epddanmark

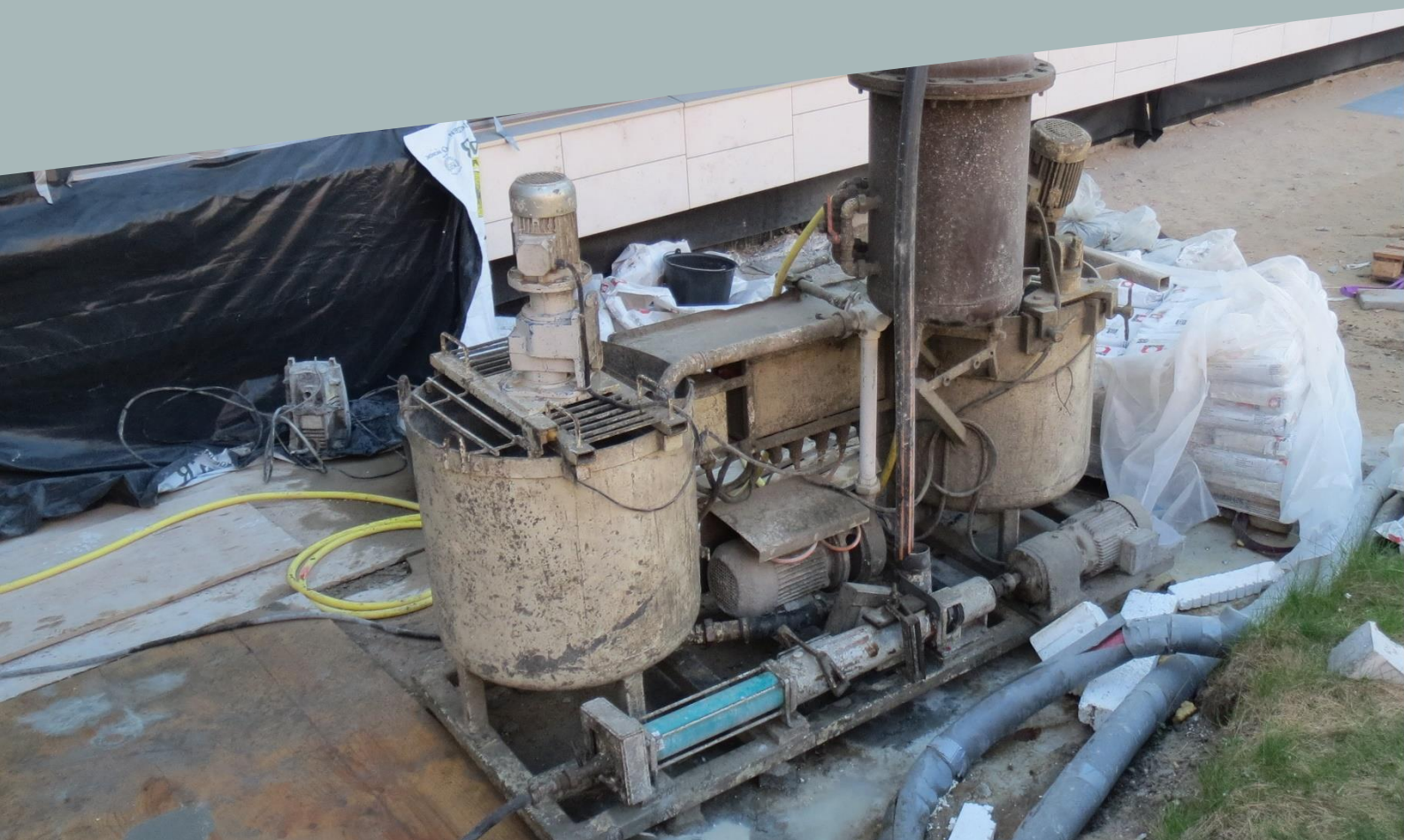
ECO PLATFORM EPD VERIFIED

Owner: Kroghs A/S
No.: MD-24082-EN
Issued: 18-06-2024
Valid to: 18-06-2029

3rd PARTY **VERIFIED**

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | **ISO 14025 & EN 15804**



Owner of declaration
Kroghs A/S
Klim Strandvej 284
9690 Fjerritslev, Denmark
VAT: 45571513

Programme
EPD Danmark
www.epddanmark.dk

☐ Industry EPD
☒ Product EPD

Declared Products
A total of 2 product groups for dry concrete products are declared in this EPD. The product groups represent products in the variations of injection cement.

