

# Environmental Product Declaration



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

## ORDINARY PORTLAND CEMENT (OPC)

from

**AL JOUF CEMENT COMPANY**



أسمنت الجوف  
AL JOUF CEMENT

Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
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## General information

### Programme information

<b>Programme:</b>	The International EPD® System
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### Accountabilities for PCR, LCA, and independent, third-party verification

#### Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR):

PCR 2019:14 Construction products, version 1.3.4

c-PCR-001 Cement and Building Lime (EN 16908:2017+A1:2022) 2022-05-18

UN CPC 374 – Plaster, lime, and cement.

PCR review was conducted by:

The Technical Committee of the International EPD System. See [www.environdec.com](http://www.environdec.com) for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat [www.environdec.com/contact](http://www.environdec.com/contact).

#### Life Cycle Assessment (LCA)

LCA accountability:

Sami G. Al-Ghamdi, Anissa Nurdiawati, Glenda Terán-Cuadrado, and Mohammed Al-Humaiqani



#### Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

EPD verification by individual verifier

Third-party verifier: Agnieszka Pikus, Greenwise

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes  No

[Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

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

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

## Company information

Owner of the EPD: Al Jouf Cement Company (Gurayat-Turaif Road Crossing, Turaif, Northern Region Province-KSA).

### Contact:

Contact Person	Chief Operating Officer, Engr. Adel Awaad Al-Enaizi
Telephone and email	+966-547265565, <a href="mailto:pmadel@joufcem.com.sa">pmadel@joufcem.com.sa</a>

### Description of the organisation:

Al Jouf Cement Company was established in 2007 to be a Saudi joint stock company specializing in the production of ordinary Portland cement, Super 20 cement, Sulphate Resistant Cement, and Finishing Cement. It follows a strategic approach that ensures the sustainability of matter, energy, and the economy in general. The company's latest factories, with a total production capacity of 10,000 tons per day, are located in the northwest of the Kingdom of Saudi Arabia, close to the Saudi-Jordanian and Iraqi border.

Over the course of nearly two decades, the company has achieved the highest quality standards in its production processes in accordance with Saudi standard specifications that conform to American and European standards. Its products have successfully passed all necessary checks from the Royal Society of Jordan and the Iraqi Central Organization for Standardization and Quality Control. On this path, Al Jouf Cement has maintained an advanced level of development in its sector by providing its products inside and outside the Kingdom and its partnerships with locally and internationally accredited suppliers to support achieving the goals of Vision 2030 and creating a sustainable future for the industry.

### Al Jouf Cement Culture

We follow six values that guide our business, support our internal and external environment, and develop our various activities.

#### 1- Commitment to Principles

Commitment to principles provides us with a strong base in the building materials sector and a comprehensive understanding of its needs. This is achieved by following the company's basic regulations, our sector standards and standards, and local and global market regulations and standards. This value is also evident in other aspects of our activities such as:

- Products and services
- Planning and implementation processes
- Internal and external transactions

- Work environment and employee performance

Strengthening and renewing these goals in line with developments and rapid progress to ensure their continuity provides us with solid foundations that contribute to comprehensive development.



## 2- Continuity

Continuity or permanence means consistency in the work approach and principles that we have adopted to achieve the company's strategic goals, which include:

- Industrial development
- Taking care of the environment and creating alternative methods and resources to maintain its sustainability
- Social and national contribution by building and developing local leadership
- Strengthening relationships with customers and partners

Strengthening and renewing these goals in line with developments and rapid progress to ensure their continuity provides us with solid foundations that contribute to comprehensive development

## 3- Justice:

Justice lies in our following all work ethics and creating an environment that respects market regulations and standards to be able to cover its requirements, consolidate the company's contributions, and position it. There are various forms of justice, including:

- Justice in the rights of employees and the workforce
- Fairness in providing products and services of equal quality and value.
- Fairness in transactions and partnerships with client

## 4- Comprehensive Quality:

Quality is not only a core value but rather a standard that is applied in all internal and external activities of the company, including:

- Quality of products and services: ensuring their quality and efficiency in accordance with local and global market standards for quality and safety.
- Quality of work: in terms of employee performance, internal transactions, and compliance with ethics and mandatory regulations.
- Quality of relationships: Strengthening our relationships with our customers and partners, whom we consider to be contributors to the company's progress and the development of its products in line with market needs.
- Quality of implementation: Internal and external executive work follows work and quality standards and adheres to time and honesty

#### 5- Taking advantage of Resources:

Taking advantage of effective human capital and local alternative resources to maintain the sustainable development of the company and its activities, as well as the environment, plays an essential role in moving the wheel of development of the building materials sector and other investment sectors. We focus our tireless efforts on employing specialized expertise to pave the way for advanced methods and multiple resources that serve and preserve the living environment.

