ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Lafarge Ciment Oggaz (LCO)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	IBU-CEI-HOL-2203120-DZ2025001467-ISUE002-EN
Issue date	26/06/2025
Valid to	25/06/2030

Production of LCO White Clinker at Oggaz plant, Bulk

Portland cement clinker
EN 197-1

Lafarge Ciment Oggaz (LCO)

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1. General Information

Lafarge Ciment Oggaz (LCO)

Programme holder
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Declaration number
IBU-CEI-HOL-2203120-DZ2025001467-ISUE002-EN

This declaration is based on the product category rules:
Cement, 07/2023
(PCR checked and approved by the SRV)

Issue date
26/06/2025

Valid to
25/06/2030

Hans Peters
(Chairman Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

LCO White Clinker

Owner of the declaration
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16058 Algiers
Algeria

Declared Product / Declared Unit
Portland Cement Clinker / 1000 kg

Scope:
This environmental product declaration shows the life cycle assessment of the production of Portland cement clinkers at the Oggaz plant of Lafarge Ciment Oggaz (LCO).

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall no be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of *EN 15804+A2*. In the following, the standard is simple referred to as *EN 15804.*

The EPD was calculated with the pre-verified software CarbonCLARITY™ EN 15804 EPD Generator – Cement of Climate Earth.

Verification

The standard *EN 15804* serves as the core PCR
Independent verification of the declaration and data accroding to *ISO 14025:2011*
☐ intern ☒ extern

Matthias Schulz
(Independent verifier)

2. Product

2.1 Product description/Product definition
LCO White Clinker is a Portland cement clinker that is manufactured and monitored in accordance with *EN 197-1*.
Portland cement clinker is a hydraulic material that is primarily used to make cement. It consists of non-metallic inorganic materials. Finely ground, it forms a suspension when water is added, which solidifies and hardens both in air and under water due to the onset of a hydration reaction and remains permanently solid. The composition of the product corresponds to the specifications of *EN 197-1*.

Regulation (EU) No. 305/2011(CPR) applies to placing the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a declaration of performance taking into account EN 197-2:2014-05, Cement - Part 2: Conformity assessment and the CE marking.

The respective national regulations apply to their use.

2.2 Application
LCO White Clinker is mainly used as a binder for cement production.

2.3 Technical Data

LCO White Clinker has no classification in a strength class

Constructional Data

Name	Value	Unit
Strength class acc. to EN 197-1	not relevant	N/mm^2
Calcium silicates content (3CaO · SiO2 and 2CaO · SiO2)	≥ 67	%
Ratio (CaO)/(SiO2)	≥ 2.0	%
MgO content	≤ 5.0	%

Performance values of the product correspond to the performance declaration in relation to its essential characteristics according to EN 197-1:2011-11 Composition, requirements and conformity criteria of common cement.

2.4 Delivery status

LCO White Clinker is delivered in bulk.

2.5 Base materials/Ancilliary materials

Portland cement clinker (ca. 100 %)
Cement clinker is made from a mixture of raw materials that is heated in a kiln at a temperature of over 1400°C until it is sintered. The starting materials for the production of cement clinker must mainly contain calcium oxide (CaO) and silicon dioxide (SiO2) as well as small amounts of oxides of aluminum (Al2O3) and iron (Fe2O3). Rocks that provide these compounds are limestone, marl and clay or their naturally occurring mixture.