Number of declared datasets/product variations: 2

Production site
Klim Strandvej 284,
9690 Fjerritslev, Danmark

Use of Guarantees of Origin
☒ No certificates used
☐ Electricity covered by GoO
☐ Biogas covered by GoO

Declared/ functional unit
1 ton of injection cement as dry concrete

Year of production site data (A3)
2023

EPD version
[1], June, 2024, Original version

Issued: 18-06-2024
Valid to: 18-06-2029

Basis of calculation
This EPD is developed and verified in accordance with the European standard EN 15804:2012+A2:2019.

Comparability
EPDs of construction products may not be comparable if they do not comply with the requirements in EN EN 15804:2012+A2:2019. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804:2012+A2:2019 and if the background systems are not based on the same database.

Validity
This EPD has been verified in accordance with ISO 14025:2010 and is valid for 5 years from the date of issue.

Use
The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

EPD type
☒Cradle-to-gate with modules C1-C4 and D
☐Cradle-to-gate with options, modules C1-C4 and D
☐Cradle-to-grave and module D
☐Cradle-to-gate
☐Cradle-to-gate with options

CEN standard EN 15804:2012+A2:2019 serves as the core PCR

Independent verification of the declaration and data, according to EN ISO 14025:2010

☐ internal ☒ external

Third party verifier:

Linda Høibye, Life Cycle Assessment Consulting

Martha Katrine Sørensen
EPD Danmark

Life cycle stages and modules (MND = module not declared)																
Product			Construction process		Use							End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Product Information

Product Description:

The declared products of injection cement are used for injecting cable ducts for prestressing cables. It is also used for injecting cracks and minor cavities in concrete structures. After adding water and mixing, the product is ready for use. The products are pumpable with low viscosity and expands for a period before setting. Additional information regarding the declared products can be obtained on the website of the manufacturer:

- **Website:** http://www.kroghs-as.dk/

The declared products are grouped together based on a mixed worst case between the environmental impact categories in module A1-A3 and C1-C4 according to the requirements specified in EN15804:2012 +A2:2019, and the guidelines concerning product groups provided by EPD Danmark. For each product group a mixed worst case represents the product group.

#	Product Name
1	CCL Readymix
	Kroghs injektionscement
	Injektionscement F
2	CCL Readymix LC

In the table below the composition of materials in each product group is presented. The material composition is declared within a range due to variance between products in each group as well as business confidentiality concerns. Materials account for 100% of the mass of the declared product.

#	Material	Weight-% of product
1	Cement	87-99%
	Sand	0-5%
	Additives	1-13%
2	Cement	65-75%
	Sand	0-5%
	Additives	25-35%

All products are packaged in bags in one of the following 3 sizes; 18.5 kg, 20 kg or 1200 kg. The packaging to product weight ratio is equal for all products according to the size of bags. The composition of the sales- and transport packaging of the 3 types of packaging per 1 ton of product is shown in the table below.

Type of packaging	Material	Weight of packaging material (kg)	Weight-% of packaging
18.5 kg	Euro pallet	22.5	86%
	LDPE	2.8	11%
	HDPE	1.0	4%
	Total	**26.3**	**100%**
20 kg	Euro pallet	20.8	86%
	LDPE	2.6	11%
	HDPE	0.9	4%
	Total	**24.3**	**100%**
1200 kg	Euro pallet	20.8	89%
	LDPE	1.5	6%
	HDPE	1.1	5%
	Total	**23.4**	**100%**

Biogenic carbon contents in packaging crossing the system boundary has been balanced out in module A3, relative to the original uptake from sequestration.

Representativity:

This declaration, including data collection and the modelled foreground system, represents the production of the declared products of Kroghs A/S at the production site, Klim Strandvej 284, DK-9690 Fjerritslev, Danmark.

Product specific data are based on average values collected in the time period 01.10.2022 – 30.09.2023 and the representative geographical area of the study is Denmark. The products declared in this EPD covers 2% of the total products produced at the Klim Strandvej 284, DK-9690 Fjerritslev, Danmark, in the data collection period.

