Environmental Product Declaration

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

Precast Concrete Crosswall Panels

Sector EPD

Mineral Products Association (MPA)

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Type of EPD:	Sector EPD (multiple products, based on an average product)
EPD registration number:	EPD-IES-0032005:001
Version date:	2026-11-02
Validity date:	2031-11-01
	An EPD may be updated or de-published if conditions change. To find the latest version of the EPD and to confirm its validity, see 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:	support@environdec.com

Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *PCR 2019:14 Construction products, version 2.0.1 Published on 2025.06.05, UN CPC code 3755.*
PCR review was conducted by: The Technical Committee of the International EPD System, chaired by Rob Rouwette (Chair) and Noa Meron (co-Chair). A full list of members is available on www.environdec.com. The review panel may be contacted via support@environdec.com.
c-PCR, if applicable: *c-PCR 003, v1.0.0 Concrete and concrete elements (EN16757:2022).*

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ **Individual EPD verification without a pre-verified LCA/EPD tool** Third-party verifier: *<name, and organization of the individual verifier>* Approved by: 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 published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.
For further information about comparability, see EN 15804 and ISO 14025.

INFORMATION ABOUT EPD OWNER

Owner of the EPD: Mineral Products Association (MPA)

Address: 1st Floor, 297 Euston Road, London NW1 3AD

Contact: hafiz.elhag@mineralproducts.org.

Person responsible for reporting future significant changes: hafiz.elhag@mineralproducts.org.

LCA practitioner: Dr. Hafiz Elhag, MPA (hafiz.elhag@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 covers 100% of cement and lime production, 90% of aggregates production, and 70% of ready mixed and precast concrete production in the UK.

Product-related or management system-related certifications: MPA is a trade association. The data has been provided by MPA members: Around 90% of MPA Precast member companies are certified to both ISO 9001 and ISO 14001. 86% of MPA Precast members are certified to BES 6001.

PRODUCT INFORMATION

Product name: Precast Concrete Crosswall Panels.

Product identification: Precast Concrete Crosswall panels manufactured to EN 14992 (precast walls), and/ or common rules standard EN 13369 (other one-off reinforced precast products).