#### 6- Loyalty and Future:

Sincerity is a basic condition and a noble value that we believe is important in advancing the company's internal and external activities, as sincerity is represented in the quality of work, services, and products, the company's advanced and ethical culture, and the environmental, social, and economic development. This value leads us to the future, for whose development and for the development of our nation we work today with dedication. The future is the goal that we seek to make prosperous with its economy, conscious society, and sustainable environment.

Product-related or management system-related certifications: ISO 9001: 2015 Certification for Quality Management System, ISO 50001: 2018 Certification for Energy Management System, ISO 14001: 2015 Certification for Environment Management System, and SASO Quality Mark Licensing.

Name and location of production site(s): Gurayat-Turaif Road Crossing, Turaif, Northern Region Province-KSA.

### Product information

Product name: Ordinary Portland Cement (OPC)

Product identification: Conforming to Saudi Gulf Standard: SASO/GSO 1914:2009 for OPC cement, ASTM C150 Type-I, and European Standards EN 197-1 2011, CEM-I 42.5N.

Product description: Portland cement is manufactured by grinding clinker, which is produced through the burning of raw materials such as limestone, clay, iron ore, and bauxite in specific proportions. Additionally, a predetermined amount of retarder, typically gypsum, is added to achieve the desired properties of the cement mixture. It sets and gains strength after a certain time of being mixed with water. Cement is primarily utilized as the fundamental ingredient in creating concrete, mortar, grouts, and plasters.



This type of cement is the most used type of cement in construction and concrete foundations due to its high early and late strength, which reaches its maximum after 28 days. It has various uses, including civil and construction projects, all types of concrete structures and foundations, reinforced concrete works, pipes, and cement brick factories.

UN CPC code: 374

Geographical scope: Kingdom of Saudi Arabia (KSA)

## **LCA information**

Functional unit / declared unit: 1 tonne (1,000 kg) of Ordinary Portland Cement (OPC)

Time representativeness: All primary data used in this study is for the entire year 2023.

Database(s) and LCA software used: All upstream material, resource, and energy carrier inputs have been sourced from the Sphera Managed LCA Content GaBi Sphera v2023.2 (representative for the years 2018-2023) and Ecoinvent v3.9.1. The software used for the production of LCA results is Sphera LCA FE (GaBi) v10.8.0.14. EN 15804 reference package based on EF 3.1 was utilized for the impact categories.

Description of system boundaries:

According to EN 15804 Section 5.2, the type of EPD for OPC product in this study is a type (d) Cradle to the gate (A1-A3). The product fulfills the three conditions required by 15804:2012+A2:2019, about the exclusion of modules C1-C4 and D: (1) the product is physically integrated with other products during installation so it cannot be physically separated from them at the end-of-life, (2) the product is no longer identifiable at the end-of-life as a result of physical transformation processes, and (3) the product does not contain biogenic carbon. As cement is an intermediate product, its use and maintenance (B1-B7) have not been studied.

