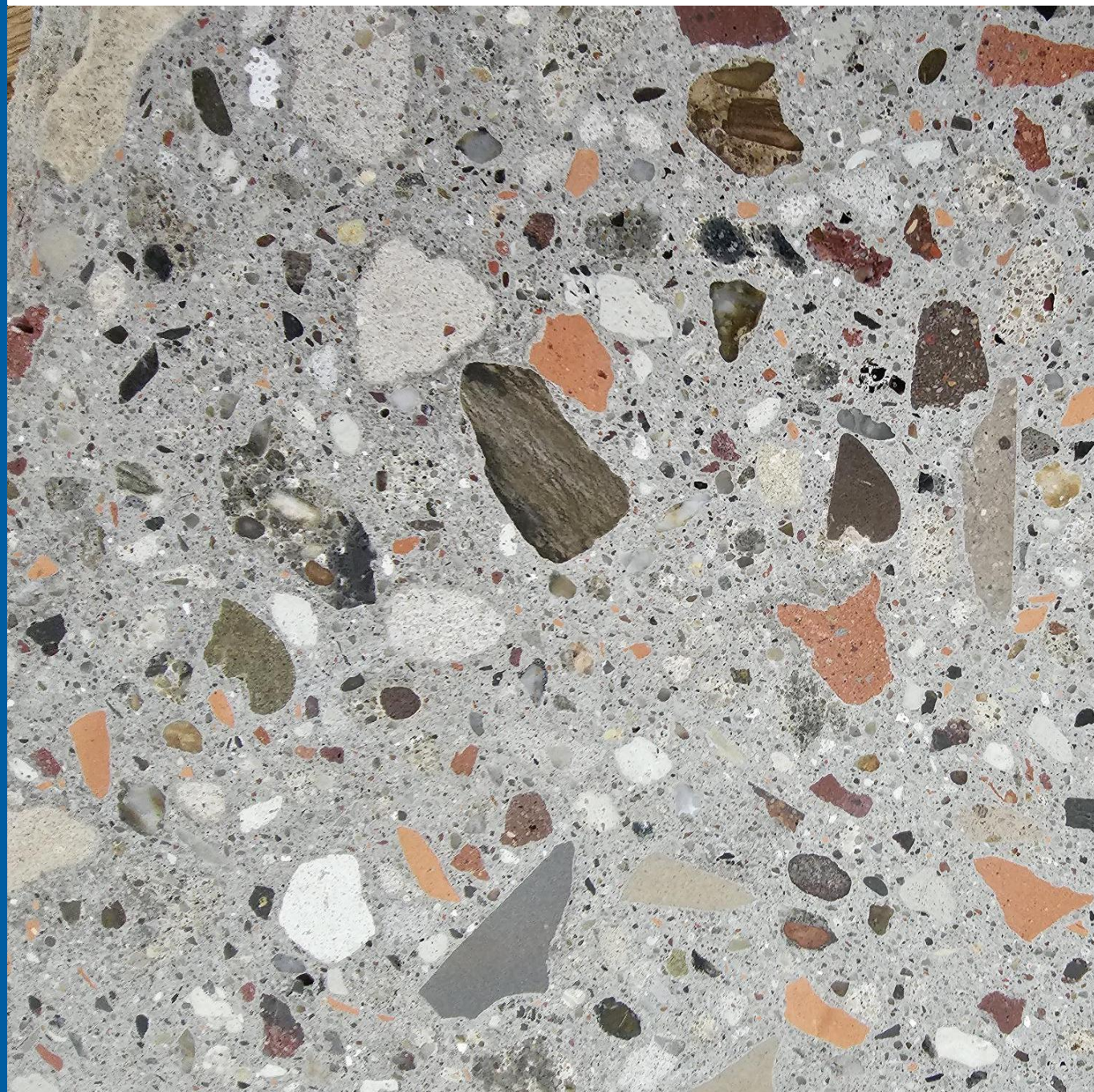
Environmental Product Declaration (EPD)
According to ISO 14025 and EN 15804

R-concrete



Registration number:	EPD-Kiwa-EE-171735-EN
Issue date:	06-05-2024
Valid until:	06-05-2029
Declaration owner:	Betonwerk Büscher GmbH & Co. KG
Publisher:	Kiwa-Ecobility Experts
Program operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