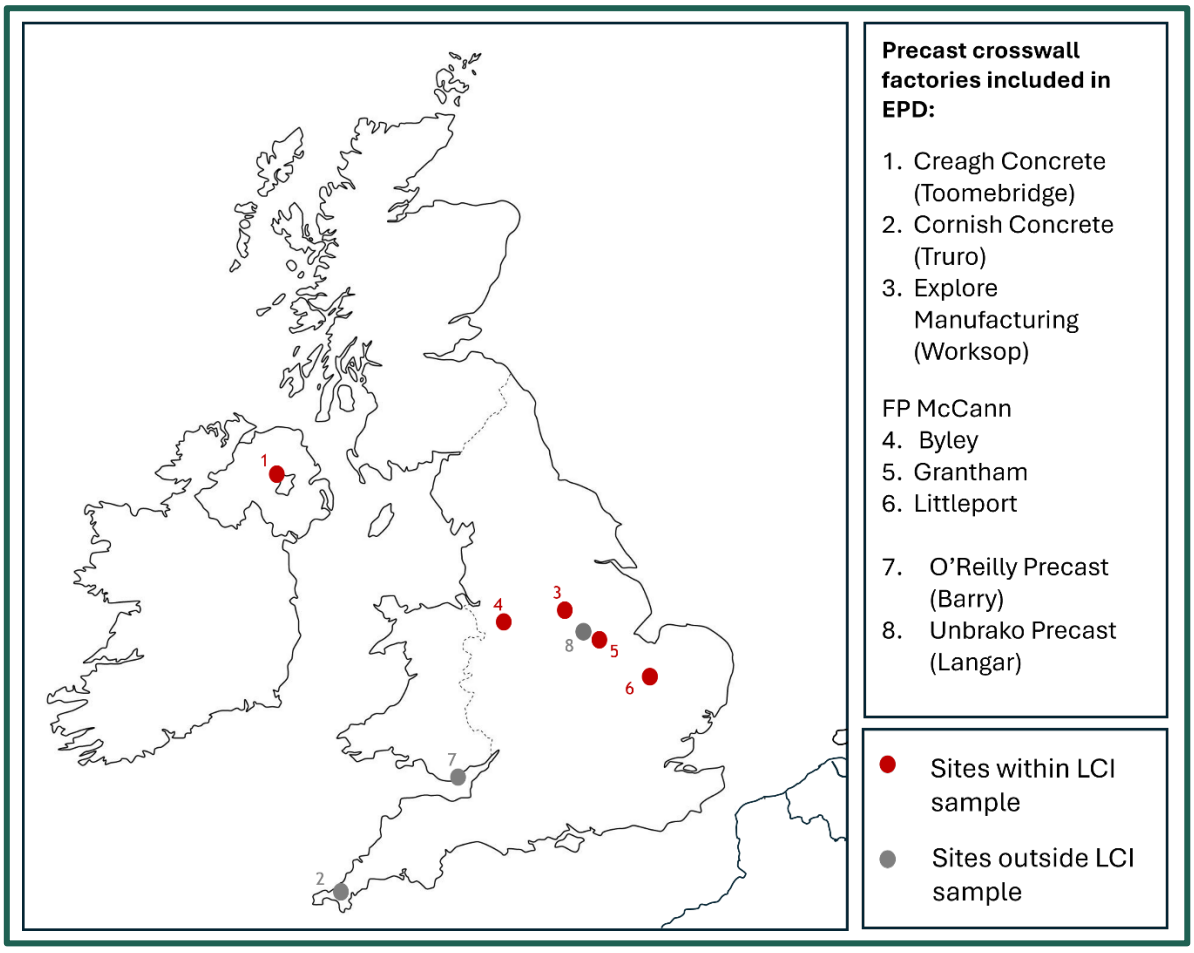
Visual representation of the product



UN CPC code: 3755 - *Prefabricated structural components for building or civil engineering, of cement, concrete or artificial stone.*

Product description: Crosswall precast concrete panels consist mainly of concrete with steel reinforcement caging. Crosswall panels are manufactured to varying shapes and depths and serve as vertical structural support in buildings. Crosswall precast panels covered in this EPD are used as wall panel systems in different types of buildings and structures (multistorey commercial, offices, schools, prisons, etc). Average density is around 2,403 kg/m^3 and compressive strengths after manufacture range between 40 to 50 MPa. Constituents include CEM I, blended CEM II A-L, GGBS, limestone fines/ Betocarb, fine and coarse aggregates, water, admixtures, steel reinforcement caging, and metallic fixings. The concrete is cast over reinforcement in mechanical, metallic or wooden moulds. After curing and hardening, the products are stocked at factory sites for weeks prior to being transported to construction sites for installation. Crosswall precast concrete panels are usually expected to serve throughout the life of the building or structure (60 to 100 years).

Name and location of production sites:
Eight precast concrete factories, for 6 companies, are covered by this EPD. The sample LCI data included 5 sites from 3 manufacturers (see map below). For information on sampling, see page 15.



Names of manufacturers:

- Creagh Concrete Products Ltd, 38 Blackpark Road, Toomebridge, Co. Antrim, Northern Ireland, BT41 3SL (https://www.creaghconcrete.com/).
- Cornish Concrete Products Ltd. Point Mills, Bissoe, Truro, Cornwall, TR4 8QZ (https://cornishconcrete.co.uk/).

- Explore Manufacturing (part of Laing O'Rourke plc), Explore Way, Worksop, S80 3FD (https://www.laingorourke.com/company/our-businesses/explore-manufacturing/).
- FP McCann Ltd, 3 Drumard Road ,Knockloughrim, Magherafelt, BT45 8QA (https://fpmccann.co.uk/).
- O'Reilly Precast, Office 1, Izabella House, 24-26 Regent Pl, Birmingham B1 3NJ (https://oreillyprecast.com/).
- Unbrako Pre-Cast Concrete, Langar, Nottingham NG13 9HY (https://www.concretewalling.co.uk/).

CONTENT DECLARATION

The mass (weight) of one unit of a product, as purchased or per declared unit: 381.72 kg/

Content of the product in the form of a list of materials and substances, and their mass:

Product content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product or declared unit*
Cements (CEM I, GGBS, CEM II A-L, Limestone fines)	84.75	0%	0%	0%
Coarse & Fine aggregates	245.79	0%	0%	0%
Reinforcing steel	12.01	98%	0%	0%
Admixture	0.89	0%	0%	0%
Water	28.29	0%	0%	0%
Metal fixings	10.00	100%		
TOTAL	**~381.7**	**5.7%**	**0%**	**0%**

Packaging materials	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/product or declared unit
TOTAL	0.0	0%	0

**1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO_2.*

Crosswall precast concrete panels included in this EPD do not contain any biogenic carbon.

Crosswall precast concrete panels do not contain any substances that can be included in "Candidate List of Substances of Very High Concern for Authorization" and raw materials used are not part of the EU REACH regulation.

LCA INFORMATION

Declared unit: 1m^2 of Crosswall precast concrete panels.

Conversion factor to mass if mass is not used as functional/declared unit (not applicable for services): ~381.72 kg/ m^2 (0.1588 m thickness).