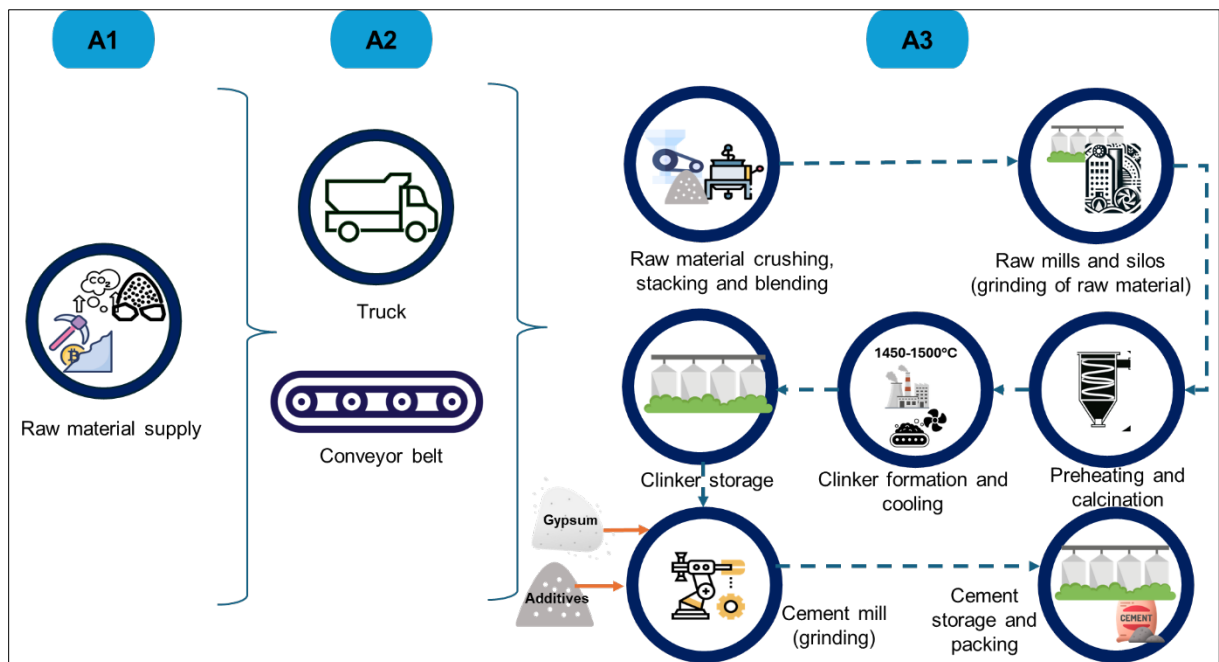
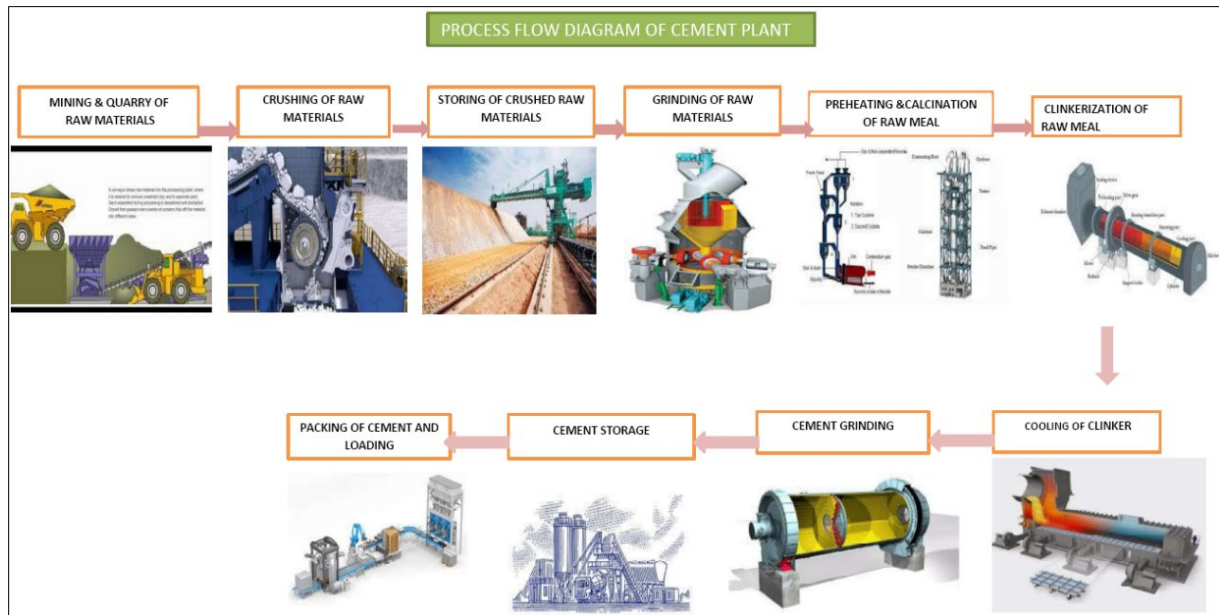
A1: Raw Material Supply - This stage covers the extraction and processing of raw materials. It includes the environmental impact associated with gathering resources and preparing them for use in manufacturing.

A2: Transportation - This stage involves the transportation of raw materials to the manufacturing site. It accounts for the emissions and environmental impact associated with transporting these materials, often from various locations to the production facility.

A3: Manufacturing (Core Process) - This stage is about the manufacturing process itself. It includes the emissions and environmental impacts resulting from the actual production of the product, including energy use, waste, and emissions from the manufacturing process.



**System diagram:**



Modules declared, geographical scope, the share of specific data (in GWP-GHG results), and data variation (in GWP-GHG results):

Module	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	SA	SA	SA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific data used*	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

\*The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that does not capture all relevant aspects of data quality. The indicator is not comparable across product categories.

