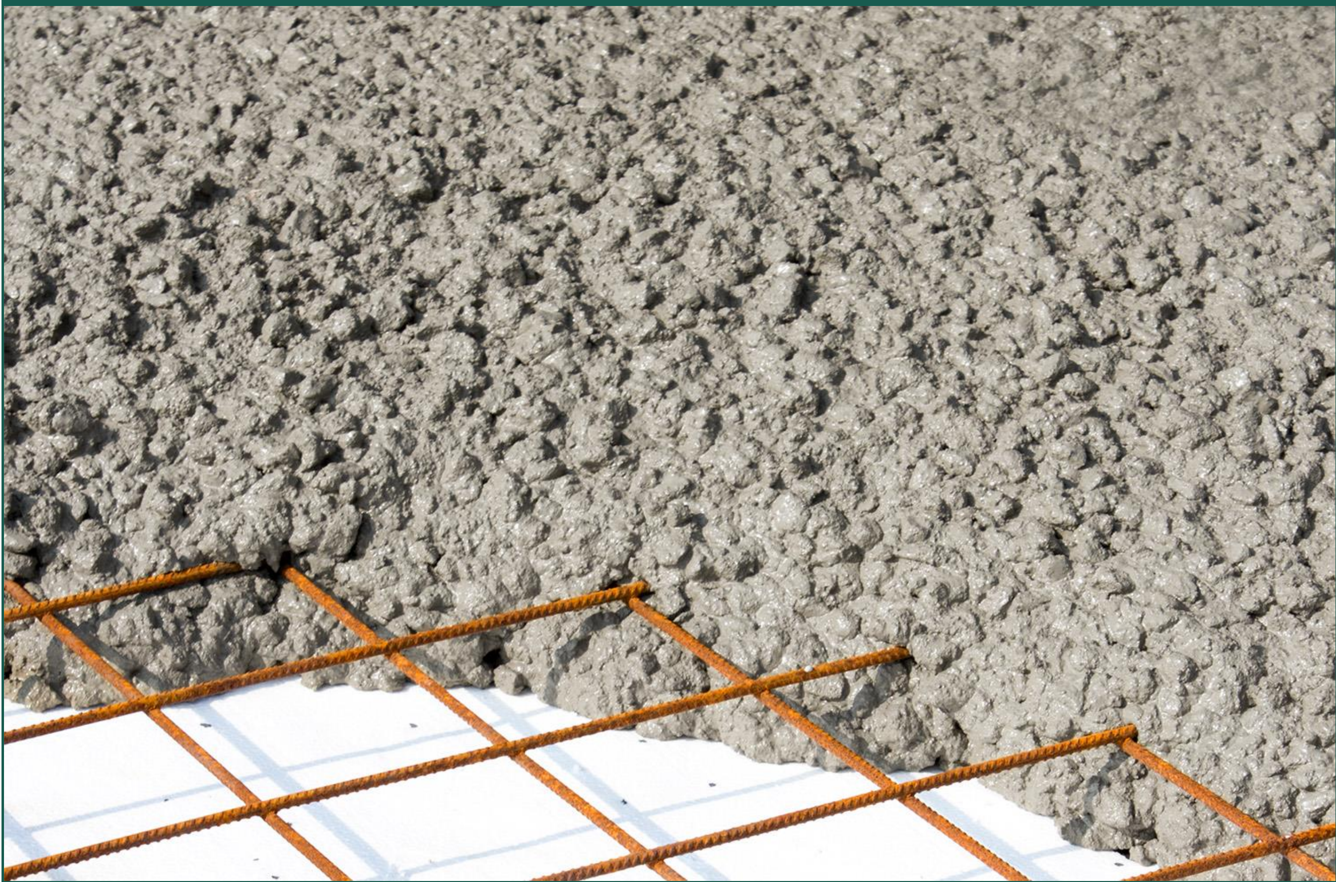
Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 +A2



The Norwegian
EPD Foundation

Owner of the declaration:
Finja Betong AB

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
[Number]

Registration Number:
[Number]

Issue date: 18.05.2022
Valid to: 18.05.2027

Product name

Grovbetong ECO

Carbon dioxide-reduced and binder-optimized concrete free from non renewable natural sand resource.

