Statement of Verification

BREG EN EPD No.: 000629 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Loveld

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

One cubic meter of white cement based prefabricated concrete element, made of concrete and reinforced steel.

Company Address

Loveld nv
12 Brug Zuid
9880 Aalter
Belgium

Signed for BRE Global Ltd	Emma Baker Operator	06 September 2024 Date of this Issue
06 September 2024 Date of First Issue		05 September 2029 Expiry Date

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ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

EPD Number: 000629

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2023 Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 PN 514 Rev 3.1
Commissioner of LCA study	**LCA consultant/Tool**
Loveld nv 12 Brug Zuid 9880 Aalter Belgium	CO2logic sa nv Rue Cantersteen 47 1000 Brussels Belgium Tool: Gabi v10.6.2.9, Sphera professional database v2022.2
Declared/Functional Unit	**Applicability/Coverage**
One cubic meter of white cement based prefabricated concrete element, made of concrete and reinforced steel, manufactured in Belgium (Aalter) and transported to Great Britain customer for its use and end-of-life	Product Average.
EPD Type	**Background database**
Cradle to Grave	Sphera professional database 2023.1 and ecoinvent v3.8

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Roger Connick
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑		☑

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Loveld nv
12 Brug Zuid
9880 Aalter
Belgium

Construction Product:

Product Description

Loveld specializes in façades of architectural concrete and the incorporation of natural stone and bricks into prefabricated elements. Its clients can be found in office and utility construction and high-rise residential building construction in Belgium, the Netherlands, United Kingdom, France and Germany. They not only offer delivery contracts, but we can also supply complete shell and façade packages.

The product covered by the EPD corresponds to an average concrete precast element made from white cement. Indeed, white cement is used in elements of a variety of colours. This EPD is the average of the Initium (white), Berkeley (light red) and Elephant Park (beige) mixes. The difference in colour stems from different coloured aggregates and colouring agents. Steel reinforcement is also included in the product while additional inclusions to the concrete such as bricks or insulation are not included.

Website: https://www.loveld.com/en/

Technical Information

Property	Value, Unit
Density	2487 kg/m3
Concrete strength (NEN-EN206-1:2014)	C35/45

