LafargeHolcim

EPD®
THE INTERNATIONAL EPD® SYSTEM

Environmental Product Declaration

Under PCR 2019:14 Construction products (EN 15804:A2); Version 1.11; 2021-02-05

and c-PCR-001 Cement and Building Lime (EN 16908:2017) 2019-12-20

PRODUCT GROUP CLASSIFICATION: UN CPC 3744

in accordance with ISO14025 and 15804:2012+A2:2019 for:

ECOPlanet MAX

CEMIII/B 42.5 N-LH/SR

Program:	The International EPD® System www.environdec.com
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Geographical scope:	Global

INTRODUCTION

This report contains the environmental performance of the production of the cement CEM III/B 42.5 N-LH/SR ECOPlanet MAX manufactured by LafargeHolcim España, S.A.U. in Spain. This product is part of the *ECOPlanet* range of cements commercialized by the manufacturer. This Environmental Product Declaration (EPD) has been developed using the Life Cycle Assessment (LCA) methodology. The environmental impact values calculated are referred to one ton (1000 kg) of product ready to send to the customer.

This EPD has been conducted according to the International EPD® System regulation. This regulation is a system for the international use of Type III Environmental Declarations, according to ISO 14025:2010. Not only the system but also its applications are described in the General Programme Instructions (GPI 3.01). The report has been made following the specifications given in the CEN standard EN 15804:2012+A2:2019 and the Product Category Rule c-PCR-001 Cement and Building Lime EN16908:2017.

The assessed life cycle includes all the stages needed to manufacture the product and have it ready for the customer at the exit gate of the factory.

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

EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

GENERAL INFORMATION

Programme-related information and verification

PROGRAMME

This Environmental Product Declaration has been developed under the programme:

The International EPD® System.

www.environdec.com Address: EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden.

COMPARABILITY

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

The owner of this EPD, LafargeHolcim España, S.A.U. has the sole ownership, liability, and responsibility on this EDP.

VERIFICATION

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR).
Product category rule: 2019:14 Construction products (EN 15804:A2); Version 1.11; 2021-02-05 and c-PCR-001 Cement and Building Lime (EN 16908:2017) 2019-12-20.
PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC 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.
Independent verification of the declaration and data, according to ISO 14025:2006: ☒ External ☐ Internal covering ☐ EPD process certification ☒ EPD verification
Third party verifier: Marcel Gómez Accredited by: Approved by The International EPD® System Technical Committee, supported by the Secretariat.
Procedure for follow-up during EPD validity involves third part verifier: ☒ Yes ☐ No

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EPD version

This EPD is not sectorial and is version number 2.0.

Difference with previous versions:

Global Warming Potential from fossil sources has been updated using a more accurate approach for emission factors of fuels used in the manufacturing plant and calcination process.

Minor typographical errors have been corrected.

COMPANY INFORMATION

Product Provider

LafargeHolcim España, S.A.U.

Avda. de Manoteras 20,
28050 – Madrid
Spain

LafargeHolcim España, S.A.U. owns five cement factories in Spain, with an installed capacity of more than seven million tons per year, 19 concrete plants, one mortar plant, six terminals and one waste recovery plant, employing more than 700 people.

The company has the first New Concrete and Mortars Research and Development Center, where specific products that meet the specific needs of customers are developed, including the first laboratory with an exclusive area of alternative fuels.

LafargeHolcim España is part of Holcim, a global leader in innovative and sustainable building solutions. Holcim is enabling greener cities, smarter infrastructure and improving living standards around the world. With sustainability at the core of its strategy Holcim is creating the path to become a net zero company, with its people and communities at the heart of its success. The company is driving the circular economy as a world leader in recycling to build more with less.

This declaration involves the activity of the plants located in Rambla Olivera s/n, 04140, Carboneras, Almería, Spain and in Carretera C-17, Km. 2,9447, 08110, Montcada i Reixac, Barcelona, Spain.