Manufacturer

Finja Betong AB

General information

Product:
Grovbetong ECO

Program Operator:
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Tlf: +47 23 08 80 00
e-mail: post@epd-norge.no

Decleration Number:
[From EPD-Norge]

This declaration is based on Product Category Rules:
Standard EN 15804+A2 serves as core PCR

Statements:
The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

Declared unit:
1 kg Grovbetong ECO, Dry Mortar mix, in sack

Declared unit with option:
A1-A5, B1, C1-C4, D

Functional unit:
-

Verification:
Independent verification of the declaration and data, according to ISO14025:2010

internal☐ external ☒

Sign

Martin Erlandsson, IVL Swedish Environmental Research Inst.
Independent verifier approved by EPD Norway

Owner of the declaration:
Finja Betong AB
Contact person: Kerstin Bergström
Phone: 0730-882946
e-mail: kerstin.bergstrom@finja.se

Manufacturer:
Finja Betong AB
Betongvägen 1, 281 93 Finja
Phone: +46 10-4552000
e-mail: info@finja.se

Place of production:
Strängnäs, Sweden

Management system:
ISO 14001

Organisation no:
556101-6840

Issue date:
2022-05-18

Valid to:
2027-05-18

Year of study:
2021

Comparability:
EPDs from other programmes than the Norwegian EPD Foundation may not be comparable.

The EPD has been worked out by:
Malin Domhagen

Approved (Manager of EPD Norway)

Product

Product description:

Carbon dioxide-reduced and binder-optimized concrete free from non renewable natural sand resource. Package consists of polyethylene made from recycled polyethylene and polyethylene made from renewable raw material originating from sugar cane.

Product specification:

Composition of the product is described in the table below

Materials	KG	%
Cement		10-25
Crushed aggregate		75-100
Packaging		<1

Technical data:

Betongklass C28/35

Exposure class XC2/XF1

For information see www.finja.se

Market:

Nordic countries

Reference service life, product:

100 years

LCA: Calculation rules

Declared unit:

1 kg Grovbetong ECO, Dry Mortar mix, in sack

Data quality:

Specific data for the production and product composition was provided by the manufacturer. Background data is based on registered EPDs as well as generic data. The data quality for the raw materials in A1 is presented in the table below.

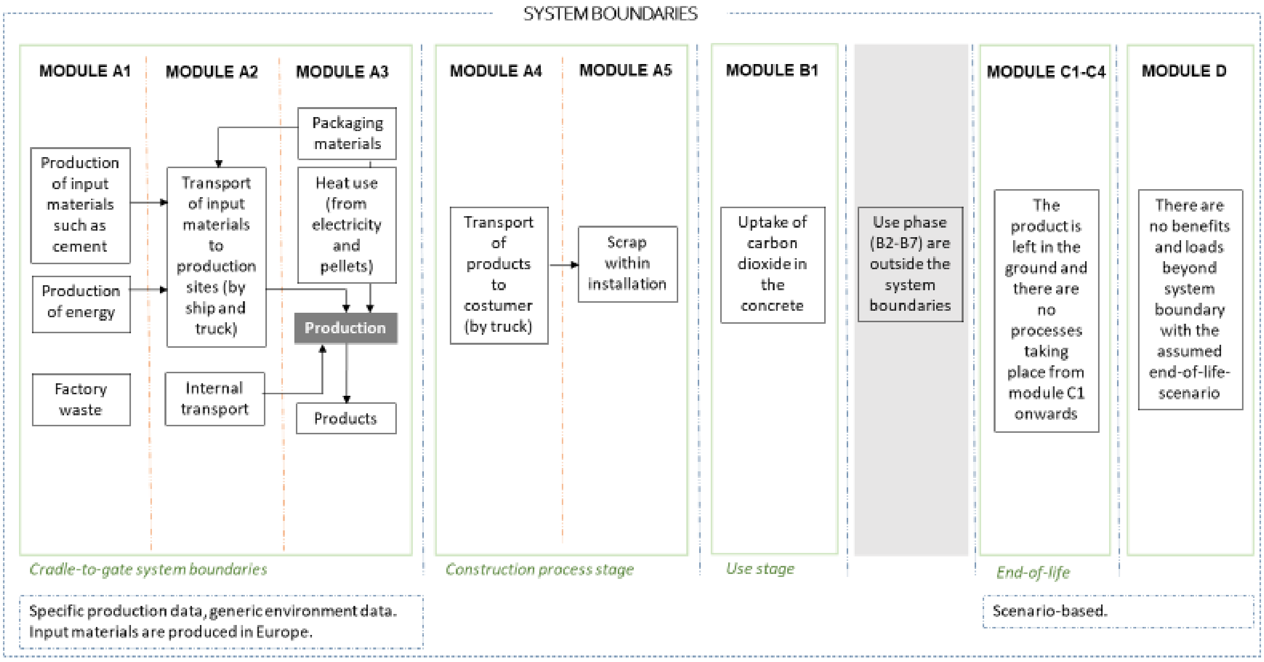
Materials	Data quality	Source	Year
Cement	EPD	Supplier	2021
Crushed aggregate	Industry data	Ecoinvent v3.8	
Packaging	Industry data	Ecoinvent v3.8	