Where a thickness of 0.15m is used, results can be multiplied by a conversion factor of 0.945.

Reference service life: No RSL is declared as this EPD is based on a Declared Unit only, but a product lifespan of 100 years was assumed for carbonation at B1 & Module C.

Time representativeness: 2023

Geographical scope: The United Kingdom, Republic of Ireland, and Belgium (Modules A1-A4). The United Kingdom (Modules A5, B1, C1-C4, D).

Database(s) and LCA software used: Ecoinvent 3.10, One Click LCA database and software.

EPD/LCA Tool used: One Click LCA EF3.1

Description of system boundaries:
Cradle-to-gate with options, modules C1-C4, module D and optional modules, A4, A5, and B1.

Modules A1-A3: Boundaries for this stage include all raw materials data and sources, based on 12-months primary data from 5 out of 8 manufacturing sites. Input flows include raw materials, water (including moisture content), fuels, electricity and other consumable (e.g. release agents). Output flows include production tonnage, material losses, waste and other outputs (e.g. co-products, secondary materials). Delivery of raw materials and ancillary materials into manufacturing sites, processing of secondary materials (up to End-of-Waste), and transport of waste and unused secondary materials out of manufacturing sites, was also accounted for within study boundaries.

Module A4: Stage A4 accounts for Just-in-Time delivery of the Crosswall panels to construction sites, using Ecoinvent and IStructE's "*How to Calculate Embodied Carbon*" factors. Transport distance and utilisation capacity data was collected from the manufacturers for 2023.

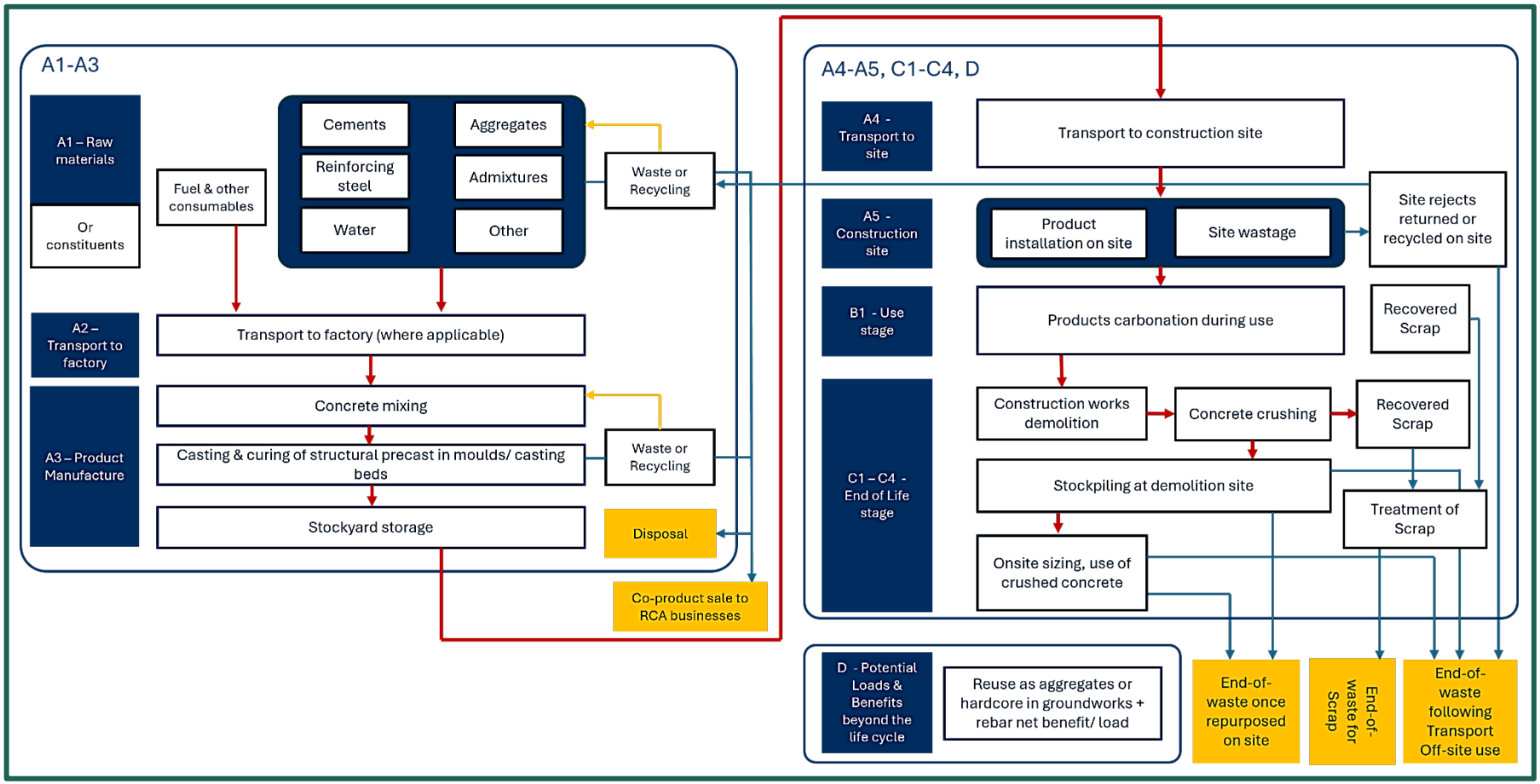
Module A5: The scenario adopted for module A5 is based on methods described in EN 15804, EN 15941 and EN 16757, addressing the impacts related to the Crosswall panels only. This includes wastage and emissions associated with the erection and lifting of units. Other installation impacts (e.g. sealants, fixings other than those within the product, grouting, etc) are excluded.

