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

BRESPA-Decke Typ A15B

Registration number:	EPD-Kiwa-EE-143155-EN
Issue date:	29-04-2024
Valid until:	29-04-2029
Declaration owner:	DW Systembau GmbH
Publisher:	Kiwa-Ecobility Experts
Program operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

BRESPA-Decke Typ A15B

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-143155-EN

1.3 VALIDITY

Issue date: 29-04-2024

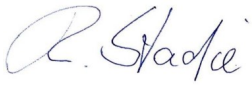
Valid until: 29-04-2029

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: DW Systembau GmbH

Address: Stockholmer Straße 1, 29640 Schneverdingen

E-mail: info@dw-systembau.de

Website: www.dw-systembau.de

Production location: DW Systembau

Address production location: Stockholmer Str. 1, 29640 Schneverdingen

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

Anne Kees Jeeninga, Advieslab

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

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

Institut Bauen und Umwelt e.V. (IBU) - PCR Teil B: Anforderungen an die EPD für Betonfertigteile (2017-11-30)

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 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

1 General information

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 'BRESPA-Decke Typ A15B ' with the calculation identifier ReTHiNK-43155.

2 Product

2.1 PRODUCT DESCRIPTION

Ceiling type A15B consists of prestressed prefabricated concrete elements (prefabricated prestressed concrete ceilings) for use as ceiling components.

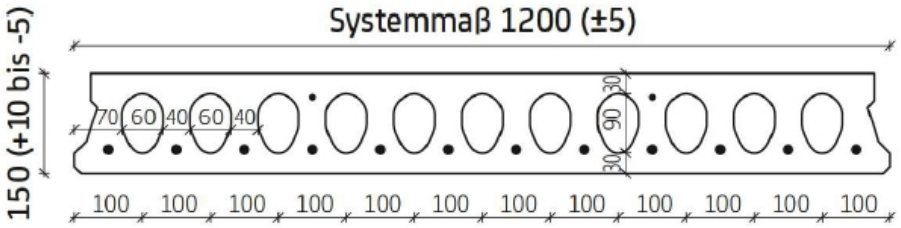
The ceiling height is 15 cm, the standard width of the ceiling elements is 1,20 m, narrower ceiling widths are possible. The transport weight of the A15B is 2,63 kN/m².

The concrete is made from aggregates, water, hydraulic binders (cement), admixtures and additives. Apart from the prestressing steel, no other reinforcement is required. Cold-drawn prestressing steel strands and wires are used for the production of prefabricated prestressed concrete slabs, which are stretched over the 120 m long strips. These are high-strength steels.

Regulation (EU) No. 305/2011(CPR) applies to the placing on the market of the product in the EU/EFTA (with the exception of Switzerland).

The products require a declaration of performance taking into account the harmonized standard EN 1168:2005+A3:2011 Precast concrete products - hollow core slabs/ and the CE marking.

The respective national regulations apply for use.



2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

Prestressed precast concrete elements are used as ceiling elements in interior and exterior areas.

The market areas that this product can be used for are the following:

- Residential and residential buildings
- Office and commercial buildings
- Industrial and hall construction
- Shopping centers
- Schools and kindergartens
- Hotels and event venues
- Parking structures

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

The Reference Service Life (RSL) for BRESPA slabs is more than 50 years according to the Assessment System for Sustainable Building (BNB).

USED RSL (YR) IN THIS LCA CALCULATION:

50

2.4 TECHNICAL DATA

Technical construction data:

- Thermal conductivity according to DIN 4108-4:2017-03: 1,4 W/(mK)
- Bulk density according to DIN EN 206:2013+ A1:2016: 2400 kg/m³
- Compressive strength according to DIN EN 1992-2 NA:2013-04: 45 N/mm²
- Tensile strength according to DIN EN 1992-2NA:2013-04: 2,7 N/mm²
- Bending tensile strength according to DIN EN 1992-2 NA:2013-04: 2,7 N/mm²
- Modulus of elasticity according to DIN EN 1992-2 NA:2013-04: 35700 N/mm²
- Equilibrium moisture content: 0 %
- Transverse bending tensile strength according to DIN EN 1992-2 NA:2013-04: 2,7 N/mm²
- Prestressing steel stress according to DAfStb guideline: St 1570/1770 N/mm²

Performance values of the product according to the declaration of performance in relation to its essential characteristics in accordance with DIN EN 206: 2013 + A1:2016: Concrete - Specification, properties, production and conformity or DIN EN 1992-2/NA:2013-04: National Annex - Nationally Determined Parameters - Eurocode 2: Design of reinforced and prestressed concrete structures - Part 2: Concrete bridges - Design rules and the relevant National Annex.

