epd-norge
Global program operatør

Environmental product declaration

In accordance with 14025 and EN15804+A2

Norcem Multicem 50-50 (CKD-Std FA) eng.

The Norwegian EPD Foundation

Owner of the declaration:
Norcem AS

Product:
Norcem Multicem 50-50 (CKD-Std FA) eng.

Declared unit:
1 tonne

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR and EN 16908 is used as PCR Part B
EN 16908:2017 Cement and building lime

Program operator:
The Norwegian EPD Foundation

Declaration number:

Registration number:

Issue date:

Valid to:

EPD Software:
LCA.no EPD generator ID: 55904

General information

Product

Norcem Multicem 50-50 (CKD-Std FA) eng.

Owner of the declaration:

Norcem AS
Contact person: Petter Thyholdt
Phone: +47 22 87 84 00
e-mail: petter.thyholdt@norcem.no

Program operator:

Post Box 5250 Majorstuen, 0303 Oslo, Norway
The Norwegian EPD Foundation
Phone: +47 23 08 80 00
web: post@epd-norge.no

Manufacturer:

Norcem AS

Declaration number:

Place of production:

Norcem AS
Lilleakerveien 2A
0283 Oslo, Norway

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR and EN 16908 is used as PCR Part B
EN 16908:2017 Cement and building lime

Management system:

Miljøstyringssystem ISO 14001-sertifisert(S-007)
Kvalitetssikriingssystem ISO 9001- sertifisert (S-006)

Statement of liability:

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

Organisation no:

934 949 145

Declared unit:

1 tonne Norcem Multicem 50-50 (CKD-Std FA) eng.

Issue date:

Declared unit with option:

A1-A3,A4

Valid to:

Year of study:

2021

Functional unit:

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

General information on verification of EPD from EPD tools:

Independent verification of data, other environmental information and the declaration according to ISO 14025:2010, § 8.1.3 and § 8.1.4. Individualthird party verification of each EPD is not required when the EPD tool is i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPDNorway, and iii)the proccess is reviewed annualy. See Appendix G of EPD-Norway's General Programme Instructions for further information on EPD tools.

Development and verification of EPD:

The declaration is created using EPD tool lca.tools ver EPD2022.03, developed by LCA.no. The EPD tool is integrated in the company's management system, and has been approved by EPD Norway.

Developer of EPD: Petter Thyholdt

Reviewer of company-specific input data and EPD: Sigrun Bremseth

Verification of EPD tool:

Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPDNorway's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Approved:

Martin Erlandsson, IVL Swedish Environmental Research Institute

(no signature required)

Product

Product description:

Multicem is mainly used to reduce soils settings and improve the stability of weak soils masses. Multicem is a binder of cement and CKD (Cement Kiln Dust), and consists mainly of cement, burnt lime and other calcined minerals. Multicem has similar properties as Lime Cement KC, and thus it is suitable for use in stabilizing clay and other unstable soils masses. CKD is a material derived from the furnace system and it is declared with GWP = 0. The total CO2 emissions from Norcem, Brevik are instead allocated to all our cements. A2 is therefore not included in the EPD of Multicem.

Product specification

Materials	Value	Unit
CKD	50	%
Norcem Standard FA	50	%

Technical data:

Market:

Norway

Reference service life, product

Depending on the area of use.

Reference service life, building or construction works

LCA: Calculation rules

Declared unit:

1 tonne Norcem Multicem 50-50 (CKD-Std FA) eng.

Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. The recycling process and transportation of the material is allocated to this analysis.

Data quality:

Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

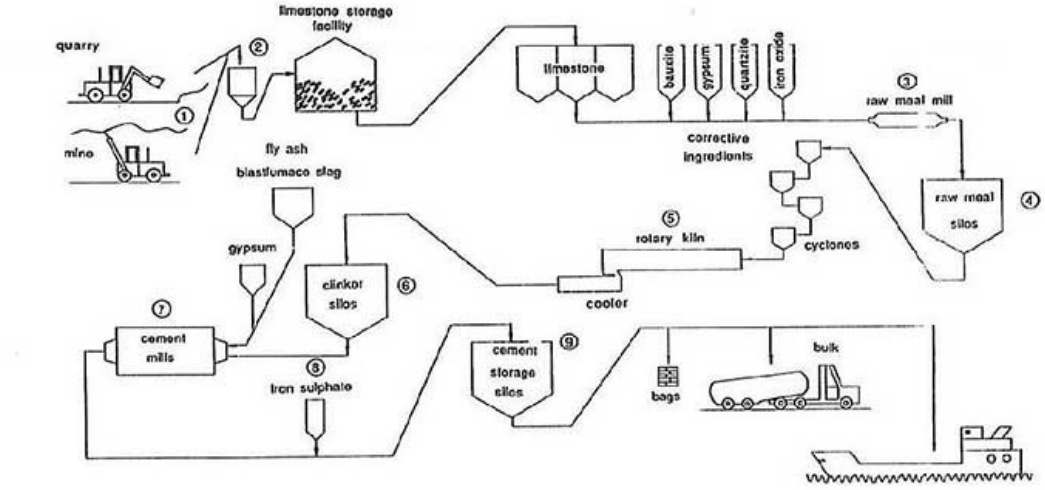
Materials	Source	Data quality	Year
SCM	LCA.no	Database	2021