Background data are based on the LCA-database, ecoinvent 3.9.1, release in 2022. The database adheres to the requirements of EN 15804:2012 +A2:2019 section 6.3.8.2, by being less than 10 years old. Generally, the used background data are of reasonably high quality, and the majority of the datasets are only a couple of years old. Where the data quality has not been sufficient,

adjustments has been made to get a more accurate representation of the geography and the technology.

Hazardous Substances:
None of the declared products by Kroghs A/S contains hazardous substances listed on the "Candidate List of Substances of Very High Concern for authorisation":

- http://echa.europa.eu/candidate-list-table

Expected Service Life (ESL):
The declared products have an expected service life (ESL) of 100 years as specified in the cPCR, EN 16757:2022, Annex F, pp. 41-42.

Essential characteristics:
All products covered in this EPD adheres to the requirements for Compressive Strength in EN 206-1 and EN 206-1 DK.

Additional technical information regarding the performance of the declared products can be obtained by contacting the manufacturer or on their website.

Picture of Product:

LCA Background

Declared Unit (DU):

As prescribed by EN 16757:2022, Section 6.3.3, the declared unit (DU) is defined as:

- 1 ton of injection cement as dry concrete

The LCI and LCIA results in this EPD hence relates to 1 ton of dry concrete. The following tables displays the conversion factors and relevant product densities.

Name	Value	Unit
Declared unit	1	ton
Conversion factor to 1 kg	0.001	-

#	Product Name	Water ratio [%]	Density* [kg/m³]
1	CCL Readymix	29.05%	2057
	Kroghs Injektionscement	25.00%	2032
	Injektionscement F	29.63%	2108
2	CCL Readymix LC	31.50%	1945

*Value after curing c.f. EN 1015-6:1999

Product Category Rules (PCR):

This EPD is developed according to the core rules for the product category of construction products in EN 15804:2012+A2:2019, and the following complementary product category rules (cPCR):

- EN 16757:2022 – Sustainability in construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements

Guarantees of Origin:

The declared products are not manufactured using guarantees of origin (GoO) for electricity and process heat during the production stage (A3) at the product site of Kroghs A/S at Klim Strandvej 284, 9690 Fjerritslev, Danmark.

Foreground System:

The production at Kroghs A/S is modelled with site specific data. The electricity is modelled with residual mix for Denmark since no GoO-certificates have been purchased. The remaining activities outside of Kroghs A/S, has been modelled with data provided by Kroghs A/S, available EPDs for raw materials of cement from the suppliers, as well as relevant assumptions.

For module C1-C4 and D for modelling the End-of-life scenario data has been utilised from the report *Miljøprojekt nr. 2217 - Affaldsstatistik 2020* by the Danish Environmental Agency (*Miljøstyrelsen, 2022a)*, the report *Livscyklusvurdering (LCA) af konsekvenser ved selektiv nedrivning* by the Danish Environmental ministry (*Miljøstyrelsen, 2022b),* and the report *Nulspildsprojektet – Genanvendelse af spildbeton fra egen produktion* by Technological institute (Teknologisk Institut, 2019)

Background System:

The database, ecoinvent 3.9.1 (published in 12-2022) is utilized for the background system. As a result, both upstream- and downstream activities are based on average supply mixes for the specific country or region depending on the given dataset.

Allocation Principles:

Allocation have been made in accordance with EN 15804:2012+A2:2019, Section 6.4.3. In this regard, allocation has been avoided to the extent that is possible by dividing unit processes into different sub-processes using site specific measurements. Energy at the production site, which cannot be directly attributed to a given product and thus sub-divided, has been allocated to the production mass thereby reflecting the underlying physical relationship of products during the manufacturing stage (A3).

Energy consumption and waste associated with administrative activities have been allocated by economic values, as the difference in revenue from each production site operated by Kroghs A/S is greater than 25%, as described in EN 15804:2012+A2:2019, Section 6.4.3.2.