#### Cut-off Criteria:

The study does not exclude any modules or processes that are stated mandatory in EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances. The analysis incorporates every input and output from unit processes for which data are available. No unit process contributing more than 1% to the overall mass or energy flows is disregarded. Furthermore, the total disregarded input and output flows specific to each module do not exceed 5% of energy usage or mass.

#### Allocation, Estimates, Assumptions:

The allocation has been avoided wherever possible. The allocation could not be avoided for raw, ancillary material, energy use, and waste generation as some information was only measured on a plant level. The inputs were physically allocated to the studied product based on annual production volume. Additionally, the clinker-to-cement ratio for each cement product was considered during the allocation of raw materials and fuels. Ancillary materials, water, and waste streams were physically allocated to the studied product (OPC) based on annual production volume (mass) and are assumed to be the same for all types of products, regardless of the product formulation.

It is assumed that for the upstream road transportation, a Euro 5 lorry of 16-32 metric tons (Global dataset) was used.

#### Energy Source and Emission Level for Electricity:

The electricity source used for modeling at the manufacturing (A3) stage is taken from Sphera database v2023.2 (SA: Electricity from heavy fuel oil). This choice accounts for 100% of electricity supplied from



on-site power generation fueled by heavy fuel oil (HFO). The dataset employed indicates a climate impact (GWP-GHG indicator) of 0.846 kg CO<sub>2</sub> eq./kWh.

## Product Raw Material Composition

Product Components	Weight (%)	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Clinker	91.55	0	0
Gypsum	5.00	0	0
Pozzolana additive	3.45	0	0
TOTAL	100	0	0

The product is delivered in bulks or 50 kg paper sacks. 2.92 kg of paper bag is used for 1 ton of final product packaging.

### Substances, Reach - Very High Concern:

Al Jouf Cement Company hereby declares that all cement products are in compliance with the REACH regulation (EC) No 1907/2006, concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals. The product does not contain any Substances of Very High Concern (SVHC) currently on the candidate list. SVHC list is not static and is updated frequently, therefore the company will continue to evaluate, research, and review to fulfill the demands of the regulation. More information about cement safety handling is available in the Safety Data Sheet (SDS) published on the company's website.

### Product Standards:

This type of cement conforms to Gulf Standard GSO 1914/2009 (E), American Standard ASTM C150 Type I, and European Standards EN 197-1 2011, CEM-I 42.5N.

### Technical Specifications:

Properties	Value	
Mechanical properties	3 days compressive strength (MPa)	26.35
	7 days compressive strength (MPa)	33.08
	28 days compressive strength (MPa)	42.80
Chemical properties	Sulfate content (SO <sub>3</sub> , % w/w)	2.39
	Loss of Ignition (% w/w)	1.96
	Insoluble residue (%)	1.35
Physical properties	Initial setting time (min)	133
	Final Setting Time (min)	166
	Autoclave expansion (%)	0.24
	Soundness (Le Chatelier) (mm)	1.42
	Specific Surface (m <sup>2</sup> /kg)	355

## Results of the environmental performance indicators

Environmental performance has been calculated with the EF 3.1 EN15804 method. The estimated impact results are only relative statements that do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins, or risks.

### Mandatory impact category indicators according to EN 15804 (EF 3.1)

Results per functional or declared unit							
Indicator	Unit	A1-A3	A4	A5	B1-B7	C1-C4	D
GWP-fossil	kg CO <sub>2</sub> eq.	9.07E+02	ND	ND	ND	ND	ND
GWP-biogenic	kg CO <sub>2</sub> eq.	0.00E+00*	ND	ND	ND	ND	ND
GWP-luluc	kg CO <sub>2</sub> eq.	1.87E-02	ND	ND	ND	ND	ND
GWP-total	kg CO <sub>2</sub> eq.	9.07E+02	ND	ND	ND	ND	ND
ODP	kg CFC 11 eq.	1.30E-07	ND	ND	ND	ND	ND
AP	mol H <sup>+</sup> eq.	1.02E+01	ND	ND	ND	ND	ND
EP-freshwater	kg P eq.	6.56E-03	ND	ND	ND	ND	ND
EP-marine	kg N eq.	4.86E-01	ND	ND	ND	ND	ND
EP-terrestrial	mol N eq.	5.32E+00	ND	ND	ND	ND	ND
POCP	kg NMVOC eq.	1.88E+00	ND	ND	ND	ND	ND
ADP-minerals&metals**	kg Sb eq.	1.12E-04	ND	ND	ND	ND	ND
ADP-fossil**	MJ	5.04E+03	ND	ND	ND	ND	ND
WDP**	m <sup>3</sup>	9.45E+00	ND	ND	ND	ND	ND
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption						

ND: Not declared

\*This indicator is negative due to an uptake of biogenic carbon in packaging materials. Considering that module A5 is not declared, the correlated emissions due to the end-of-life of packaging, are balanced out already in Module A1-A3, hence resulting in a total value of zero.

