EN 15804+A2 EPD

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2.
Owner of the Declaration – Irish Cement

Declaration number: EPDIE-24-130
Issue date 24th May 2024
Valid to 23rd May 2029

EPD Programme - EPD Ireland
Programme Operator - Irish Green Building Council
www.epdireland.org

Irish Cement

Bagged CEM II/A-L

1. General information

PROGRAMME OPERATOR	OWNER OF DECLARATION
Irish Green Building Council 19 Mountjoy Square, Dublin D01 E8P5 info@igbc.ie	Irish Cement Limited, Platin, Drogheda, Co. Louth. 041 987 6000; info@irishcement.ie; www.irishcement.ie
DECLARATION NUMBER	**PRODUCTION SITE**
EPDIE-24-130	Irish Cement, Castlemungret, Co. Limerick, Irish Cement, Platin, Drogheda, Co. Louth.
ECO PLATFORM EPD	**DECLARED UNIT**
Yes	1 tonne of cement (Bagged CEM II/A-L) according to to EN 197-1
APPLICABLE PRODUCT CATEGORY RULES	**DECLARED PRODUCT**
EN 15804:2012+A2:2019, EPD Ireland PCR Part A, PCR for cement and building lime, EN 16908:2017	Bagged CEM II/A-L
DATE OF ISSUE	**SCOPE OF EPD**
24th May 2024	Bagged CEM II/A-L cement in accordance to EN 197-1
DATE OF EXPIRY	**LCA CONSULTANT OR PERSON RESPONSIBLE FOR LCA**
23rd May 2029	Irish Cement Limited, Platin, Drogheda Co. Louth
TYPE OF EPD: SINGLE OR MULTI PRODUCT	**LCA SOFTWARE AND DEVELOPER IF APPLICABLE**
Single product EPD	GCCA Industry EPD Tool for cement and concrete version 4.2
PRODUCT CLASSIFICATION OR NACE CODE	**NAME AND VERSION OF INVENTORY USED**
Manufacture of cement	Ecoinvent version 3.5
COMPARABILITY	
The purpose of this EPD is to provide data to the construction industry to allow for the life cycle assessment of buildings and other construction works. The intended use of this EPD is for B2B communication. A comparison of EPD data is only meaningful if all the data sets compared are developed according to EN 15804 and the product-specific performance characteristics and its impact on the construction works are taken into account. The EPD owner has the sole ownership, liability, and responsibility for the EPD.	
This declaration is based on the European standand EN 15804:2012+A2:2019 and the PCR for cement, EN 16908:2017	
In accordance to EN ISO 14025, it was verified by an external independent expert.	

Internally ☐ Externally ×

SIGNATURE OF PROGRAMME OPERATOR	SIGNATURE VERIFIER
Pat Barry - CEO, Irish Green Building Council  IGBC IRISH GREEN BUILDING COUNCIL	Marcel Gómez Ferrer - Marcel Gómez Consultoria Ambiental  MARCEL GÓMEZ consultoría ambiental

2. Scope and Type of EPD

Scope

This EPD covers the product stage modules A1 – A3 (raw material supply, transport, manufacturing of products), i.e. from cradle to gate. Cement is used in a multitude of possible construction applications which are beyond the scope of this EPD. The modules that are declared are shown in the table below.

PRODUCT STAGE			CONSTRUCTION ON 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	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

X = Module declared; ND = Module not declared.