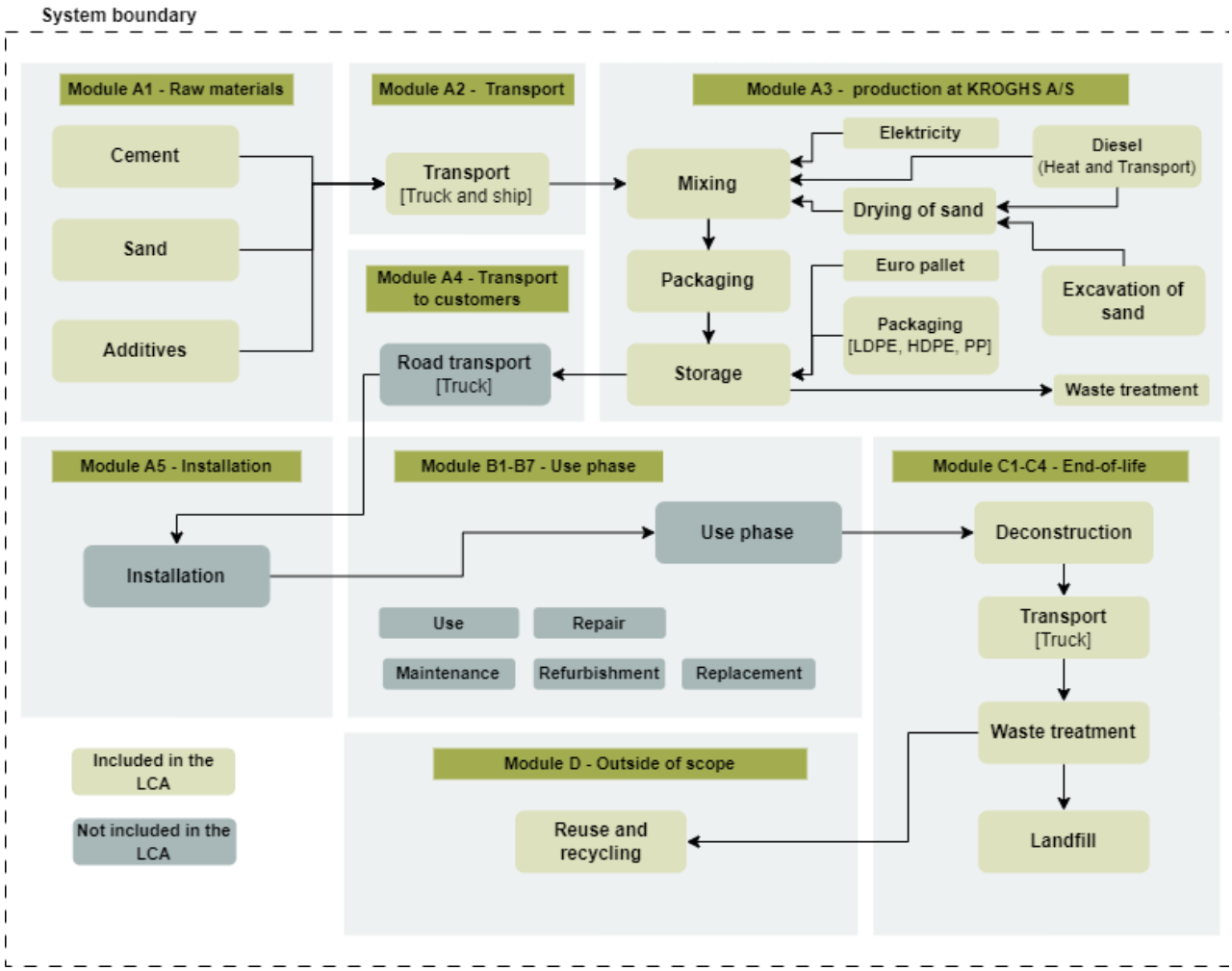
System Boundary:

This EPD is based on a cradle-to-grave LCA and covers the life cycle modules A1-A3, C1-C4, and D, in which 100 weight-% of the product has been accounted for.

The general rules for the exclusion of inputs and outputs follows the requirements specified in EN 15804:2012+A2:2019, Section 6.3.6, where the total of neglected input flows per module shall be a maximum of 5% of energy usage and mass and 1% of renewable and non-renewable primary energy usage and mass for unit processes. In addition, particular care has been taken to include

materials and flows known to have the potential to cause significant emissions into air, water and soil related to the environmental indicators assessed in this study. In this respect, conservative assumptions in combination with plausibility considerations and expert judgement has been used to demonstrate compliance with this criterion.

