Environmental Product Declaration

In accordance with ISO 14025:2006, ISO 21930:2017, and EN 15804:2012+A2:2019/AC:2021 for:

Ready-mixed concrete
C28/35 CIIIB+SR Sector EPD

from

Mineral Products Association (MPA) UK

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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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 information

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

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 + A2 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 – Construction Products (EN 15804+A2) – version 1.3.1 PCR 2019:14-c-PCR-003 c-PCR-003 Concrete and concrete elements (EN 16757) (2023-01-02)
PCR review was conducted by: The Technical Committee of the International EPD® System. See 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.
Life Cycle Assessment (LCA)
LCA accountability: *<name, organization>*
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: Jane Anderson, Construction LCA 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 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.

Cover image: Grant Smith Photography

Company information

Owner of the EPD: Mineral Products Association (MPA) UK
https://mineralproducts.org/
Contact: Dr Rachel Capon (rachel.capon@mineralproducts.org)
Description of the organisation: The Mineral Products Association (MPA) is the UK industry trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar and industrial sand industries. MPA membership is made up of the vast majority of the independent SME quarrying companies throughout the UK, as well as the 9 major international and global companies. MPA covers 100% of UK cement and lime production, 90% of GB aggregates production, 95% of asphalt and over 70% of ready-mixed concrete and precast concrete production.
Product-related or management system-related certifications: MPA is a trade association. Data has been provided by MPA members. Over 90% of production is certified to BES 6001. Over 99% of production sites have both ISO 9001 and ISO 14001 certifications.
Name and location of production site(s):
The results are based on aggregated data for the year 2021 reported by the following MPA member sites producing ready-mixed concrete in England and Wales:

MPA Member company	Number of ready-mixed concrete production sites included in data reported to MPA
Aggregate Industries	73
Breedon	142
CEMEX UK	126
Heidelberg Materials	164
Tarmac	127

The MPA 'Profile of the UK Mineral Products Industry' has maps of member sites, including the locations of concrete plants.

Product information

Product name: Ready-mixed concrete C28/35 CIIIB+SR
Product identification: The product is 1m^3 of ready-mixed concrete specified to C28/35 CIIIB+SR, in accordance with BS 8500-2 and BS EN 206. The constituent proportions are 108 kg CEM I, 252 kg ground granulated blast furnace slag (GGBS), 1858 kg natural aggregate, 160 litres of mains water and 1.69 kg of chemical admixture. The fresh wet density is 2380 kg/m^3.
Product description: Ready-mixed concrete is made by mixing coarse and fine aggregates, cement and water in controlled proportions. Chemical admixtures are used to reduce water content and improve fresh and hardened concrete properties. Delivered to site on a just-in-time basis, ready-mixed concrete may be cast into any conceivable shape with almost no limit on volume.
When hardened, concrete can carry substantial compressive loads by itself, but is more frequently reinforced to substantially increase its tensile and flexural strength.
Nearly all foundations, floors and the majority of building structures are made of concrete. Concrete is also often key to the architecture of our buildings, contributing greatly to their energy efficiency and visual appeal.
UN CPC code: 375 Articles of concrete, cement and plaster
Geographical scope: United Kingdom

LCA information

Functional unit / declared unit: 1 m^3
Reference service life: 100 years
Time representativeness: 2021
Database(s) and LCA software used: The LCA software used is the One Click LCA Pre-Verified EPD Generator – Ecoinvent v3.8. The source of LCA data is Ecoinvent 3.8, One Click LCA databases and verified EPDs.
Description of system boundaries:

Cradle to gate with options, modules A4-A5, modules B1, modules C1–C4, and module D.
Modules A1-A4 are based on production data aggregated over MPA member sites.
The scenario adopted for the module A5 construction and module B1 use stages is based on a typical ready-mix concrete frame building – a six-storey residential apartment block (Figure 2).
Module C, the end-of-life stage, and module D, the resource recovery stage, are based on typical UK practice for demolition, recovery, and reuse (Figure 3, personal communication MPA and National Federation of Demolition Contractors Feb 2023).
Recarbonation of concrete is calculated for modules B1, C1, C3 and in secondary use, as additional information beyond the system boundaries.