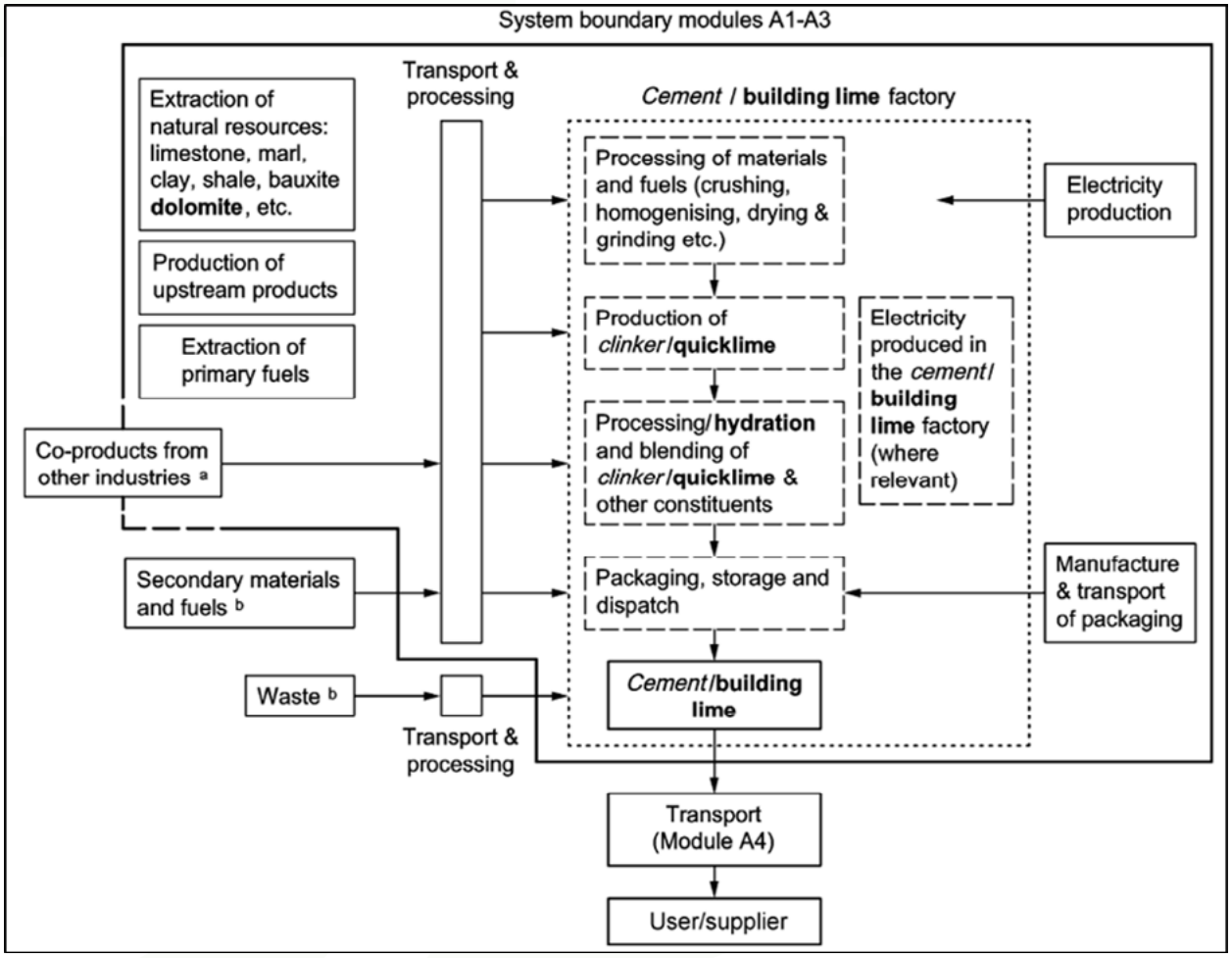
The geographical area covered includes two cement manufacturing facilities in the Republic of Ireland.

Declared Functional Unit

The declared unit is 1 tonne of cement (Bagged CEM II/A-L) according to EN 197-1. Note that this is a weighted average based on the total production volume at the Limerick and Platin cement factories.

System Boundaries

Life cycle stages/system boundaries: The EPD covers the product stage ("cradle to gate", A1-A3). The selected system boundaries comprise the production of cement including raw material extraction up to the finished product at the factory gate. The following figure shows the system boundaries, in accordance with EN 16908:2017, Figure 1:



The product stage contains:

- Module A1: extraction and processing of raw materials and primary fuels
- Module A2: transportation up to the factory gate and internal transports
- Module A3: cement production

3. Detailed product description

Cement product

The Central Product Classification (CPC) for cement is CPC 37440. Cement is a hydraulic binder i.e., a finely ground in-organic material which, when mixed with water, forms a paste which sets and hardens by means of hydration reactions and processes and which, after hardening, retains its strength and stability, even under water. Cement is mainly used as a binder for concrete, mortar or cement screed. Irish Cement Limited operate two cement manufacturing facilities in the Republic of Ireland.