Flow Diagram:



Product Stage (A1-A3):
The product stage comprises the acquisition of raw materials, products and energy, transport to the production site, packaging and waste processing up to the ”end-of-waste” state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

All declared products consists of a mixture of cement, sand and additives. The raw materials are produced at external production sites in primarily Denmark, and a few materials are produced in Sweden, Holland, Czechia and Belgium. For modelling the production of cement, published and verified EPDs have been utilized. For modelling the production of additives generic datasets have been utilized, which have been compared with information from Danish Concrete Association (*Dansk Betonforening & IDA, 2016)*.

The sand is produced at internal production sites owned by Kroghs A/S, where site specific data has been applied. The sites are located in Denmark and the machinery for production consumes electricity and diesel. All raw materials are transported by truck and container ship. The production facility of Kroghs A/S, Fjerritslev is primarily utilized for weighing and mixing raw

materials in the right amount, and to package the finished products. The machinery at the facility consumes electricity and diesel, while the heating at the production hall is produced from diesel.

End-of-Life (C1-C4):
The end-of-life stage includes the deconstruction of the product from the building, the treatment of the deconstructed product and landfilling. The transport associated with the treatment is also included. A waste scenario is created based on data from the report *Miljøprojekt nr. 2217 - Affaldsstatistik 2020* Danish Environmental Agency (*Miljøstyrelsen, 2022a)*, where 99% of the waste concrete is modelled to be recycled, and 1% is modelled to be landfilled. The recycled concrete is modelled to replace gravel in the creation of new concrete. This is deemed to be the most representative and likely end-of-life scenario. The declared products are dry concrete and must be mixed with water in a certain ratio to be able to harden. This results in a higher mass at the end-of-life stage (C1-C4), than the declared unit of 1 ton of dry concrete at the factory gate (A3). The additional weight during the end-of-life stage (C1-C4) and the environmental impacts associated with waste treatment is therefore exclusively contributed to the dry concrete and not the added water in the mixtures.

C1: A conservative assumption has been applied for the deconstruction of the building of 1.4 L of diesel per 1 ton of selectively deconstructed building material. Data is obtained from the report *Livscyklusvurdering (LCA) af konsekvenser ved selektiv nedrivning* by the Danish Environmental ministry (*Miljøstyrelsen, 2022b).*

C2: As Kroghs A/s primarily sells products to customers in Denmark, the waste concrete is also assumed to be treated in Denmark, and the estimated transport associated with waste treatment reflects this assumption. The modelled transport distances are based on data from ASRO (2008).

C3: For the modelling of waste treatment of deconstructed concrete data is used from Teknologisk Institut, 2019 – *"Nulspildsprojektet – Genanvendelse af spildbeton fra egen produktion"*, where 1 L of diesel is consumed for crushing 1 ton of concrete. Additionally, data concerning dust from crushing is also used from this report, where it is documented that 1 ton of concrete for crushing results in 1 ton of crushed concrete (*Teknologisk Institut, 2019)*. During waste treatment, the surface area of the concrete is increased when crushed, and is exposed to air. This results in recarbonatisation of the concrete, which is included in module C3. However, as the conditions for the crushed concrete, such as the exposure time, size of recycled ballast etc. is not known, a more simple formula is utilised for the calculations based on EN 16757:2022, Annex G.4:

$$CO_2\ uptake = \frac{5\ kg\ CO_2}{m^3\ concrete} \qquad (Eq\ 1)$$

C4: The 1% of the deconstructed concrete is sent to landfill (*Miljøstyrelsen, 2022a)*. It is assumed that the concrete is inert waste, and is landfilled in Denmark, and the modelling of this scenario reflects Danish conditions.

