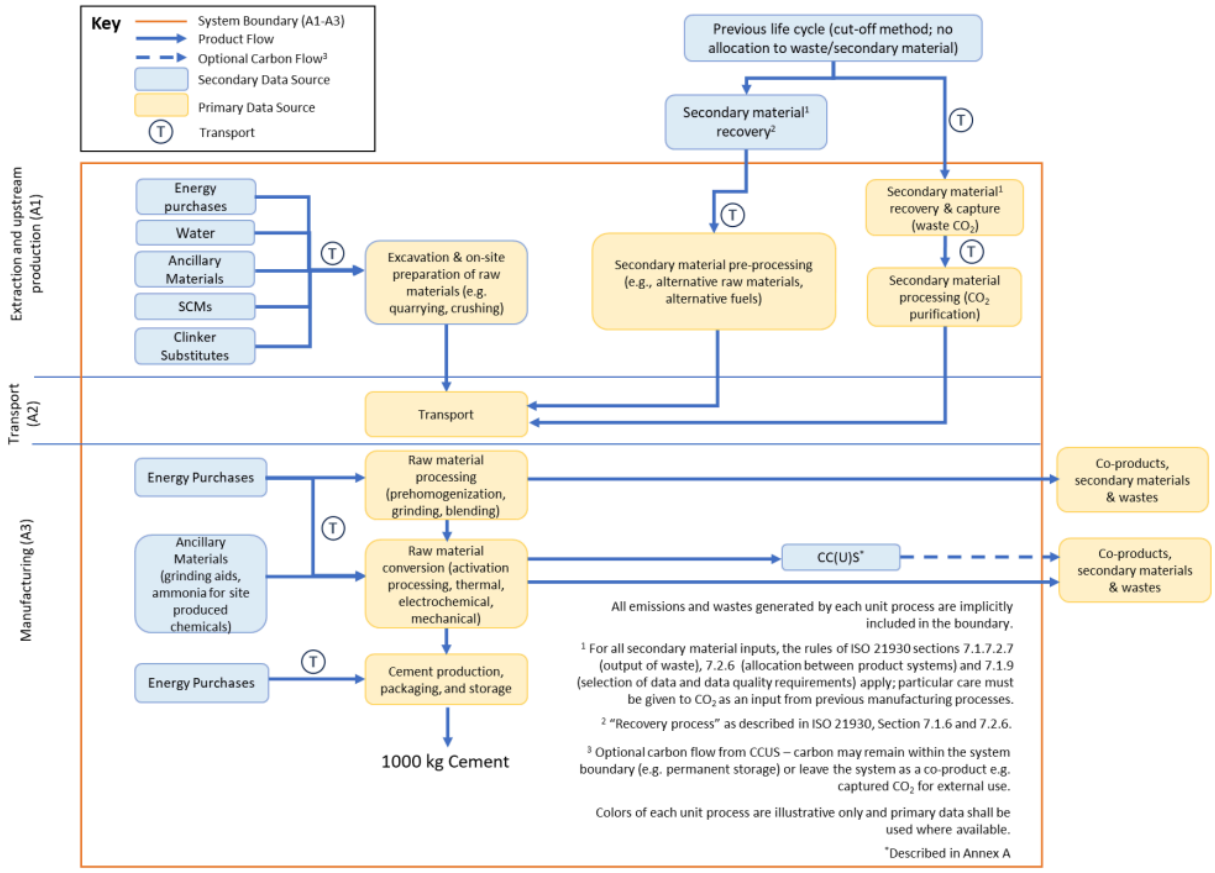

Diagram from Smart EPD (2025) Part B Product Category Rules for Cements for Construction Version 4.0. Standard 1000-010

Manufacturing Process Description

EcoCem®PLUS, Oil Well, GU/Type 10 (Type I), HE/Type 30 (Type III), and HS/Type 50 (Type V) cements at the Edmonton site go through the following general processes: raw material extraction and quarrying; raw material preparation (crushing, grinding, blending); clinker production via kiln; clinker cooling; cement grinding with gypsum, limestone, and other additives; and storage. This cement facility utilized two different types of clinker (clinker type 1 and clinker type 2). Clinker is not a final product at the facility, but is used in producing all of the cement products at Edmonton.