This product contains substances listed in the candidate list (date: 07.11.2024) exceeding 0.1 percentage by mass: no

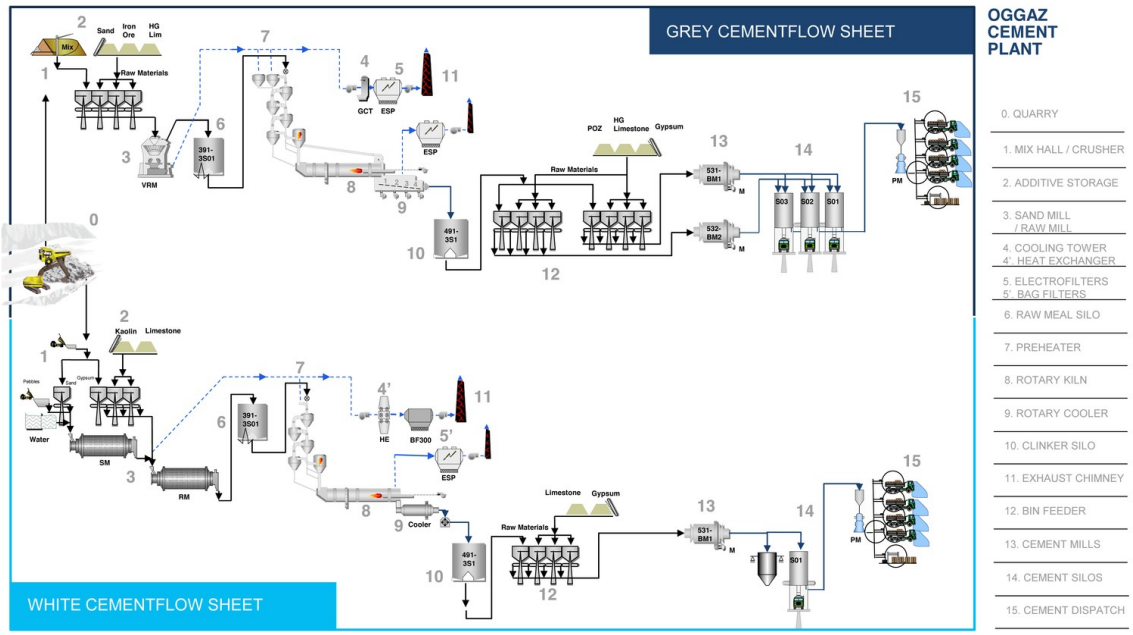
This product contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): no

2.6 Manufacture

LCO White Clinker is manufactured at the Oggaz plant.

Production of Portland cement clinker
Limestone, marl, clay or their natural mixture, are required for the production of Portland cement clinker. These starting materials are mined in quarries, pre-crushed and transported to the nearby cement works. There they are homogenized into an intermediate product, with additional natural or secondary corrective substances being added to fine-tune the chemical composition. In the subsequent heating process, the Portland cement clinker is produced from the intermediate product. The firing process takes place in a rotary kiln, where the material is thermally converted at around 1450 °C and then rapidly cooled. The finished clinker is stored in silos.



Note: dashed lines indicate production steps that do not necessarily apply to this cement

2.7 Environment and health during manufacturing

The operation of the Oggaz plant is subject to the provisions of the Algerian Environmental regulation, in particular the *Executive Decree n°06-198* relating to the regulations applicable to establishments classified for the protection of the environment, *Executive Decree n°06-138* related to atmospheric emission control, *Executive Decree n°06-141* related to limit value of liquid effluents from industrial discharges and *Executive Decree n°93-184* regulating noise

emissions. Furthermore, measures are taken to protect workers from potential exposure to respirable crystalline silica dust in accordance with the European social agreement *Negotiation Platform on Silica*.

An environmental management system according to *ISO 14001* is installed in this plant.

2.8 Product processing/Installation

General
The product is mainly used as an intermediate product in cement production. To produce the final cement, the product is finely ground and, depending on the type of cement to be produced, mixed with other components. A sulfate carrier is added to control the setting behavior.

Mixing cement and water creates the cement paste, which encases the individual grains of the aggregate in concrete or mortar and binds them together firmly as it hardens. The cement paste, which is liquid after the addition of water, turns into the solid cement paste. Today, fresh concrete is produced almost exclusively in ready-mixed concrete plants, on large construction sites or in precast plants in medium-sized and large mixing plants.

Environment and health during product processing
The dust particles of the product can irritate the eyes and respiratory system.