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

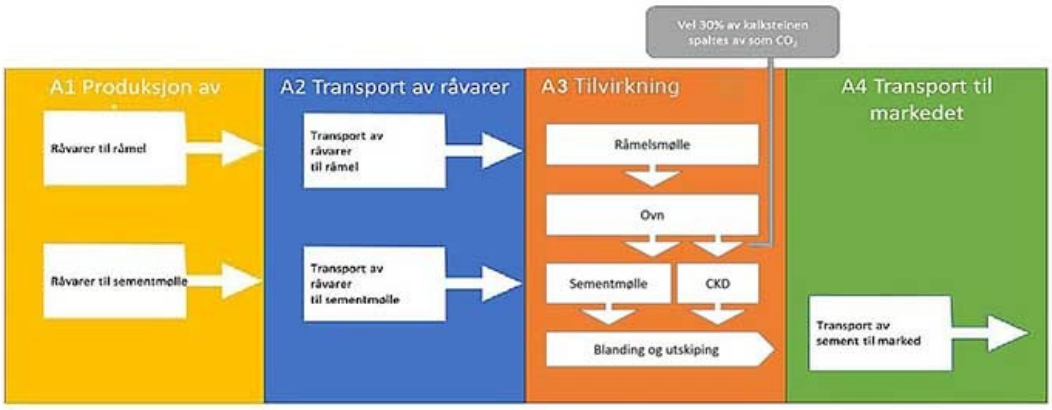
Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

System boundary:

From raw material extraction to market.



1. Uttak av kalkstein fra gruve og dagbrudd
2. Knusing av kalkstein
3. Maling av kalkstein og tilsetningstoffer til råmel
4. Siloer for lagring og homogenisering
5. Brenning av klinker i roterende ovn der materialene når en temperatur på 1450°C
6. Siloer for lagring av klinker
7. Maling av klinker med gips og andre tilsetninger for produksjon av sement
8. Tilsetning av jernsulfat
9. Lagring og utsendelse av sementen



Additional technical information:

LCA: Scenarios and additional technical information

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

Cement and CKD is shipped from Norcem, Brevik to Slemmestad where they are mixed to the product Multicem.

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Ship, Cement boat	50,0 %	148	0,005	l/tkm	0,74
Truck, over 32 tonnes, EURO 6	53,3 %	148	0,023	l/tkm	3,40

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Environmental impact				
	Indicator	**Unit**	A1-A3	A4
	GWP-total	kg CO_2 -eq	2,84E+02	7,59E+00
	GWP-fossil	kg CO_2 -eq	2,84E+02	7,58E+00
	GWP-biogenic	kg CO_2 -eq	5,68E-02	2,99E-03
	GWP-luluc	kg CO_2 -eq	1,39E-02	2,40E-03
	ODP	kg CFC11 -eq	2,15E-06	1,78E-06
	AP	mol H+ -eq	3,47E-01	5,51E-02
	EP-FreshWater	kg P -eq	2,20E-03	5,45E-05
	EP-Marine	kg N -eq	9,18E-02	1,22E-02
	EP-Terrestial	mol N -eq	1,17E+00	1,37E-01
	POCP	kg NMVOC -eq	2,70E-01	4,23E-02
	ADP-minerals&metals[1]	kg Sb -eq	1,85E-04	1,20E-04
	ADP-fossil[1]	MJ	5,13E+02	1,19E+02
	WDP[1]	m^3	3,86E+03	8,35E+01

GWP total Global Warming Potential total; GWP fossil Global Warming Potential fossil fuels ; GWP biogenic Global Warming Potential biogenic; GWP luluc Global W Potential land use change; ODP Ozone Depletion; AP Acidification; EP freshwater Eutrophication aquatic freshwater; EP marine Eutrophication aquatic marine; EP terrestrial Eutrophication terrestrial ;POCP Photochemical zone formation; ADPE Abiotic Depletion Potential minerals and metals; ADPf Abiotic Depletion Potential fossil fuels; WPD Water Depletion Potential

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. 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

Remarks to environmental impacts

The parameter GWP (A1-A3) includes 142,3 kg CO2-eq. from the combustion of alternative fossil fuels during clinker production. In accordance with the "polluter pays" principle / EN 15804 /, the emissions will be added to the production system that caused the waste. In this EPD, the CO2 contribution from alternative fossil fuels has not been deducted. This is to be able to compare calculated global warming from cement regardless of the status of the waste in different countries.