Re-use, Recovery & Recycling Potential (D):
The crushed concrete is assumed to be able to replace gravel as an input is the creation of new concrete, where no further treatment is needed after crushing. This is deemed to be the most representative and likely end-of-life scenario for crushed concrete. The recycling of concrete is assumed to take place in Denmark, and the avoided production of gravel is modelled to reflect Danish conditions

LCA Results

Due to the multiple declared products covered by this EPD, a series of results for each product group are presented. It should be recognized, that the results of the LCA are relative expressions and do not indicate the endpoints of environmental impacts, exceeding of thresholds, safety margins, or risks associated with the declared products. The results for each of the declared products can be found on the following pages:

- **Page 8-9:** Product Group #01
- **Page 10-11:** Product Group #02

Product Group #01

ENVIRONMENTAL IMPACTS PER 1 TON OF DRY CONCRETE - PRODUCT GROUP 1							
Parameter	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	[kg CO_2 eq.]	7.71E+02	7.03E+00	1.64E+01	1.59E+00	8.00E-02	-6.46E+00
GWP-fossil	[kg CO_2 eq.]	7.69E+02	7.02E+00	1.64E+01	1.59E+00	7.97E-02	-6.27E+00
GWP-biogenic	[kg CO_2 eq.]	2.05E+00	1.61E-03	1.48E-02	1.15E-03	2.46E-04	-1.78E-01
GWP-luluc	[kg CO_2 eq.]	1.20E-01	7.90E-04	7.96E-03	5.65E-04	1.57E-05	-6.84E-03
ODP	[kg CFC 11 eq.]	1.46E-05	1.12E-07	3.57E-07	7.98E-08	2.76E-09	-9.50E-08
AP	[mol H^+ eq.]	2.59E+00	6.56E-02	5.39E-02	4.69E-02	5.19E-04	-4.76E-02
EP-freshwater	[kg P eq.]	3.23E-02	2.17E-04	1.16E-03	1.55E-04	3.75E-06	-2.25E-03
EP-marine	[kg N eq.]	3.97E-01	3.04E-02	1.85E-02	2.17E-02	2.26E-04	-1.31E-02
EP-terrestrial	[mol N eq.]	4.60E+00	3.31E-01	1.96E-01	2.36E-01	2.43E-03	-1.73E-01
POCP	[kg NMVOC eq.]	1.30E+00	9.79E-02	8.05E-02	7.00E-02	9.63E-04	-4.58E-02
ADPm[1]	[kg Sb eq.]	3.26E-03	2.47E-06	5.31E-05	1.77E-06	8.47E-08	-7.30E-05
ADPf[1]	[MJ]	4.40E+03	9.27E+01	2.34E+02	6.62E+01	2.04E+00	-7.71E+01
WDP[1]	[m^3 world eq. deprived]	4.87E+01	1.88E-01	8.96E-01	1.34E-01	6.92E-03	-5.11E+00
Caption	GWP-total = Globale Warming Potential - total; 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 = Ozone Depletion; AP = Acidifcation; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water depletion potential						
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: $1{,}95*10^{2}$ or 195, while 1,12E-11 is the same as $1{,}12*10^{-11}$ or 0,0000000000112.						
Disclaimer	[1] The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.						

ADDITIONAL ENVIRONMENTAL IMPACTS PER 1 TON OF DRY CONCRETE – PRODUCT GROUP 1							
Parameter	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	[Disease incidence]	2.38E-05	1.83E-06	1.32E-06	1.31E-06	1.31E-08	-8.70E-07
IRP[2]	[kBq U235 eq.]	7.87E+00	4.13E-02	2.94E-01	2.95E-02	1.83E-03	-5.32E-01
ETP-fw[1]	[CTUe]	1.08E+04	4.43E+01	1.16E+02	3.17E+01	8.63E-01	-3.83E+01
HTP-c[1]	[CTUh]	5.57E-07	2.15E-09	7.44E-09	1.54E-09	2.71E-11	-1.00E-08
HTP-nc[1]	[CTUh]	3.17E-06	1.50E-08	1.64E-07	1.07E-08	3.56E-10	-9.50E-08
SQP[1]	-	7.90E+02	5.86E+00	1.31E+02	4.19E+00	3.96E+00	-1.55E+02
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)						
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: $1{,}95*10^{2}$ or 195, while 1,12E-11 is the same as $1{,}12*10^{-11}$ or 0,0000000000112.						
Disclaimers	[1] The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.						
	[2] 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.						

