

# Environmental product declaration

In accordance with 14025 and EN15804+A2

Norcem Anleggsement SR, Brevik - CEM I 42,5N-SR3 eng.



The Norwegian EPD Foundation

**Owner of the declaration:**

Norcem AS

**Product:**

Norcem Anleggsement SR, Brevik - CEM I 42,5N-SR3 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:**

NEPD-3949-2906-EN

**Registration number:**

NEPD-3949-2906-EN

**Issue date:** 28.11.2022

**Valid to:** 28.11.2027

**EPD Software:**

LCA.no EPD generator ID: 55666

## General information

### Product

Norcem Anleggsement SR, Brevik - CEM I 42,5N-SR3 eng.

### Program operator:

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

### Declaration number:

NEPD-3949-2906-EN

### 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

### 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.

### Declared unit:

1 tonne Norcem Anleggsement SR, Brevik - CEM I 42,5N-SR3 eng.

### Declared unit with option:

A1-A3,A4

### Functional unit:

### 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. Individual third 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 process is reviewed annually. See Appendix G of EPD-Norway's General Programme Instructions for further information on EPD tools.

### 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:

Martin Erlandsson, IVL Swedish Environmental Research Institute  
(no signature required)

### Owner of the declaration:

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

### Manufacturer:

Norcem AS  
Lilleakerveien 2A  
0283 Oslo, Norway

### Place of production:

Norcem AS, Brevik  
Setreveien 2  
3950 Brevik, Norway

### Management system:

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

### Organisation no:

934 949 145

### Issue date:

28.11.2022

### Valid to:

28.11.2027

### Year of study:

2021

### Comparability:

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

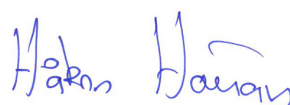
### Development and verification of EPD:

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

### Approved:



Håkon Hauan  
Managing Director of EPD-Norway

## Product

### Product description:

Norcem Anleggsement SR (Anlæggningsement Brevik) is produced in Brevik. It is a low alkali CEM I 42,5 N-SR 3 cement adapted for use in plant constructions with requirements for cement with moderate heat development.

### Product specification

Portland cement

| Materials        | Value | Unit |
|------------------|-------|------|
| Clinker          | 91    | %    |
| Gypsum           | 4,9   | %    |
| Limestone filler | 4,1   | %    |

### Technical data:

CEM I 42,5N-SR3

Further information is available at [www.norcem.no](http://www.norcem.no)

### Market:

Sweden, 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 Anleggsement SR, Brevik - CEM I 42,5N-SR3 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.

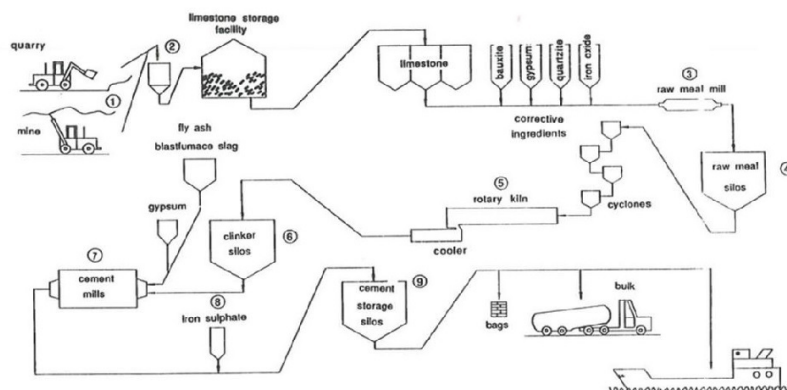
| Materials              | Source        | Data quality | Year |
|------------------------|---------------|--------------|------|
| Additives              | ecoinvent 3.6 | Database     | 2019 |
| Binder                 | ecoinvent 3.6 | Database     | 2019 |
| Raw materials, Mineral | LCA.no        | Database     | 2021 |
| SCM                    | LCA.no        | Database     | 2021 |
| Waste products         | LCA.no        | Database     | 2021 |

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

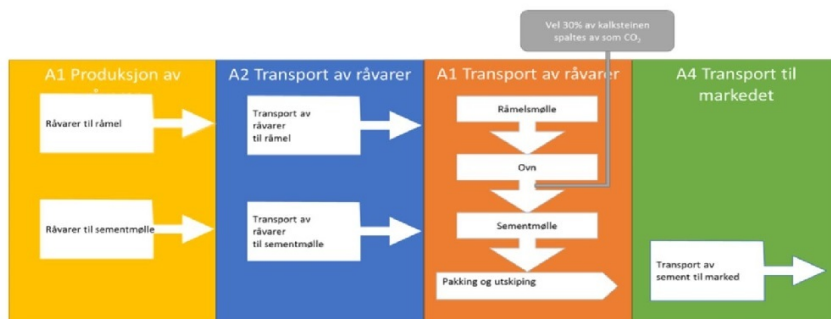
| Product stage |           |               | Construction installation stage | Use stage |     |             |        |             |               |                        |                       |                            |           | End of life stage |          |                                     |  | 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 | Re-use-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.