Software and Data

Software

LCA Software	Pathways v1.0

Data Quality

Indicator	**Definition**		**Data Quality Score Meaning**	**Data Quality Score** (1=lowest; 5=highest)
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 (1 year)	1
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	Aggregate - sand (Natural)	Gravel and sand quarry operation (Ecoinvent 3.10)	Rest of World	1997-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Construction and demolition refuse derived fuel (CDRDF) production	Custom Construction and Demolition Residue Derived Fuel Activity using Ecoinvent processes	Rest of World	2010-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.

	A1	Explosives	Market for blasting, GLO (Ecoinvent 3.10)	Global	2010-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Limestone	n/a (primary data collected for quarry)	Alberta, CA	2024	n/a (primary data at quarry)
	A1	Clay	Market for clay (Ecoinvent 3.10)	Rest of World	2010-2023	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 - GLO (Ecoinvent 3.10)	Global	2010-2023	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	Natural gas production	market for natural gas, high pressure, custom dataset	Alberta, CA	2010-2024	See Section 3.4
	A1-A2	Refuse derived fuel (RDF) production	Market for municipal solid waste - CA (Ecoinvent 3.10)	Canada	2010-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1-A2	Tire derived fuel (TDF) production	Custom pathways activity using Ecoinvent 3.10 datasets	Rest of World	2010-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1-A2	Construction and demolition refuse derived fuel (CDRDF) production	Custom pathways activity using Ecoinvent 3.10 datasets	Rest of World	2010-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
	A1	Grinding aids	Alkylbenzene sulfonate production, linear, petrochemical 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.
	A3	Process water	Market for tap water - RoW (Ecoinvent 3.10)	Rest of World	2012-2023	ecoinvent Association. (2023). *ecoinvent database, version 3.10*. Zurich, Switzerland: ecoinvent Association.
Transportation	A2	Aggregate - Sand (Natural) Transport	Transport, combination truck, short-haul, diesel powered (USLCI)	United States	2024	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search
	A2	Limestone transport	Alberta rail specific emissions data	Alberta, CA	2024	See section 3.4
	A2	Limestone - Preblend transport	Alberta rail specific emissions data	Alberta, CA	2024	See section 3.4
	A2	Mill scale transport	Transport, combination truck, short-haul, diesel powered (USLCI)	United States	2024	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search
	A2	Grinding aid transport	Transport, combination truck, short-haul, diesel powered (USLCI)	United States	2024	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search
	A2	Fly ash transport	Alberta rail specific emissions data	Alberta, CA	2024	See section 3.4
	A2	Synthetic gypsum transport	Alberta rail specific emissions data	Alberta, CA	2024	See section 3.4
Electricity	A3	Electricity	AESO 2024 Electricity Custom Dataset	Alberta, CA	2024	See section 3.4
Energy	A3	Diesel - mobile equipment	Diesel, combusted in industrial equipment (USLCI)	United States	2003	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search

	A3	Gasoline - mobile equipment	Gasoline, combusted in industrial equipment (USLCI)	United States	1995-2002	U.S. Life Cycle Inventory Database. (2012). National Renewable Energy Laboratory. Accessed Sept. 9, 2025: https://www.lcacommons.gov/nrel/search
	A3	Natural gas	n/a (primary data using CEMS data)	Alberta, CA	2024	n/a (primary data from CEMs and ultimate analysis)
	A3	Tire derived fuel (TDF)	n/a (primary data using CEMS data)	Alberta, CA	2024	n/a (primary data from CEMs and ultimate analysis)
	A3	Refuse derived fuel (RDF)	n/a (primary data using CEMS data)	Alberta, CA	2024	n/a (primary data from CEMs and ultimate analysis)
	A3	Construction and demolition refuse derived fuel (CDRDF) production	n/a (primary data using CEMS data)	Alberta, CA	2024	n/a (primary data from CEMs and ultimate analysis)
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