Data available in declaration of performance (DoP) upon request to Loveld

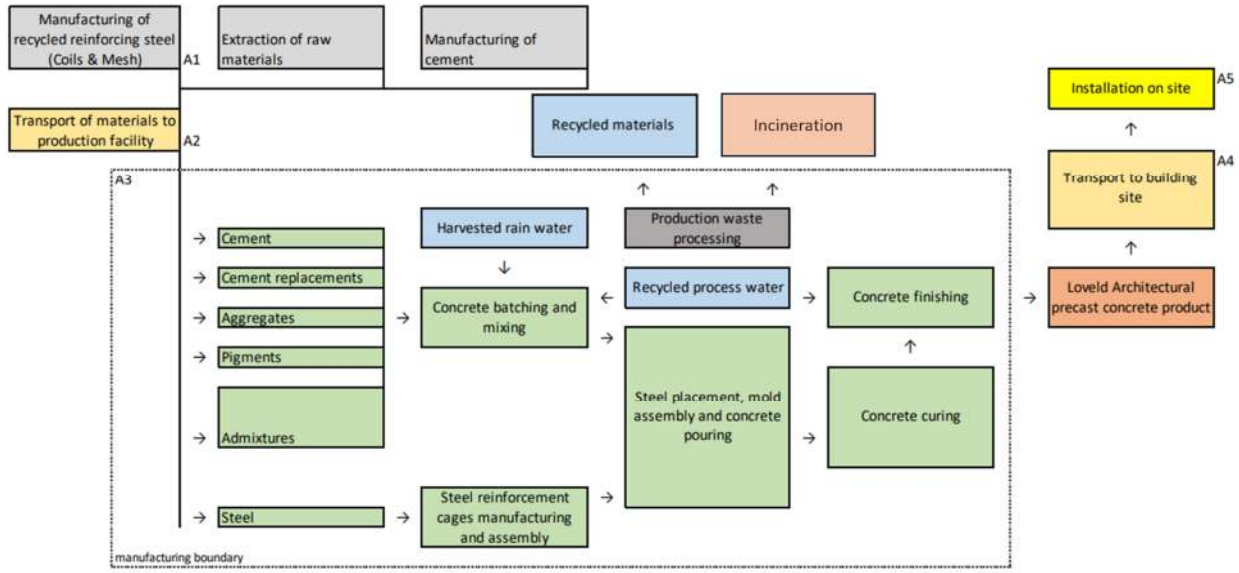
Main Product Contents

Material/Chemical Input	%
Aggregates	73,0%
Cement	14,8%
Additives	0,7%
Water	6,7%
Steel reinforcement	4,7%

Manufacturing Process

1. Design and preparation: The design of the precast concrete elements is first developed, and the necessary preparations are made for manufacturing. This includes creating molds and creating the steel reinforcing mesh.
2. Mixing and casting: The concrete mix is prepared according to the specific requirements of the precast element being produced. The mix is then poured into the mold and allowed to harden.
3. Finishing and curing: When the concrete has hardened enough, the mold is removed, and a surface finishing is applied. The element is then cured, typically using a combination of heat and moisture, to ensure that it reaches its full strength.

Process flow diagram



Construction Installation

Concrete elements are hoisted with a crane, placed at their respective location in the building and fastened using anchor rods.

Use Information

No specific information is required for this module. No maintenance, energy or repair are required.

End of Life

The building is demolished, and the concrete rubble waste is sent to a sorting plant where concrete and steel are separated. The recovered concrete rubble and steel are recycled. The share of waste concrete that has not been sent to the sorting plant is sent to landfill.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

One cubic meter of prefabricated concrete element, made of concrete and reinforced steel, manufactured in Belgium (Aalter) and transported to Great Britain customer for its use and end-of-life.

System boundary

The system boundaries of the product LCA follow the modular design defined by EN 15804+A2. The following chapters describe the modules which are within the scope of this study. The scope for the EPD is "**cradle to grave"**.

All stages of the products life cycle have been taken into account and calculated. However, some of the modules are not relevant for precast concrete.
For the following modules, no impact on the environment has been taken into account:

- **B1 Use stage:** no emissions to the environment are expected to arise from the use phase of the precast concrete elements. Note however that the carbonation of the use phase of the concrete is declared in this module.
- **B2 Maintenance:** no maintenance is required for the concrete elements.
- **B3 Repair:** no repair is required for the concrete elements.
- **B4 Replacement:** no concrete elements are replaced before the end of life of the building is reached.
- **B5 Refurbishment:** there is no refurbishment of the concrete elements in practice.
- **B6 Operational energy use:** not relevant for concrete elements.
- **B7 Operational water use:** not relevant for concrete elements.

Data sources, quality and allocation

The data used is specific production data provided by Loveld from its manufacturing site in Aalter covering the production period of January to December 2021. Energy and ancillaries have been allocated on a mass basis to the declared unit. Material inputs have been obtained from specific product recipes. The waste quantities have been obtained by closing the mass balance.

The activity data is thus of high quality. The background data originates from the Sphera database and is supported by ecoinvent datasets for small material contributions when more relevant. The choice of dataset has been checked for representativeness according to the UN Environment Global Guidance on LCA database development levels and criteria. The overall geographical representativeness is good with most material datasets available at European level and energy datasets available at country level. The time representativeness and technical representativeness are very good, the datasets are indeed up to date and fit the modelled materials and processes well.

There are no co-products of the manufacturing process. No allocation was required.

Cut-off criteria

For this study, all inputs and outputs have been taken into account.

Energy

The emission factor for the Belgian grid electricity mix used is 0,181 kgCO2e/kWh.

