EPD

IN ACCORDANCE WITH ISO 14025 AND EN 15804:2012+A2:2019 FOR:

Lafarge Portland Cement (CEM I 52.5N)

from

Lafarge Cauldon Ltd

PROGRAMME: The International EPD® System, www environdec.com

PROGRAMME OPERATOR: EPD International AB

EPD REGISTRATION NUMBER S-P-03928

PUBLICATION DATE 2021-08-13

VALID UNTIL 2026-08-12

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

GENERAL INFOMATION

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

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

Product category rules (PCR): PCR 2019:14 Construction products (EN 15804+A2)

PCR review was conducted by: Claudia A. Peña

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

☐ EPD process certification ☑ EPD verification

Third party verifier: Chris Foster, EuGeos, chrisf@eugeos.co.uk

In case of accredited certification bodies:
Accredited by: Not applicable

In case of recognised individual verifiers:
Approved by: The International EPD® System

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

☐ Yes ☑ No

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

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. For further information about comparability, see EN 15804 and ISO 14025.

COMPANY INFORMATION

Owner of the EPD: Lafarge Cauldon Ltd

Contact: Vincent Olivier (vincent.olivier@aggregate.com), Hannah Clark (hannah.clark@lafargeholcim.com)

Description of the organisation:

Lafarge Cement is a major manufacturer and supplier of cement, GGBS, Fly Ash and specialist cementitious materials to the UK construction industry. Lafarge Cement joined Aggregate Industries UK Ltd in 2015, Aggregate Industries, manufactures and supplies a wide range of heavy building materials to the construction industry and with the cement business now offers a complete solution. The company part of the Holcim group, which employs 70,000 people across 70 countries with 386.5Mt of installed capacity worldwide and leads the industry for innovation.

Product-related or management system-related certifications:

ISO 9001, ISO 14001, ISO 50001, ISO 45001, BES 6001
More information can be found at www.lafargecement.co.uk

Name and location of production site(s):

Cauldon Cement Plant, Yelsway Lane, Waterhouses, Staffordshire, ST10 3EQ

PRODUCT INFORMATION

Product name: Lafarge Cauldon Portland Cement

Product identification: Cauldon CEM I 52.5N

Product description:

Ordinary Portland Cement (OPC) is the most commonly used cement in the UK and indeed the world. It is suitable for a range of uses and is produced to consistent quality standards. OPC can be used on its own or in conjunction with other supplementary materials such as Fly Ash and GGBS. It is compatible with admixtures including plasticizers and air-entrainers.

UN CPC code: 3744 Cement

Other codes for product classification:
Not applicable

LCA INFORMATION

Functional unit / declared unit: 1 tonne

Reference service life: Not applicable

Time representativeness:

All material and energy flows within the scope of the study are based on the plant specific data collected for the year 2020. Background data is in large part from the Ecoinvent database v3.5.