LCIA Results - EcoCemPLUS

Impact Indicator	Unit	A1	A2	A3	Total
Global warming potential – total (GWP-total)	kg CO_2 eq	19.8	13.8	539.3	573
Global warming potential – fossil (GWP-fossil)	kg CO_2 eq	19.5	13.8	536	569
Global warming potential – biogenic (GWP-biogenic)	kg CO_2 eq	0.02	0.01	4.03	4.05
Global warming potential – CC (GWP-CC)	kg CO_2 eq	0	0	0	0
Global warming potential – S (GWP-CC)	kg CO_2 eq	0	0	0	0
Global warming potential – U (GWP-U)	kg CO_2 eq	0	0	0	0
Global warming potential – land use and land transformation (GWP-luluc)	kg CO_2 eq	9.92e-3	0	0.03	0.04
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	1.50e-7	4.33e-7	1.85e-6	2.43e-6
Eutrophication potential – freshwater (EP-freshwater)	kg P eq	0	5.04e-6	1.04e-3	1.04e-3
Eutrophication potential – marine (EP-marine)	kg N eq	8.05e-3	6.20e-3	0.12	0.13
Acidification potential (AP)	kg SO_2 eq	0.17	0.10	1.15	1.42
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq	3.97	3.43	34.5	41.9
Resource Uses					
Use of renewable primary energy resources (RPR_E)	MJ	6.19	0	0	6.19
Use of renewable primary energy resources used as raw materials (RPR_M)	MJ	0	0	211	211
Total use of renewable primary energy resources (RPR_T)	MJ	6.19	0	153.5	159.7
Use of non-renewable primary energy resources ($NRPR_E$)	MJ	150	0	443	593
Use of non-renewable primary energy resources used as raw materials ($NRPR_M$)	MJ	8.23	0	227	235
Total use of non-renewable primary energy resources ($NRPR_T$)	MJ	158.23	0	670	828
Use of secondary material (SM)	kg	0.05	0	0.13	0.18
Use of renewable secondary fuels (RSF)	MJ	3.23e-3	0	7.01e-4	3.93e-3
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0
Use of net fresh water (FW)	m^3	0.12	0	249	249
Use of recovered energy (RE)	MJ	0.07	0	0.16	0.22
Waste and Output Flows					
Hazardous waste disposed (HWD)	kg	87.1	0	1.85	89.0

Non-hazardous waste disposed (NHWD)	kg	219	0	92.9	312
High-level radioactive waste (HLRW)	kg	1.96e-5	0	3.55e-5	5.51e-5
Intermediate and low-level radioactive waste (ILLRW)	kg	4.31e-5	0	3.75e-5	8.06e-5
Materials for recycling (MFR)	kg	2.81e-3	0	1.58	1.58
Materials for energy recovery (MER)	kg	2.31e-5	0	9.79e-6	3.29e-5
Exported energy – electricity (EEE)	MJ	0.02	0	0.11	0.14

Additional Carbon Emissions and Removals – EcoCemPLUS

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	18.4
Calcination Carbon Emissions	238.0
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	0

GWP Impact Reporting for Different Processes – EcoCemPLUS

Impact Category		Unit	Primary Fuels Combustion	Alternative Fuels Combustion	Calcination	Other	GWP-CC	GWP-S	GWP-U	GWP-CCUS
GWP	Fossil	kg CO2 eq	140.6	21.6	238	0	0	0	0	0
	Biogenic	kg CO2 eq	0	18.4	0	0	0	0	0	0
	Total	kg CO2 eq	140.6	40.0	238	0	0	0	0	0

LCIA Results – OWG

Impact Indicator	Unit	A1	A2	A3	Total
Global warming potential – total (GWP-total)	kg CO_2 eq	38.9	18.9	737.8	796
Global warming potential – fossil (GWP-fossil)	kg CO_2 eq	38.8	18.9	734	791
Global warming potential – biogenic (GWP-biogenic)	kg CO_2 eq	0.03	0.01	5.54	5.57
Global warming potential – CC (GWP-CC)	kg CO_2 eq	0	0	0	0