Cut-offs
EN 15804 requires that where there are data gaps for a unit process, the cut-off criteria shall be 1% of renewable and non-renewable primary energy usage and 1% of the total mass input of that process. The total of neglected input flows per module shall be a maximum of 5% of energy usage and mass. This assessment includes all raw materials, electrical energy and other fuels used, transport and direct production waste.
Formwork and placing of formwork (module A5) contribute less than 1% of the total product CO_2 emissions (Kaethner & Burridge, 2012), and are therefore neglected under cut-off rules.
Capital goods and infrastructure are excluded under cut-off rules: batching plants serve for many years processing tens of thousands of tonnes of material, therefore their contribution to the impacts is likely to be very low.

System diagrams:

Modules A1-A3 Manufacturing
Ready-mixed concrete is mixed from the raw materials at a wet batch plant (Figure 1).

Electricity mix
All electricity purchased from the grid by MPA members for use in concrete manufacturing is either backed by GO or a zero-carbon (nuclear) tariff. Per m^3 concrete, including transmission and distribution losses, the breakdown of electricity is:

Electricity	**Renewable**	**Nuclear**	**Total**
kWh/m³	2.43	0.72	3.15

The grid mix for renewable generation is based on statistics published by the UK government Department for Energy Security and Net Zero (DESNZ).

The corresponding climate impact, GWP-GHG, of the electricity mix is:

GWP-GHG/kWh	**Renewable**	**Nuclear**	**Overall**
kg CO_2e/kWh	0.018	7.25E-03	0.015