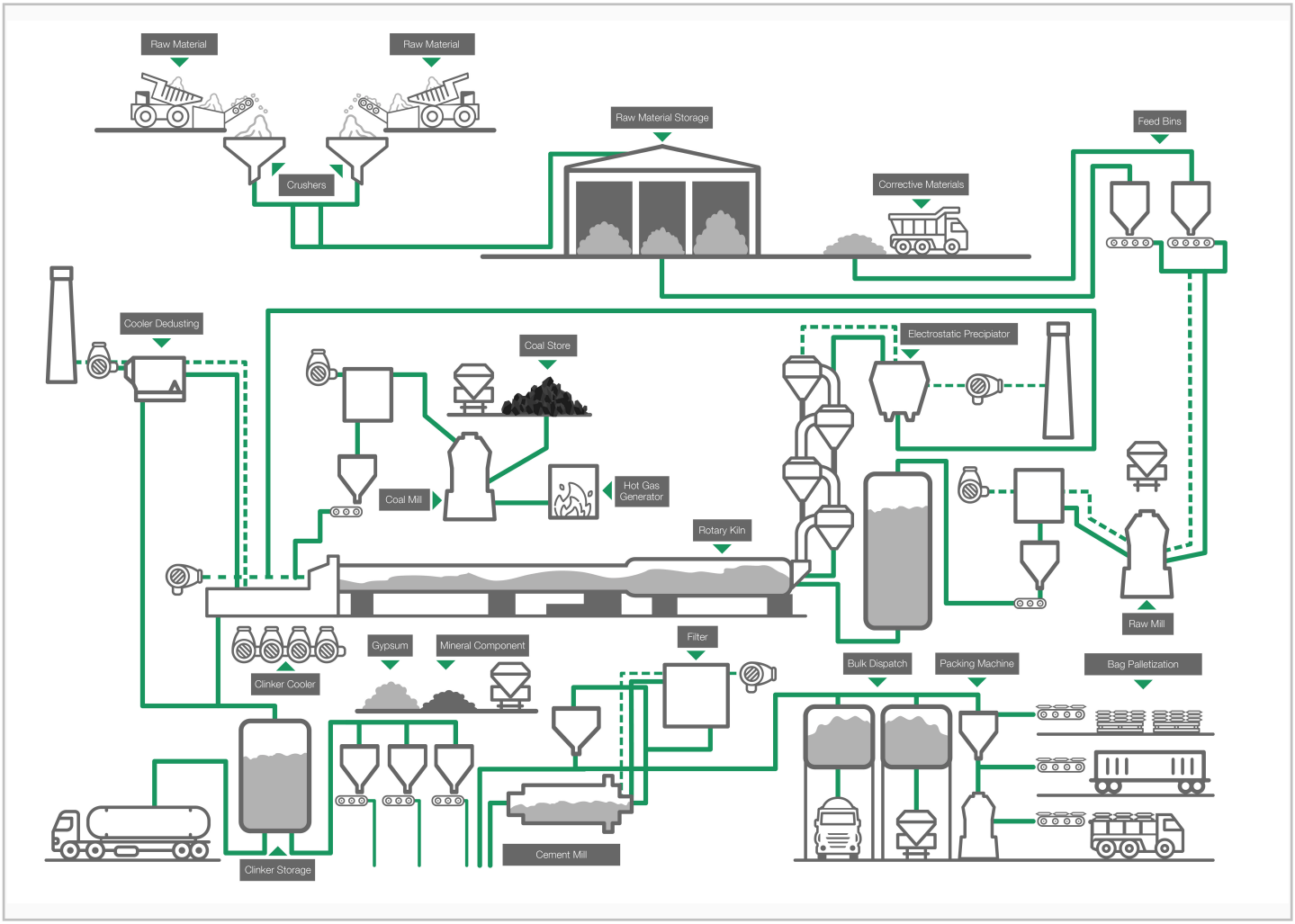
Database(s) and LCA software used:

GCCA EPD tool, version 3 / ecoinvent database version 3.5 in large part, completed by processes adapted from ecoinvent database and by literature data in order to represent regional electricity production. Further details of LCI methodology is described in the section 3 of "GCCA Industry EPD Tool for Cement and concrete - LCA model, International Version"

Description of system boundaries:

EPD type is "Cradle to gate" (A1–A3). This system includes the extraction and production of raw materials, transportation of raw materials to the cement plant, cement manufacturing process (including on-site transportation) and treatment of waste produced within processes throughout the cement plant. All processes related to construction stage, use stage, end-of-life of cement and module D are out of the scope of this EPD.

System diagram:



More information:

Typical Uses of OPC and OPC based products:

- Readymix concrete
- Precast concrete units
- Foundation
- Soil stabilization
- Highway applications
- Coastal structures
- Tunneling

Conditions of use:

- There is no substitute for good site practices.
- Trials should take place to ensure the cement content is correct
- The cement and water ratio must be as low as possible but sufficient to ensure compaction and effective curing.
- It is essential to use the correct materials, proportions and mixing to produce a good quality concrete
- Then compact, cure and protect as appropriate.
- Lafarge Cement cannot be held responsible where workmanship has not been carried out in accordance with good practice.
- Slight variations in colour may occur due to variations in the raw materials.
- Further information is available on request or on the website: www.lafargecement.co.uk

Description of the manufacturing process:

Quarrying
Natural raw materials used to manufacture clinker are calcareous materials like limestone, and argillaceous materials like clay. These materials are extracted using drilling and blasting techniques.

Crusher
The quarried material is then reduced in size by compression and / or impact in various mechanical crushers. There is a two-stage crushing process for the limestone and one-stage crushing for the clay.

Conveyor
Raw material is then transported from the quarry to the plant using conveyors.

Raw Mill
The raw materials extracted from quarry along with silica corrective material is sent to a vertical roller mill for milling and drying. The raw meal is ground in the vertical roller mill, where heavy rollers apply pressure on the raw material over a rotating table. Once the coarse material is fine enough, it is carried away with exhaust gases from the clinker manufacturing line, captured in a filter and sent to a homogenizing silo.

Preheater
The material leaves the homogenizing silo and is fed to the preheater tower.
Cauldon plant has a 4-stage preheater. A preheater consists of a series of cyclones that enable the raw material for clinker production to be preheated before entering the calciner. This increases the energy efficiency of the kiln as it uses waste heat from the combustion gases.