Global warming potential – S (GWP-CC)	kg CO_2 eq	0	0	0	0
Global warming potential – U (GWP-U)	kg CO_2 eq	0	0	0	0
Global warming potential – land use and land transformation (GWP-luluc)	kg CO_2 eq	0.02	0	0.03	0.05
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	2.30e-7	4.26e-7	2.50e-6	3.15e-6
Eutrophication potential – freshwater (EP-freshwater)	kg P eq	0	9.62e-6	1.37e-3	1.37e-3
Eutrophication potential – marine (EP-marine)	kg N eq	8.61e-3	0.01	0.16	0.18
Acidification potential of soil and water sources (AP)	kg SO_2 eq	0.26	0.11	1.57	1.95
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq	6.09	3.93	47.3	57.3
Resource Uses					
Use of renewable primary energy resources (RPR_E)	MJ	11.3	0	0	11.3
Use of renewable primary energy resources used as raw materials (RPR_M)	MJ	0	0	289	289
Total use of renewable primary energy resources (RPR_T)	MJ	11.3	0	203.4	214.7
Use of non-renewable primary energy resources ($NRPR_E$)	MJ	256	0	578	834
Use of non-renewable primary energy resources used as raw materials ($NRPR_M$)	MJ	0	0	312	312
Total use of non-renewable primary energy resources ($NRPR_T$)	MJ	256	0	890	1,146
Use of secondary material (SM)	kg	0.09	0	0.17	0.26
Use of renewable secondary fuels (RSF)	MJ	4.00e-3	0	9.39e-4	4.94e-3
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0
Use of net fresh water (FW)	m^3	0.31	0	342	342
Use of recovered energy (RE)	MJ	0.10	0	0.21	0.31
Waste and Output Flows					
Hazardous waste disposed (HWD)	kg	189	0	2.48	191
Non-hazardous waste disposed (NHWD)	kg	201	0	119	320
High-level radioactive waste (HLRW)	kg	3.68e-5	0	4.67e-5	8.35e-5
Intermediate and low-level radioactive waste (ILLRW)	kg	7.96e-5	0	4.86e-5	1.28e-4
Materials for recycling (MFR)	kg	4.54e-3	0	2.17	2.17
Materials for energy recovery (MER)	kg	3.56e-5	0	1.30e-5	4.85e-5
Exported energy – electricity (EEE)	MJ	0.04	0	0.16	0.20

Additional Carbon Emissions and Removals – OWG

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	25.3
Calcination Carbon Emissions	410.7
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	0

GWP Impact Reporting for Different Processes – OWG

Impact Category		Unit	Primary Fuels Combustion	Alternative Fuels Combustion	Calcination	Other	GWP-CC	GWP-S	GWP-U	GWP-CCUS
GWP	Fossil	kg CO2 eq	193	29.7	410.7	0	0	0	0	0
	Biogenic	kg CO2 eq	0	25.3	0	0	0	0	0	0
	Total	kg CO2 eq	193	55.0	410.7	0	0	0	0	0

LCIA Results – GU/Type 10

Impact Indicator	Unit	A1	A2	A3	Total
Global warming potential – total (GWP-total)	kg CO_2 eq	25.75	14.4	699.6	740
Global warming potential – fossil (GWP-fossil)	kg CO_2 eq	25.7	14.4	695	735
Global warming potential – biogenic (GWP-biogenic)	kg CO_2 eq	0.02	7.55e-3	5.34	5.37
Global warming potential – CC (GWP-CC)	kg CO_2 eq	0	0	0	0
Global warming potential – S (GWP-CC)	kg CO_2 eq	0	0	0	0
Global warming potential – U (GWP-U)	kg CO_2 eq	0	0	0	0
Global warming potential – land use and land transformation (GWP-luluc)	kg CO_2 eq	0.01	0	0.03	0.04
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	1.95e-7	3.68e-7	2.27e-6	2.84e-6
Eutrophication potential – freshwater (EP-freshwater)	kg P eq	0	6.65e-6	6.20e-4	6.20e-4

Eutrophication potential – marine (EP-marine)	kg N eq	9.56e-3	8.18e-3	0.15	0.17
Acidification potential of soil and water sources (AP)	kg SO_2 eq	0.21	0.09	1.49	1.80
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq	5.00	3.20	45.1	53.3
Resource Uses					
Use of renewable primary energy resources (RPR_E)	MJ	8.05	0	0	8.05
Use of renewable primary energy resources used as raw materials (RPR_M)	MJ	0	0	278	278
Total use of renewable primary energy resources (RPR_T)	MJ	8.05	0	148	156
Use of non-renewable primary energy resources ($NRPR_E$)	MJ	196	0	350	546
Use of non-renewable primary energy resources used as raw materials ($NRPR_M$)	MJ	10.7	0	300	311
Total use of non-renewable primary energy resources ($NRPR_T$)	MJ	206.7	0	650	857
Use of secondary material (SM)	kg	0.07	0	0.13	0.20
Use of renewable secondary fuels (RSF)	MJ	4.14e-3	0	7.49e-4	4.89e-3
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0
Use of net fresh water (FW)	m^3	0.15	0	320	320
Use of recovered energy (RE)	MJ	0.09	0	0.19	0.28
Waste and Output Flows					
Hazardous waste disposed (HWD)	kg	115	0	1.96	117
Non-hazardous waste disposed (NHWD)	kg	289	0	110	399
High-level radioactive waste (HLRW)	kg	2.55e-5	0	3.50e-5	6.06e-5
Intermediate and low-level radioactive waste (ILLRW)	kg	5.61e-5	0	3.80e-5	9.41e-5
Materials for recycling (MFR)	kg	3.59e-3	0	2.08	2.08
Materials for energy recovery (MER)	kg	3.01e-5	0	9.76e-6	3.98e-5
Components for reuse (CRU)	kg	0	0	0	0
Exported energy – electricity (EEE)	MJ	0.03	0	0.15	0.18

