epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Marble Block Stone from Norwegian Rose Quarry - Europe



The Norwegian EPD Foundation

Owner of the declaration:
Norwegian Rose AS

Product:
Marble Block Stone from Norwegian Rose Quarry - Europe

Declared unit:
1 tonne

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 018:2022 Part B for natural stone products, aggregates and fillers

Program operator:
The Norwegian EPD Foundation

Declaration number:

Registration number:

Issue date:

Valid to:

EPD software:
LCAno EPD generator ID: 427717

General information

Product

Marble Block Stone from Norwegian Rose Quarry - Europe

Owner of the declaration:

Norwegian Rose AS
Contact person: Susan Moser
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Program operator:

The Norwegian EPD Foundation
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Manufacturer:

Norwegian Rose AS

Declaration number:

Place of production:

Norwegian Rose AS
Løvgavlveien 16
8218 Fauske, Norway

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 018:2022 Part B for natural stone products, aggregates and fillers

Management system:

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:

982 422 639

Declared unit:

1 tonne Marble Block Stone from Norwegian Rose Quarry - Europe

Issue date:

Declared unit with option:

A1,A2,A3,A4,C1,C2,C3,C4,D

Valid to:

Year of study:

2023

Functional unit:

Not applicable.

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. Verification of each EPD is made according to EPD-Norway's guidelines for verification and approval requiring that tools are i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPD-Norway, and iii) the process is reviewed annually by an independent third party verifier. 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: Pedro Ferreira

Reviewer of company-specific input data and EPD: Børge Heggen Johansen, Energiråd AS

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.

Approved:

Third party verifier:

Martin Erlandsson, IVL Swedish Res. Inst

(no signature required)

Product

Product description:

Marble block stone from Fauske is quarried north of the Arctic Circle and characterized by its distinctive patterns and a range of shades and colors. These versatile blocks can be used as walling stone, exterior wall cladding, interior design, high-traffic flooring, and sculptural artistic work, to name a few.

Product specification

The petrographic classification of the stone is Calcitic-Dolomitic marble. The marble with its significant Dolomite content is typically more durable and better suited for high-traffic areas or exterior applications where durability is essential, making the product known for versatile usage. The stone block comes as squared or shapeless (labeled as Mosaic). The marble comes in three dominating colors:

1. Norwegian Rose, world-renowned pink marble.
2. Hermelin (Antique Fonce), classic blue-grey marble in a dark and light version.
3. Antique Verdatre, exclusive mint green-white marble.

Materials	Value	Unit
Stone	1000	kg

Technical data:

Mineralogy: Calcite (65%), dolomite (30%), various auxiliary minerals (5%)

The product meets the requirements set by the general reference rules UNI EN 1469/2015 and the chemical and physical properties correspond to the values specified by the relevant UNI.
Reference standards: EN 1936, 12373, 13755, 1926, 12371.

Physical properties	Value	Unit
Flexural strength-average value	12.3	MPa
Real density and apparent density and total and open porosity	2760	kg/m^3
Water absorption at atmospheric pressure	0.1	%
Uniaxial compressive strength	98	MPa
Frost resistance after 56 cycles	-3.6	%

Market:

Sweden, Portugal, Italy, Denmark and Norway.
Country-specific EPDs are available on request: https://www.fauskemarble.com/

Reference service life, product

Depending on the application.

Reference service life, building or construction works

The lifespan of buildings is often assumed to be 60 years.

LCA: Calculation rules

Declared unit:

1 tonne Marble Block Stone from Norwegian Rose Quarry - Europe

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. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Data quality:

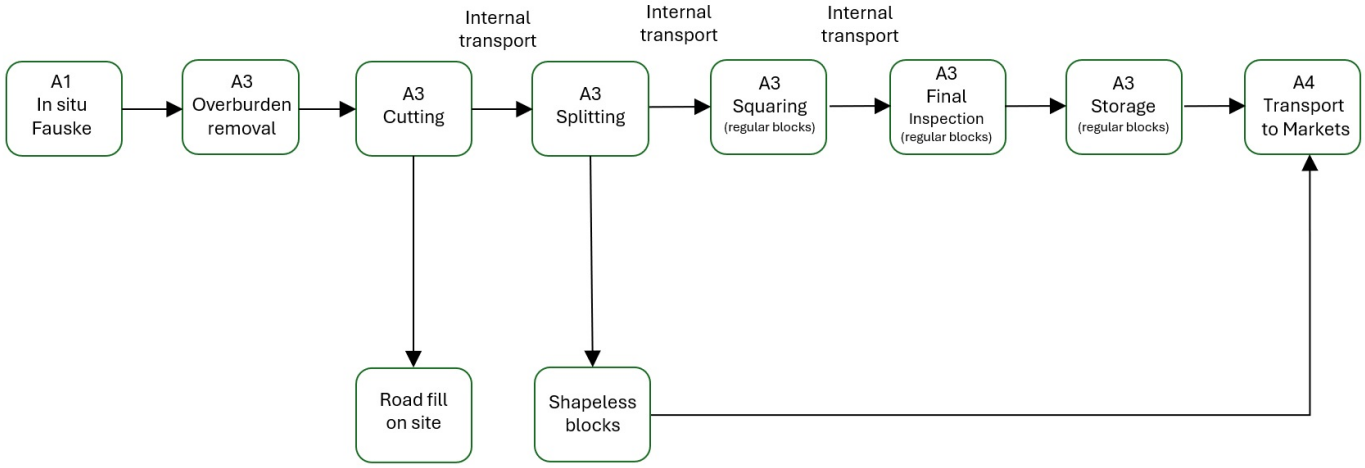
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