Additional environmental impact indicators

Indicator		Unit	A1-A3	A4
	PM	Disease incidence	1,50E-06	5,92E-07
	IRP[2]	kgBq U235 -eq	1,01E+00	5,21E-01
	ETP-fw[1]	CTUe	6,19E+03	8,42E+01
	HTP-c[1]	CTUh	6,19E-09	0,00E+00
	HTP-nc[1]	CTUh	1,72E-07	7,40E-08
	SQP[1]	dimensionless	9,88E+01	1,22E+02

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)

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. 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
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				
Indicator		Unit	A1-A3	A4
	PERE	MJ	2,74E+02	1,39E+00
	PERM	MJ	0,00E+00	0,00E+00
	PERT	MJ	2,74E+02	1,39E+00
	PENRE	MJ	5,15E+02	1,19E+02
	PENRM	MJ	0,00E+00	0,00E+00
	PENRT	MJ	5,15E+02	1,19E+02
	SM	kg	5,09E+02	0,00E+00
	RSF	MJ	4,42E+02	4,88E-02
	NRSF	MJ	6,29E+02	1,73E-01
	FW	m^3	2,04E+00	1,23E-02

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 materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; FW Use of net fresh water

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Waste

Indicator		Unit	A1-A3	A4
	HWD	kg	3,62E-02	6,20E-03
	NHWD	kg	2,15E+00	9,12E+00
	RWD	kg	1,13E-03	8,18E-04

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

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Output flow

Indicator		Unit	A1-A3	A4
	CRU	kg	0,00E+00	0,00E+00
	MFR	kg	2,05E-02	0,00E+00
	MER	kg	5,68E-03	0,00E+00
	EEE	MJ	3,70E-03	0,00E+00
	EET	MJ	5,60E-02	0,00E+00

CRU Components for re-use; MFR Materials for recycling; MER Materials for energy recovery; EEE Exported electrical energy; EET Exported energy Thermal

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

Biogenic Carbon Content

Indicator	Unit	At the factory gate
Biogenic carbon content in product	kg C	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	0,00E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2

Additional Norwegian requirements

Greenhouse gas emissions 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 process (A3).

Dangerous substances

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

Indoor environment

Additional Environmental Information

Environmental impact indicators EN 15804+A1 and NPCR Part A v2.0			
Indicator	**Unit**	A1-A3	A4
GWP	kg CO_2 -eq	2,82E+02	7,51E+00
ODP	kg CFC11 -eq	2,01E-06	1,48E-06
POCP	kg C_2H_4 -eq	6,88E-03	1,54E-03
AP	kg SO_2 -eq	1,96E-01	4,12E-02
EP	kg PO_4^{3-} -eq	2,70E-02	4,17E-03
ADPM	kg Sb -eq	1,85E-04	1,20E-04
ADPE	MJ	4,99E+02	1,17E+02
GWPIOBC	kg CO_2 -eq	1,72E+01	7,59E+00

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources; GWP-IOBC/GHG Global warming potential calculated according to the principle of instantanious oxidation (except emissions and uptake of biogenic carbon)

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 Environmental product declaration - Core rules for the product category of construction products.
ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
ecoinvent v3, Allocation, cut-off by classification, Swiss Centre of Life Cycle Inventories.
Iversen et al., (2021) eEPD v2021.09 Background information for EPD generator tool system verification, LCA.no report number: 07.21
Vold et al, (2022) EPD generator for CEN PCR EN 16908:2017 Cement and building lime - Background information for PCR application and LCA data
, LCA.no report number: 01.22.
NPCR Part A: Construction products and services. Ver. 2.0. April 2021, EPD-Norge.
CEN PCR EN 16908:2017 Cement and building lime

	Program operator and publisher The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo, Norway	Phone: +47 23 08 80 00 e-mail: post@epd-norge.no web: www.epd-norge.no
	Owner of the declaration: Norcem AS Lilleakerveien 2A, 0283 Oslo	Phone: +47 22 87 84 00 e-mail: petter.thyholdt@norcem.no web: www.norcem.no
	Author of the Life Cycle Assessment LCA.no AS Dokka 6B, 1671	Phone: +47 916 50 916 e-mail: post@lca.no web: www.lca.no
	Developer of EPD generator LCA.no AS Dokka 6B,1671 Kråkerøy	Phone: +47 916 50 916 e-mail: post@lca.no web: www.lca.no
	ECO Platform ECO Portal	web: www.eco-platform.org web: ECO Portal