LafargeHolcim España sustainable practices

Sustainability is at the core of our strategy. LafargeHolcim España will continue to stay at the forefront of green building solutions. On our net-zero journey, we are **decarbonizing our business end-to-end**, from our operations and products all the way to the built environment.

Decarbonizing our operations, with our Geocycle business, we are recycling materials at the end of their life cycle as a source of alternative fuels.

Decarbonizing our products, we offer the world's broadest range of sustainable solutions, making low-carbon construction possible at scale.

Decarbonizing our built environment, working for a net-zero built environment, we play an essential role across a building's entire life cycle.

We care about nature, we are working to make a positive and measurable impact on water and biodiversity, by protecting and restoring the natural resources around us.

ECOPlanet is the world's broadest global range of green cement, offering a low carbon footprint while delivering equal to superior performance.

From our ECOPact green concrete to our ECOPlanet green cement, we offer the world's first global ranges of low-carbon building materials. With our industry's broadest formulation expertise, we adapt our solutions to local needs making low-carbon building possible at scale.

Product-related or management system-related certifications

LafargeHolcim España has an integrated management system certified according to ISO 9001:2015 "Quality Management" and ISO 14001:2015 "Environmental Management" standards.

The greenhouse gases emissions inventory of LafargeHolcim España is verified every year according to the requirements of the ISO 14064-1:2012 "Green House Gases" standard and is included in the Carbon Footprint National Registry of the *Ministerio para la Transición Ecológica y el Reto Demográfico* of Spain, obtaining the labels "*Calculo*", for calculated carbon footprint and "*Reduzco*" for achieving a substantial GHG emissions reduction in the last four years.

PRODUCT INFORMATION

Product Identification

The system analysed in this Declaration comprises the life cycle of the production of the cement CEM III/B 42.5 N-LH/SR ECOPlanet MAX manufactured by LafargeHolcim España in Spain.

Product Description

The Functional Unit of this LCA is **one ton (1000 kg) of product** ready to be sent to the customer**.** The product included in this declaration is CEM III/B 42.5 N-LH/SR ECOPlanet MAX from LafargeHolcim España. This Portland slag cement can be used in mass or reinforced concretes, especially in large volume concreting, when a low heat hydration is required. Very suitable to improve the performance of concrete in sulphate or sea water environments and, in general, in concretes in chemically aggressive environments because increase their impermeability. All environmental impacts and use of resources, both direct and indirect, are reported to this unit.

This assessment has been done using the production data of 2020. CEM III/B 42.5 N-LH/SR ECOPlanet MAX cement and the life cycle assessment includes the productions in the plants located in Carboneras and in Montcada i Reixac, Spain.

Composition

COMPONENT	% by mass*	Post-consumer material, weight%	Renewable material, weight%
Clinker	28%	2%	0%
Blast furnace slag	70%	100%	0%
Minor additional constituents	2%	0%	0%
TOTAL	**100%**	**70%**	**0%**

*Including main components and additional constituents

Technical characteristics according to UNE-EN 197-1

Mechanical and physical properties	Amount	Unit
Compressive strength 2 days	≥ 10	MPa
Compressive strength 28 days	≥ 42.5 and ≤ 62.5	MPa
Initial setting time	≥ 60	min
Soundness	≤ 10	Mm
Heat of hydration	≤ 270	J/g

During the life cycle of the product any hazardous substance listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorization” has not been used in a percentage higher than 0,1% of the weight of the product.

LCA INFORMATION

Declared Unit

This EPD represents the environmental impacts of one ton (1000 kg) of product ready to send to customers. The product included in this declaration is CEM III/B 42.5 N-LH/SR ECOPlanet MAX from LafargeHolcim España.

A **reference service life** is not relevant due to this cradle-to-gate boundary conditions.

System boundaries

The LCA has a boundary "from cradle to gate", being the end of the life cycle the exit gate of the cement factory, covering the modules A1 to A3 (product stage).