Main product components

Cement according to EN 197-1 is produced by grinding and mixing the constituents defined in the standard Constituents of cement as defined in EN 197-1 are:

- main constituents (portland cement clinker and e.g. limestone)
- minor additional constituents (added to improve the physical properties of the cement, such as workability
- or water retention)
- calcium sulfate (natural gypsum, added to control setting)
- additives (the total quantity of additives shall not exceed 1% by mass of the cement)

The main constituents of Bagged CEM II/A-L cement are clinker and limestone. The composition of Bagged CEM II/A-L cement as per EN 197 Table 1 is assumed for the LCA model:

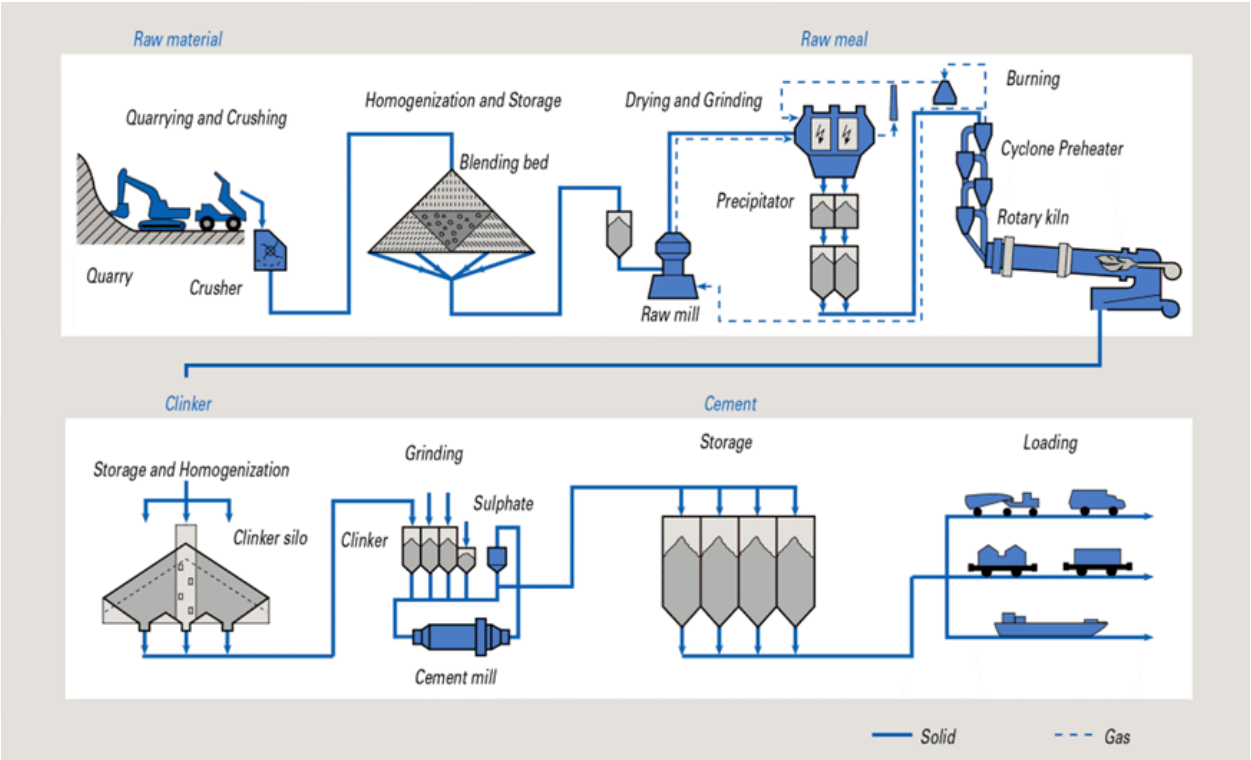
Portland cement clinker	Limestone	Gypsum	Minor additional constituents
80-94%	6-20%	3-5%	0-5%

3.1 Manufacturing Process Description

The most important component of cement according to EN 197-1 is clinker. It is produced from raw materials such as limestone and clay which are crushed, homogenized and fed into a rotary kiln. The raw materials are sintered at a temperature of 1450°C to form new compounds. Clinker consists mainly of calcium, silica, aluminium and iron-oxides.