If the product comes into contact with water or if the product gets wet, an alkaline solution will be formed which may cause skin and eye irritation.

2.9 Packaging
No packaging material is used as the product is delivered in bulk.

2.10 Condition of use
Not relevant for LCO White Clinker.

2.11 Environment and health during use
Not relevant for LCO White Clinker.

2.12 Reference service life
Not relevant for LCO White Clinker.

2.13 Extraordinary Effects

Fire
LCO White Clinker is neither flammable nor explosive. The product is classified in Class A1 according to *EN 13501-1*.

Water
When cement reacts with water, the so-called hydrate phases arise, which causes the cement paste to solidify and harden to form cement paste. If larger amounts of cement are accidentally released into bodies of water, the pH value in the body of water can increase.

Water hazard class: (slightly hazardous to water according to *Executive Order January 6, 2013*.

Mechanical destruction
Not relevant for LCO White Clinker.

2.14 Re-use phase
Not relevant for LCO White Clinker.

2.15 Disposal
If LCO White Clinker has to be disposed of, it should be hardened with water and disposed off in accordance with local regulations.

Disposal of the hardened product such as concrete waste and concrete slurry as per *Law No 01-19*.

2.16 Further information
For more information: https://www.lafarge.dz/.

3. LCA: Rules of calculation

3.1 Declared unit
The declared unit is 1000 kg.

Declared unit

Name	Value	Unit
Declared unit	1000	kg
Conversion factor to 1 kg	0.001	-

3.2 System boundary
Type of EPD: cradle-to-factory gate

The system boundaries include the manufacture of LCO White Clinker including the extraction of raw materials through to the finished product at the factory gate. The product stage includes:

Module A1: Extraction and processing of raw materials

Module A2: Transport of raw materials to the factory gate and internal transport

Module A3: Manufacture of final product

The construction stage, the use stage and the disposal stage are not taken into account in the life cycle assessment for the final product.

3.3 Estimates and assumptions
No estimates or assumptions were made that would be relevant for the interpretation of the life cycle assessment results.

3.4 Cut-off criteria
The flows not taken into account are less than 0.01% of the total incoming mass of each elementary process and in total for module A1-A3.

3.5 Background data
The data on which the life cycle assessment is based comes from data collection at the Oggaz plant. Information on the use of material and energy resources as well as transport distances was provided by Lafarge Ciment Oggaz (LCO).

The emission data used in the life cycle assessment of clinker production are based on the legally prescribed emission measurements on rotary kilns of Lafarge Ciment Oggaz (LCO) for the period 01/01/2021 to 31/12/2021. Gaps in kiln emission reporting were filled with proxy data from generic clinker profiles of the ecoinvent database.

The CarbonCLARITY™ EN 15804 EPD Generator – Cement, version 1.2.0 dated 07/11/2022 with the configuration file dated 21/01/2025 was used for the life cycle assessment. The calculation used the Ecoinvent database v3.8.

3.6 Data quality
The data basis for this EPD is the continuous data acquisition in the Oggaz plant.
The data was collected for the calendar year 01/01/2021 to 31/12/2021 by Lafarge Ciment Oggaz (LCO) and checked for plausibility by Climate Earth.

The data quality can be rated as very good. Any gaps in the collected data were filled in with conservative proxy data.

The background datasets are on average less than 5 years old and their quality is rated as good or very good.

3.7 Period under review
Data from the period 01/01/2021 to 31/12/2021 were used for the life cycle assessment of LCO White Clinker.

3.8 Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Algeria.

3.9 Allocation
There are no co-products at the Oggaz plant and therefore all environmental impacts are allocated to the final product.

Kiln dust or bypass dust can be co-produced during clinker production. The sum of the inputs and outputs of this production process are assigned to the clinker.

No alternative materials or fuels are used in the Oggaz plant.

3.10 Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

The Ecoinvent background database is used (version 3.8).