This EPD covers all product stages from "cradle to gate" (modules A1-A3), since the product fulfils all the conditions required by EN 15084:2012+A2:2019 regarding the exclusion of modules B1 to D (the product is physically integrated with other products during installation so they cannot be physically separated at the end of life, and the product is no longer identified at the end of life as a result of a physical-chemical transformation process, and the product does not contain biogenic carbon). This means that all processes up to the output gate of the manufacturer are included, from quarry works and components manufacturing, to transports of materials and fuels, factory process and final preparation. All direct and indirect environmental impacts have been calculated and are reported in this document.

LafargeHolcim España has a complete control over all the processes within the factories and the quarry of main raw materials.

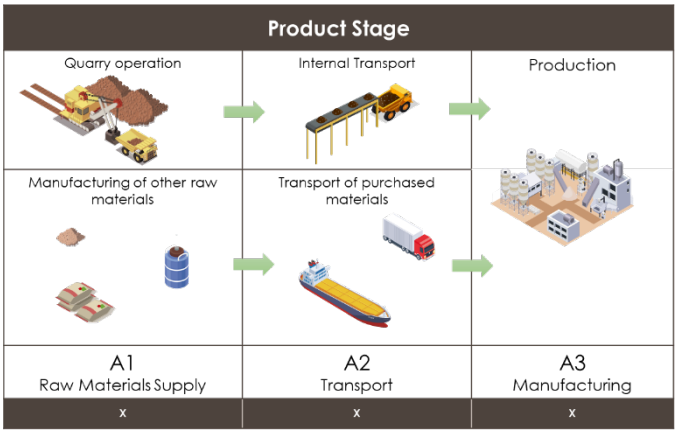
The only processes that are not controlled directly by the company are the production of main fuels, the transport of the raw materials, and minor inputs excluded according to the cut-off rules.

The environmental impacts related to the extraction and production of fuels, as well as the indirect impacts related to the production of electricity are also included in the environmental impacts calculation. The national electricity mix for Spain has been used.

A simplified model of the process of cement manufacturing is described in the following diagrams, enumerating the main activities included in the system boundaries. The process and installations are also linked to the phases of the product life cycle (A1-A3).

	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	GLO	GLO	GLO	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific data used	>95% GWP			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variations - products	Less than 10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variations - sites	2 sites Less than 10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

In the A1 module the components and materials are extracted in a quarry or manufactured in a third-party location (ie. manufacture of fuels and blast furnace slag). Raw materials that are not produced in the plant are transported to the plant by ship and truck (A2 module). In the manufacturing stage (A3), the components of the clinker are heated and once the clinker is produced it is mixed with the additions and crushed to produce the final cement.



There is no packaging as this product is marketed in bulk.

The scenarios included are currently in use and are representative for one of the most probable alternatives.

Technical Information

Calculation methodology

This EPD represents Type III Environmental Declarations according to ISO 14025 2010. The inherent Life Cycle Assessment (LCA) has been developed according to ISO 14040 and ISO 14044 International Standards, and following the International EPD System General Programme Instruction (GPI 3.01), the PCR 2019:14 Construction products (EN 15804:A2); Version 1.11; 2021-02-05 and c-PCR-001 Cement and Building Lime (EN 16908:2017) 2019-12-20.

Version 3.12 of software Air.e LCA™ with Ecoinvent™ 3.7.1 database has been used for LCA modelling and impacts calculations.

The following characterization models have been used:

Impact	Model	Unit
Global Warming Potential (GWP Total)	Baseline model of 100 years of the IPCC (based on IPCC 2013)	kg of CO_2 equivalent
Global Warming Potential (GWP Fossil)	Baseline model of 100 years of the IPCC (based on IPCC 2013)	kg of CO_2 equivalent
Global Warming Potential (GWP Biogenic)	Baseline model of 100 years of the IPCC (based on IPCC 2013)	kg of CO_2 equivalent
Global Warming Potential (GWP LULUC)	Baseline model of 100 years of the IPCC (based on IPCC 2013)	kg of CO_2 equivalent
Ozone depletion	Steady-state ODPs as in (WMO 2014 + integrations)	kg of CFC11 equivalent
Acidification	Accumulated Exceedance (Seppälä et al. 2006, Posch et al, 2008)	mol of H+ equivalent
Eutrophication fresh water	EUTREN, Struijs et al., 2009b, as implemented in ReCiPe	kg of $PO4^{-3}$ equivalent
Eutrophication fresh water	EUTREN, Struijs et al., 2009b, as implemented in ReCiPe	kg of P equivalent
Eutrophication marine water	EUTREN, Struijs et al., 2009b, as implemented in ReCiPe	kg of N equivalent
Eutrophication terrestrial	Accumulated Exceedance (Seppälä et al. 2006, Posch et al, 2008)	mol of N equivalent
Photochemical ozone creation	LOTOS-EUROS model (Van Zelm et al, 2008) as implemented in ReCiPe 2008	kg of NMVOC equivalent
Depletion of abiotic resources (elements)*	CML 2002 (Guinée et al., 2002) and van Oers et al. 2002	kg of Sb equivalent
Depletion of abiotic resources (fossil)*	CML 2002 (Guinée et al., 2002) and van Oers et al. 2002	MJ net calorific value
Water scarcity*	Available WAter REmaining (AWARE) as recommended by UNEP, 2016	m^3 world equivalent

*The result 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.

All processes related to the product have been included in the assessment.

According to EN 15804:2012+A2:2019 and EN 16908:2017, some components with less than 1% impact or use of co-products with no significant economic value have been excluded from the assessment.

All transports of components have been included in the LCA, considering real loads and distances travelled by materials used from January 2020 to December 2020. Main means of transport have been included for fuel purchases and external raw materials. Operation in port has also been excluded.

Road distances calculated using Google Maps. Maritime distances calculated using MarineTraffic Voyage Planner.

The allocation was avoided when possible. Allocation was only used for the verified direct emissions of the furnace, where the manufactured clinker can be later used to produce different cements.

Cut-off rules: more than 99% of the materials and energy consumption have been included. Capital equipment production and maintenance, as well as employee transports have been excluded.

The analysed product is representative for all manufacturing plants.

The recycled components are considered from the sorting and processing plant of the recovered materials.

The Polluter Payer Principle and the Modularity Principle had been followed.

Emissions Factors and Tools

The emission factors and environmental impacts of the elements in the life cycles that are not controlled by LafargeHolcim, or direct emissions that has not measured or calculated, come from Ecoinvent database, version 3.7.1, using the cut-off criteria of that database.

The LCA has been carried out using the software tools Air.e LCA v3.12.

Data quality

According to the environmental footprint product category rules quality data criteria, and considering that the data used for the processes is representative of the geography scope declared, that there was no need to significantly modify technical aspects and that the data is from the last complete year, and considering that the direct emissions of the manufacturing plant are third-party verified and included in the PRTR (Spanish National Emissions and Contaminant Sources Registry) and specifically the GHG emissions are included in the EU Emissions Trade System, the data quality is considered as **high**.

ENVIRONMENTAL PERFORMANCE

In the following tables, the environmental performance of the declared unit "**one ton (1000 kg) of CEM III/B 42.5 N-LH/SR ECOPlanet MAX produced by LafargeHolcim España and ready to send to customer**" is presented totalized and for every stage of the life cycle. The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