2.5 SUBSTANCES OF VERY HIGH CONCERN

The product does not contain substances on the ECHA list of Substances of Very High Concern (SVHC) above 0,1% by mass.

The product does not contain any other CMR substances of category 1A or 1B, which are on the candidate list, above 0,1% by mass

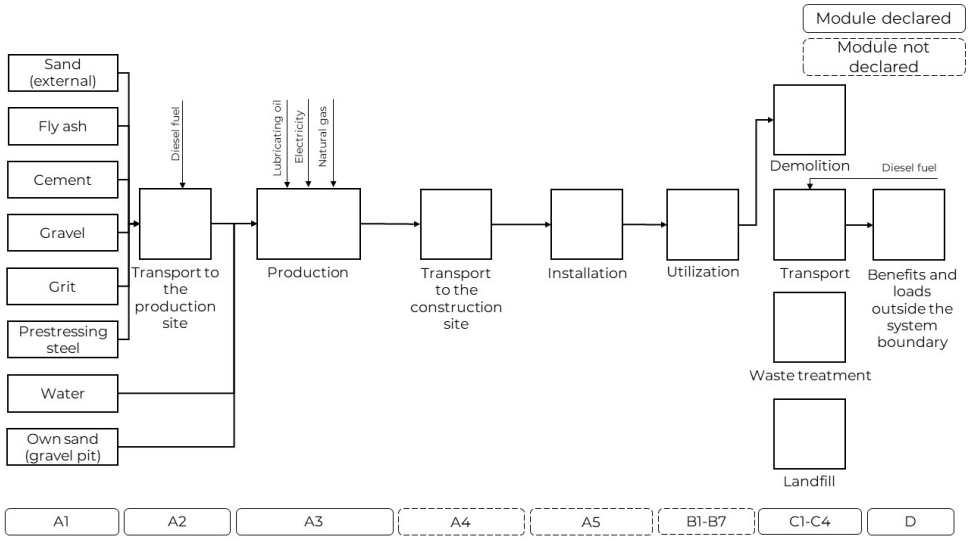
2 Product

No biocidal products have been added to the product and it has not been treated with biocidal products (it is therefore a treated product within the meaning of the Biocidal Products Regulation (EU) No. 528/2012).

2.6 DESCRIPTION PRODUCTION PROCESS

Cement EN 197 is added to the natural aggregates (sand, grit, gravel) as a binding agent. Fly ash or granulated blast furnace slag can also be added. Depending on the type, bulk density and grain size, the aggregates are stored in silos in the factory or stored separately in the open air. The binder and additives are stored in silos. The dosed aggregates are first removed from the silos and premixed dry with the binder. The mixture is then mixed with water to form a malleable concrete. After treatment, the process water is used for cleaning purposes in the plant. The prefabricated prestressed concrete slabs are produced with extruders and slipform pavers on heatable steel tracks as hollow cross-sections with the required thickness and prestressing reinforcement. After the concrete has cured to a strength that allows the floor elements to be further processed, the floor elements are cut to the required length and temporarily stored on the factory premises.

Cold-drawn prestressing steel strands and wires are used to produce the prefabricated prestressed concrete slabs, which are stretched over the 120 m long strips. These are high-strength steels.



3 Calculation rules

3.1 DECLARED UNIT

1 m² Precast prestressed concrete slab

1 m² Precast prestressed concrete slab
(German translation: Spannbeton-Fertigdecke)

reference_unit: square meter (m2)

3.2 CONVERSION FACTORS

Description	Value	Unit
reference_unit	1	m2
weight_per_reference_unit	263.230	kg
Conversion factor to 1 kg	0.003799	m2

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 input data are representative for BRESPA-Decke Typ A15B, a product of DW Systembau GmbH. The data are representative for Germany.

3.5 CUT-OFF CRITERIA

Production stage (modules A1-A3)

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

3 Calculation rules

The capital and production goods were not taken into account.

Product end-of-life stage (modules C1-C4)

All input flows (e.g. energy consumption for demolition or dismantling, transportation to waste recycling, etc.) and output flows (e.g. waste recycling at the end of the product's life cycle, etc.) are taken into account in this LCA. The total neglected input flows therefore do not exceed the limit of 5% of energy consumption and mass.

Credits and debits beyond the system boundary (module D)

All benefits and burdens that go beyond the system boundary because reusable products, recyclable materials and/or useful energy sources leave the product system are taken into account in this LCA.