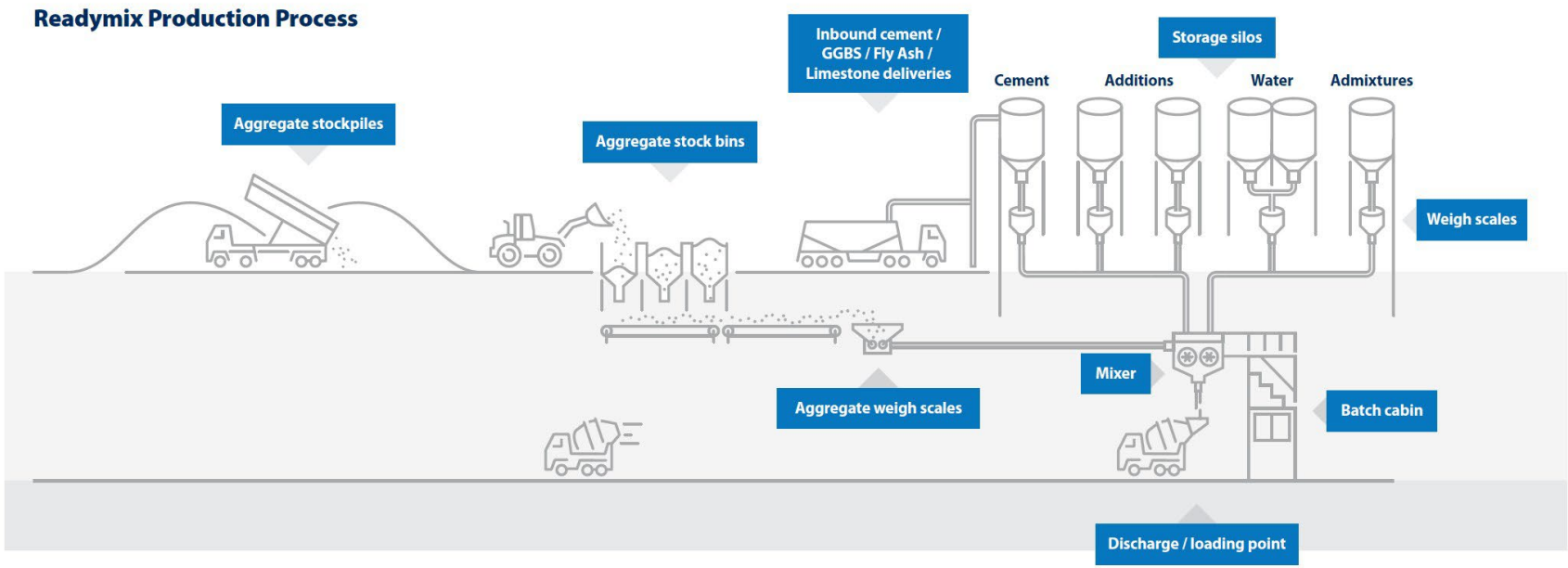

Figure 1 A1-A4 system diagram

Modules A4-5 Construction Process and Module B Use Stage

The assumed construction scenario is based on a typical use of ready-mixed concrete in the superstructure of a six-storey concrete frame apartment block (Figure 2).

Module A4 Transport to construction site

The ready-mixed concrete is transported from the batching plant by Euro 6 mixer truck an average distance of 10km to the construction site.

Module A5 Construction Installation

Energy and water consumption are based on a typical concrete pump specification. The typical wastage rate on site is 1.5% (Adams, 2023).

Per m^3 concrete placed	**Quantity**	**Unit**
Energy consumption (converted to diesel used in building machine)	2.24	*kWh*
Water consumption	44.78	*litres*
Wastage rate	1.5	*%*