\*\* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

## Additional mandatory and voluntary impact category indicators

Results per functional or declared unit							
Indicator	Unit	A1-A3	A4	A5	B1-B7	C1-C4	D
GWP-GHG <sup>1</sup>	kg CO <sub>2</sub> eq.	9.07E+02	ND	ND	ND	ND	ND
<i>Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017</i>							

## Resource use indicators

Results per functional or declared unit							
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3
PERE	MJ	1.08E+02	ND	ND	ND	ND	ND
PERM	MJ	0.00E+00	ND	ND	ND	ND	ND
PERT	MJ	1.08E+02	ND	ND	ND	ND	ND
PENRE	MJ	5.04E+03	ND	ND	ND	ND	ND
PENRM	MJ	0.00E+00	ND	ND	ND	ND	ND
PENRT	MJ	5.04E+03	ND	ND	ND	ND	ND
SM	kg	0.00E+00	ND	ND	ND	ND	ND
RSF	MJ	0.00E+00	ND	ND	ND	ND	ND
NRSF	MJ	0.00E+00	ND	ND	ND	ND	ND
FW	m <sup>3</sup>	3.22E-01	ND	ND	ND	ND	ND
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

<sup>1</sup> This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO<sub>2</sub> is set to zero.

## Waste indicators

Results per functional or declared unit							
Indicator	Unit	A1-A3	A4	A5	B1-B7	C1-C4	D
Hazardous waste disposed	kg	1.14E-08	ND	ND	ND	ND	ND
Non-hazardous waste disposed	kg	6.20E-01	ND	ND	ND	ND	ND
Radioactive waste disposed	kg	1.90E-04	ND	ND	ND	ND	ND

## Output flow indicators

Results per functional or declared unit							
Indicator	Unit	A1-A3	A4	A5	B1-B7	C1-C4	D
Components for re-use	kg	0.00E+00	ND	ND	ND	ND	ND
Material for recycling	kg	0.00E+00	ND	ND	ND	ND	ND
Materials for energy recovery	kg	0.00E+00	ND	ND	ND	ND	ND
Exported energy, electricity	MJ	0.00E+00	ND	ND	ND	ND	ND
Exported energy, thermal	MJ	0.00E+00	ND	ND	ND	ND	ND

## Other environmental performance indicators

Results per functional or declared unit							
Indicator	Unit	A1-A3	A4	A5	B1-B7	C1-C4	D
Particulate matter	Disease incidences	8.56E-05	ND	ND	ND	ND	ND
Ionizing, radiation human health	kBq U235 eq.	5.70E-01	ND	ND	ND	ND	ND
Ecotoxicity, freshwater	CTUe	3.27E+03	ND	ND	ND	ND	ND
Human toxicity, cancer	CTUh	2.11E-07	ND	ND	ND	ND	ND
Human toxicity, non-cancer	CTUh	1.86E-06	ND	ND	ND	ND	ND
Land Use	Pt	6.54E+02	ND	ND	ND	ND	ND

## References

- **GPI v5.0.0:2024-06-19** General Programme Instructions of the International EPD® System.
- **PCR 2019:14 v1.3.4:2024-04-30** Product Category rules | Construction products | The International EPD® System.
- **EN 15804:2012+A2:2019/AC:2021** Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.
- **EN 16908:2017+A1:2022** Cement and building lime - Environmental product declarations - Product category rules complementary to EN 15804.
- **EN 197-1:2011** Cement - Part 1: Composition, specifications and conformity criteria for common cements.
- **CPC 374, c-PCR-001** Cement and building lime (EN 16908:2017) | The International EPD® System.
- **ISO 14020:2000** Environmental labels and declarations - General principles.
- **ISO 14025:2006** Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
- **ISO 14040:2006** Environmental management - Life Cycle Assessment - Principles and framework.
- **ISO 14044:2006** Environmental management – Life Cycle Assessment – Requirements and guidelines.
- **Ecoinvent database v3.9.1 and GaBi Sphera Database v2023.2**
- **LCA for Experts (GaBi) v10.8.0.14.** <https://sphera.com/>.
- A Cradle-to-gate Life Cycle Assessment of Al Jouf Cement Products – Ordinary Portland Cement (OPC). Background report 17.05.2024.