Additional Carbon Emissions and Removals - GU/Type 10

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	24.3

Calcination Carbon Emissions	410.7
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	0

GWP Impact Reporting for Different Processes - GU/Type 10

Impact Category		Unit	Primary Fuels Combustion	Alternative Fuels Combustion	Calcination	Other	GWP-CC	GWP-S	GWP-U	GWP-CCUS
GWP	Fossil	kg CO2 eq	185.5	28.5	410.7	0	0	0	0	0
	Biogenic	kg CO2 eq	0	24.3	0	0	0	0	0	0
	Total	kg CO2 eq	185.5	52.8	410.7	0	0	0	0	0

LCIA Results - HE/Type 30

Impact Indicator	Unit	A1	A2	A3	Total
Global warming potential – total (GWP-total)	kg CO_2 eq	27.28	15.2	758.3	801
Global warming potential – fossil (GWP-fossil)	kg CO_2 eq	27.2	15.2	753	795
Global warming potential – biogenic (GWP-biogenic)	kg CO_2 eq	0.02	8.03e-03	5.56	5.59
Global warming potential – land use and land transformation (GWP-luluc)	kg CO_2 eq	0.01	0	0.04	0.05
Global warming potential – CC (GWP-CC)	kg CO_2 eq	0	0	0	0
Global warming potential – S (GWP-CC)	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	2.15e-7	3.89e-7	2.60e-6	3.20e-6
Eutrophication potential – freshwater (EP-freshwater)	kg P eq	-9.42e-3	6.96e-6	2.17e-3	-7.25e-3
Eutrophication potential – marine (EP-marine)	kg N eq	9.74e-3	8.55e-3	0.16	0.18
Acidification potential of soil and water sources (AP)	kg SO_2 eq	0.22	0.09	1.61	1.93
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq	5.17	3.38	48.1	56.6
Resource Uses					
Use of renewable primary energy resources (RPR_E)	MJ	8.64	0	0	8.64
Use of renewable primary energy resources used as raw materials (RPR_M)	MJ	0	0	290	290

Total use of renewable primary energy resources (RPR_T)	MJ	8.64	0	263.9	272.5
Use of non-renewable primary energy resources ($NRPR_E$)	MJ	211	0	836	1,047
Use of non-renewable primary energy resources used as raw materials ($NRPR_M$)	MJ	16.2	0	313	330
Total use of non-renewable primary energy resources ($NRPR_T$)	MJ	227.2	0	1,149	1,376
Use of secondary material (SM)	kg	0.08	0	0.20	0.28
Use of renewable secondary fuels (RSF)	MJ	4.35e-3	0	1.13e-3	5.47e-3
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0
Use of net fresh water (FW)	m^3	0.16	0	327	327
Use of recovered energy (RE)	MJ	0.10	0	0.22	0.33
Hazardous waste disposed (HWD)	kg	120	0	2.98	123
Waste and Output Flows					
Non-hazardous waste disposed (NHWD)	kg	302	0	121	423
High-level radioactive waste (HLRW)	kg	2.75e-5	0	5.74e-5	8.49e-5
Intermediate and low-level radioactive waste (ILLR)	kg	6.07e-5	0	5.57e-5	1.16e-4
Materials for recycling (MFR)	kg	3.84e-3	0	2.18	2.19
Materials for energy recovery (MER)	kg	3.43e-5	0	1.62e-5	5.05e-5
Exported energy – electricity (EEE)	MJ	0.03	0	0.16	0.19

Additional Carbon Emissions and Removals – HE/Type 30

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	25.4
Calcination Carbon Emissions	412.9
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	0

