Environmental Product Declaration (EPD) for Cement

GENERAL INFORMATION

This cradle to gate Environmental Product Declaration Type I/II and Type IL cement produced at Çanakkale Cement Plant in Türkiye and separately inclusive of transport to Heidelberg Materials' import terminals along the Atlantic seaboard of the contiguous United States. 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.

Akçansa, a joint venture of Sabanci Holding and Heidelberg Materials

Çanakkale Cement Plant
Çanakkale, Türkiye

PROGRAM OPERATOR

National Ready Mixed Concrete Association
66 Canal Center Plaza, Suite 250
Alexandria, VA 22314
https://www.nrmca.org/

Environmental Impacts

Çanakkale, Türkiye Plant: Product-Specific Type III EPD

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

Declared Unit: One metric tonne of cement

	Cement Products	
	Type IL	Type I/II
	ecocem PLC	
Global Warming Potential (kg CO_2-eq)	**839**	**921**
Ozone Depletion Potential (kg CFC-11-eq)	1.77E-05	1.91E-05
Eutrophication Potential (kg N-eq)	0.69	0.74
Acidification Potential (kg SO^2-eq)	1.54	1.67
Photochemical Ozone Creation Potential (kg O_3-eq)	34.14	37.18
Abiotic Depletion, nonfossil (kg Sb-eq)	2.08E-04	2.25E-04
Abiotic Depletion, fossil (MJ, NCV)	3441	3750
Product Components:		
Clinker	86%	95%
Limestone, Gypsum and Others	14%	5%

Additional details and impacts are reported on page 4, 5 and 6.

NRMCA EPD: 20243

DATE OF ISSUE: Nov 26, 2024 - valid for five years Nov 26, 2029

ISO 21930:2017 Sustainability in Building Construction-Environmental Declaration of Building Products: serves as the core PCR **NSF PCR for Portland, Blended, Masonry, Mortar, and Plastic (Stucco) Cements V3.2: serves as the sub-category PCR**
Sub-category PCR review was conducted by Thomas P. Gloria, PhD. (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants
Independent verification of the declaration, according to ISO 21930:2017 and ISO 14025:2006.: ☐ internal ☑ external
Third party verifier • Denice Viktoria Staaf • Labelling Sustainability
For additional explanatory material Manufacture Representative: Jeff Hook (jeff.hook@heidelbergmaterials.com) This EPD was prepared using the pre-verified GCCA Tool by: Athena Sustainable Materials Institute
EPDs are comparable only if they comply with ISO 21930 (2017), use the same, sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

LIFE CYCLE ASSESSMENT

PRODUCER

Akçansa, a joint venture of Sabancı Holding and Heidelberg Materials , is the largest and leading cement producer of Turkey. Akçansa was founded in 1996 as a result of the merger of Akçimento (founded in 1967) and Çanakkale Çimento (founded in 1974). Operating in the Marmara, Aegean, and Black Sea regions, Akçansa produces cement and clinker in its three factories located in Istanbul-Büyükçekmece, Çanakkale, and SamsunLadik. Company also has a total seven cement terminals.
AKÇANSA Canakkale's products comply to the global quality standards, its eco-friendly identity was awarded by the Istanbul Chamber of Industry, for its outstanding service and its plants equipped with high technology. During the production, AKÇANSA makes use of the waste heat and benefits from its wind power plant. This reduces the amount of mains electricity that AKÇANSA needs to use.

Akçansa launched the "Sustainable Product Movement" for its cement products with its investment and product transformation plan, which was designed in the CO2 emission reduction roadmap Akçansa prepared as part of its targets. In this context, it invested in silos and feeding systems and established strategic partnerships for the use of fly ash, a by-product of thermal power plants in its region, in cement production.

Akçansa achieved great success in the Climate Change Program of the Carbon Disclosure Project (CDP), the world's leading environmental reporting platform. Since 2011, Akçansa has voluntarily participated in the Climate Change Program of the platform, where Akçansa transparently shares its environmental performance with all stakeholders, and it has become the only Turkish cement company in its industry to receive the Leadership rating in this program while raising its score from B to A- (Leadership) level.

PRODUCT

The cement products covered in this EPD meet UN CPC 3744 classification and the following standards:

Product Type	Applicable Standard	Standard Designation
Portland Limestone Cement	ASTM C595, C1157, AASHTO M240	Type IL
Portland Cement	ASTM C150, C1157, AASHTO M85	Type I/II

PRODUCT DESCRIPTION

This EPD reports environmental transparency information for Type I/II and Type IL cement products, manufactured by Akçansa at its Çanakkale 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.