Calciner
The preheated material enter a chamber (calciner) where a large portion of fuel is being burnt (about 60% of the total fuel consumption). This heat is used to decarbonise almost all the material before it enters the rotary kiln.

Kiln
While travelling through the kiln, the material is exposed to high temperature levels (up to 2000 C) and a chemical reaction takes place that results in a new mineral phase, forming a material with hydraulic properties.

Cooler
The material falls from the kiln into a cooler where it is quenched by air to fix the newly formed mineral phases. The recuperated heat is used to minimise fuel consumption. Further cooling is required to allow the handling of the material now called clinker.

Cement mill
Because the clinker comes out of the quenching process as granules, further grinding is required. Cement milling is done in ball mills at Cauldon and consist of grinding together clinker with gypsum. Other materials such as limestone and/or fly ash are also incorporated in the final cement powder. Cement is either delivered in bulk tankers or packaged in paper bags and delivered on pallets.

LCA INFORMATION

Composition of Cauldon CEM I 52.5N:
Lafarge cement has a typical composition and its representative as follows:
- Clinker (~88%)
- Gypsum (~6%)
- Ground limestone (<5%)
- Ferrous sulphate (<0.5%)
- Grinding aids (<0.1%)

Modeling processes:
Specific data for 2020 was collected for Cauldon Cement Plant, all background data comes directly from the GCCA EPD tool. The input to the process are for the raw materials for clinker production and additional raw materials and processing to produce OPC up to the gate of the cement plant before delivery.
The modeling of clinker and cement production in the GCCA EPD tool is divided into three modules : raw materials, manufacturing and waste management. Each module follows the background report of the tool respectively for clinker and cement modeling.
The module "raw materials" reports the quantity of raw materials and their transport information (distance and transport mode), while the module "manufacturing" requires the information on energy and water consumption during the manufacturing processes for clinker and cement production. The module "waste management" aims to characterise the management of wastes associated with the manufacturing process of the project.

Allocation:
Data for the entire year 2020 for the cement plant has been collected. As no co-products are produced, the flow of raw materials, energy, and the associated emissions are exclusively related to the cement production. According to the polluter pays principal of the standard EN 15804+A2, CO2 emissions due to the kiln secondary fuels as waste are allocated to the product system that generates these waste. For other non-CO2 measured emissions due to the secondary fuels, there is no system to identify and remove these emissions from the inventory for kiln operation. Therefore, these are included although should strictly be outside of the system boundary. Background data follow the allocation principles established by Ecoinvent.

Cut-off criteria:
All known and available reference flows as well as associated background data were taken into account in the LCI modeling. Foreground and background data have used the same cut-off criteria regarding processes with insufficient available data. No process excluded should represent more than 1% of the total primary energy or total mass used, while the total neglected input flows should be less than 5% of the total energy use and mass. Overall, the packaging materials have a mass representing less than 0.001% regarding 1 tonne of cement production. Therefore, the packaging materials are excluded from this study.

Key assumptions:
Electricity consumption: During the year 2020, Cauldon cement plant had three periods, each of them with a different contract for electricity supply. In order to take into account these three contacts at the same time, based on the monthly electricity consumption, a weighted average distribution of sources of electricity has been calculated and used in the GCCA EPD tool, made up of Gas 19.1%, Coal and peat 1.0%, Oil 1.3%, Hydro 0.9%, Solar 1.8%, Wind 9.3%, Nuclear 37.3% and Biomass 29.3%.

Emissions from the kiln: emissions of chemical substances from the kiln to the air have an influence on at least one of the environmental impact indicators. The GCCA provides the default value in accordance with the guideline for emission monitoring and reporting in the Cement Industry in the GCCA tool, in the present study, these emissions are manually customized based on data provided.

Data quality assessment:
In compliance with the core data requirements for the study, data has been collected from Cauldon cement plant for the year 2020. For the background data, in agreement with the PCR and the General Programme Instructions (GPI) for the international EPD® system (Environdec, 2013), a complete data quality assessment is provided in the LCA database associated with the GCCA EPD tool.
In accordance with the tool guide for inventory modeling, the data quality was based on the approach described in the Product Environmental Footprint (PEF) Guide of the European Commission.
The inventory data quality is judged by the six criteria defined in PEF Guide: 1) Technological representativeness, 2) Geographical representativeness, 3) Time-related representativeness, 4) Completeness, 5) Parameter uncertainty and 6) Methodological appropriateness and consistency

The overall quality of the datasets was calculated by summing up the individual quality rating for each criteria, divided by the total number of criteria. Limestone, ground limestone, ferrous sulphate and grindings aid are considered as "good quality" while sand, shale and gypsum are noted as "very good quality".