GWP Impact Reporting for Different Processes – HE/Type 30

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	194.0	29.9	412.9	0	0	0	0	0
	Biogenic	kg CO2 eq	0	25.4	0	0	0	0	0	0
	Total	kg CO2 eq	194.0	55.2	412.9	0	0	0	0	0

LCIA Results – HS/Type 50

Impact Indicator	Unit	Total	A1	A2	A3
Global warming potential – total (GWP-total)	kg CO_2 eq	748	37.48	17.8	692.5
Global warming potential – fossil (GWP-fossil)	kg CO_2 eq	743	37.4	17.8	687
Global warming potential – biogenic (GWP-biogenic)	kg CO_2 eq	5.27	0.03	0.01	5.23
Global warming potential – land use and land transformation (GWP-luluc)	kg CO_2 eq	0.05	0.02	-3.21e-19	0.03
Global warming potential – CC (GWP-CC)	kg CO_2 eq	0	0	0	0
Global warming potential – S (GWP-CC)	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	2.95e-6	2.36e-7	3.98e-7	2.32e-6
Eutrophication potential – freshwater (EP-freshwater)	kg P eq	-0.01	-0.01	9.11e-6	1.02e-3
Eutrophication potential – marine (EP-marine)	kg N eq	0.17	8.76e-3	0.01	0.15
Acidification potential of soil and water sources (AP)	kg SO_2 eq	1.84	0.26	0.10	1.48
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	54.2	5.9	3.69	44.6
Resource Uses					
Use of renewable primary energy resources (RPR_E)	MJ	0	11.2	0	11.2
Use of renewable primary energy resources used as raw materials (RPR_M)	MJ	273	0	0	273
Total use of renewable primary energy resources (RPR_T)	MJ	273	11.2	0	284.2
Use of non-renewable primary energy resources ($NRPR_E$)	MJ	719	251	0	468
Use of non-renewable primary energy resources used as raw materials ($NRPR_M$)	MJ	307	11.9	0	295
Total use of non-renewable primary energy resources ($NRPR_T$)	MJ	1026	262.9	0	763
Use of secondary material (SM)	kg	0.23	0.09	0	0.15
Use of renewable secondary fuels (RSF)	MJ	4.77e-3	3.94e-3	0	8.29e-4
Use of non-renewable secondary fuels (NRSF)	MJ	0	0	0	0

Use of net fresh water (FW)	m^3	329	0.29	0	329
Use of recovered energy (RE)	MJ	0.31	0.12	0	0.20
Waste and Output Flows					
Hazardous waste disposed (HWD)	kg	181	178	0	2.18
Non-hazardous waste disposed (NHWD)	kg	302	191	0	112
High-level radioactive waste (HLRW)	kg	7.66e-5	3.62e-5	0	4.04e-5
Intermediate and low-level radioactive waste (ILLRW)	kg	1.21e-4	7.86e-5	0	4.28e-5
Materials for recycling (MRR)	kg	2.05	4.55e-3	0	2.05
Materials for energy recovery (MER)	kg	5.17e-5	4.05e-5	0	1.12e-5
Exported energy – electricity (EEE)	MJ	0.19	0.04	0	0.15

Additional Carbon Emissions and Removals – HS/Type 50

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	23.9
Calcination Carbon Emissions	388
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	0

GWP Impact Reporting for Different Processes – HS/Type 50

Impact Category		Unit	Primary Fuels Combustion	Alternative Fuels Combustion	Calcination	Other	GWP-CC	GWP-S	GWP-U	GWP-CCUS
GWP	Fossil	kg CO2 eq	182.6	28.1	388	0	0	0	0	0
	Biogenic	kg CO2 eq	0	23.9	0	0	0	0	0	0
	Total	kg CO2 eq	182.6	52	388	0	0	0	0	0

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.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building or construction works has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase only when product or construction works performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparisons can be inaccurate and could lead to erroneous selection of materials or products that are higher-impact, at least in some impact categories.