In a second phase of manufacturing, calcium sulphates and additional materials are added to the clinker. All constituents are ground together leading to a fine and homogenous powder.

The following figure is a schematic representation of the cement manufacturing process from quarry to dispatch (production stage, information modules A1 to A3).



4.A. LCA results - 1 tonne of cement

Core Environmental impact per 1 tonne of cement (Bagged CEM II/A-L)

PARAMETER	UNIT	Modules A1-A3	Modules A4-D
GWP-GHG	[kg CO_2 eq.]	692.5**	ND
GWP-total	[kg CO_2 eq.]	692.5*	ND
GWP-fossil	[kg CO_2 eq.]	692.2*	ND
GWP-biogenic	[kg CO_2 eq.]	0.09*	ND
GWP-luluc	[kg CO_2 eq.]	0.15	ND
ODP	[kg CFC-11 eq.]	0.000015	ND
AP	[mol H+ eq.]	1.3	ND
EP-freshwater[1]	[kg P eq.]	0.016	ND
EP-marine	[kg N eq.]	0.0015	ND
EP-terrestrial	[mol N eq.]	5.2	ND
POCP	[kg NMVOC eq.]	1.3	ND
ADP-minerals&metals[2]	[kg Sb eq.]	0.00015	ND
ADP-fossils[2]	[MJ] ncv	3223	ND
WDP[2]	m^3 world eq. deprived	38	ND

GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-fossil; 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&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

It should be noted that the net/ gross differentiation applies to GWP indicators only and is ignored for other indicators where gross is applied by default.

[1]To express EP freshwater as kg of PO43- eq, multiply the value for kg P eq. by 3.067

[2]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 experienced with the indicator.

** The indicated values (net values) do not include the greenhouse gas emissions from the combustion of secondary fuels at clinker production.The gross GWP-tot (including the emissions from the combustion of secondary fuels at clinker production) is 724 kg CO_2 eq. The gross GWP-fos is 724 kg CO_2 eq. The gross GWP-bio is 0.148 kgCO_2 eq.*

*** The indicated values (net value) do not include the greenhouse gas emissions from the combustion of secondary fuels at clinker production, The gross GWP-GHG (including the emissions from the combustion of secondary fuels at clinker production) is 724 kg CO_2 eq.*

LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

ND = Module not declared.

4.B. LCA results - 1 tonne of cement

Resource use per 1 tonne of cement (Bagged CEM II/A-L)

PARAMETER	UNIT	Modules A1-A3	Modules A4-D
PERE	[MJ]	488	ND
PERM	[MJ]	158	ND
PERT	[MJ]	646	ND
PENRE	[MJ]	3212	ND
PENRM	[MJ]	11.0	ND
PENRT	[MJ]	3223	ND
SM	[kg]	0	ND
RSF	[MJ]	273	ND
NRSF	[MJ]	305	ND
FW	[m^3]	1.0	ND

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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

ND = Module not declared.

4.C. LCA results - 1 tonne of cement

Output flows and waste categories per 1 tonne of cement (Bagged CEM II/A-L)

PARAMETER	UNIT	Modules A1-A3	Modules A4-D
HWD	[kg]	0	ND
NHWD	[kg]	0	ND
RWD	[kg]	ND	ND
CRU	[kg]	0	ND
MFR	[kg]	0.68	ND
MER	[kg]	0.13	ND
EE	[MJ]	0	ND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Exported energy.

LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

ND = Module not declared.

4.D. LCA results - 1 tonne of cement

Additonal Environmental impact per 1 tonne of cement (Bagged CEM II/A-L)

PARAMETER	UNIT	Modules A1-A3	Modules A4-D
PM	Disease incidence	0.000010	ND
IRP[1]	kBq U235 eq	5.3	ND

PM = Potential incidence of disease due to PM emissions, IRP = Potential Human exposure efficiency relative to U235.

[1]The results of IRP deals mainly with the eventual impacts of low dose ionising radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

ND = Module not declared.