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

	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	v	v	v	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	UK	UK	UK	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Specific data	All foreground data					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ND	ND					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

CONTENT INFORMATION

Product components	Weight, kg	Post-consumer material, weight -%	Renewable material, weight -%
Clinker	886	-	-
Gypsum	66	-	-
Ground limestone	44	-	-
Ferrous sulphate	3.66	-	-
Grinding aids (additives)	0.52	-	-
TOTAL	1000	-	-

ENVIRONMENTAL INFORMATION

For construction services, the total value of A1-A3 shall be replaced with the total value of A1-A5.

Potential environmental impact – mandatory indicators according to EN 15804

Results per functional or declared unit																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Total A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP - fossil	kg CO_2 eq.	7.20E+2	4.60E-1	9.05E+0	7.30E+2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GWP - biogenic	kg CO_2 eq.	2.37E-1	1.63E-4	1.41E-2	2.51E-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GWP - luluc	kg CO_2 eq.	4.22E-2	1.79E-4	1.15E-2	5.39E-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GWP - total	kg CO_2 eq.	7.21E+2	4.60E-1	9.07E+0	7.30E+2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ODP	kg CFC 11 eq.	1.08E-5	8.32E-8	4.26E-6	1.51E-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AP	mol H^+ eq.	1.23E+0	1.37E-3	6.05E-2	1.29E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EP - freshwater	kg PO_4^{3-} eq.	1.94E-1	1.13E-4	5.83E-3	2.00E-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EP - freshwater	kg P eq	6.32E-2	3.69E-5	1.90E-3	6.51E-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EP - marine	kg N eq.	4.43E-3	3.07E-6	3.67E-4	4.80E-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EP - terrestrial	mol N eq.	4.88E+0	2.72E-3	1.90E-1	5.07E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
POCP	kg NMVOC eq.	1.18E+0	1.07E-3	4.17E-2	1.22E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ADP - minerals & metals*	kg Sb eq.	1.19E-4	1.43E-6	2.92E-5	1.50E-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ADP - fossil*	MJ	1.97E+3	6.80E+0	1.26E+2	2.10E+3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
WDP	m^3	2.34E+1	4.82E-2	3.26E+0	2.67E+1	ND	ND	ND	ND	ND	ND	ND	ND	ND	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																		

*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.

Potential environmental impact – additional mandatory and voluntary indicators

Results per functional or declared unit																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Total A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	7.21E+2	4.60E-1	9.07E+0	7.30E+2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017																			

Disclaimers shall be added, if required by EN 15804.

Use of resources

Results per functional or declared unit																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Total A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	4.36E+2	8.98E-2	2.61E+2	6.97E+2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PERM	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PERT	MJ	4.36E+2	8.98E-2	2.61E+2	6.97E+2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PENRE	MJ	2.52E+3	7.35E+0	3.89E+2	2.92E+3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PENRM	MJ.	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PENRT	MJ	2.52E+3	7.35E+0	3.89E+2	2.92E+3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SM	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RSF	MJ	3.34E+2	0.00E+0	0.00E+0	3.34E+2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NRSF	MJ	1.15E+3	0.00E+0	0.00E+0	1.15E+3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FW	m^3	5.85E-1	1.40E-3	8.51E-2	6.71E-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	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																		

[1]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 equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

WASTE PRODUCTION AND OUTPUT FLOWS

Waste production

Results per functional or declared unit																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Total A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Non-hazardous waste disposed	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Radioactive waste disposed	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Output flows

Results per functional or declared unit																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Total A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Material for recycling	kg	0.00E+0	0.00E+0	1.14E+0	1.14E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Materials for energy recovery	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Exported energy, electricity	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Exported energy, thermal	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

The result tables shall only contain values or the letters “ND” (Not Declared). It is not possible to specify ND for mandatory indicators. ND shall only be used for voluntary parameters that are not quantified because no data is available.

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0.00E+0
Biogenic carbon content in packaging	kg C	0.00E+0

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

Other environmental indicators

Substances of Very High Concern:
According to EN 15804, the content declaration shall list, as a minimum, substances contained in the products that are listed in the REACH “Candidate List of Substances of Very High Concern for Authorization” when their content exceeds the limits for registration with the European Chemicals Agency. No substances that appear in the list are present or used in Cauldon cement production.

GWP-GHG indicator:
The current version of the tool does not include the impact indicator GWP-GHG. The removals and emissions associated with biogenic carbon content of the bio-based product and packaging are not calculate and therefore not reported in the tool. The only limitation is the uptake of CO2 in A1-A3 and reemission in A5. This does not affect the GWP-tot indicator, and as a result, the GWP-GHG indicator can be assimilated to the GWP-tot indicator.