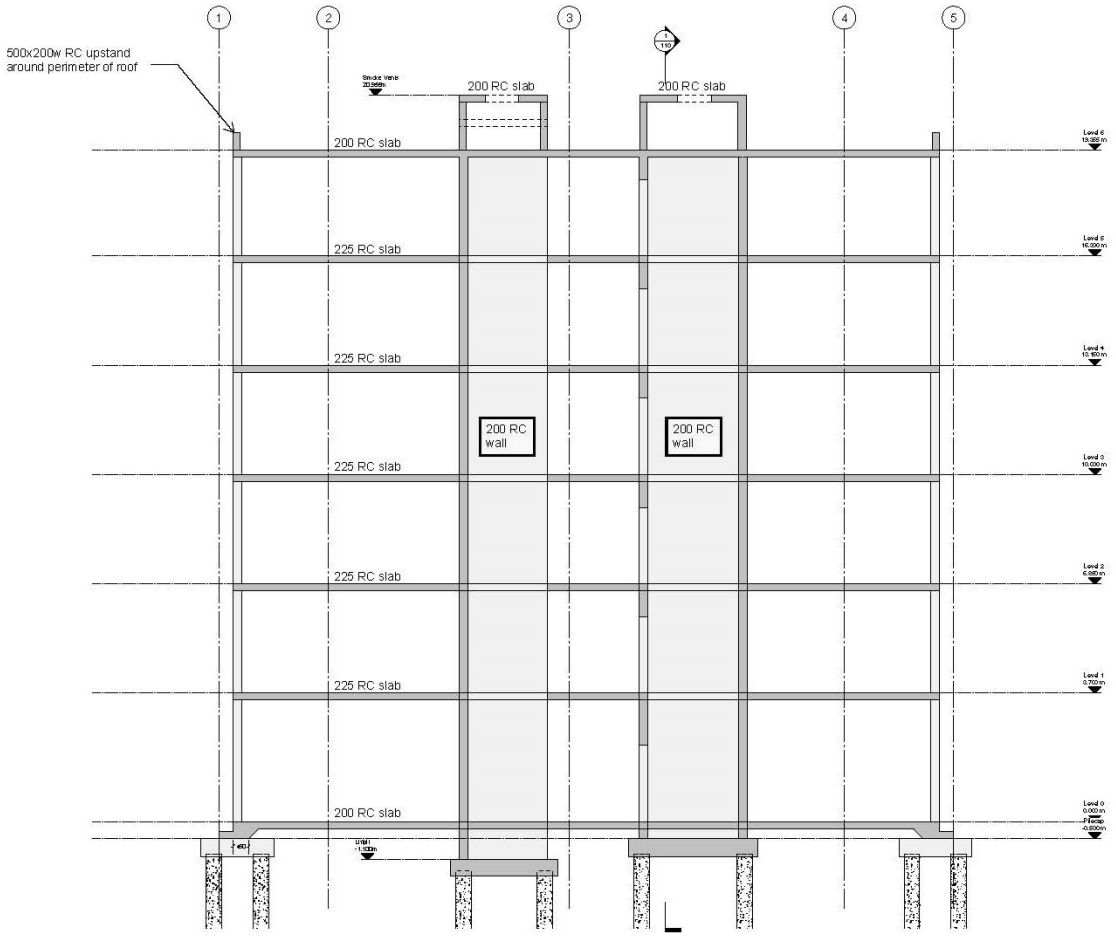

Figure 2 Typical six-storey concrete frame residential apartment block (MPA The Concrete Centre, 2021). The scenario adopted for the module A5 construction and module B1 use stages is based on the use of ready-mixed concrete in the building superstructure.

Module B1 Use

Recarbonation of concrete occurs in the superstructure on the ceilings and core walls.

Module C End of Life and Module D Resource Recovery

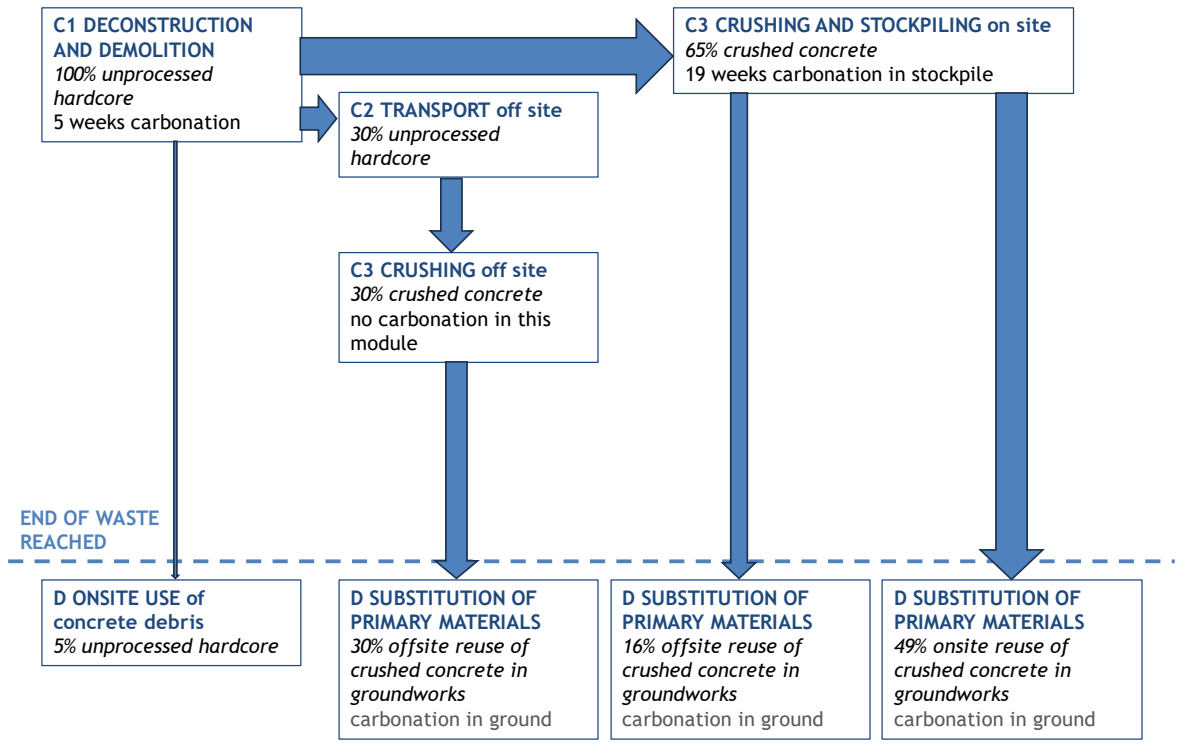

Figure 3 Modules C and D end-of-life scenario for ready-mix concrete in building superstructure (including ground slab). Personal communication MPA and National Federation of Demolition Contractors (NFDC) Feb 2023.