R-concrete

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-1711735-EN

1.3 VALIDITY

Issue date: 06-05-2024

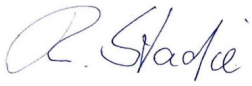
Valid until: 06-05-2029

1.4 PROGRAM OPERATOR

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin
DE

Raoul Mancke

(Head of programme operations, Kiwa-Ecobility Experts)



Dr. Ronny Stadie

(Verification body, Kiwa-Ecobility Experts)

1.5 OWNER OF THE DECLARATION

Manufacturer: Betonwerk Büscher GmbH & Co. KG

Address: Bült 54, 48619 Heek

E-mail: overbeeke@buescher-containerdienst.de

Website: https://www.buescher-betonfertigteile.de/

Production location: concrete plant Büscher

Address production location: Bült 54, 48619 Heek

1.6 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804:2012+A2:2019 serves as the core PCR.

☐ Internal ☑ External

Elisabeth Amat Guasch, Greenize

1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The programme operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

1.8 PRODUCT CATEGORY RULES

PCR A: Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

PCR B: Nachhaltigkeit von Bauwerken –Umweltproduktdeklarationen - Produktkategorieregeln für Beton und Betonelemente; Deutsche Fassung EN 16757:2022

1.9 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804. For the

1 General information

evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPDs programs may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

1.10 CALCULATION BASIS

LCA method R<THiNK: Ecobility Experts | EN15804+A2

LCA software*: Simapro 9.1

Characterization method: EN 15804 +A2 Method v1.0

LCA database profiles: EcoInvent version 3.6

Version database: v3.16 (2024-02-12)

** Used for calculating the characterized results of the Environmental profiles within R<THiNK.*

1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'R-concrete' with the calculation identifier ReTHiNK-71735.

2 Product

2.1 PRODUCT DESCRIPTION

The R-concrete from Betonwerk Büscher GmbH & Co. KG for the Büscher wall is a normal concrete of strength class strength class C20/25 or higher in accordance with DIN EN 206-1 in conjunction with DIN 1045-2 using a recycled aggregate in accordance with DIN EN 12620 in conjunction with DIN 4226-101 which deviates from the German Committee for Reinforced Concrete (DAfStb) guideline "Concrete with recycled aggregates".

The R-concrete from Betonwerk Büscher GmbH & Co. KG for the Büscher wall consists of:

- a Portland cement CEM I 52.5 R or Portland slag cement CEM II/A-S 52.5 R according to DIN EN 197-1
- a concrete admixture of the superplasticizer (FM) action group according to DIN EN 934-2
- a recycled aggregate according to DIN EN 12620 similar to type 3 according to DIN 4226-101 with proven environmental compatibility and a grading curve A/B 22 in accordance with DIN 1045-2, Figures L.2 and L.3

The water/cement ratio is a maximum of 0.50.
The product is being distributed as bulk material.

Ingredient	~ Composition
Cement	~15-25%
Recycled aggregate	~70-80%
Water	~7-17%
Ancillary materials	~0-2%

2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The R-concrete from Betonwerk Büscher GmbH & Co. KG for the Büscher wall may be used for the production of precast concrete and reinforced concrete elements in accordance with DIN EN 1992-1-1/NA Section 12 "Structures made of unreinforced or lightly reinforced concrete" for walls and in accordance with DIN EN 1992-1-1 for buildings in building classes 1 to 4. As such, it is only being used for internal production. These include:

- Büscher wall according to general building approval / general type approval from the German Institute for Construction Technology (DIBt) (Z-3.51-2184)
- Büscher-Block heavyweight masonry according to general building approval from the DIBt (Z.17.13-1284)

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

The reference service life could not be determined in accordance with /ISO 15686-1/. According to the service lives of building components for life cycle analyses in accordance with the Assessment System for Sustainable Building /BBSR Table 2017/, the reference service life of concrete products is over 50 years. Adding to this, the reference service live has not been taken into account in this caluclation since the Use stage (modules B1-B7) is not declared.