3.6 ALLOCATION

Allocations were avoided as far as possible. There are no coproducts or by-product in the manufacturing of the examined product. Based on energy consumption measurements, the energy requirements of the production were allocated to the individual products. Specific information about allocations within the background data is included in the documentation of the Ecoinvent datasets.

3.7 DATA COLLECTION & REFERENCE TIME PERIOD

The data is averaged from the 2022 annual production from the BRESPA® plant in Schneverdingen.

3.8 ESTIMATES AND ASSUMPTIONS

As only data sets for Switzerland were available for sand, gravel and grit, the electricity mix used in these data sets was changed from "Electricity, medium voltage {CH} | market for | Cut-off, U" for Switzerland to "Electricity, medium voltage {DE} | market for | Cut-off, U" for Germany.

For the prestressing steel, there are 4 suppliers who delivered this material to DW Systembau in 2022. Four different inputs were entered for steel, one for each supplier, based on the quantities they supplied during the year. One of the suppliers has an EPD according to EN15804+A2, which was used in this LCA. The other suppliers do have EPDs, but to EN15804+A1, so they could not be used for this LCA. The standard Ecoinvent v3.6 environmental profile "Reinforcing steel {RER}| production | Cut-off, U" was used for the steel from these suppliers. The secondary material specified in the EPD was taken into account for all suppliers and the environmental profile was adjusted accordingly.

For demolition and movement in module C1, the assumptions from the Dutch NMD report (NMD = Nationale Milieudatabase) for concrete structures "LCA Rapportage categorie 3 data - Nationale Milieudatabase - Hoofdstuk 42 Betonconstructies" dated May 17, 2023 were adopted. For this purpose, the weight of the precast prestressed concrete slab (263,23 kg) was divided by the processing quantity per hour of the excavator. The processing quantity for demolition is 9,8 t/h and 8,3 t/h for moving.

The environmental profile used for this is "Hydraulic excavator (average) [NMD generic]" (unit is hour), which is based on the Ecoinvent v3.6 dataset "Diesel, burned in building machine {GLO}| market for | Cut-off, U" (of which 572 MJ are considered in the consumption per hour).

3.9 DATA QUALITY

The quality of the data used for this EPD can be divided into three categories according to the criteria of the United Nations Global Environmental Guidelines for the development of an LCA database (as described in EN 15804+A2).

The quality level of geographical representativeness is very good, the quality level of technical representativeness can be considered good, and the temporal representativeness can also be considered good. Therefore, the overall data quality for this EPD can be described as good.

3.10 GUARANTEES OF ORIGIN

For this EPD, the “market-based approach” has been applied, meaning that the specific electricity mix used by DW Systembau has been considered. DW Systembau gets electritiy from an energy provider with national registry.

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]	0.027	hr
Hydraulic excavator (average) [NMD generic]	0.032	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) (NMD ID 9)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
sand, soil (NMD ID 85)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
Steel, reinforcement (NMD ID 74)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
Steel, construction profiles (NMD ID 70)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	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

4 Scenarios and additional technical information

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) (NMD ID 9)	NL	0	1	0	99	0
sand, soil (NMD ID 85)	NL	0	1	0	0	99
Steel, reinforcement (NMD ID 74)	NL	0	5	0	95	0
polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	NL	0	10	85	5	0
Steel, construction profiles (NMD ID 70)	NL	0	1	0	94	5

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
concrete (i.a. elements, brickwork, reinforced concrete) (NMD ID 9)	0.000	1.649	0.000	163.241	0.000
sand, soil (NMD ID 85)	0.000	0.951	0.000	0.000	94.119
Steel, reinforcement (NMD ID 74)	0.000	0.098	0.000	1.853	0.000
polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.000	0.002	0.017	0.001	0.000
Steel, construction profiles (NMD ID 70)	0.000	0.013	0.000	1.222	0.065
Total	**0.000**	**2.712**	**0.017**	**166.317**	**94.184**

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) (NMD ID 9)	163.241	0.000
Total	**259.143**	**0.557**

4 Scenarios and additional technical information

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
sand, soil (NMD ID 85)	94.119	0.000
Steel, reinforcement (NMD ID 74)	0.936	0.000
polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.001	0.557
Steel, construction profiles (NMD ID 70)	0.846	0.000
Total	**259.143**	**0.557**