288 km is the average transport distance from Norcem, Brevik, Norway to Wallhamn, Varberg and Malmö in Sweden.

| 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 %                                | 288           | 0,005                   | l/tkm | 1,44                |

## 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 <sub>2</sub> -eq | 7,19E+02 | 4,44E+00 |
|  | GWP-fossil                       | kg CO <sub>2</sub> -eq | 7,19E+02 | 4,44E+00 |
|  | GWP-biogenic                     | kg CO <sub>2</sub> -eq | 1,67E-01 | 9,04E-04 |
|  | GWP-luluc                        | kg CO <sub>2</sub> -eq | 2,66E-02 | 1,71E-03 |
|  | ODP                              | kg CFC11 -eq           | 4,06E-06 | 8,64E-07 |
|  | AP                               | mol H+ -eq             | 6,97E-01 | 1,34E-01 |
|  | EP-FreshWater                    | kg P -eq               | 5,59E-03 | 1,24E-05 |
|  | EP-Marine                        | kg N -eq               | 1,90E-01 | 3,00E-02 |
|  | EP-Terrestrial                   | mol N -eq              | 2,55E+00 | 3,37E-01 |
|  | POCP                             | kg NMVOC -eq           | 5,61E-01 | 8,73E-02 |
|  | ADP-minerals&metals <sup>1</sup> | kg Sb -eq              | 4,08E-04 | 1,87E-05 |
|  | ADP-fossil <sup>1</sup>          | MJ                     | 1,23E+03 | 5,71E+01 |
|  | WDP <sup>1</sup>                 | m <sup>3</sup>         | 8,58E+03 | 1,27E+01 |

GWP total Global Warming Potential total; GWP fossil Global Warming Potential fossil fuels ; GWP biogenic Global Warming Potential biogenic; GWP luluc Global Warming 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<sup>-3</sup> = 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 CO<sub>2</sub>-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 CO<sub>2</sub> 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 | 4,23E-06 | 0,00E+00 |
|  | IRP <sup>2</sup>    | kgBq U235 -eq     | 2,09E+00 | 2,49E-01 |
|  | ETP-fw <sup>1</sup> | CTUe              | 1,79E+04 | 2,96E+01 |
|  | HTP-c <sup>1</sup>  | CTUh              | 1,50E-08 | 0,00E+00 |
|  | HTP-nc <sup>1</sup> | CTUh              | 4,20E-07 | 0,00E+00 |
|  | SQP <sup>1</sup>    | dimensionless     | 3,58E+02 | 7,29E+00 |

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<sup>-3</sup> = 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             | 6,02E+02 | 2,82E-01 |
|  | PERM      | MJ             | 0,00E+00 | 0,00E+00 |
|  | PERT      | MJ             | 6,02E+02 | 2,82E-01 |
|  | PENRE     | MJ             | 1,24E+03 | 5,71E+01 |
|  | PENRM     | MJ             | 0,00E+00 | 0,00E+00 |
|  | PENRT     | MJ             | 1,24E+03 | 5,71E+01 |
|  | SM        | kg             | 8,55E+01 | 0,00E+00 |
|  | RSF       | MJ             | 1,02E+03 | 1,08E-02 |
|  | NRSF      | MJ             | 1,45E+03 | 7,40E-02 |
|  | FW        | m <sup>3</sup> | 4,50E+00 | 1,61E-03 |

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<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed








| End of life - Waste   |           |  |      |          |          |
|---|-----------|--|------|----------|----------|
|   | Indicator |  | Unit | A1-A3    | A4       |
|  | HWD       |  | kg   | 1,36E-01 | 1,83E-03 |
|  | NHWD      |  | kg   | 5,11E+00 | 8,06E-02 |
|  | RWD       |  | kg   | 2,20E-03 | 4,03E-04 |

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

"Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3} = 0,009$ "

\*INA Indicator Not Assessed

| End of life - Output flow   |           |  |      |          |          |
|---|-----------|--|------|----------|----------|
|   | Indicator |  | Unit | A1-A3    | A4       |
|  | CRU       |  | kg   | 0,00E+00 | 0,00E+00 |
|  | MFR       |  | kg   | 6,48E-02 | 0,00E+00 |
|  | MER       |  | kg   | 1,93E-02 | 0,00E+00 |
|  | EEE       |  | MJ   | 1,16E-02 | 0,00E+00 |
|  | EET       |  | MJ   | 1,76E-01 | 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 =  $9,0 \cdot 10^{-3} = 0,009$ "

\*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 CO<sub>2</sub>

## 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).

| Electricity mix           | Data source   | Amount | Unit         |
|---------------------------|---------------|--------|--------------|
| Electricity, Norway (kWh) | ecoinvent 3.6 | 24,33  | g CO2-eq/kWh |

### 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 <sub>2</sub> -eq               | 7,15E+02 | 4,41E+00 |  |
| ODP  | kg CFC11 -eq                         | 3,73E-06 | 8,64E-07 |  |
| POCP   | kg C <sub>2</sub> H <sub>4</sub> -eq | 1,32E-02 | 2,94E-03 |  |
| AP   | kg SO <sub>2</sub> -eq               | 3,21E-01 | 1,08E-01 |  |
| EP   | kg PO <sub>4</sub> <sup>3-</sup> -eq | 4,99E-02 | 1,06E-02 |  |
| ADPM   | kg Sb -eq                            | 4,08E-04 | 1,87E-05 |  |
| ADPE   | MJ                                   | 1,20E+03 | 5,68E+01 |  |
| GWPIOBC  | kg CO <sub>2</sub> -eq               | 3,81E+01 | 4,44E+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 instantaneous 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

|   |  |   |
|---|--|---|
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