At the end-of-life, 100% of the building superstructure is demolished and recovered.
The National Federation of Demolition Contractors (NFDC) have provided information on typical recovery routes for demolished concrete buildings as shown in Figure 3.
It is assumed that all concrete which is processed post-demolition is crushed to a 6F2 specification. In practice, some of the recovered concrete will be crushed more finely, depending on its intended secondary use. Substitution of virgin materials by crushed concrete is included in module D.
Carbonation has been calculated in modules C1 and C3, and beyond the system boundaries.

Carbonation

Carbonation in modules B1, C1, C3 and beyond the system boundaries has been calculated using the methodology given in EN 16757:2022 Annex G.
The CO_2 uptake per m^2 concrete surface area is

$$CO_2 \text{ uptake} = (k/1000) * K_k * \sqrt{t} * U_{tcc} * C * D_c$$

where:

k is the k-factor (mm/year$^{0.5}$) given in EN 16757 Table G.1,
D_c is the degree of carbonation given in EN 16757 Table G.1,
K_k is the SCM correction factor given in EN 16757 Table G.2,
t is the time (year),
U_{tcc} is the maximum theoretical CO_2 uptake of cement (kg CO_2/kg cement),
C is the cementitious content of concrete (kg/m^3 concrete).

The CO_2 uptake is entered into the LCA model as a negative emission of carbon dioxide.

Table 1 Carbonation calculations showing parameters used in each lifecycle stage. Calculated CO_2 uptake values for each lifecycle stage are input into the OneClick LCA tool as negative CO_2 emissions.

Lifecycle stage (exposed surfaces)	**Carbonation parameters (see EN 16757 Annex G)**				**CO_2 UPTAKE**
	K_k			1.30	
	U_{tcc}	*kg CO_2/ kg cement*		0.147	
	C	*kg cement/ m^3 concrete*		360	
	Exposure	***k***	***Dc***	***t***	*kg CO_2 / m^3 concrete*
		mm/$yr^{0.5}$	*%*	*years*	
Module B1 (ceilings and core walls)	Indoor/No cover	6.6	40%	100	**7.18**
Module C1 (floors, roof and underside of ground slab)	Outdoor/Exposed	1.6	85%	0.01	**0.18**
Module C3 (6F2 crushed concrete)	Average of Outdoor/Exposed and Buried (above groundwater level)	1.20	85%	0.37	**8.95**
Secondary use (6F2 crushed concrete)	Buried (above groundwater level)	0.80	85%	100	**22.15**
TOTAL CO_2 uptake over lifecycle					38.46
Maximum theoretical CO_2 uptake					52.92
TOTAL CO_2 uptake over lifecycle (% of maximum theoretical CO_2 uptake)					73%

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

	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	x	x	x	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	UK	UK	UK	UK	UK	UK	ND	ND	ND	ND	ND	ND	UK	UK	UK	UK	UK
Specific data used	>60%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Less than 10%					-	-	-	-	-	-	-	-	-	-	-	-

LCA variability is discussed in section ’Information related to Sector EPD’.

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
CEM I	108	0.58%	-
GGBS	252	100%	
Primary aggregate – coarse	1078	-	-
Primary aggregate – fine	780	-	-
Water	160	-	-
Admixture	1.69	-	-
TOTAL	2380	10.6%	-
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
None (delivered by mixer truck)	0	-	-

The product does not contain any REACH SVHC substances in amounts greater than 0.1 %.