USED RSL (YR) IN THIS LCA CALCULATION:

50

2.4 TECHNICAL DATA

Information on the R-concrete:

- Gross density according to DIN EN 1097-6: >= 2.0 t/m³
- Water-cement ratio w/c: <=0.5
- Consistency range: F 3
- Frost resistance DIN CEN/TS 12390-3: < 1000 g/m³
- E-modulus reduction to normal concrete: - 45 %

Information on the R-aggregate:

- Composition according to DIN 4226-101-2017-08
- Classification similar to type 3 according to no. Z-3.51-2184
- Grading curve test according to DIN 933-1
- Composition of at least 2 grain groups
- Grading curve A/B 22 based on DIN 1045-2, Figures L.2 and L.3 consisting of recycled aggregates of grain groups 0/8 and 8/22

2.5 SUBSTANCES OF VERY HIGH CONCERN

The product was tested for hazardous substances according to DIN EN 12620 and DIN 4226-101. Either the hazardous substances were not measurable or below the limits set forth by the standards.

2 Product

2.6 DESCRIPTION PRODUCTION PROCESS

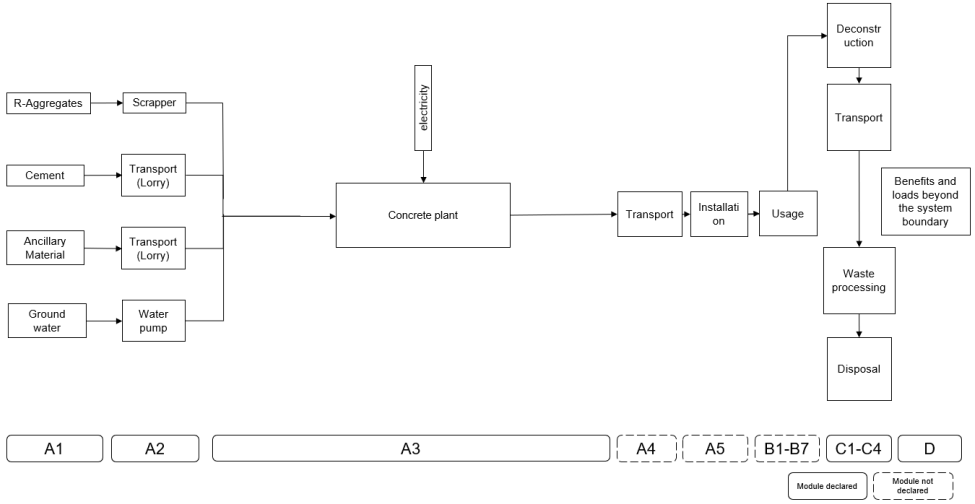
As a result of various research projects with extensive material testing, Betonwerk Büscher manufactures special Büscher walls consisting of a special type of concrete made out of:

- 100% recycled aggregate
- cement
- admixtures
- water

The process of creating the concrete is as follows:

The recycled aggregate is transported from the star-shaped storage facility to the storage silo for dosing using an automatic scraper system. The admixtures are delivered in IBC containers or by tanker and stored according to the supplier's specifications. The cement is delivered in bulk by silo trucks and stored in high silos for production. Water is added from approved groundwater extraction, which is tested annually for its suitability for concrete.

The materials are then mixed in the concrete plant. The basis for dosing one m^3 is the recipe composition of the building material. All materials used are dosed fully automatically via the mixing plant's machine- and moisture-control system. The accuracy of the weights is ensured by entering the maximum permitted weighing tolerances for each individual component in the machine parameters and is achieved via coarse and fine dosing. Water is dosed via a regularly calibrated water meter. Special valves ensure that water is added once the target moisture content of the mixture has been reached.



3 Calculation rules

3.1 DECLARED UNIT

m3

m3

reference_unit: cubic meter (m3)

3.2 CONVERSION FACTORS

Description	Value	Unit
reference_unit	1	m3
weight_per_reference_unit	2148.880	kg
Conversion factor to 1 kg	0.000465	m3

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with modules C1-C4 and module D LCA. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

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	X	X	X	X	X

The modules of the EN15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

3.4 REPRESENTATIVENESS

The EPD is representative for R-concrete, a product of Betonwerke Büscher GmbH. The data is representative for the companies products in the geographic location of Germany.

3.5 CUT-OFF CRITERIA

Product Stage (A1-A3)

All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

3 Calculation rules

More specifically for this calculation, the manufacturing process of the equipment, buildings and any other capital goods used in the concrete production have not been included. Also not considered was the transportation of personnel to the plant, within the plant, research and development activities and long-term emissions.

End of life stage (C1-C4)

All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Benefits and Loads beyond the system boundary (Module D)

All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

3.6 ALLOCATION

Allocation has not been applied in this LCA.