RESOURCE USE PER 1 TON OF DRY CONCRETE – PRODUCT GROUP 1							
Parameter	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	1.17E+03	5.28E-01	3.63E+00	3.77E-01	4.06E-02	-2.20E+01
PERM	[MJ]	1.21E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	1.17E+03	5.28E-01	3.63E+00	3.77E-01	4.06E-02	-2.20E+01
PENRE	[MJ]	4.40E+03	9.27E+01	2.34E+02	6.62E+01	2.04E+00	-7.71E+01
PENRM	[MJ]	1.58E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	4.40E+03	9.27E+01	2.34E+02	6.62E+01	2.04E+00	-7.71E+01
SM	[kg]	4.51E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	1.20E+00	6.83E-03	3.13E-02	4.88E-03	2.24E-03	-4.60E-01
Caption	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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Net use of fresh water						
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: $1,95*10^2$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.						

WASTE CATEGORIES AND OUTPUT FLOWS PER 1 TON OF DRY CONCRETE – PRODUCT GROUP 1							
Parameter	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	2.03E+01	6.24E-04	1.49E-03	4.46E-04	9.98E-06	-4.93E-04
NHWD	[kg]	8.55E+02	1.33E-01	1.14E+01	1.41E+03	1.42E+01	-1.24E+00
RWD	[kg]	5.77E-03	9.53E-06	7.14E-05	6.81E-06	4.15E-07	-1.30E-04
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	3.90E+00	0.00E+00	0.00E+00	1.32E+03	0.00E+00	0.00E+00
MER	[kg]	9.18E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy						
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: $1,95*10^2$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.						

BIOGENIC CARBON CONTENT PER 1 TON OF DRY CONCRETE – PRODUCT GROUP 1		
Parameter	**Unit**	**At the factory gate**
Biogenic carbon content in product	[kg C]	0.00E+00
Biogenic carbon content in accompanying packaging	[kg C]	3.57E-01
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Product Group #02

ENVIRONMENTAL IMPACTS PER 1 TON OF DRY CONCRETE - PRODUCT GROUP 2							
Parameter	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	[kg CO_2 eq.]	4.96E+02	7.13E+00	1.67E+01	1.42E+00	8.12E-02	-6.56E+00
GWP-fossil	[kg CO_2 eq.]	4.94E+02	7.13E+00	1.66E+01	1.41E+00	8.09E-02	-6.37E+00
GWP-biogenic	[kg CO_2 eq.]	1.00E+00	1.64E-03	1.50E-02	1.17E-03	2.49E-04	-1.80E-01
GWP-luluc	[kg CO_2 eq.]	1.43E-01	8.02E-04	8.08E-03	5.73E-04	1.59E-05	-6.94E-03
ODP	[kg CFC 11 eq.]	1.90E-05	1.13E-07	3.62E-07	8.10E-08	2.81E-09	-9.67E-08
AP	[mol H^+ eq.]	1.64E+00	6.61E-02	5.43E-02	4.72E-02	5.23E-04	-4.80E-02
EP-freshwater	[kg P eq.]	3.21E-02	2.19E-04	1.16E-03	1.56E-04	3.78E-06	-2.27E-03
EP-marine	[kg N eq.]	2.55E-01	3.06E-02	1.87E-02	2.19E-02	2.28E-04	-1.32E-02
EP-terrestrial	[mol N eq.]	2.85E+00	3.33E-01	1.97E-01	2.38E-01	2.44E-03	-1.74E-01
POCP	[kg NMVOC eq.]	9.68E-01	9.86E-02	8.10E-02	7.04E-02	9.69E-04	-4.61E-02
ADPm[1]	[kg Sb eq.]	1.37E-03	2.49E-06	5.34E-05	1.78E-06	8.53E-08	-7.35E-05
ADPf[1]	[MJ]	3.84E+03	9.34E+01	2.36E+02	6.67E+01	2.06E+00	-7.76E+01
WDP[1]	[m^3 world eq. deprived]	4.34E+01	2.01E-01	9.61E-01	1.44E-01	7.43E-03	-5.48E+00
Caption	GWP-total = Globale Warming Potential - total; 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 = Ozone Depletion; AP = Acidifcation; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water depletion potential						
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: $1{,}95*10^2$ or 195, while 1,12E-11 is the same as $1{,}12*10^{-11}$ or 0,0000000000112.						
Disclaimer	[1] The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.						