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy, water and waste production in-house is allocated equally among all products through mass allocation, except heat from pellets to dry crushed aggregate which is allocated to the crushed aggregate percentage in the process. Effects of primary production of recycled materials are allocated to the main product in which the material was used.

System boundary:

All processes from raw material extraction to product from the factory gate are included in the analysis (A1-A3). In addition, a median value for transport to the customer (A4). Module A5 are calculated on the assumptions that 5% waste of the product occur in the assembly state, and that water and electricity used at the assembly are assumed to be negligible. Calculations regarding carbonisation after construction phase has been made in Module B1.



Cut-off criteria:

All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included in very small amounts (<1%) are not included included in the culculations of environmental impact (except packaging). This cut-off rule does not apply for hazardous materials and substances.

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

Transport from production place to assembly/user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck	50	Truck, lorry, EURO 5	407	l/tkm	

50 % of the product is delivered to the customer from the factory in Strängnäs (125 km). The remaining half of the products are first transported to Finja Betongs warehouse in Hässleholm before it is transported to the customer (total distance 689 km). The distance to customer is a median value in terms of deliveries made in 2020.

Assembly (A5)

	Comment
Auxiliary	Not applicable
Water consumption	Use of water is not included in the assembly calculations as it is assumed to have a small environmental impact.
Electricity consumption	Use of electricity is not included in the assembly calculations as it is assumed to have a very small environmental impact.
Other energy carriers	Not applicable
Material loss	Material loss is assumed to be 5 %
Output materials from waste treatment	Waste management process for packaging materials
Dust in the air	Not applicable

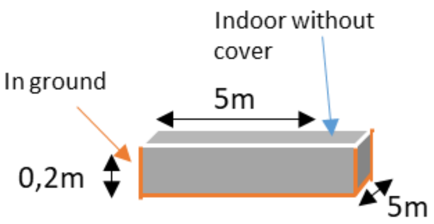
Use (B1)

In the use-phase, the carbonation process of concrete is considered. The precast concrete products are passive in various buildings and constructions, therefore the carbonation process is considered to cover the main part of the activities during the use-phase.

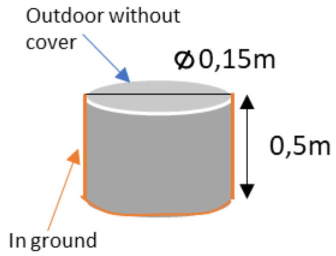
Carbonation of concrete is a chemical reaction where CO_2 in air penetrates the concrete and reacts with hydration products in the concrete. The CO_2 uptake in this module depends on the concrete strength, the exposure conditions and the service life. Two scenarios have been developed to show two characteristic ways to use the product. The calculations have been done according to “Svensk Standards SS-EN 16757:2017 Hållbarhet hos byggnadsverk – miljövarudeklarationer – Produktspecifika regler för betong och förtillverkade betongprodukter”.

The scenarios and their exposure conditions are shown below. In scenario 1, 10 000 kg of concrete is used, and in scenario 2, 18 kg is used. Both scenarios are calculated for a service life of 50 and 100 years.

Scenario 1



Scenario 2



End of Life (C)

The product has many areas of use. It is intended for smaller casting works, and can for example be used for casting foundations for smaller buildings and concrete plinths. It has been assumed that a large part of foundings are left in the ground after end of life and only a minimal share are dug up after service life. It has therefore assumed that no processing in end-of-life is carried out.