3.7 DATA COLLECTION & REFERENCE TIME PERIOD

Primary data was collected and provided by Betonwerke Büscher internally. As the product for which the EPD is created is based on a precise recipe, the used raw materials stem from the most current iteration of that recipe. Thus, the raw material data has been collected in 2023.
Transportation distances are based on the distances of the production plant and the suppliers that are being used in the year 2023.
The electricity usage was determined using the average energy consumption of each machine being used for one minute in between 4 and 6 runs. Through this, an average consumption per minute was calculated and applied to the exact times the production of one m^3 of concrete needs at the specific machine.

3.8 ESTIMATES AND ASSUMPTIONS

For the deconstruction of the product (module C1), a scenario was developed that reflects the average deconstruction process. Weight of the raw material taken into relation of hourly demolition potential. The same approach was used in regard to the debris removal. The value was, thus, taken from an NMD dataset, that has been entered in R<THiNK. Summarizing, two inputs have been made in C1, one for demolishing and one for debris removal by excavators.

The distances from the place of use to the respective waste treatment have been provided by the company on an average based on its internal data.

3.9 DATA QUALITY

The data is comprised of primary data directly collected by Betonwerk Büscher. It stems from the internal controlling, the exact measurements of the recipe for the product and measurements of the energy usage of singular machines used in the process. According to the criteria of the "UN Environmental Global Guidance on LCA database development" mentioned in EN 15804+A2, the data quality for all three representativeness categories (geographical, technical and time) can be described as good.
In addition, secondary data from the Ecoinvent database (2019, version 3.6) was used. The database is checked regularly and therefore meets the requirements of DIN EN ISO 14040/44 (background data not older than 10 years). The background data meets the requirements of EN 15804+A2.

The general rule that specific data from certain production processes or average data derived from certain processes must take precedence when calculating an EPD or LCA was upheld. Data for processes over which the manufacturer has no influence were assigned to generic data.

3.10 GUARANTEES OF ORIGIN

The electricity mix was chosen according to the average renewable mix delivered to Betonwerk Büscher GmbH in the reference year 2023. The calculation of this electricity mix followed the market based approach. No CO2 certificates were counted.

4 Scenarios and additional technical information

4.1 DE-CONSTRUCTION, DEMOLITION (C1)

The following information describes the scenario for demolition at end of life.

Description	Amount	Unit
Hydraulic excavator (average) [NMD generic]	0.219	hr
Hydraulic excavator (average) [NMD generic]	0.259	hr

4.2 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
concrete (i.a. elements, brickwork, reinforced concrete) Büscher	Lorry (Truck), unspecified (default) | market group for (GLO)	0	0	0	30	0

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default) | market group for (GLO)
Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.3 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables. First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
concrete (i.a. elements, brickwork, reinforced concrete) Büscher	DE	0	0	0	100	0

4 Scenarios and additional technical information

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
concrete (i.a. elements, brickwork, reinforced concrete) Büscher	0.000	0.000	0.000	2148.880	0.000
Total	**0.000**	**0.000**	**0.000**	**2148.880**	**0.000**

4.4 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
concrete (i.a. elements, brickwork, reinforced concrete) Büscher	538.880	0.000
Total	**538.880**	**0.000**

5 Results

For the impact assessment, the characterization factors of the LCIA method EN 15804 +A2 Method v1.0 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER CUBIC METER