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	X	X	X	X	X

System boundary:

Modules A1-A4 are included in the document. A1-A3 encompass the extraction of raw materials, transportation of those materials, and the manufacturing of shapeless and regular blocks. Both products share the processes of marble extraction from the quarry, internal transportation, cutting, and splitting. Regular blocks also undergo cutting, final inspection, and storage before being transported to markets in module A4. The blocks are exported to European countries, where natural stone factories handle further processing into various marble products.





The predominant colors of the marble are: Norwegian Rose, Antique Verdatre, and Hermelin (Antique Fonce).

Additional technical information:

Not applicable.

LCA: Scenarios and additional technical information

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

The square and shapeless blocks are distributed to clients in Italy, Portugal, Sweden, Denmark and Norway. The method of transport is a combination of truck, rail and container ship, depending on the country.

Module A4 contains a weighted average of the distances, based on the market share of each country.

Modules C and D present average values for the end-of-life stages of natural stone products, based on Norwegian statistics. 50 km in module C2 is used as the industry average.

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Ship, freight 150 000 DWT (km)	65,0 %	821	0,003	l/tkm	2,46
Train, Electrical (km) - Europe	42,0 %	1857	0,051	kWh/tkm	94,73
Truck, over 32 tonnes, EURO 6 (km)	53,3 %	336	0,023	l/tkm	7,73

De-construction demolition (C1)	Unit	Value			
Demolition of stone materials (kg)	kg/DU	1000,00			

Transport to waste processing (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	50	0,043	l/tkm	2,15

Waste processing (C3)	Unit	Value			
Waste treatment of stone products after demolition (kg)	kg/DU	700,00			

Disposal (C4)	Unit	Value			
Waste, stone, for landfill (kg)	kg/DU	300,00			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of stone materials (kg)	kg/DU	700,00			

LCA: Results

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

Environmental impact										
Indicator		Unit	Squared Blocks	Shapeless Blocks	A4	C1	C2	C3	C4	D
	GWP-total	kg CO_2 -eq	2,08E+01	2,93E+01	1,11E+02	4,00E+00	8,17E+00	5,04E-01	1,29E+00	-1,64E+00
	GWP-fossil	kg CO_2 -eq	2,07E+01	2,92E+01	1,11E+02	4,00E+00	8,17E+00	4,97E-01	1,28E+00	-1,60E+00
	GWP-biogenic	kg CO_2 -eq	7,39E-02	7,37E-02	3,42E-01	7,50E-04	3,38E-03	4,29E-03	1,09E-03	-3,20E-02
	GWP-luluc	kg CO_2 -eq	4,09E-03	4,01E-03	1,54E-01	3,15E-04	2,91E-03	6,88E-04	2,52E-04	-1,08E-03
	ODP	kg CFC11 -eq	4,30E-06	6,16E-06	1,61E-05	8,64E-07	1,85E-06	9,80E-08	6,26E-07	-2,92E-07
	AP	mol H+ -eq	2,11E-01	3,00E-01	7,95E-01	4,19E-02	2,35E-02	4,02E-03	1,25E-02	-1,44E-02
	EP-FreshWater	kg P -eq	1,30E-04	1,49E-04	5,63E-03	1,46E-05	6,53E-05	3,14E-05	9,59E-06	-4,26E-05
	EP-Marine	kg N -eq	9,15E-02	1,31E-01	1,75E-01	1,85E-02	4,64E-03	1,18E-03	4,70E-03	-5,00E-03
	EP-Terrestial	mol N -eq	1,00E+00	1,44E+00	1,99E+00	2,00E-01	5,19E-02	1,36E-02	5,18E-02	-5,88E-02
	POCP	kg NMVOC -eq	2,76E-01	3,96E-01	5,69E-01	5,57E-02	1,99E-02	3,64E-03	1,48E-02	-1,55E-02
	ADP-minerals&metals[1]	kg Sb-eq	7,64E-05	7,58E-05	1,29E-03	6,14E-06	2,26E-04	6,31E-06	1,14E-05	-1,42E-04
	ADP-fossil[1]	MJ	2,82E+02	3,99E+02	1,78E+03	5,51E+01	1,23E+02	1,54E+01	4,15E+01	-2,71E+01
	WDP[1]	m^3	1,35E+03	9,19E+02	1,20E+04	1,17E+01	1,19E+02	1,70E+03	8,73E+01	-1,27E+03