Module C and Information Module D: Module C (end of life), and Module D (potential loads & benefits), are based on typical UK practice for demolition and recovery up to the point of End-of-Waste, accounting for the crushing and recycling of concrete, and recycling of rebar and wire. This is the only 100% scenario as identified in NFDC statistics for end-of-life concrete.

Carbonation was accounted for in Modules B1, C3 and in secondary use beyond system boundaries. All carbonation calculations were carried out in accordance with Annex G of EN 16757 using statistical data from NFDC.

Process flow diagram:

Figure 2. Crosswall precast concrete panels' product system's flow diagram.



More information:

Data Quality Assessment (DQA) and Declaration:

DQA was carried out in accordance with EN 15941 and the PCR/ GPI requirements. Data contributing to over 80% of the results for all core environmental indicators have been assessed in terms of time, geographic and technology representativeness and was found to be mostly **very good/ good** and appropriate for use. No relevant datasets with "fair" or "poor" data constitute >30% of each of the core indicators. The data was also found to be relevant, complete (all relevant flows included) and consistent across the system boundary. Use of proxy data, or data from earlier years, was highlighted in the DQA and justified in the LCA Report. Its effect is believed to be minimal.

It should be noted that uncertainty was deemed high for a limited number of indicators due to use of earlier versions of Ecoinvent for some raw materials' datasets (e.g. Ecoinvent 3.5).

Cut-off criteria

Cut-off rules employed are in accordance with EN 145804 where a cut-off criterion of 1% (for renewable and non-renewable primary energy usage and total mass input) was maintained. The total of neglected input flows per module do not exceed 5% of energy usage or mass.

Capital Goods and Equipment

Capital goods impacts associated with renewable electricity infrastructure (solar panels and wind turbines) were included in accordance with the EPD international PCR (4.3.6). Ecoinvent 3.10 was used to account for the impact of Capital Goods, assuming 20 years' service life for such equipment.

Module A1-A3:

Allocation:

A1-A2: Upstream co-product allocation for GGBS is based on economic allocation. Upstream allocation associated with the pre-consumer scrap in rebar also complies with the requirements of Section 4.5.3 of PCR 2019:14, v2.0.1.

A3: Co-product allocation between precast concrete products manufactured on site was based on no allocation (physical partitioning) and physical allocation based on mass. No impacts are allocated to the crushed concrete aggregates generated and exported/ sold from the sites.

GWP intensity of recycled content:

The combined GWP-GHG intensity associated with input recycled content in the product (mainly rebar and metal fixings) is **~ 577 kg CO_2e eq./ tonne of input**.

Share or primary data:

Total share of primary data contributing to the declared GWP-GHG (A1-to-A3) is ~10.4% (see table in page 12 below).

Electricity Mix:

Some of the electricity used by MPA members for the manufacture of reinforced precast is either generated (and used) on-site or backed by European Guarantees of Origin and Ofgem's REGOs. These also include transmission and distribution losses:

Electricity	Renewable (REGOs & European GO's	Renewable (generated & used onsite)	Residual mix	Total
kWh/m²	5.57	0.05	0.78	6.40

The grid mix for REGO and other renewable generation is based on statistics published by the UK government's Department of Energy Security and Net Zero (DesNZ) for 2023 and companies' own certificates. AIB statistics for 2023 were used for residual electricity mix data.

REGO electricity source (%)	Onshore wind	Offshore wind	Solar	Hydro	Bioenergy waste
	24.0%	36.6%	10.2%	4.1%	25.1%

The corresponding climate impact, GWP-GHG, associated with the overall electricity mix at A3 is **~0.053 kg CO_2e/ kWh**.