The table below outlines the material composition for each cement type, in order of greatest mass.

Type I/II	Type IL
Clinker	Clinker
Gypsum	Limestone
Limestone	Gypsum
Other	Other

Akçansa exports Type I/II and Type IL cement from their cement plant located in Çanakkale, Türkiye to various termials operated by Heidelberg Material along the Atlantic seaboard of the contiguous United States. This EPD covers Type I/II and Type IL cement produced at Akçansa's Çanakkale plant and shipped to the following four terminals:

1. Providence, RI
2. Brooklyn, NY
3. Cementon, NY
4. Fort Lauderdale, FL

DECLARED UNIT

The declared unit is one metric tonne of Type I/II and Type IL cement.

SYSTEM BOUNDARY

This EPD is a cradle-to-gate EPD covering A1-A3 stages of the life cycle, inclusive of transport to four cement import terminals operated by Heidelberg along the Atlantic seaboard of the contiguous United States.

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.

The cut-off criteria as per NSF PCR, Section 7.1.8 and ISO 21930, 7.1.8 were followed. All input/output data required were collected and included in the LCI modelling. 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 2022:
Clinker production and cement manufacture – Çanakkale, Türkiye
Transport mode and distance from the Çanakkale plant to receiving US ports.

All applicable North American background LCI data are publicly available in the GCCA LCA Database [4] – https://concrete-epd-tool.org/.

ALLOCATION PROCEDURE

Allocation follows the requirements and guidance of ISO 14044:2006, Clause 4.3.4; NSF PCR:2021; and ISO 21930:2017 section 7.2. Recycling and recycled content is modeled using the cut-off rule [5].

This sub-category PCR recognizes fly ash, silica fume, granulated blast furnace slag, cement kiln dust, flue gas desulfurization (FGD) gypsum, and post-consumer gypsum as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a cement material input.

REFERENCES

1. ASTM C150 / C150M – 20 Standard Specification for Portland Cement.
2. ASTM C595 / C595M – 21 Standard Specification for Blended Hydraulic Cements
3. Global Cement and Concrete Association (GCCA) 2023. N.A. version of Industry EPD tool for Cement and Concrete – v4.2. https://concrete-epd-tool.org/
4. Global Cement and Concrete Association (GCCA) 2024. LCA Database, North American version – v4.2, Prepared by Quantis. https://concrete-epd-tool.org/
5. Global Cement and Concrete Association (GCCA) 2024. LCA Model, North American version – v4.2, Prepared by Quantis https://concrete-epd-tool.org/
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 2021: 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 – Akçansa Çanakkale Bulk Cement Products: Type I/II Cement, Inclusive of Transport to Import Terminals – Results per metric tonne

Impact Assessment	Unit	Providence, RI Type I/II	Brooklyn, NY Type I/II	Cementon, NY Type I/II	Fort Lauderdale, FL Type I/II
Global warming potential (GWP)[1]	kg CO_2 eq	**974.92**	**975.92**	**977.00**	**982.80**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	**3.03E-05**	**3.05E-05**	**3.08E-05**	**3.20E-05**
Eutrophication potential (EP)	kg N eq	**1.08**	**1.09**	**1.09**	**1.13**
Acidification potential of soil and water sources (AP)	kg SO_2 eq	**2.81**	**2.83**	**2.85**	**2.97**
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	**45.51**	**45.66**	**45.83**	**46.72**
Resource Use					
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	**2.38E-04**	**2.39E-04**	**2.39E-04**	**2.40E-04**
Abiotic depletion potential for fossil resources (ADPfossil)	MJ, NCV	**4514**	**4528**	**4543**	**4625**
Renewable primary energy resources as energy (fuel), (RPRE)*	MJ, NCV	**937**	**937**	**938**	**940**
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	**4514**	**4528**	**4543**	**4625**
Non-renewable primary resources as material (NRPRM)*	MJ, NCV	**0.00**	**0.00**	**0.00**	**0.00**
Consumption of fresh water	m3	**1.54**	**1.55**	**1.55**	**1.57**
Secondary Material, Fuel and Recovered Energy					
Secondary Materials, (SM)*	kg	**15.56**	**15.56**	**15.56**	**15.56**
Renewable secondary fuels, (RSF)*	MJ, NCV	**207**	**207**	**207**	**207**
Non-renewable secondary fuels (NRSF)*	MJ, NCV	**649**	**649**	**649**	**649**
Recovered energy, (RE)*	MJ, NCV	**47**	**47**	**47**	**47**
Waste & Output Flows					
Hazardous waste disposed*	kg	**0.00**	**0.00**	**0.00**	**0.00**
Non-hazardous waste disposed*	kg	**0.00**	**0.00**	**0.00**	**0.00**
High-level radioactive waste*[2]	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	**0.43**	**0.43**	**0.43**	**0.43**
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	**497.26**	**497.26**	**497.26**	**497.26**
Global warming potential, biogenic	kg CO_2 eq	**0.74**	**0.74**	**0.74**	**0.75**
Emissions from combustion of waste from renewable sources	kg CO_2 eq	**0.06**	**0.06**	**0.06**	**0.06**
Emissions from combustion of waste from non-renewable sources	kg CO_2 eq	**74.85**	**74.85**	**74.85**	**74.85**

* Emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in these categories.
Only EPDs prepared from cradle-to-grave life-cycle results and based on the same function, quantified by the same functional unit, and taking account of replacement based on the product reference service life (RSL) relative to an assumed building service life, can be used to assist purchasers and users in making informed comparisons between products.

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

[2] Not calculated by GCCA Tool

LIFE CYCLE IMPACT ASSESSMENT RESULTS – Akçansa Çanakkale Bulk Cement Products: Type IL Cement, Inclusive of Transport to Import Terminals – Results per metric tonne

Impact Assessment	Unit	Providence, RI Type IL	Brooklyn, NY Type IL	Cementon, NY Type IL	Fort Lauderdale, FL Type IL
Global warming potential (GWP)[1]	kg CO_2 eq	**892.95**	**893.95**	**895.03**	**900.83**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	**2.89E-05**	**2.91E-05**	**2.94E-05**	**3.06E-05**
Eutrophication potential (EP)	kg N eq	**1.03**	**1.04**	**1.04**	**1.08**
Acidification potential of soil and water sources (AP)	kg SO_2 eq	**2.68**	**2.7**	**2.72**	**2.84**
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	**42.47**	**42.62**	**42.79**	**43.68**
Resource Use					
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	**2.21E-04**	**2.22E-04**	**2.22E-04**	**2.23E-04**
Abiotic depletion potential for fossil resources (ADPfossil)	MJ, NCV	**4205**	**4219**	**4234**	**4316**
Renewable primary energy resources as energy (fuel), (RPRE)*	MJ, NCV	**881**	**881**	**882**	**884**
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	**4205**	**4219**	**4234**	**4316**
Non-renewable primary resources as material (NRPRM)*	MJ, NCV	**0.00**	**0.00**	**0.00**	**0.00**
Consumption of fresh water	m3	**1.44**	**1.45**	**1.45**	**1.47**
Secondary Material, Fuel and Recovered Energy					
Secondary Materials, (SM)*	kg	**14.13**	**14.13**	**14.13**	**14.13**
Renewable secondary fuels, (RSF)*	MJ, NCV	**188**	**188**	**188**	**188**
Non-renewable secondary fuels (NRSF)*	MJ, NCV	**589**	**589**	**589**	**589**
Recovered energy, (RE)*	MJ, NCV	**43**	**43**	**43**	**43**
Waste & Output Flows					
Hazardous waste disposed*	kg	**0.00**	**0.00**	**0.00**	**0.00**
Non-hazardous waste disposed*	kg	**0.00**	**0.00**	**0.00**	**0.00**
High-level radioactive waste*[2]	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	**0.40**	**0.40**	**0.40**	**0.40**
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	**451.34**	**451.34**	**451.34**	**451.34**
Global warming potential, biogenic	kg CO_2 eq	**0.70**	**0.70**	**0.70**	**0.710**
Emissions from combustion of waste from renewable sources	kg CO_2 eq	**0.06**	**0.06**	**0.06**	**0.06**
Emissions from combustion of waste from non-renewable sources	kg CO_2 eq	**67.93**	**67.93**	**67.93**	**67.93**

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

[2] Not calculated by GCCA Tool

LIFE CYCLE IMPACT ASSESSMENT RESULTS – Akçansa Çanakkale Bulk Cement Products: Type I/II and Type IL Cement, Exclusive of transport to import terminals – per metric tonne