Potential Environmental Impact

		A1	A2	A3	**Total**
 Global Warming Potential (GWP100) (kg of CO_2 equivalent)	Total	9.91	13.99	243.16	**267.06***
	Fossil	9.90	13.98	243.12	**267.00****
	Biogenic	0.01	0.01	0.04	**0.07**
	LULUC	<0.01	<0.01	<0.01	**<0.01**
 Ozone depletion (kg of CFC11 equivalent)		1.22e-5	2.92e-6	8.95e-7	1.60e-5
 Acidification (mol of H+ equivalent)		9.46e-2	3.00e-1	4.08e-1	8.02e-1
 Eutrophication fresh water (kg of PO_4^{-3} equivalent)		6.02e-3	1.96e-3	1.51e-2	2.31e-2
 Eutrophication fresh water (kg of P equivalent)		1.96e-3	6.38e-4	4.92e-3	7.52e-03
 Eutrophication marine water (kg of N equivalent)		1.39e-2	6.89e-2	1.76e-1	2.59e-1
 Eutrophication terrestrial (mol of N equivalent)		0.15	0.77	1.92	2.85
 Photochemical ozone creation (kg of NMVOC equivalent)		5.45e-2	2.04e-1	4.69e-1	7.27e-01
 Depletion of abiotic resources (elements) (kg of Sb equivalent)		6.07-5	2.97e-5	1.14e-4	2.05e-4
 Depletion of abiotic resources (fossil) (MJ net calorific value)		680.55	188.39	299.38	1168.32
 Water scarcity (m3 equivalent)		3.55	0.92	4.07	8.55

*Net Emissions. Gross emissions (including secondary fuels) = 289.97kg CO_2e

**Net Emissions. Gross emissions (including secondary fuels) = 289.88 kg CO_2e

Use of resources

	**TOTAL A1-A3**
Use in plant of RENEWABLE primary energy excluding renewable primary energy resources used as raw materials	**7.25e+02**
Use in plant of RENEWABLE primary energy resources used as raw materials	**<0,01**
Total use of RENEWABLE primary energy resources (primary energy and primary energy resources used as raw materials)	**7.25e+02**

Data in MJ, net calorific value

	**TOTAL A1-A3**
Direct use in plant of NON- RENEWABLE primary energy excluding non- renewable primary energy resources used as raw materials	**9.80e+02**
Use in plant of NON-RENEWABLE primary energy resources used as raw materials	**<0.01**
Total use of NON-RENEWABLE primary energy resources (primary energy and primary energy resources used as raw materials)	**9.80e+02**

Data in MJ, net calorific value

	**TOTAL A1-A3**
Use of secondary material	**6.83e+02**

Data in kg

	**TOTAL A1-A3**
Use of net fresh water	**0.19**

Data in m3

Additional environmental information

Additional mandatory environmental impacts

Results per functional unit		
Indicator	**Unit**	**Tot. A1-A3**
GWP-GHG*	Kg CO_2 eq.	289.97

* The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013. Gross emissions (including secondary fuels).

Waste production

Results per functional unit		
Indicator	**Unit**	**Tot. A1-A3**
Hazardous waste disposed	Kg	<0.01
Non-hazardous waste disposed	Kg	1.54
Radioactive waste disposed	Kg	<0.01

Output flows

Results per functional unit		
Indicator	**Unit**	**Tot. A1-A3**
Components for re-use (CRU)	Kg	0
Material for recycling (MFR)	Kg	0
Materials for energy recovery (MER)	Kg	0
Exported electrical energy (EEE)	MJ	0
Exported thermal energy (ETE)	MJ	0

Information on biogenic carbon content

Results per functional unit		
Biogenic carbon content	**Unit**	**Quantity**
Biogenic carbon content in product	Kg C	0
Biogenic carbon content in packaging	Kg C	0

REFERENCES

This declaration has been developed according to the General Programme Instructions of the International EPD® System. Version 3.01.

PCR 2019:14 Construction products (EN 15804:2012+A2:2019).

c-PCR-001 Cement and Building Lime (EN 16908:2017).

ISO 14040:2006 Environmental management - Life Cycle Assessment - Principles and framework.

ISO 14044:2006 Environmental management - Life Cycle Assessment - Requirements and guidelines.

LCA Report: Life Cycle Inventory of CEM III/B 42.5 N-LH/SR ECOPlanet MAX by LafargeHolcim España, S.A.U.

Software: Air.e LCA rev. 3.12 (www.solidforest.com).

Main database: Ecoinvent 3.7.1 (www.ecoinvent.org).

Geographical scope of the EPD: Global.

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