LCA Results

Parameters describing environmental impacts									
			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	kg $(PO_4)^{3-}$ eq
Product stage	Raw material supply	A1	6,52E+02	6,46E+02	5,41E+00	2,54E-01	1,17E-06	3,54E+00	1,25E-01
	Transport	A2	2,56E+01	2,57E+01	-3,81E-01	2,39E-01	3,36E-12	1,66E-01	9,44E-05
	Manufacturing	A3	3,55E+01	1,02E+02	-6,61E+01	4,49E-02	8,17E-08	1,90E-01	6,09E-04
	Total (of product stage)	A1-3	7,13E+02	7,73E+02	-6,11E+01	5,38E-01	1,25E-06	3,90E+00	1,26E-01
Construction process stage	Transport	A4	3,24E+01	3,25E+01	-3,66E-01	2,34E-01	3,79E-12	4,27E-01	9,41E-05
	Construction	A5	7,29E+00	7,65E+00	-3,61E-01	2,89E-04	1,14E-10	3,73E-02	1,29E-05
Use stage	Use	B1	-2,50E+01	-2,50E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
End of life	Deconstruction, demolition	C1	1,40E+01	1,47E+01	-6,92E-01	3,05E-04	2,10E-12	7,17E-02	2,94E-06
	Transport	C2	1,50E+01	1,51E+01	-2,24E-01	1,41E-01	1,97E-12	9,74E-02	5,55E-05
	Waste processing	C3	2,54E+00	2,52E+00	1,81E-02	1,68E-04	5,54E-11	6,26E-03	3,71E-06
	Disposal	C4	3,77E-01	4,93E-01	-1,27E-01	1,16E-02	9,53E-12	2,66E-02	7,55E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3,73E+01	-3,75E+01	3,06E-01	-2,27E-02	1,72E-11	-1,03E-01	-2,92E-05

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, 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; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

Parameters describing environmental impacts									
			EP-marine	EP-terrestrial	POCP	ADP-mineral& metals	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m^3 world eq deprived	disease incidence
Product stage	Raw material supply	A1	6,86E-01	7,49E+00	2,61E+00	-2,21E-04	5,86E+03	6,16E+01	1,15E-05
	Transport	A2	8,14E-02	9,00E-01	1,57E-01	1,71E-06	3,52E+02	3,12E-01	6,16E-07
	Manufacturing	A3	6,90E-02	7,29E-01	2,01E-01	5,25E-05	2,36E+03	4,36E+00	6,52E-06
	Total (of product stage)	A1-3	8,37E-01	9,12E+00	2,97E+00	-1,67E-04	8,57E+03	6,63E+01	1,86E-05
Construction process stage	Transport	A4	1,50E-01	1,65E+00	3,43E-01	1,74E-06	4,33E+02	3,18E-01	5,02E-06
	Construction	A5	1,78E-02	1,95E-01	4,93E-02	8,44E-08	9,86E+01	1,58E-02	4,22E-07
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
End of life	Deconstruction, demolition	C1	3,43E-02	3,76E-01	9,52E-02	2,06E-07	1,90E+02	1,73E-02	8,16E-07
	Transport	C2	4,78E-02	5,29E-01	9,22E-02	1,01E-06	2,07E+02	1,83E-01	3,62E-07
	Waste processing	C3	2,25E-03	2,44E-02	6,37E-03	5,13E-07	5,46E+01	1,34E-01	6,32E-08
	Disposal	C4	6,87E-03	7,56E-02	2,07E-02	1,73E-07	4,99E+01	4,12E-01	3,27E-07
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2,08E-02	-2,03E-01	-7,41E-02	-1,89E-04	-3,98E+02	-2,70E+00	-2,05E-06

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
PM = Particulate matter.

LCA Results (continued)

Parameters describing environmental impacts							
			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U^{235} eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	3,47E+01	1,02E+04	1,52E-06	6,82E-06	1,15E+03
	Transport	A2	9,86E-02	2,52E+02	5,12E-09	2,28E-07	1,47E+02
	Manufacturing	A3	2,11E+01	3,16E+02	1,29E-07	4,94E-07	1,76E+04
	Total (of product stage)	A1-3	5,59E+01	1,08E+04	1,66E-06	7,54E-06	1,89E+04
Construction process stage	Transport	A4	1,11E-01	3,09E+02	6,15E-09	2,59E-07	1,44E+02
	Construction	A5	1,92E-02	4,42E+01	9,73E-10	2,77E-08	2,41E+00
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
End of life	Deconstruction, demolition	C1	2,88E-02	8,39E+01	1,59E-09	5,20E-08	1,11E+00
	Transport	C2	5,79E-02	1,48E+02	3,01E-09	1,34E-07	8,64E+01
	Waste processing	C3	6,92E-01	2,59E+01	9,34E-10	2,54E-08	2,58E+01
	Disposal	C4	6,56E-02	2,70E+01	4,19E-09	4,43E-07	1,21E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1,46E-03	-4,97E+01	1,08E-08	-1,97E-07	-2,68E+01