Module A4: Transport to construction site

Ecoinvent 3.10 transport emission factors were modified to reflect factors used in the UK's (from IStructE HTCEC guide). No return journey included to enable assessors to include their own project-specific scenarios in accordance with EN 15978. Distance to site data, and capacity utilization, are based on companies' own KPI data submissions. In general, and for all construction products, HTCEC assumes a distance for return empty running of 43% of distance to site.

Scenario parameter (A4)	Quantity	Unit
Specific transport CO_2e emission factor	0.08997	Kg CO_2e/ tkm
Fuel consumption estimated for "*market for transport, freight, lorry >32 metric ton, EURO6*"	1.88	L/100 tkm
Distance to site	142.0	km
Capacity Utilisation	100	%

Module A5: Construction process

No site wastage was assumed as any rejected Crosswall panels are returned to the manufacturer for re-purposing. Cranage energy was accounted for using data from a similar precast concrete product EPD. The installation of any additional supporting fixings or concrete toppings is omitted as these vary widely based on project specifications.

Scenario parameter (A5)	Quantity	Unit
Wastage rate	0.00	%
Cranage (lifting of units per DU)	1.68	kWh

Module B1 Use stage

Any exposed surface of a Crosswall panel would be expected to experience some carbonation at 40% Degree of Carbonation (D_c) as with an "indoor/ no cover" exposure condition, leading to 41.8mm carbonation depth. This exposure condition is associated with a fully exposed crosswall, or crosswall covered in plasterboard with a 10mm cavity. See Annex G of EN 16757 for more information.

Scenario parameter (B1)	Quantity	Unit
Product's CO_2 uptake (carbonation)	0.90	Kg CO_2/ m^2

Module C1-C4 End-of-Life

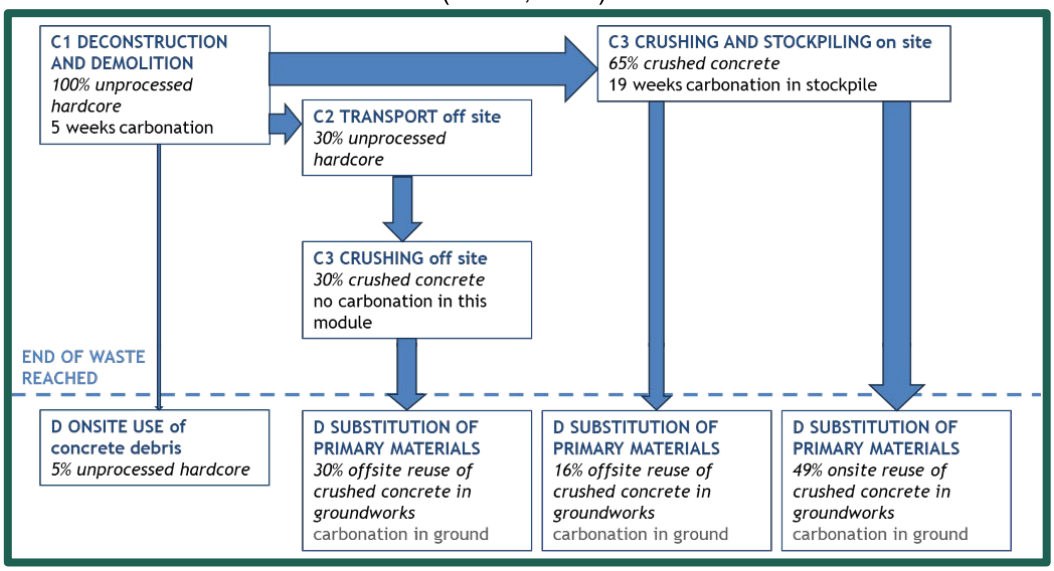
End-of-Life scenarios are based on statistics from the National Federation of Demolition Contractors (see Figure 3). It is assumed that all concrete and reinforcement (100%) is recycled. Around 95% is processed post-demolition and then crushed to a 6F2 specification. The unprocessed material first remains on site for 5 weeks:

- Around 65% of the concrete is then crushed and recycled on-site, remaining at the demolished structure site for an average period of 19 weeks prior to being used on-site as hardcore for site reinstatement.
- Around 30% of the crushed concrete is transported for further treatment and processing.
- Around 5% is left unprocessed at the demolition site and is directly used as hardcore.

Very little carbonation take place in C1. Therefore, only carbonation at stage C3 is accounted for. Carbonation takes place when the crushed concrete is further processed and managed until it is no longer waste or until demolition and site reinstatement works are complete. All carbonation calculations were carried out in accordance with the methodology introduced in EN 16757, using The Degree of Carbonation (Dc) of around 85%, the k-factors are based on a mixture of "*outdoor/ exposed*" and "*buried*" exposure conditions. Transport for waste concrete and rebar treatment is assumed to be for 50 km (IStructE, 2025). Crushing energy consumption is based on Table 4 of PCR 2019:14.V 2.0.1.