Net and gross GWP indicators:
GWP indicators do not include 9.67E+01 kgCO2 eq. due to the incineration of wastes fuels in clinker production. According to the “polluter pay” principle stated in the section 6.3.5.1 of the standard EN15804, the impact related to these wastes should be assigned to the system that generates the wastes. For the sake of transparency, the gross value of GWP-tot is 8.26E+02 kgCO2eq. for 1 tonne of cement production.

ADDITIONAL INFORMATION

Holcim is a global leader in innovative and sustainable buildings, it is at the forefront of green building solutions, from ECOPact concrete, enabling carbon-neutral construction to Firestone Building products, improving energy efficiency in buildings. Driving the circular economy to build more with less, it launched the world's first green cement ECOPlanet with recycled construction and demolition waste inside and is pushing the boundaries of digitalization to make its business smarter end-to-end. With sustainability at the core of its strategy Holcim is becoming a net zero company, accelerating our world's green transformation. Holcim's 70,000 people are passionate about building progress across its 70 markets and four business segments: Cement, Ready-Mix Concrete, Aggregates and Solutions & Products.

Reducing CO2 emissions is key to creating long-term value to the business. Our cement is one of the most carbon efficient in our sector, our scope 1 and scope 2 emissions per ton of product are 28% lower than in 1990.

To continue making progress, Holcim became the first global building materials company to sign the United Nations Global Compact's "Business Ambition for 1.5°C" initiative with intermediate targets approved by the Science-Based Targets Initiative (SBTI) in alignment with the net zero pathway. In addition, we have partnered with STBI to define our net zero road-map beyond 2030.

To reach our 2030 targets, we will invest in proven technologies that leverage our expertise, especially reducing our clinker factor and using alternative fuels instead of fossil fuels (or increasing our 'thermal substitution rate').

Reducing clinker factor: during the production of clinker, (the main component of cement) produces the most CO2 emissions. The majority of these emissions result from the chemical reaction that occurs when the raw material (limestone) calcinates into a clinker in the kiln. Replacing the clinker in our final cement products with alternative mineral components reduces the carbon intensity. The main reduction will not only come from recycling construction and demolition waste or by-products from other industries but also by investing in calcined clay facilities and developing novel cements with new binders. We expect calcined clay to gradually replace traditional mineral components such as slag or fly-ash.

Increasing the use of recycled fuels : Taking a circular approach, we will reduce the carbon intensity of our cement by substituting fossil fuels with pretreated non-recyclable and biomass waste fuels to operate our cement kilns. Preparing, recovering and recycling fuels and materials in our processes allows us to divert waste from incineration or landfill and improve the waste management hierarchy at a local level. To increase this "thermal substitution rate" (TSR) we will be investing in co-processing facilities and process improvements. We aim to increase our TSR from 20 % currently to 37% by 2030.

Alternative raw materials : The use of alternative sources of materials is a key lever to further reduce our CO_2 emissions. Waste materials and byproducts from other industries can be used to replace some of the limestone in the production process. These materials can include recycled "fines" from demolition waste, air-cooled slag and waste lime. We are working with innovative companies to keep on raising the standards and developing new alternative material streams.

More information can be found in the LafargeHolcim Integrated Annual Report 2020 (https://www.lafargeholcim.com/sustainability-reports).

REFERENCES

General Programme Instructions of the International EPD® System. Version 3.01.

ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework

ISO 14044:2006, Environmental management -- Life cycle assessment -- Requirements and guidelines

EN 15804:2012 + A2:2019, Sustainability of construction works - Environmental product declarations - core rules for the product category of construction products

Product Category Rules (PCR) for Construction products 2019:14, Version 1.1, The International EPD system

Complementary Product Category Rules (c-PCR) to PCR 2019:14, The International EPD system

Quantis, “GCCA Industry EPD Tool for Cement and concrete - LCA model, International Version” (Tool version 3.0), November 2020

UK Government, Department for Business, Energy & Industrial Strategy, Statistical press release, “UK Energy statistics, 2019 & Q4 2019”, 26 March 2020

UK Government, Department for Business, Energy & Industrial Strategy, Statistical release, “Energy Trends”, 22 December 2020

References for ISO & BES certificates.
ISO 9001 - FM 96927
ISO 14001 - EMS 96928
ISO 50001 - ENMS 695367
ISO 45001 - OHS 61759
BES 6001 - 680983 (Responsible Sourcing of Construction Products)