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 SQUARE METER

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbreviation	Unit	A1	A2	A3	C1	C2	C3	C4	D
AP	mol H+ eqv.	8.29E-2	1.32E-2	7.51E-3	3.21E-2	6.72E-3	1.69E-3	1.36E-4	-1.76E-2
GWP-total	kg CO2 eqv.	3.06E+1	4.04E+0	3.71E+0	3.07E+0	1.16E+0	3.13E-1	1.46E-2	-3.60E+0
GWP-b	kg CO2 eqv.	5.50E-2	2.93E-3	1.98E-2	8.54E-4	5.35E-4	1.54E-3	2.84E-5	2.19E-2
GWP-f	kg CO2 eqv.	3.06E+1	4.03E+0	3.69E+0	3.07E+0	1.16E+0	3.11E-1	1.46E-2	-3.63E+0
GWP-luluc	kg CO2 eqv.	1.03E-2	1.45E-3	1.68E-3	2.42E-4	4.25E-4	5.43E-5	3.99E-6	7.52E-4
EP-m	kg N eqv.	1.58E-2	2.96E-3	1.67E-3	1.42E-2	2.37E-3	6.68E-4	4.67E-5	-4.03E-3
EP-fw	kg P eqv.	1.74E-3	3.57E-5	1.19E-4	1.12E-5	1.17E-5	8.41E-6	1.60E-7	-1.28E-4
EP-T	mol N eqv.	1.98E-1	3.30E-2	2.02E-2	1.55E-1	2.61E-2	7.42E-3	5.16E-4	-4.70E-2
ODP	kg CFC 11 eqv.	5.28E-7	9.31E-7	4.06E-7	6.63E-7	2.56E-7	3.58E-8	5.89E-9	-1.71E-7
POCP	kg NMVOC eqv.	6.29E-2	1.20E-2	6.61E-3	4.27E-2	7.46E-3	2.02E-3	1.50E-4	-2.16E-2
ADP-f	MJ	1.52E+2	6.23E+1	5.14E+1	4.22E+1	1.75E+1	3.60E+0	3.99E-1	-3.13E+1
ADP-mm	kg Sb-eqv.	9.39E-5	9.64E-5	1.88E-5	4.71E-6	2.94E-5	8.07E-7	1.31E-7	-5.47E-5
WDP	m3 world eqv.	3.45E+0	1.95E-1	-7.97E-2	5.66E-2	6.25E-2	1.85E-2	1.79E-2	-1.60E+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

Abbreviation	Unit	A1	A2	A3	C1	C2	C3	C4	D
ETP-fw	CTUe	1.21E+2	5.06E+1	2.85E+1	2.55E+1	1.56E+1	3.46E+0	2.59E-1	-1.06E+2
PM	disease incidence	6.85E-7	2.92E-7	6.00E-8	8.51E-7	1.04E-7	3.69E-8	2.64E-9	-2.80E-7
HTP-c	CTUh	1.72E-7	1.41E-9	5.77E-9	8.90E-10	5.06E-10	7.72E-11	6.00E-12	-9.15E-10
HTP-nc	CTUh	4.21E-6	5.42E-8	1.59E-7	2.19E-8	1.71E-8	2.12E-9	1.84E-10	4.81E-7
IR	kBq U235 eqv.	4.50E-1	2.74E-1	8.27E-2	1.81E-1	7.33E-2	1.15E-2	1.64E-3	-9.36E-3
SQP	Pt	2.64E+1	5.32E+1	2.88E+1	5.39E+0	1.52E+1	6.08E-1	8.38E-1	-2.12E+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
	Potential Comparative Toxic Unit for humans (HTP-c)	2

5 Results

ILCD classification	Indicator	Disclaimer
	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

Abbreviation	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ	8.98E+0	9.51E-1	1.05E+1	2.28E-1	2.19E-1	2.06E-1	3.23E-3	-3.67E-1
PERM	MJ	7.10E-1	0.00E+0	2.18E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	9.68E+0	9.51E-1	1.05E+1	2.28E-1	2.19E-1	2.06E-1	3.23E-3	-3.67E-1
PENRE	MJ	1.57E+2	6.62E+1	5.48E+1	4.49E+1	1.86E+1	3.84E+0	4.24E-1	-3.28E+1
PENRM	MJ	6.89E-1	0.00E+0	1.39E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.85E-2
PENRT	MJ	1.57E+2	6.62E+1	5.62E+1	4.49E+1	1.86E+1	3.84E+0	4.24E-1	-3.29E+1
SM	Kg	1.72E+0	0.00E+0	8.56E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.48E-2
RSF	MJ	3.22E+1	0.00E+0	6.30E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	6.97E+1	0.00E+0	1.36E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	3.55E-1	7.34E-3	7.41E-3	2.17E-3	2.13E-3	1.26E-3	4.26E-4	-3.71E-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