Additional Environmental Information

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
Edmonton, AB	100%	Rail	1276 km	Flin Flon, MB - Company 1 Road
Edmonton, AB	100%	Rail	1199 km	Fort St John, BC - 110, 9503 - 72 St
Edmonton, AB	100%	Rail	835 km	Kamloops, BC - 9785 E Trans Canada Hwy
Edmonton, AB	100%	Rail	970 km	Regina, SK - 1540 Fleet Street N
Edmonton, AB	100%	Truck	525 km	Saskatoon, SK - 314 Portage Ave
Edmonton, AB	100%	Rail	1268 km	Winnipeg, MB - 1191 Kenaston Blvd

Environmental Management System (EMS)

The Edmonton plant has an EMS in place. The EMS identifies environmental impacts and ensures that control procedures are maintained to reflect current environmental knowledge and regulations.

For environmental reporting, the plant complies with the Albertan and Canadian environmental compliance requirements and emissions reports:

- Canadian National Pollutant Release Inventory (NPRI)
- Alberta Air Monitoring Directive Emission Inventory Reporting (AEIR)
- Multi-sector Air Pollutants Regulations (MSAPR)
- Greenhouse Gas Reporting:
- Alberta's Climate Change Legislation- Technology Innovation & Emissions Reduction (TIER)legislation
- Environment & Climate Change Canada (ECCC) and Partner's Greenhouse Gas Reporting
- Operating Approval

The Edmonton plant operates under an Operating Approval (#10339-03-00), issued by the Province under the Environmental Protection and Enhancement Act.

Recycling Programs

The Edmonton plant offers an impacted clay recycling/reuse program in which impacted clay is reused to manufacture clinker in place of mining and utilizing virgin clay. This program has resulted in over 200,000 tonnes of clay being diverted from landfill to the Edmonton plant yielding a savings in GHG emissions related to the material decomposition and the avoidance of transportation to distant landfills.

We recycle all process water collected and treated in the process pond. The process pond also helps collect stormwater for reuse in the manufacturing process. There is no process wastewater discharge from the plant. The Edmonton plant sorts and stores onsite the following used materials for recycling: batteries, aerosol cans, discarded paper and cardboard, non-functional electronic hardware, parts, light ballasts and bulbs. The sorted recyclable materials are recycled offsite through contractors.

Heidelberg Materials Sustainability Commitments 2030

The world needs smart, sustainable and resilient infrastructure, buildings, and public spaces. At Heidelberg Materials, we have transformed our business to address these challenges, and placed 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/en/sustainability).

References

ACLCA. (2018). *ACLCA Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930: 2017.*

ACLCA. (2025). *EPD classifications addendum 2025: Guidance for determining EPD types and calculating and communicating data specificity through the supply chain*. ACLCA.

Bare, J. (2011). TRACI - The Tool for the Reduction and Assessment of Chemical and other Environmental Impacts. *CLEAN TECHNOLOGIES AND ENVIRONMENTAL POLICY*.

European Standards. (2012). *EN 15804 - 2012 Sustainability of construction works, Environmental product declarations, Core rules for the product category of construction products.*

Guinée, J.B. et al. (2002). *Handbook on life cycle assessment. Operational guide to the ISO standards. I: LCA in perspective. IIa: Guide. IIb: Operational annex. III: Scientific background.* Dordrecht: Kluwer Academic Publishers.

IPCC. (2021). *Climate Change 2021: The Physical Science Basis.* IPCC.

ISO. (2006a). *14040:2006/Amd.1:2020 – Environmental management — Life cycle assessment — Principles and framework.* Geneva: International Organization of Standardization.

ISO. (2006b). *14044:2006/Amd.1:2017/Amd.2:2020 – Environmental management — Life cycle assessment — Requirements and guidelines.* Geneva: International Organization for Standardization.

National Renewable Energy Laboratory. (2012). *U.S. Life Cycle Inventory Database*. U.S. Department of Energy. https://www.lcacommons.gov/nrel/search

Smart EPD (2025) *Part A Product Category Rules for Building and Construction Products and Services* 1000-012 . Published March 14, 2025. www.smartepd.com.

Smart EPD (2025) *Part B Product Category Rules for Cements for Construction Version 4.0. Standard* 1000-010. Published July 2, 2025. www.smartepd.com. .

Statistics Canada. (2024). *Electric power generation, fuel consumed and cost of fuel by electricity generating thermal plants (Table 25-10-0084-01)*. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2510008401

UL Environment. (2022). *Part A: Life Cycle Assessment Calculation Rules and Report Requirements.* UL Environment.

Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., & Weidema, B. (2016). The ecoinvent database version 3 (part I): overview and methodology. *The International Journal of Life Cycle Assessment*, 1218-1230.