5. Calculation rules

Irish Cement Limited operates two cement manufacturing facilities in the Republic of Ireland. 2022 production data from the two manufacturing facilities were aggregated to obtain a Company average data set. During the LCA modelling, this average data (raw materials, fuels, emissions, transport distances) was used.

The GCCA EPD tool (International version, Version 4.2, 18th December 2023) was used for the LCA in this project. In this study, the impact categories, indicators and methods given in EN 15804+A2:2019, were used.

Cut-off rules

According to EN 15804, the cut-off criteria are 1% of renewable and non-renewable primary energy usage and 1% of the total mass input of that unit process. The total of neglected input flows per module, e.g. per module A1-A3, shall be a maximum of 5% of energy usage and mass. There were no cut-offs relating to primary energy usage. Cut-offs associated with total mass inputs included small quantities of ammonia water, explosives, ferrous sulphate, grinding aids, refractories and alternative raw materials. Cut offs totalled 1.1%.

Data Quality

The data quality level for the specific data is assessed according to the criteria of the UN Environment Global Guidance on LCA database development. See table below with results on the geographical, technical and time representativeness.

Geographical representativeness	Technical representativeness	Time representativeness
Very good (data from area under study)	Very good (data from processes and products under study. Same state of technology applied as defined in goal and scope.)	Very good (less than 3 years difference between the reference year according to documentation, and the time period for which data are representative.)

6. Scenarios and additional technical information

Declaration of biogenic carbon content at the production gate

Biogenic carbon per declared unit	Unit	Quantity
Biogenic carbon content in product	[kg C]	0
Biogenic carbon content in packaging	[kg C]	-17.07

Additional Technical Information

N/A.

7. Mandatory additional information on release of dangerous substances to indoor air, soil and water

None of the substances contained in the product are listed in the “Candidate List of Substances of Very High Concern for authorisation”, or they do not exceed the limit for registration with the European Chemicals Agency.

8. Other optional additional environmental information

Chromate

Prolonged physical contact with non-low chromate cements can cause allergic skin reactions. The REACH Regulation (EC 1907/2006) imposes requirements on the chromate content permissible for cement products. In line with this, only low chromate cements may now be used for the manufacture of concrete and mortar if the possibility of physical contact with these concretes and mortars during processing cannot be ruled out. The permissible chromate content is less than 2 ppm, or 2 grams per tonne.

Carbonation

During and after the lifetime of concrete structures or other cement-containing products, hydrated cement contained within the product reacts with CO_2 in the air. Part of the CO_2 emitted during cement production is reabsorbed by the cement through carbonation, a reaction also referred to as cement carbonation. The quantity of CO_2 taken up will depend on the type of application and also its treatment after its lifetime. This reaction takes place mainly on the surface of cement-based products. Structural concrete applications are designed according to strict codes which ensure that carbonation at the concrete surface does not lead to corrosion of reinforcement. Carbonation can nevertheless be particularly relevant after demolition when the surface area in contact with air increases very significantly. Carbonation contributes to a reduced GWP impact of cement products over their whole life.

Since carbonation will depend on the application in question, please refer to the respective PCR/EPDs for ready-mix concrete, precast concrete, mortar, cement screed or other cement-based products.

Use of cement

Information on the safe and effective use of cement can be obtained from the cement supplier.

9. References

[1] EN 197-1:2011: Cement - Part 1: Composition, specifications, and conformity criteria for common cements.

[2] ISO 14025:2011: Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

[3] EN 15804:2012+A2:2019: Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.

[4] EN 16908:2017: Cement and building lime - Environmental product declarations - Product Category Rules complementary to EN 15804.

[5] Irish Cement Limited EPD Technical Report for Bulk CEM I, Bulk CEM II/A-L, and Bagged CEM II/A-L cements produced by Irish Cement Limited in the Republic of Ireland, dated January 2024 (confidential, reviewed, and approved by the third-party verifier).

[6] EPD Ireland Product Category Rules: PART A Implementation and use of IS 15804:2012 and CEN TR 16970 in Ireland for the development of Environmental Product Declarations, Version 2.1, dated 05.03.2022.

10. Annex

N/A.