Benefits and loads beyond the system boundaries (D)

There are no benefits beyond the system boundary as the products are left in the ground and therefore unavailable for energy or material recovery.

LCA: Results

System boundaries (X=included, ND= not declared, MNR=module not relevant)

	Product stage			Assembly stage		Use stage							End of life stage				Benefits & loads beoyond system boundary
	Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	X	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU	EU	SE	SE	SE	SE	-	-	-	-	-	-	-	-	-	-	-
Specific data used	75 %					-	-	-	-	-	-	-	-	-	-	-	-

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	Acidification 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
	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

Core environmental impact indicators

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1-C4	D
GWP-total	kg CO2 eq.	1,10E-01	6,64E-03	5,36E-03	1,22E-01	2,84E-02	7,54E-03	0,00E+00	0,00E+00
GWP-fossil	kg CO2 eq.	1,10E-01	6,72E-03	8,39E-03	1,25E-01	2,84E-02	7,67E-03	0,00E+00	0,00E+00
GWP-biogenic	kg CO2 eq.	4,30E-04	-8,16E-05	-3,08E-03	-2,73E-03	-3,94E-06	-1,37E-04	0,00E+00	0,00E+00
GWP-LULUC	kg CO2 eq.	5,89E-05	1,24E-06	3,59E-05	9,60E-05	0,00E+00	4,80E-06	0,00E+00	0,00E+00
ODP	kg CFC11 eq.	2,38E-09	2,13E-10	4,45E-10	3,03E-09	4,38E-11	1,54E-10	0,00E+00	0,00E+00
AP	mol H^+ eq.	2,14E-04	4,53E-05	5,95E-05	3,19E-04	1,50E-04	2,35E-05	0,00E+00	0,00E+00
EP-freshwater	kg P eq.	8,59E-06	1,87E-07	2,74E-06	1,15E-05	1,07E-08	5,76E-07	0,00E+00	0,00E+00
EP-marine	kg N eq.	1,37E-05	2,02E-05	1,86E-05	5,25E-05	6,94E-05	6,09E-06	0,00E+00	0,00E+00
EP-terrestial	mol N eq.	7,36E-04	2,21E-04	1,79E-04	1,14E-03	7,61E-04	9,48E-05	0,00E+00	0,00E+00
POCP	kg NMVOC eq.	1,97E-04	5,53E-05	4,23E-05	2,94E-04	1,84E-04	2,39E-05	0,00E+00	0,00E+00
ADP-M&M	kg Sb eq.	1,07E-07	1,26E-08	4,71E-08	1,66E-07	1,12E-09	8,37E-09	0,00E+00	0,00E+00
ADP-fossil	MJ	3,53E-01	9,22E-02	1,38E-01	5,83E-01	3,98E-01	4,91E-02	0,00E+00	0,00E+00
WDP	m^3	6,50E-03	1,28E-04	1,66E-01	1,72E-01	1,08E-04	8,62E-03	0,00E+00	0,00E+00

GWP-total: *Global Warming Potential;* ***GWP-fossil:*** *Global Warming Potential fossil fuels;* ***GWP-biogenic:*** *Global Warming Potential biogenic;* ***GWP-LULUC:*** *Global Warming Potential land use and land use change;* ***ODP:*** *Depletion potential of the stratospheric ozone layer;* ***AP:*** *Acidification potential, Accumulated Exceedance;* ***EP-freshwater:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See "additional Norwegian requirements" for indicator given as PO4 eq.* ***EP-marine:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment;* ***EP-terrestial:*** *Eutrophication potential, Accumulated Exceedance;* ***POCP****: Formation potential of tropospheric ozone;* ***ADP-M&M****: Abiotic depletion potential for non-fossil resources (minerals and metals);* ***ADP-fossil:*** *Abiotic depletion potential for fossil resources;* ***WDP:*** *Water deprivation potential, deprivation weighted water counsumption*