ADDITIONAL ENVIRONMENTAL IMPACTS PER 1 TON OF DRY CONCRETE – PRODUCT GROUP 2							
Parameter	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	[Disease incidence]	1.63E-05	1.84E-06	1.32E-06	1.32E-06	1.32E-08	-8.76E-07
IRP[2]	[kBq U235 eq.]	1.56E+01	4.43E-02	3.16E-01	3.16E-02	1.96E-03	-5.71E-01
ETP-fw[1]	[CTUe]	5.25E+03	4.46E+01	1.16E+02	3.19E+01	8.69E-01	-3.85E+01
HTP-c[1]	[CTUh]	3.56E-07	2.18E-09	7.55E-09	1.56E-09	2.75E-11	-1.03E-08
HTP-nc[1]	[CTUh]	2.71E-06	1.52E-08	1.66E-07	1.08E-08	3.62E-10	-9.61E-08
SQP[1]	-	6.54E+02	6.29E+00	1.40E+02	4.49E+00	4.25E+00	-1.66E+02
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)						
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: $1{,}95*10^2$ or 195, while 1,12E-11 is the same as $1{,}12*10^{-11}$ or 0,0000000000112.						
Disclaimers	[1] The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.						
	[2] 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.						

RESOURCE USE PER 1 TON OF DRY CONCRETE – PRODUCT GROUP 2							
Parameter	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	1.35E+03	5.31E-01	3.66E+00	3.79E-01	4.09E-02	-2.22E+01
PERM	[MJ]	1.12E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	1.35E+03	5.31E-01	3.66E+00	3.79E-01	4.09E-02	-2.22E+01
PENRE	[MJ]	3.82E+03	9.34E+01	2.36E+02	6.67E+01	2.06E+00	-7.76E+01
PENRM	[MJ]	1.47E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	3.82E+03	9.34E+01	2.36E+02	6.67E+01	2.06E+00	-7.76E+01
SM	[kg]	2.25E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	2.15E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	3.61E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	1.24E+00	7.33E-03	3.36E-02	5.24E-03	2.40E-03	-4.94E-01
Caption	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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Net use of fresh water						
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: $1,95*10^2$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.						

WASTE CATEGORIES AND OUTPUT FLOWS PER 1 TON OF DRY CONCRETE – PRODUCT GROUP 2							
Parameter	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	9.55E+00	6.28E-04	1.50E-03	4.49E-04	1.00E-05	-4.96E-04
NHWD	[kg]	3.49E+02	1.34E-01	1.15E+01	1.42E+03	1.43E+01	-1.25E+00
RWD	[kg]	1.22E-02	1.02E-05	7.66E-05	7.31E-06	4.45E-07	-1.35E-04
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	3.54E-04	0.00E+00	0.00E+00	1.42E+03	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy						
	The numbers are declared in scientific notation, e.g. 1,95E+02. This number can also be written as: $1,95*10^2$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.						

BIOGENIC CARBON CONTENT PER 1 TON OF DRY CONCRETE – PRODUCT GROUP 2		
Parameter	**Unit**	**At the factory gate**
Biogenic carbon content in product	[kg C]	0.00E+00
Biogenic carbon content in accompanying packaging	[kg C]	3.57E-01
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Additional Information

Interpretation:

Overall, the supply of raw materials (A1) constitutes the most significant contribution to the environmental impact of the declared products within the defined system boundary. This is partly due to the relatively low energy consumption, and thus limited direct emissions, associated with the production of dry concrete at the production stage (A3), which is mainly done by mixing materials according to a prescription. Upstream emissions associated with each supply chain of raw materials and the specific material mix are thus the determinants of the environmental impact of each product – especially cement, which makes the main contribution to the majority of EF impact categories.

Technical Information on Scenarios:

End-of-Life (C1-C4)	Value	Unit
Collected separately	1	ton
Collected with mixed waste	0	ton
For reuse	0	ton
For recycling	0,99	ton
For energy recovery	0	ton
For final disposal	0,01	ton

Reuse, Recovery and Recycling potential (D)	Value	Unit
Recovered material	0.99	ton
Energy recovery from waste incineration	0	MJ

Indoor Air:

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN 15804:2012+A2:2019, Section 7.4.1.

Soil and Water:

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN 15804:2012+A2:2019 Section 7.4.2.

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LCA software /background data	SimaPro 9.5 / ecoinvent 3.9.1
3rd party verifier	Linda Høibye, Life Cycle Assessment Consulting

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