4. LCA: Scenarios and additional technical information

The development of scenarios must be based on the end product (e.g. concrete) and not on the preliminary product LCO White Clinker.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	0	kg C
Biogenic carbon content in accompanying packaging	0	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Module A3: Manufacturing
The carbon intensity of the electricity used in manufacturing is 0.17 kgCO2eq./kWh.

5. LCA: Results

The following table contains the results of the life cycle assessment for a declared unit of 1000 kg of LCO White Clinker.

The characterization factors of the "Environmental Footprint reference Package 3.0" were used to determine the impact balance.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
x	x	x	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	ND	ND	ND	ND	ND

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT according to *EN 15804+A2*: 1000 kg LCO White Clinker

Core indicator	Core indicator	Unit	A1-A3
GWP-total	Global warming potential - total	[kg CO_2-Eq.]	958
GWP-fossil	Global warming potential - fossil fuels	[kg CO_2-Eq.]	958
GWP-biogenic	Global warming potential - biogenic	[kg CO_2-Eq.]	0.09
GWP-luluc	GWP from land use and land use change	[kg CO_2-Eq.]	4.82E-3
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	8.14E-6
AP	Acidification potential, accumulated exceedance	[mol H^+-Eq.]	2.86
EP-freshwater	Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg P-Eq.]	1.5E-3
EP-marine	Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	1.19
EP-terrestrial	Eutrophication, accumulated exceedance	[mol N-Eq.]	14.1
POCP	Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	3.13
ADPE	Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	4.72E-6
ADPF	Abiotic depletion potential for fossil resources	[MJ]	6546
WDP	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m^3 world-Eq deprived]	51.8

RESULTS OF THE LCA – INDICATORS TO DESCRIBE RESOURCE USE according to *EN 15804+A2*: 1000 kg LCO White Clinker

Indcator	Indcator	Unit	A1-A3
PERE	Renewable primary energy as energy carrier	[MJ]	5.22
PERM	Renewable primary energy resources as material utilization	[MJ]	0
PERT	Total use of renewable primary energy resources	[MJ]	5.22
PENRE	Non-renewable primary energy as energy carrier	[MJ]	6546
PENRM	Non-renewable primary energy as material utilization	[MJ]	0
PENRT	Total use of non-renewable primary energy resources	[MJ]	6546
SM	Use of secondary material	[kg]	0
RSF	Use of renewable secondary fuels	[MJ]	0
NRSF	Use of non-renewable secondary fuels	[MJ]	0
FW	Use of net fresh water	[m^3]	0.86

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to *EN 15804+A2*: 1000 kg LCO White Clinker

Indicator	Indicator	Unit	A1-A3
HWD	Hazardous waste disposed	[kg]	0.54
NHWD	Non-hazardous waste disposed	[kg]	2.21
RWD	Radioactive waste disposed	[kg]	1.71E-3
CRU	Components for re-use	[kg]	0
MFR	Materials for recycling	[kg]	0.03
MER	Materials for energy recovery	[kg]	0
EEE	Exported electrical energy	[MJ]	0
EET	Exported thermal energy	[MJ]	0

RESULTS OF THE LCA – additional impact categories according to *EN 15804+A2*-optional: 1000 kg LCO White Clinker

Indicator	Indicator	Unit	A1-A3
PM	Potential incidence of disease due to PM emissions	[Disease Incidence]	8.92E-6
IRP	Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	1.30
ETP-fw	Potential comparative toxic unit for ecosystems	[CTUe]	2686
HTP-c	Potential comparative toxic unit for humans - cancerogenic	[CTUh]	7.36E-8
HTP-nc	Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	4.34E-6
SQP	Potential soil quality index	[-]	23.0

$2.51e2 = 2.51 \times 10^{2} = 251$

$4.25e\text{-}3 = 4.25 \times \frac{1}{10^{3}} = 0.00425$

Disclaimer 1 - for the indicator "potential Human exposure efficiency relative to U235". This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 - for the indicators: "abiotic depletion potential for fossil resources", "abiotic depletion potential for non-fossil resources", "water (user) deprivation potential", "deprivation-weighted water consumption", "potential comparative toxic unit for ecosystems", "potential comparative toxic unit for humans - cancer effects", "potential comparative toxic unit for humans – non-cancer effects", "potential soil quality index".
The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