IRP = Potential human exposure efficiency relative to U235;
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
HTP-nc = Potential comparative toxic unit for humans; and
SQP = Potential soil quality index.

LCA Results (continued)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	3,76E+02	0,00E+00	3,76E+02	5,86E+03	0,00E+00	5,86E+03
	Transport	A2	2,56E+01	0,00E+00	2,56E+01	3,53E+02	0,00E+00	3,53E+02
	Manufacturing	A3	1,73E+03	8,94E+02	2,63E+03	9,18E+02	1,44E+03	2,36E+03
	Total (of product stage)	A1-3	2,13E+03	8,94E+02	3,03E+03	7,13E+03	1,44E+03	8,57E+03
Construction process stage	Transport	A4	2,55E+01	0,00E+00	2,55E+01	4,35E+02	0,00E+00	4,35E+02
	Construction	A5	5,86E+00	0,00E+00	5,86E+00	9,91E+01	0,00E+00	9,91E+01
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
End of life	Deconstruction, demolition	C1	1,08E+01	0,00E+00	1,08E+01	1,91E+02	0,00E+00	1,91E+02
	Transport	C2	1,50E+01	0,00E+00	1,50E+01	2,07E+02	0,00E+00	2,07E+02
	Waste processing	C3	4,03E+01	0,00E+00	4,03E+01	5,46E+01	0,00E+00	5,46E+01
	Disposal	C4	8,13E+00	0,00E+00	8,13E+00	5,00E+01	0,00E+00	5,00E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-8,47E+00	0,00E+00	-8,47E+00	-3,98E+02	0,00E+00	-3,98E+02

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	7,71E+01	0,00E+00	0,00E+00	-3,46E+00
	Transport	A2	0,00E+00	0,00E+00	0,00E+00	2,80E-02
	Manufacturing	A3	0,00E+00	0,00E+00	0,00E+00	3,18E-01
	Total (of product stage)	A1-3	7,71E+01	0,00E+00	0,00E+00	-3,11E+00
Construction process stage	Transport	A4	0,00E+00	0,00E+00	0,00E+00	2,80E-02
	Construction	A5	8,63E-03	0,00E+00	0,00E+00	1,56E-04
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00
End of life	Deconstruction, demolition	C1	0,00E+00	0,00E+00	0,00E+00	1,07E-03
	Transport	C2	0,00E+00	0,00E+00	0,00E+00	1,65E-02
	Waste processing	C3	0,00E+00	0,00E+00	0,00E+00	1,61E-02
	Disposal	C4	0,00E+00	0,00E+00	0,00E+00	1,26E-02
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0,00E+00	0,00E+00	0,00E+00	-3,39E+00

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	-1,45E-06	2,80E+01	1,95E-02
	Transport	A2	1,09E-09	5,38E-02	6,61E-04
	Manufacturing	A3	1,06E+00	2,19E+00	2,29E-01
	Total (of product stage)	A1-3	1,06E+00	3,73E+01	4,07E-02
Construction process stage	Transport	A4	1,35E-09	6,08E-02	7,52E-04
	Construction	A5	9,54E-05	2,10E-01	1,60E-04
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00
End of life	Deconstruction, demolition	C1	1,82E-11	1,37E-02	2,84E-04
	Transport	C2	6,42E-10	3,16E-02	3,88E-04
	Waste processing	C3	-6,34E-09	5,71E-02	6,72E-03
	Disposal	C4	1,09E-09	4,99E+02	5,69E-04
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2,48E-06	-8,52E+01	-4,53E-03