Reading example: 9,0 E-03 = 9,0*10-3 = 0,009

Additional environmental impact indicators

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1-C4	D
PM 2)	Disease incidence	3,07E-09	2,07E-10	1,36E-09	4,63E-09	6,45E-10	2,64E-10	0,00E+00	0,00E+00
IRP 1)	kBq U235 eq.	6,65E+00	9,64E-05	1,02E-03	6,65E+00	6,95E-05	3,32E-01	0,00E+00	0,00E+00
ETP-fw 2)	CTUe	1,30E-01	2,41E-02	2,80E-01	4,34E-01	2,16E-02	2,28E-02	0,00E+00	0,00E+00
HTP-c 2)	CTUh	1,66E-10	1,41E-12	5,61E-12	1,73E-10	1,85E-12	8,76E-12	0,00E+00	0,00E+00
HTP-nc 2)	CTUh	1,47E-09	5,45E-11	1,45E-10	1,67E-09	6,64E-11	8,70E-11	0,00E+00	0,00E+00
SQP 2)	Dimensionless	2,35E-01	0,00E+00	0,00E+00	2,35E-01	0,00E+00	1,18E-02	0,00E+00	0,00E+00

PM: *Particulate matter emissions;* ***IRP:*** *Ionising radiation, human health;* ***ETP-fw:*** *Ecotoxicity (freshwater);* ***ETP-c:*** *Human toxicity, cancer effects;* ***HTP-nc:*** *Human toxicity, non-cancer effects;* ***SQP:*** *Land use related impacts / soil quality Note 1) and 2) see disclaimers above.*

Resource use

Parameter	Unit	A1	A2	A3	A1-A3	A4	A5	C1-C4	D
RPEE	MJ	9,78E-02	1,75E-03	1,37E-01	2,37E-01	4,51E-04	1,18E-02	0,00E+00	0,00E+00
RPEM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	9,78E-02	1,75E-03	1,37E-01	2,37E-01	4,51E-04	1,18E-02	0,00E+00	0,00E+00
NRPE	MJ	4,71E-01	9,80E-02	1,47E-01	7,16E-01	4,23E-01	5,69E-02	0,00E+00	0,00E+00
NRPM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	4,71E-01	9,80E-02	1,47E-01	7,16E-01	4,23E-01	5,69E-02	0,00E+00	0,00E+00
SM	kg	2,59E-02	0,00E+00	0,00E+00	2,59E-02	0,00E+00	1,30E-03	0,00E+00	0,00E+00
RSF	MJ	1,02E-01	0,00E+00	0,00E+00	1,02E-01	0,00E+00	5,08E-03	0,00E+00	0,00E+00
NRSF	MJ	1,66E-01	0,00E+00	0,00E+00	1,66E-01	0,00E+00	8,32E-03	0,00E+00	0,00E+00
W	m^3	1,98E-03	1,27E-04	1,66E-01	1,68E-01	1,08E-04	8,39E-03	0,00E+00	0,00E+00

RPEE *Renewable primary energy resources used as energy carrier;* ***RPEM*** *Renewable primary energy resources used as raw materials;* ***TPE*** *Total use of renewable primary energy resources;* ***NRPE*** *Non renewable primary energy resources used as energy carrier;* ***NRPM*** *Non renewable primary energy resources used as materials;*

*TRPE Total use of non renewable primary energy resources; **SM** Use of secondary materials; **RSF** Use of renewable secondary fuels; **NRSF** Use of non renewable secondary fuels; **W** Use of net fresh water * Energy stored as material in the product and the packing material is direct balanced out and not reported (<5%).*

Use-phase (B1) – Carbonation

The result of the carbonation is based on the usage scenarios described in more detail on page 5 and not with respect to the declared unit of the EPD.

Scenario for use phase (B1)		Indicator	Unit	50 years	100 years
Scenario 1	5 sides in ground, one exposed side indoor without cover	Climate impact	Kg CO^2 - eq	-4,67E+01	-6,60E+01
Scenario 2	2 sides in ground, one side exposed outdoor without cover	Climate impact	Kg CO^2 - eq	-1,15E-01	-1,63E-01

In the carbonation process, the concrete in scenario 1 is excepected to absorb 3% of its climate impact in A1-C4 in 50 years, and 4% in 100 years. In scenario 2 the corresponding figure is 4% in 50 years, and 6% in 100 years. The figures are based on the impact calculated in this EPD.