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per functional or declared unit											Additional Information†
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**C1**	**C2**	**C3**	**C4**	**D**	**Carbonation in secondary use**
GWP-fossil[1)]	kg CO_2 eq.	1.45E+02	3.88E+00	2.99E+00	-7.18E+00	1.32E+01	6.21E-01	-8.74E+00	0.00E+00	-1.57E+01	-2.21E+01
GWP-biogenic[2)]	kg CO_2 eq.	9.11E-02	0.00E+00	2.00E-04	0.00E+00	2.45E-03	0.00E+00	3.82E-05	0.00E+00	-4.82E-02	
GWP-luluc	kg CO_2 eq.	3.55E-02	1.55E-03	6.53E-04	0.00E+00	1.33E-03	2.33E-04	2.08E-05	0.00E+00	-2.18E-02	
GWP-total	kg CO_2 eq.	1.45E+02	3.84E+00	2.99E+00	-7.18E+00	1.32E+01	6.21E-01	-8.74E+00	0.00E+00	-1.58E+01	-2.21E+01
ODP	kg CFC 11 eq.	5.90E-06	8.98E-07	2.62E-07	0.00E+00	2.86E-06	1.55E-07	4.46E-08	0.00E+00	-1.28E-06	
AP	mol H^+ eq.	4.39E-01	1.10E-02	1.45E-02	0.00E+00	1.39E-01	1.98E-03	2.17E-03	0.00E+00	-1.02E-01	
EP-freshwater	kg P eq.	2.46E-02	2.77E-05	3.73E-04	0.00E+00	4.44E-05	4.44E-06	6.91E-07	0.00E+00	-8.93E-04	
EP-marine	kg N eq.	6.32E-02	2.20E-03	4.40E-03	0.00E+00	6.16E-02	4.37E-04	9.59E-04	0.00E+00	-2.25E-02	
EP-terrestrial	mol N eq.	1.41E+00	2.44E-02	5.90E-02	0.00E+00	6.75E-01	4.84E-03	1.05E-02	0.00E+00	-2.89E-01	
POCP	kg NMVOC eq.	3.77E-01	9.38E-03	1.61E-02	0.00E+00	1.86E-01	1.91E-03	2.89E-03	0.00E+00	-7.48E-02	
ADP-minerals&metals*	kg Sb eq.	1.79E-04	1.40E-05	3.36E-06	0.00E+00	6.78E-06	1.52E-06	1.06E-07	0.00E+00	-1.48E-04	
ADP-fossil*	MJ	1.05E+03	5.77E+01	2.68E+01	0.00E+00	1.80E+02	9.92E+00	2.81E+00	0.00E+00	-2.29E+02	
WDP*	m^3	3.60E+01	2.70E-01	5.86E-01	0.00E+00	4.84E-01	4.58E-02	7.54E-03	0.00E+00	-2.75E+01	
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										

† Carbonation in secondary use beyond the system boundaries is provided as additional information,

1) The indicated Global Warming Potential fossil fuels (GWP-fossil) value includes CO_2 emissions from combustion of both fossil and waste-derived fuels during cement manufacture. The A1-A3 'net' value of GWP-fossil, excluding combustion of waste-derived fuel is 1.36E+02 kg $CO_{2\ eq.}$

2) The indicated Global Warming Potential biogenic (GWP-bio) value includes CO_2 emissions from combustion of waste biomass during cement manufacture.

** 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											Additional Information
Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D	Carbonation in secondary use
GWP-GHG[1]	kg CO_2 eq.	1.45E+02	3.88E+00	2.99E+00	-7.18E+00	1.32E+01	6.21E-01	-8.74E+00	0.00E+00	-1.57E+01	-2.21E+01