6. LCA: Interpretation

The contribution of clinker production to the indicators GWP (Global Warming Potential), AP (Acidification Potential of Soil and Water), EP-terrestrial (Eutrophication Potential), POCP (Tropospheric Ozone Creation Potential) and PM (Potential Occurrence of Diseases due to Particulate matter emissions) is largely determined by the exhaust air emissions from the rotary kiln, while the contribution to the PENRT indicator (non-renewable primary energy) is due to the use of fossil fuels and electrical energy.

7. Requisite evidence

7.1 Radioactivity
The radioactivity of cements is currently not routinely measured in Algeria. Literature shows that the activity index for cement, is in the order of magnitude of the activity index for natural soils and rocks (*IAEA*).

7.2 Chromate
Clinker is the main component of cement. Compliance with any limit value for water-soluble chromate is only required for the cement that is placed on the market. Therefore not relevant for LCO White Clinker.

8. References

Norms

EN 196-10
EN 196-10:2016, Methods of testing cement - Part 10: Determination of the water-soluble chromium (VI) content of cement

ISO 14001
EN ISO 14001:2015-11, Environmental management systems - Requirements with guidance for use

EN 13501-1
EN 13501-1:2018, Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

EN 197-1
EN 197-1:2011-11, Cement – Part 1: Composition, specifications and conformity criteria for common cements

EN 197-2
EN 197-2:2014-05, Cement - Part 2: Conformity of evaluation

EN 15804
EN 15804:2012+A2+AC:2021, Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

ISO 14025
EN ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

Other Literature

CarbonCLARITY™ EN 15804 EPD Generator – Cement
Version 1.2.0 dated 07/11/2022
www.climateearth.com

CPR
Construction Products Regulation
Establishing harmonized conditions for the marketing of construction products, (EU) No. 305/2011, March 09, 2011.

ECHA
European Chemicals Agency (ECHA): Candidate list of substances of very high concern.
https://echa.europa.eu/

IBU 2021
Institut Bauen und Umwelt e.V.: General instructions for the EPD program of Institut Bauen und Umwelt e.V. Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021. www.ibu-epd.com

PCR Part A
Product category rules for building related products and services. Part A: Calculation rules for the life cycle assessment and requirements for the project report according to EN 15804+A2:2021 (v1.3). Berlin: Institut Bauen und Umwelt e.V., 31/8/2022

PCR Cement
Product category rules for building related products and services. Part B: Requirements for the EPD for cement, version 5. Berlin: Institut Bauen und Umwelt e.V. (ed.), 04/07/2023.
www.ibu-epd.com

Executive Decree No. 06-138
Regulating the emission into the atmosphere of gases, fumes, vapors, liquid or solid particles, as well as the conditions under which they are controlled.

Executive Decree No. 06-141
Defining the limit values for industrial liquid effluent discharges.

Executive Decree No. 06-198
Defining the regulations applicable to establishments classified for the protection of the environment.

Executive Decree No. 93-184
Regulating the emission of noise.

Executive Order January 6, 2013
Setting the maximum limit values and specific data relating to discharges of effluents, spills or deposits of materials of any kind that do not present any risk of toxicity or nuisance in the public water domain.

IAEA
International Atomic Energy Agency, Radioactivity in Building Materials: a first Overview of the European Scenario, 2008.

Law No 01 - 19 of December 12, 2001
Relating to the management, control and elimination of waste.

Negotiation Platform on Silica
Negotiation Platform on Silica (NePSi) 'Agreement on workers' health protection through the good handling and use of crystalline silica and products containing it'.

REACH-Regulation
Registration, Evaluation, Authorisation and Restriction of Chemicals, EG 1907/2006:2006-12-18.

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