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
AP	mol H+ eqv.	3.98E-1	2.71E-2	3.62E-4	4.26E-1	2.62E-1	5.05E-2	2.19E-2	0.00E+0	-1.64E-2
GWP-total	kg CO2 eqv.	2.21E+2	4.67E+0	1.06E-1	2.26E+2	2.51E+1	8.71E+0	3.52E+0	0.00E+0	-2.27E+0
GWP-b	kg CO2 eqv.	3.92E-1	2.16E-3	1.67E-3	3.96E-1	6.97E-3	4.02E-3	2.02E-2	0.00E+0	-1.04E-2
GWP-f	kg CO2 eqv.	2.21E+2	4.67E+0	1.04E-1	2.26E+2	2.51E+1	8.70E+0	3.50E+0	0.00E+0	-2.26E+0
GWP-luluc	kg CO2 eqv.	2.29E-2	1.71E-3	1.14E-4	2.48E-2	1.97E-3	3.19E-3	6.66E-4	0.00E+0	-2.43E-3
EP-m	kg N eqv.	1.10E-1	9.55E-3	7.48E-5	1.20E-1	1.16E-1	1.78E-2	8.72E-3	0.00E+0	-4.68E-3
EP-fw	kg P eqv.	2.57E-5	4.71E-5	7.02E-6	7.98E-5	9.12E-5	8.78E-5	1.09E-4	0.00E+0	-8.35E-5
EP-T	mol N eqv.	1.35E+0	1.05E-1	9.99E-4	1.46E+0	1.27E+0	1.96E-1	9.69E-2	0.00E+0	-5.43E-2
ODP	kg CFC 11 eqv.	3.77E-13	1.03E-6	5.59E-9	1.04E-6	5.41E-6	1.92E-6	4.53E-7	0.00E+0	-2.26E-7
POCP	kg NMVOC eqv.	3.22E-1	3.00E-2	2.27E-4	3.52E-1	3.49E-1	5.60E-2	2.64E-2	0.00E+0	-1.50E-2
ADP-f	MJ	8.03E+2	7.04E+1	1.54E+0	8.75E+2	3.45E+2	1.31E+2	4.70E+1	0.00E+0	-2.82E+1
ADP-mm	kg Sb-eqv.	0.00E+0	1.18E-4	9.41E-7	1.19E-4	3.84E-5	2.20E-4	9.86E-6	0.00E+0	-1.13E-4
WDP	m3 world eqv.	1.15E+1	2.52E-1	5.56E-3	1.17E+1	4.62E-1	4.69E-1	2.13E-1	0.00E+0	-3.24E+1

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

5 Results

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15084+A2

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
ETP-fw	CTUe	2.01E+2	6.28E+1	2.45E+0	2.66E+2	2.08E+2	1.17E+2	3.81E+1	0.00E+0	-4.55E+1
PM	disease incidence	3.07E-6	4.20E-7	2.02E-9	3.49E-6	6.95E-6	7.83E-7	4.83E-7	0.00E+0	-2.81E-7
HTP-c	CTUh	1.48E-8	2.04E-9	3.87E-11	1.68E-8	7.26E-9	3.80E-9	9.03E-10	0.00E+0	-1.68E-9
HTP-nc	CTUh	1.96E-6	6.87E-8	1.50E-9	2.03E-6	1.79E-7	1.28E-7	2.56E-8	0.00E+0	-4.75E-8
IR	kBq U235 eqv.	3.67E+0	2.95E-1	5.04E-3	3.97E+0	1.48E+0	5.50E-1	1.49E-1	0.00E+0	-1.14E-1
SQP	Pt	2.24E+1	6.11E+1	2.84E+0	8.64E+1	4.40E+1	1.14E+2	7.83E+0	0.00E+0	-3.64E+1

ETP-fw=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP)

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	AAcidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2

5 Results

ILCD classification	Indicator	Disclaimer
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing 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 ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 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.

5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	4.88E+1	8.82E-1	1.10E+0	5.08E+1	1.87E+0	1.64E+0	2.67E+0	0.00E+0	-1.95E+0
PERM	MJ	3.37E-1	0.00E+0	0.00E+0	3.37E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	4.92E+1	8.82E-1	1.10E+0	5.12E+1	1.87E+0	1.64E+0	2.67E+0	0.00E+0	-1.95E+0
PENRE	MJ	8.69E+2	7.48E+1	1.61E+0	9.45E+2	3.66E+2	1.39E+2	5.01E+1	0.00E+0	-2.99E+1
PENRM	MJ	1.66E+1	0.00E+0	0.00E+0	1.66E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	MJ	8.85E+2	7.48E+1	1.61E+0	9.62E+2	3.66E+2	1.39E+2	5.01E+1	0.00E+0	-2.99E+1
SM	Kg	1.62E+3	0.00E+0	0.00E+0	1.62E+3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	3.23E+2	0.00E+0	0.00E+0	3.23E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	4.83E+2	0.00E+0	0.00E+0	4.83E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	4.22E-1	8.58E-3	4.59E-4	4.31E-1	1.78E-2	1.60E-2	1.57E-2	0.00E+0	-7.60E-1

PERE=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

5 Results

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	Kg	1.49E-6	1.79E-4	2.89E-6	1.83E-4	9.39E-4	3.33E-4	8.19E-5	0.00E+0	-5.70E-5
NHWD	Kg	4.69E-1	4.47E+0	1.03E-2	4.95E+0	4.08E-1	8.32E+0	6.54E+0	0.00E+0	-3.06E-1
RWD	Kg	4.88E-2	4.63E-4	6.48E-6	4.93E-2	2.39E-3	8.62E-4	2.11E-4	0.00E+0	-1.23E-4