Resource use indicators

Results per functional or declared unit										
Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PERE	MJ	1.17E+02	8.39E-01	1.86E+00	0.00E+00	1.03E+00	1.28E-01	1.60E-02	0.00E+00	-2.12E+01
PERM	MJ	1.98E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.17E+02	8.39E-01	1.86E+00	0.00E+00	1.03E+00	1.28E-01	1.60E-02	0.00E+00	-2.12E+01
PENRE	MJ	1.04E+03	5.77E+01	2.67E+01	0.00E+00	1.80E+02	9.92E+00	2.81E+00	0.00E+00	-2.29E+02
PENRM	MJ	9.77E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.05E+03	5.77E+01	2.67E+01	0.00E+00	1.80E+02	9.92E+00	2.81E+00	0.00E+00	-2.29E+02
SM	kg	6.59E+00	1.96E-02	1.03E-01	0.00E+00	7.05E-02	2.80E-03	1.10E-03	0.00E+00	-2.44E-01
RSF	MJ	4.62E+01	2.16E-04	6.92E-01	0.00E+00	2.30E-04	2.47E-05	3.59E-06	0.00E+00	-1.69E-03
NRSF	MJ	8.50E+01	0.00E+00	1.27E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.23E+00	7.36E-03	7.94E-02	0.00E+00	1.09E-02	1.32E-03	1.70E-04	0.00E+00	-1.03E+00
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] 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_2 is set to zero.

Waste indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1.38E+00	6.56E-02	3.63E-02	0.00E+00	2.41E-01	1.06E-02	0.00E+00	0.00E+00	-1.32E+00
Non-hazardous waste disposed	kg	3.46E+01	1.17E+00	6.77E-01	0.00E+00	1.69E+00	1.85E-01	0.00E+00	0.00E+00	-3.92E+01
Radioactive waste disposed	kg	1.40E-02	3.97E-04	2.89E-04	0.00E+00	1.27E-03	6.84E-05	0.00E+00	0.00E+00	-1.16E-03

Output flow indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Other environmental performance indicators

None declared

Additional environmental information

UK Concrete and Cement Industry Roadmap to Beyond Net Zero
https://thisisukconcrete.co.uk/Resources/UK-Concrete-and-Cement-Roadmap-to-Beyond-Net-Zero.aspx
The UK concrete and cement industry has developed a roadmap to beyond net zero by 2050 – removing more carbon dioxide from the atmosphere than it emits each year.
The industry has a strong track record having taken considerable early action and delivered a 53% reduction in absolute carbon dioxide emissions since 1990 – decarbonising faster than the UK economy as a whole. However, it is committed to building on this early action and has prepared a detailed and viable roadmap that sets out a clear pathway to reduce emissions to beyond net zero. Importantly, the roadmap does not rely upon carbon offsetting or offshoring emissions but demonstrates an achievable route to beyond net zero through the application of seven decarbonisation technologies. The 'Roadmap to Beyond Net Zero' calculates the potential of each technology and the carbon savings which can be achieved.
Five of these technologies focus on production related emissions:

- Indirect emissions from decarbonised electricity
- Decarbonised transport networks
- Low carbon cements and concretes
- Fuel switching
- Carbon capture, usage and storage (CCUS)

Going beyond net zero will be achieved by using on-site carbon capture and by maximising the natural, in-use properties of concrete which include:

- Carbonation – the natural process where concrete absorbs CO_2 from the atmosphere throughout its lifetime
- Thermal mass – a property of heavyweight materials like concrete and masonry where heat can be absorbed, stored and released, reducing the energy needed to heat and cool buildings

UK Concrete Industry Sustainable Construction Strategy
https://www.sustainableconcrete.org.uk/
By launching the Concrete Industry Sustainable Construction Strategy in 2008, the concrete industry demonstrated its leadership position by setting clear targets and ambitions for the delivery of a sustainable, low carbon built environment in a socially, environmentally, and economically responsible manner. This next iteration of the strategy focuses on the sector's journey to 2030.
The new strategy will align with key industry initiatives such as the UK Concrete and Cement sector roadmap to beyond net zero. Through adoption of our strategy, the UK Concrete industry aims to show our leadership and demonstrate our ambition to deliver sustainable outcomes in collaboration with the value chain and stakeholders.
The website includes key performance indicators and annual performance reports.