Impact Assessment	Unit	Type I/II	Type IL
Global warming potential (GWP)[1]	kg CO_2 eq	**920.67**	**838.7**
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	**1.91E-05**	**1.77E-05**
Eutrophication potential (EP)	kg N eq	**0.74**	**0.69**
Acidification potential of soil and water sources (AP)	kg SO_2 eq	**1.67**	**1.54**
Formation potential of tropospheric ozone (POCP)	kg O_3 eq	**37.18**	**34.14**
Resource Use			
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	**2.25E-04**	**2.08E-04**
Abiotic depletion potential for fossil resources (ADPfossil)	MJ, NCV	**3750**	**3441**
Renewable primary energy resources as energy (fuel), (RPRE)*	MJ, NCV	**917**	**861**
Renewable primary resources as material, (RPRM)*	MJ, NCV	**0.00**	**0.00**
Non-renewable primary resources as energy (fuel), (NRPRE)*	MJ, NCV	**3750**	**3441**
Non-renewable primary resources as material (NRPRM)*	MJ, NCV	**0.00**	**0.00**
Consumption of fresh water	m3	**1.36**	**1.26**
Secondary Material, Fuel and Recovered Energy			
Secondary Materials, (SM)*	kg	**15.56**	**14.13**
Renewable secondary fuels, (RSF)*	MJ, NCV	**207**	**188**
Non-renewable secondary fuels (NRSF)*	MJ, NCV	**649**	**589**
Recovered energy, (RE)*	MJ, NCV	**47**	**43**
Waste & Output Flows			
Hazardous waste disposed*	kg	**0.00**	**0.00**
Non-hazardous waste disposed*	kg	**0.00**	**0.00**
High-level radioactive waste*[2]	kg	**n/c**	**n/c**
Intermediate and low-level radioactive waste*[2]	kg	**n/c**	**n/c**
Components for reuse*	kg	**0.00**	**0.00**
Materials for recycling*	kg	**0.43**	**0.40**
Materials for energy recovery*	kg	**0.00**	**0.00**
Recovered energy exported from the product system*	MJ, NCV	**0.00**	**0.00**
Additional Inventory Parameters for Transparency			
CO_2 emissions from calcination and uptake from carbonation	kg CO_2 eq	**497.26**	**451.34**
Global warming potential, biogenic	kg CO_2 eq	**0.69**	**0.65**
Emissions from combustion of waste from renewable sources	kg CO_2 eq	**0.06**	**0.06**
Emissions from combustion of waste from non-renewable sources	kg CO_2 eq	**74.85**	**67.93**

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

[2] Not calculated by GCCA Tool

ADDITIONAL ENVIROMENTAL INFORMATION

Environmental Management System (EMS)

Akcansa Çanakkale plant has an EMS in place. The EMS identifies environmental impacts and compliance requirements and ensures that these are continually updated to reflect current environmental knowledge and regulations. Environmental requirements are documented in the EMS which serves as a reference and provides operating personnel with relevant information and compliance deadlines. For environmental reporting the plant complies with Turkish Environmental Regulations.

Environmental policies and procedures have been composed, which serve as a reference and provides operating personnel with environmental procedures.

For environmental reporting the plant complies with

- Greenhouse Gas Monitoring, Reporting and Verification Regulation
- GCCA Cement Sustainability Initiative Cement CO2 and Energy Protocol, Version 3.1.
- Continuous Emission Monitoring System reporting

Akcansa carries out production activities in all its facilities in accordance with ISO 45001 Occupational Health and Safety Management System, BS EN ISO 9001: 2000 Quality Management System, ISO 50001 Energy Management System and BS EN ISO 14001 Environmental Management System.

Air Emission Permit

Çanakkale Plant has been issued Environmental Permit and License from the Ministry of Environment, Urbanization and Climate Change. 17.11.2023 dated 222515096.0.01 permit details all pollution control requirements applicable the Plant including air pollution, waste co-incineration and other conditions considering the aspects of operation.

Oil, Used Oil, Waste Chemicals, and Anti-Freeze:

The Çanakkale plant stores hazardous chemicals and wastes in appropriate storage containers in a secondary containment area and in compliance with Spill Containment, Control and Countermeasure (SPCC) requirements. A third-party, authorized contractor removes all hazardous and non-hazardous wastes and properly recycles or disposes of them in accordance with Turkish Waste Management Regulation. Annual notifications are performed by Canakkale Plant. There is a legally approved waste management plan in place.

Recycling Programs

Çanakkale plant ensures that the following materials are recycled in compliance with regulations, discarded paper, cardboard, aluminum, and other scrap metals, and outdated or damaged electronic hardware and parts, batteries, plastics, rubber belts.

Heidelberg Materials Sustainability Commitments 2030

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

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