*Calculation example: Per declared unit, in module A1-C4, the cliamte impact for Grovbetong ECO is **1,58E-01** kg CO2 – eq, this is calculated by adding the modules together, see the table below. Module D is excluded due to that it is not included in the lifecycle.*

Indicator	*Unit*	*A1-A3*	*A4*	*A5*	*C1-C4*	*TOTAL*
GWP-total	*kg CO2 eq.*	*1,22E-01*	*2,84E-02*	*7,54E-03*	*0,00E+00*	***1,58E-01***

Scenario 1 contains 10 000 kg of concrete. To calculate the total impact in A1-C4 for scenario 1, multiply the concrete weight with the total impact per declared unit.

*10 000 kg * **1,58E-01** Kg CO2 – eq. = 1,58E+03 kg CO2 – eq.*

*The concrete in scenario 1 abosrbs **4,67E+01 kg** CO2 – eq in the carbonation process in 50 years, see the table above. To get how large part of the total impact in A1-C4 the carbonation process absorbes, divide the absorbed kg CO2 – eq. with the total impact for the scenario.*

***4,67E+01** kg CO2 – eq/ 1,58E+03 kg CO2 – eq. = 0,03.*

This gives that the carbonation process absorbes 3% of the total impact in A1-C4 for scenario 1 in 50 years.

End of life – Waste

Parameter	Unit	A1	A2	A3	A1-A3	A4	A5	C1-C4	D
HW	KG	2,02E-05	0,00E+00	0,00E+00	2,02E-05	0,00E+00	1,01E-06	0,00E+00	0,00E+00
NHW	KG	6,59E-01	0,00E+00	0,00E+00	6,59E-01	0,00E+00	3,30E-02	0,00E+00	0,00E+00
RW	KG	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

***HW** Hazardous waste disposed; **NHW** Non hazardous waste disposed; **RW** Radioactive waste disposed*

End of life – output flow

Parameter	Unit	A1	A2	A3	A1-A3	A4	A5	C1-C4	D
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	2,66E-03	0,00E+00	0,00E+00	2,66E-03	0,00E+00	1,33E-04	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	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	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

***CR** Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energy*

Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0
Biogenic carbon content in the accompanying packaging	kg C	2,17E-04*

* The inherent energy is assumed to be direct balanced out and therefore not reported as RPEM.

Additional Norwegian requirements

Greenhous gas emission from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing prosess(A3).

National electricity grid	Unit	Value
SE, Ecoinvent v3.8 (2021)	kg CO2 -eq/kWh	0,0767

Additional environmental impact indicators required in NPCR Part A for construction products

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator for GWP has been sub-divided into the following:

GWP-IOBC Climate impacts calculated according to the principle of instantanious oxidation

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1-C4	D
GWP-IOBC	kg CO2 eq.	1,10E-01	6,72E-03	8,39E-03	1,25E-01	2,84E-02	7,67E-03	0,00E+00	1,10E-01

GWP-IOBC *Global warming potential calculated according to the principle of instantanious oxidation.*

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

☒ The product contains no substances given by the REACH Candidate list or the Norwegian priority list.

☐ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.

☐ The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.

☐ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiften, Annex III), see table.

Indoor environment

The product meets the requirements for low emissions.

Bibliography

ISO 14025:2010	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines
EN 15804:2012+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
SS-EN 16757:2017	Hållbarhet hos byggnadsverk – miljövarudeklarationer – Produktspecifika regler för betong och förtillverkade betongprodukter
Domhagen, Bergström	LCA Report Finja Grovbetong ECO and Grovbetong – 2022-04-29. WSP.

	Program Operator	tlf	+47 23 08 80 00
	The Norwegian EPD Foundation		
	Post Box 5250 Majorstuen, 0303 Oslo	e-post:	post@epd-norge.no
	Norway	web	www.epd-norge.no
	Publisher	tlf	+47 23 08 80 00
	The Norwegian EPD Foundation		
	Post Box 5250 Majorstuen, 0303 Oslo	e-post:	post@epd-norge.no
	Norway	web	www.epd-norge.no
	Owner of the decleration	tlf	0730-882946
	Finja Betong AB		
	Betongvägen 1, 281 93 Finja	e-post:	kerstin.bergstrom@finja.se
	Sweden	web	www.finja.se
	Author of the life cycle assesment	tlf	+46 10-722 50 00
	WSP		
	Box 13033	e-post:	malin.domhagen@wsp.com
	402 51 Göteborg	web	www.wsp.com

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