Scenario parameter (C1-C4)	Quantity	Unit
Diesel use for crushing and processing operations (up to End-of-waste)	3.82	kWh/m^2
CO_2 uptake (carbonation) at C3	3.05	Kg CO_2/ m^2

Figure 3. Typical flows of end-of-life concrete during modules C and D and relevant carbonation (NFDC, 2023).



Module D Loads & Benefits beyond the System Boundary

Substitution of virgin materials (aggregates) by the crushed concrete from the demolished building is based on 100% of the total mass of concrete. Substitution of the virgin steel content from the reinforcement was also accounted for, resulting in a positive value as rebar and mesh is largely made of recycled steel.

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

	Product stage			Distribution/ installation stage		Use stage							End-of-life stage				Beyond product life cycle
	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	-	-	-	-	-	-	UK	UK	UK	UK	UK
Share of primary data	10.4%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	NA			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	+28.1%/-13.4%			0%	0%	-	-	-	-	-	-	-	-	-	-	-	-

x= declared, ND = not declared

Share of primary data:

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Production of Portland cements and reinforcing steel	EPD, Database	Confidential	2022, 2023, 2021, 2023	Primary data, secondary data	3.2%
Other raw materials	Database, EPD	Ecoinvent v3.10, One Click LCA	2021, 2023, 2024, 2025	Secondary data	0%
Transport of raw materials to manufacturing sites	Database Data collection	Ecoinvent v3.10 EPD Owner	2023	Primary data, secondary data	0%
Manufacture of product	Collected data	EPD owner	2023	Primary data	7.2%
Generation of electricity used in manufacturing of product	Database	Ecoinvent v3.10	2023	Primary data, secondary data	0.8% (already part of manufacture of product)
Other processes	Databases	Ecoinvent v3.10, One Click LCA	2019–2023	Secondary data	0%
Total share of primary data, of GWP-GHG results for A1-A3					10.4%

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories. The reported share of primary data is associated with uncertainty, as an EPD [or: several EPDs] used as data source lack information on the share of primary data.

ENVIRONMENTAL PERFORMANCE

LCA results of the product(s) - main environmental performance results

Mandatory impact category indicators according to EN 15804

Results per declared unit																
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	6,88E+01	4,89E+00	6,06E−01	−9,00E−01	ND	ND	ND	ND	ND	ND	1,38E+00	6,72E−01	−6,11E−01	1,12E−01	2,71E+01
GWP-fossil [1]	kg CO_2 eq.	6,87E+01	4,88E+00	6,06E−01	−9,00E−01	ND	ND	ND	ND	ND	ND	1,38E+00	6,72E−01	−6,12E−01	1,12E−01	2,71E+01
GWP-biogenic	kg CO_2 eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-luluc	kg CO_2 eq.	2,49E−02	1,90E−03	6,20E−05	0,00E+00	ND	ND	ND	ND	ND	ND	1,41E−04	2,62E−04	6,04E−04	6,42E−05	−4,01E−03
ODP	kg CFC 11 eq.	8,78E−07	1,02E−07	9,27E−09	0,00E+00	ND	ND	ND	ND	ND	ND	2,11E−08	1,40E−08	3,50E−08	3,25E−09	−5,56E−09
AP	mol H^+ eq.	2,20E−01	1,15E−02	5,47E−03	0,00E+00	ND	ND	ND	ND	ND	ND	1,24E−02	1,59E−03	2,09E−02	7,96E−04	8,17E−02
EP-freshwater	kg P eq.	7,15E−01	3,41E−04	1,75E−05	0,00E+00	ND	ND	ND	ND	ND	ND	3,98E−05	4,69E−05	2,22E−04	9,23E−06	1,19E−02
EP-marine	kg N eq.	4,78E−02	3,02E−03	2,54E−03	0,00E+00	ND	ND	ND	ND	ND	ND	5,77E−03	4,16E−04	9,45E−03	3,04E−04	2,03E−02
EP-terrestrial	mol N eq.	7,02E−01	3,27E−02	2,78E−02	0,00E+00	ND	ND	ND	ND	ND	ND	6,31E−02	4,50E−03	1,01E−01	3,31E−03	2,23E−01
POCP	kg NMVOC eq.	1,87E−01	2,00E−02	8,28E−03	0,00E+00	ND	ND	ND	ND	ND	ND	1,88E−02	2,76E−03	3,01E−02	1,19E−03	8,09E−02
ADP-minerals &metals*	kg Sb eq.	4,87E−05	1,40E−05	2,17E−07	0,00E+00	ND	ND	ND	ND	ND	ND	4,94E−07	1,92E−06	9,37E−06	1,78E−07	−2,34E−06
ADP-fossil*	MJ	4,92E+02	7,33E+01	7,92E+00	0,00E+00	ND	ND	ND	ND	ND	ND	1,80E+01	1,01E+01	3,08E+01	2,76E+00	2,28E+02
WDP*	m^3	6,85E+00	3,76E−01	1,98E−02	0,00E+00	ND	ND	ND	ND	ND	ND	4,50E−02	5,17E−02	1,65E−01	7,95E−03	3,73E+00
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 on these results are high or as there is limited experienced with the indicator.*