Abbreviation	Unit	A1	A2	A3	C1	C2	C3	C4	D
HWD	Kg	4.65E-4	1.58E-4	8.23E-5	1.15E-4	4.43E-5	6.29E-6	5.97E-7	-3.34E-4
NHWD	Kg	1.47E+0	3.81E+0	3.76E-1	5.00E-2	1.11E+0	4.98E-1	2.71E+0	-3.72E-1
RWD	Kg	4.60E-3	4.24E-4	1.87E-4	2.93E-4	1.15E-4	1.61E-5	2.62E-6	-4.27E-5

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

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbreviation	Unit	A1	A2	A3	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	1.85E+0	0.00E+0	0.00E+0	9.42E+1	0.00E+0	0.00E+0
MFR	Kg	1.01E-1	0.00E+0	3.26E+0	0.00E+0	0.00E+0	1.66E+2	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
EET	MJ	0.00E+0	0.00E+0	4.30E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.73E-1
EEE	MJ	0.00E+0	0.00E+0	2.50E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.00E-1

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

5 Results

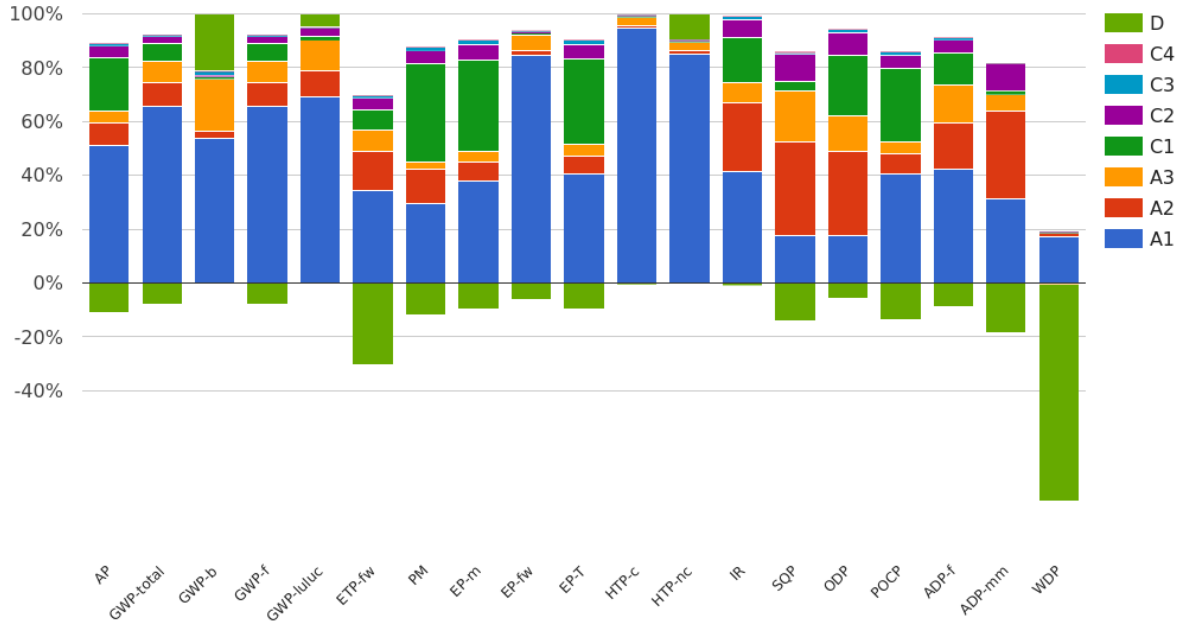
5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER SQUARE METER

BIOGENIC CARBON CONTENT

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



As can be seen from the graph, module A1 has the greatest influence on the overall global warming potential (GWP-total) and on most other environmental impact categories. For the other categories, either module A2, C1 or D has the biggest influence.

In terms of the materials used, it is the cements and the prestressing strands that have a significant influence on all environmental impacts.

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
Institut Bauen und Umwelt e.V. (IBU) - PCR Teil B: Anforderungen an die EPD für Betonfertigteile (2017-11-30)

Calculation module C1
Nationale Milieudatabase (NMD) - LCA Rapportage categorie 3 data Nationale Milieudatabase. Hoofdstuk 42 Betonconstructies. Version 1.0 (2021-08-17)

8 Contact information

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