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Transport	A2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Manufacturing	A3	0,00E+00	2,00E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Total (of product stage)	A1 -3	0,00E+00	2,00E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Construction process stage	Transport	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Construction	A5	0,00E+00	9,18E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use stage	Use	B1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Maintenance	B2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Repair	B3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Replacement	B4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Refurbishment	B5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational energy use	B6	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Operational water use	B7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
End of life	Deconstruction, demolition	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Transport	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Waste processing	C3	0,00E+00	2,25E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Disposal	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Potential benefits and loads beyond the system	Reuse, recovery, recycling potential	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Scenario specific to concrete elements sold in the UK. The first two legs of transport, from the manufacturing site to the Belgian port and transport over the English Channel have been assumed. In practice, this part of the transport is performed by a freight company. The last leg of transport, from the port of Tilbury to the UK clients has been based on client addresses.		
	Fuel type / Vehicle type	kg/tkm	Leg 1: 0,0226 Leg 2: 0,0028 Leg 3: 0,0226
	Distance:	km	Leg 1: 44 Leg 2: 272 Leg 3: 89,6
	Capacity utilisation (incl. empty returns)	%	Leg 1: 65% Leg 2: 70% Leg 3: 61%
	Bulk density of transported products	kg/m^3	2487
A5 – Installation in the building	Placing of the concrete element with a crane and losses		
	Crane fuel consumption	l/h	2,5
	Loss factor	%	0,009%
B2 – Maintenance	No maintenance and repair is foreseen. Replacement and refurbishment are irrelevant for concrete elements (EN 16757, 2017).		
B3 – Repair			
B4 – Replacement			
B5 – Refurbishment			
Reference service life	100 years. This is the reference service life of structural concrete according to EN 16757.		
B6 – Use of energy; B7 – Use of water	No heating systems are included in the elements and no energy and water consumption is foreseen.		
C1 to C4 End of life,	The building is demolished. The recovered concrete rubble is sent to precursing before being reused in roadbeds or being sent to landfill.		
C1 – Deconstruction, demolition	Demolition machine diesel consumption	MJ/kg	0,07
C2 – Transport	Fuel type / Vehicle type	kg/tkm	0,0226
	Distance:	km	71
	Capacity utilisation (incl. empty returns)	%	61
	Bulk density of transported products	kg/m^3	2238

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
C3 – Waste processing	Recycling share	%	90%
	Landfill share	%	10%
	Crusher electricity consumption	kWh/kg	0,0037
	Charging and discharging diesel consumption	MJ/m^3	5,9
C4 – Waste disposal	The concrete disposed on landfill is modelled as inert material on landfill with the additional of a carbonation contribution.		
Module D	The recovered steel and concrete from module C3 are assumed to replace virgin steel and gravel respectively.		

Summary, comments and additional information

Interpretation

Overall, the impact of the concrete on the environment mainly arise from the raw materials production in module A1. This corresponds to the upstream production of cement and rebars.
An overview of the main sources of impacts for the main indicators of the EN15804+A2 is provided below:

Climate change: the upstream production of cement and rebars are the main drivers of the impacts (see A1). Energy use at the concrete plant always plays a role (see A3).

Ozone depletion: the impacts of this indicator are driven by the use of additives.

Acidification: the impacts of this indicator are driven by the upstream production of cement and rebars as well as the transport.

Eutrophication, freshwater: the impacts of this indicator are driven by the use of additives.

Eutrophication, marine: the impacts of this indicator are driven by the upstream production of cement and rebars as well as the transport.

Eutrophication terrestrial: the impacts of this indicator are driven by the upstream production of cement and rebars as well as the transport.

Photochemical ozone formation: the impacts of this indicator are driven by the upstream production of cement and rebars as well as the transport.

Resource use, minerals and metals: minerals used and additives.

Resource use, fossils: upstream energy use for rebars and cement production as well as concrete production energy requirements.

Water use: the impacts of this indicator are driven by the upstream production of cement and rebars as well as additives.

References

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BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

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B-EPD. B-EPD – Construction Product Category Rules.

EN 16757. Sustainability of construction works - Environmental product declarations - Product Category Rules for concrete and concrete elements.

European Cement Research Academy. Closing the loop: What type of concrete re-use is the most sustainable option?

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