[1] The indicated Global Warming Potential fossil fuels (GWP-fossil) value includes GHG emissions from combustion of both fossil and waste-derived fuels during cement manufacture. The A1-A3 'net' (or cut-off-by-Classification) value of GWP-fossil, excluding combustion of waste-derived fuel, is **64.0 kg CO_2e/ m^2** (167.7 kg CO_2e/ tonne).

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. The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Additional mandatory and voluntary impact category indicators

Results per declared unit																
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[2]	kg CO_2 eq.	6,88E+01	4,89E+00	6,06E−01	−9,00E−01	ND	ND	ND	ND	ND	ND	1,38E+00	6,72E−01	−6,11E−01	1,12E−01	2,71E+01

Additional voluntary environmental impact indicators (EN 15804, Table 4) are not declared.

Resource use indicators

Results per declared unit																
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,15E+02	1,19E+00	5,02E−02	0,00E+00	ND	ND	ND	ND	ND	ND	1,14E−01	1,64E−01	8,46E−01	2,66E−02	−1,19E+01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,15E+02	1,19E+00	5,02E−02	0,00E+00	ND	ND	ND	ND	ND	ND	1,14E−01	1,64E−01	8,46E−01	2,66E−02	−1,19E+01
PENRE	MJ	4,66E+02	7,33E+01	7,92E+00	0,00E+00	ND	ND	ND	ND	ND	ND	1,80E+01	1,01E+01	3,08E+01	2,76E+00	2,28E+02
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	4,66E+02	7,33E+01	7,92E+00	0,00E+00	ND	ND	ND	ND	ND	ND	1,80E+01	1,01E+01	3,08E+01	2,76E+00	2,28E+02
SM	kg	3,21E+01	3,17E−02	3,29E−03	0,00E+00	ND	ND	ND	ND	ND	ND	7,48E−03	4,36E−03	1,81E−02	6,93E−04	−1,94E+01
RSF	MJ	2,35E+01	4,00E−04	8,60E−06	0,00E+00	ND	ND	ND	ND	ND	ND	1,96E−05	5,50E−05	5,61E−04	1,43E−05	−9,70E−04
NRSF	MJ	4,32E+01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	5,76E−01	1,08E−02	5,24E−04	0,00E+00	ND	ND	ND	ND	ND	ND	1,19E−03	1,49E−03	3,87E−03	2,87E−03	1,43E−02
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															

[2] 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 declared unit															
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1,42E+00	1,06E−01	8,82E−03	0,00E+00	ND	ND	ND	ND	ND	ND	2,01E−02	1,46E−02	6,78E−02	3,04E−03	−1,19E+00
Non-hazardous waste disposed	kg	1,77E+01	2,12E+00	1,20E−01	0,00E+00	ND	ND	ND	ND	ND	ND	2,73E−01	2,92E−01	2,21E+00	6,96E−02	7,23E+01
Radioactive waste disposed	kg	8,14E−03	2,19E−05	8,61E−07	0,00E+00	ND	ND	ND	ND	ND	ND	1,96E−06	3,01E−06	1,61E−05	4,22E−07	−4,89E−04

Output flow indicators

Results per declared unit																
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	2,19E−01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	3,64E+02	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	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	ND	ND	ND	ND	ND	ND	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	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Disclaimer: A minor technical inconsistency (<10%) between PENRE and ADP-fossil results in modules A1-A3 has been identified. A contribution analysis shows that the discrepancy originates from the specific characterization factors in the background environmental profiles of some fuel datapoints.

ADDITIONAL ENVIRONMENTAL INFORMATION

Further carbonation beyond the system boundary

100% of the Declared Unit is recycled and reused in groundworks at the End-of-life, either within the demolished building/ structure site, or offsite, and either after demolition or after further sizing/ crushing. By assuming a 6F2 distribution for the further processed recycled concrete and a "buried in ground (above groundwater level)" exposure condition, and by considering a Secondary Life extended over 100 years, the additional carbonation beyond the system boundary would be 11.15 kg CO_2e/m^2. This calculation was carried out in accordance with Annex G of EN 16757.