HWD=hazardous waste disposed | **NHWD**=non hazardous waste disposed | **RWD**=radioactive waste disposed

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.15E+3	0.00E+0	0.00E+0
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

5 Results

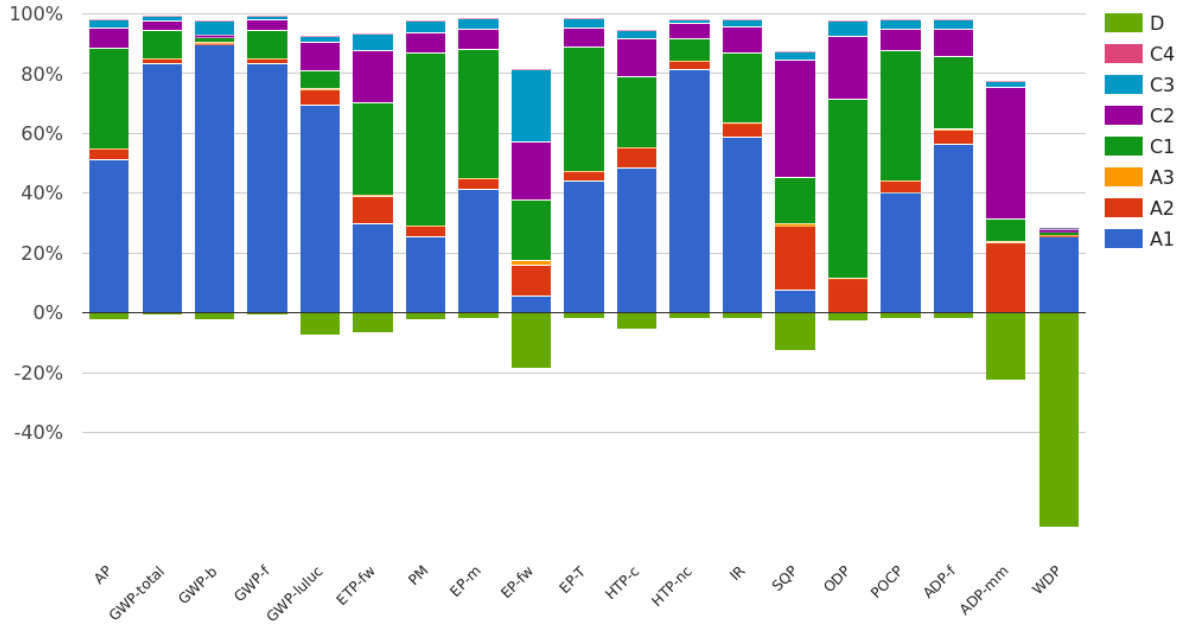
5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER CUBIC METER

BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per cubic meter:

Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0	kg C

6 Interpretation of results



The most significant contribution to the Global Warming potential (GWP-total) is the manufacturing stage (A1-A3) with a contribution of ~82%. Most of this impact stems from (A1).

In all of the other impact categories, (A1), (C1), (C2) and/or (D) prove to be most impactful. Apart from GWP-total, (A1) is showing especially high impacts in Human toxicity, non-cancer (HTP-nc) with ~78%, Ionising radiation (IR) with ~58% and Resource use, fossils (ADP-f) with ~57% contribution. (C1) is especially impactful in Particulate Matter (PM) and Ozone depletion (ODP) with between ~45% to ~60% contribution. (C2) has a ~45% to 60% impact in Land use (SQP) and Resource use, minerals and metals (ADP-mm).

6 Interpretation of results

Observing the results of Water depletion (WDP) shows (D) to have a significant benefit outside the system boundary with ~ -60%.

7 References

ISO 14040
ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044
ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

ISO 14025
ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A2
EN 15804+A2: 2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

General PCR Ecobility Experts
Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

PCR B concrete and concrete elements
Nachhaltigkeit von Bauwerken –Umweltproduktdeklarationen - Produktkategorieregeln für Beton und Betonelemente; Deutsche Fassung EN 16757:2022

Scenario for C1
LCA Rapportage categorie 3 data Nationale Milieudatabase Hoofdstuk 42 Betonconstructies, p. 10

8 Contact information

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