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 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: EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

"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

Additional environmental impact indicators

Indicator		Unit	Squared Blocks	Shapeless Blocks	A4	C1	C2	C3	C4	D
	PM	Disease incidence	5,47E-06	7,86E-06	6,40E-06	5,07E-06	5,00E-07	6,44E-08	2,67E-07	-3,07E-07
	IRP[2]	kgBq U235 -eq	1,32E+00	1,78E+00	1,08E+01	2,40E-01	5,40E-01	2,59E-01	1,80E-01	-2,49E-01
	ETP-fw[1]	CTUe	1,86E+02	2,39E+02	1,73E+03	3,01E+01	9,15E+01	1,09E+01	2,05E+01	-2,79E+01
	HTP-c[1]	CTUh	8,10E-09	1,01E-08	0,00E+00	1,00E-09	0,00E+00	7,00E-10	6,00E-10	-1,40E-09
	HTP-nc[1]	CTUh	1,90E-07	2,38E-07	2,19E-06	2,80E-08	1,00E-07	9,80E-09	1,20E-08	-3,43E-08
	SQP[1]	dimensionless	3,95E+01	5,34E+01	1,45E+03	6,69E+00	8,64E+01	8,73E+00	1,51E+02	6,15E+01

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 = Potential Soil Quality Index (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	Squared Blocks	Shapeless Blocks	A4	C1	C2	C3	C4	D
	PERE	MJ	9,18E+01	5,84E+01	1,72E+02	3,00E-01	1,77E+00	7,95E+00	6,38E-01	-6,35E+00
	PERM	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
	PERT	MJ	9,18E+01	5,84E+01	1,72E+02	3,00E-01	1,77E+00	7,95E+00	6,38E-01	-6,35E+00
	PENRE	MJ	2,82E+02	3,99E+02	1,78E+03	5,51E+01	1,23E+02	1,54E+01	4,15E+01	-2,86E+01
	PENRM	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
	PENRT	MJ	2,82E+02	3,99E+02	1,78E+03	5,51E+01	1,23E+02	1,54E+01	4,15E+01	-2,86E+01
	SM	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
	RSF	MJ	1,57E-01	1,49E-01	1,22E+01	0,00E+00	6,32E-02	0,00E+00	1,32E-02	-1,30E-01
	NRSF	MJ	7,55E-01	9,25E-01	5,52E+00	0,00E+00	2,26E-01	0,00E+00	3,79E-02	-1,33E-01
	FW	m^3	1,48E+00	1,28E+00	9,32E-01	2,83E-03	1,32E-02	2,64E-02	4,94E-02	-9,96E-01

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 = Net use of fresh water

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

End of life - Waste

Indicator		Unit	Squared Blocks	Shapeless Blocks	A4	C1	C2	C3	C4	D
	HWD	kg	1,18E-01	1,26E-01	2,35E-01	1,62E-03	6,37E-03	1,54E-03	0,00E+00	-6,54E-03
	NHWD	kg	2,54E+00	2,58E+00	5,97E+01	6,52E-02	6,01E+00	4,87E-02	3,00E+02	-1,98E-01
	RWD	kg	1,97E-03	2,77E-03	1,12E-02	3,82E-04	8,41E-04	1,63E-04	0,00E+00	-2,15E-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	Squared Blocks	Shapeless Blocks	A4	C1	C2	C3	C4	D
	CRU	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
	MFR	kg	1,53E+00	1,62E+00	0,00E+00	0,00E+00	0,00E+00	7,00E+02	0,00E+00	0,00E+00
	MER	kg	4,74E-01	5,04E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	EEE	MJ	2,82E-01	2,99E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	EET	MJ	4,26E+00	4,53E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

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

Indoor environment

Additional Environmental Information

Additional environmental impact indicators required in NPCR Part A for construction products									
Indicator	**Unit**	Squared Blocks	Shapeless Blocks	A4	C1	C2	C3	C4	D
GWPIOBC	kg CO_2 -eq	2,07E+01	2,92E+01	1,11E+02	4,00E+00	8,17E+00	4,98E-01	1,29E+00	-1,71E+00

GWP-IOBC: Global warming potential calculated according to the principle of instantaneous oxidation. In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

Bibliography

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ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
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