MPA The Concrete Centre
www.concretecentre.com
The Concrete Centre provides material, design and construction guidance. Our aim is to enable all those involved in the design, use and performance of concrete to realise the potential of the material. The Concrete Centre provides published guidance, seminars, courses, online resources and industry research to the design community.
Key guidance on low carbon concrete includes:
'Specifying Sustainable Concrete' and 'Whole-life Carbon and Buildings'.

Information related to Sector EPD

The declared concrete is a sector EPD for a specific concrete product modelled using collective average data from MPA member ready-mixed concrete production sites. This data is estimated to represent around 90% of ready-mixed concrete produced by MPA members, and 62% of the total UK market for ready-mixed concrete. The MPA CEM I sector EPD used in the model represents 100% of UK cement production. UK produced cement accounts for around 80% of the UK cement market.
N.B. The GWP-fossil values reported in this EPD are based on 'gross' CO_2 emissions, i.e., they include combustion of both fossil and waste-derived fuels (also called 'alternative' or 'secondary' fuels) during the manufacture of cement. Some cement and concrete EPDs exclude emissions due to the combustion of waste-derived fuels in the cement kiln, and report GWP values based on 'net' CO_2 emissions. When comparing EPDs, it is important to note that 'net' GWP values, which exclude CO_2 emissions from the combustion of waste-derived fuels during cement manufacture, will be lower than 'gross' GWP values which include them.
The LCA indicators for C28/35 CIIIB+SR ready-mixed concrete in this sector EPD are intended to provide the basis for the environmental assessment of buildings and other construction works in typical UK situations. Such assessments should consider the whole lifecycle; modules A1-A3 should not be used without considering the results of module C. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. This declared concrete is a representative product which is not available for purchase on the market. For very detailed calculations requiring LCA data for specific concrete mix designs, please refer to EPDs from the individual manufacturer.

Variability of GWP-fossil

The key contributing factor to GWP-fossil is the CEM I content of the ready-mixed concrete. This will vary subject to local availability of aggregates. Most structural C28/35 CIIIB+SR concretes in the UK have a CEM I content in the range 102-114 kg/m^3, with total cementitious content 340-380 kg/m^3. The variation in GWP-fossil is < ± 10%.

Differences versus previous versions

This is the first sector EPD for C28/35 CIIIB+SR ready-mixed concrete published by MPA.
It is part of a series of five sector EPDs from MPA for specific C28/35 ready-mixed concretes:

- Ready-mixed concrete C28/35 CEM I Sector EPD
- Ready-mixed concrete C28/35 CIIB-V+SR Sector EPD
- Ready-mixed concrete C28/35 CIIC-SL+SR Sector EPD
- Ready-mixed concrete C28/35 CIIIA+SR Sector EPD
- Ready-mixed concrete C28/35 CIIIB+SR Sector EPD

References

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BRE Group. BES 6001 Framework Standard for Responsible Sourcing of Construction Products. https://bregroup.com/services/standards/bes-6001-the-framework-standard-for-responsible-sourcing/ (2023).

BS EN 206:2013+A2:2021 Concrete - Specification, Performance, Production and Conformity.

BS 8500-1:2015+A2:2019 Concrete. Complementary British Standard to BS EN 206. Part 1: Method of specifying and guidance for the specifier (currently under review).

BS 8500-2:2015+A2:2019 Concrete. Complementary British Standard to BS EN 206, Part 2: Specification for Constituent Materials and Concrete (currently under review).

EN 15804:2012 + A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

EN 16757:2022 Sustainability of Construction Works. Environmental Product Declarations. Product Category Rules for Concrete and Concrete Elements.

General Programme Instructions of the International EPD® System. Version 4.0.

ISO 14001:2015 Environmental management systems — Requirements with guidance for use.

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

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

ISO 21930:2017 Sustainability in Buildings and Civil Engineering Works — Core Rules for Environmental Product Declarations of Construction Products and Services

ISO 9001:2015 Quality management systems — Requirements

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RTS PCR EN 15804:2019 RTS PCR in line with EN 15804+A2. Published by the Building Information Foundation RTS 1.6.2020.

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