Overall CO_2 uptake in cladding (100 and 60 years lifespan)

LIFE CYCLE STAGE	CO_2 UPTAKE			
	100 years lifespan		*60 years lifespan*	
	Kg CO_2/ m^2	Kg CO_2/ tonne	Kg CO_2/ m^2	Kg CO_2/ tonne
Module B1	0.90	2.36	0.70	1.82
Module C3	3.05	7.99	3.05	7.99
Total (Modules A-C)	3.95	10.35	3,75	9.81
Secondary Use (beyond system boundary)	11.15	29.21	11.15	29.21
Total (all modules including secondary use)	15.10	39.56	14.90	39.02

INFORMATION RELATED TO SECTOR EPD

Sector EPD manufacturer population and sample size

The results of this Sector EPD are based on average (mean) results from an LCI combining a sample of 5 factories. The production volume covered by data collection (sample) is believed to be >80% of the production represented by the EPD and the production/ sites of the manufacturing companies identified in the "Product Information" section in 2023. No differences in manufacturing or concrete mix practices were identified in the other three factories included in the population, but not in the sample. The sample included in LCI is therefore considered representative of MPA Precast membership.

This Sector EPD is representative only of Crosswall precast concrete panel manufacturing sites within MPA Precast membership. MPA Precast membership makes up around 70% of the reinforced precast concrete market in the UK, which is believed to be around 5 million tonnes of reinforced precast per annum. The declared product is an average that is not available for purchase on the market.

Conversion

Where these EPD results are used for different shapes and depths of Crosswall panels manufactured by members of MPA Precast, a tonne conversion factors should be used using equivalent mass units. For example, 68.8 kg CO_2e/m^2 (GWP-Fossil for A1-A3) is converted to 180.2 kg CO_2e/ tonne.

The GWP-fossil values reported in this EPD are based on 'Gross' CO_2e emissions i.e., they include combustion emissions from both fossil and waste-derived fuels (also called 'alternative' or 'secondary' fuels) during the manufacture of cement. An equivalent 'Net' (*Cut-off by Classification*) GWP-fossil value,

which excludes waste-derived fuel emissions in accordance with the Polluter Pays principle, is also reported as recommended in EN 16908 (**64.0 kg CO_2e/m²** or **167.7 kg CO_2e/ tonne** for A1-A3). The 'Net' value is also more in line with other product assessments in accordance with EN 15804 (D.2.4), ensuring more consistency in assessments and optioneering to EN 15978 and EN 17274.

Use of this Sector EPD

The LCA indicators for Crosswall Precast Panels in this sector EPD are intended to provide the basis for the environmental assessment of buildings, infrastructures and other construction works in typical UK situations and in accordance with nationally recognised standards, such as the UK RICS WLCA Professional Standard, NZCSB Standard, or PAS 2080. Such assessments should consider the whole life cycle: Modules A1-A3 should not be used alone without considering results from Module C.

The sampling and data used for this Sector EPD is only applicable to members of MPA Precast and signatories of the MPA Precast Sustainability Charter. The sampling carried out did not account for any representation of products manufactured outside the MPA Precast Sustainability Charter. Therefore, this EPD is not representative of production at sites not covered by MPA Precast's membership.

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. The declared product is an average that is not available for purchase on the market, and the results are not representative of any specific manufacturer or its products.

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
6F2	Refers to a type of graded crushed recycled aggregate with 75mm – 0mm grading.
AIB	Association of Issuing Bodies
CEN	European Committee for Standardization
CLC	Co-location centre
CPC	Central product classification
EF	Environmental Footprint
EN	European Norm (Standard)
D_c	Degree of Carbonation (see EN 16757)
DQA	Data Quality Assessment
GGBS	Ground Granulated Blast-furnace Slag
GHS	Globally harmonized system of classification and labelling of chemicals
GPI	General Programme Instructions
GRI	Global Reporting Initiative
HTCEC	"How to Calculate Embodied Carbon" guide
ISO	International Organization for Standardization
IStructE	Institute of Structural Engineers (UK)
MPA	Mineral Products Association
ND	Not Declared
NFDC	National Federation of Demolition Contractors (UK)
NZCBS	Net Zero Carbon Building Standard (UK)
RCA	Recycled Concrete Aggregates
RICS	Royal Institution of Chartered Surveyors (UK)
SCM	Supplementary Cementitious Materials
SVHC	Substances of Very High Concern
WLCA	Whole Life Carbon Assessment

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VERSION HISTORY

Original Version of the EPD, 20YY-MM-DD

Revision 1, 20YY-MM-DD,
Differences versus the previously published version: ...

Revision 2, 20YY-MM-DD
Differences versus the previously published version: ...

...

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