epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Red and black bricks produced at Graasten Teglværk - Biogas

MATZEN TEGL
DANISH BRICK DESIGN - SINCE 1750

The Norwegian EPD Foundation

Owner of the declaration:
Graasten Teglværk A/S

Product:
Red and black bricks produced at Graasten Teglværk - Biogas

Declared unit:
1 tonne

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

Program operator:
The Norwegian EPD Foundation

Declaration number:
NEPD-12067-12059

Registration number:
NEPD-12067-12059

Issue date:
19.08.2025

Valid to:
19.08.2030

EPD software:
LCAno EPD generator ID: 882042

ver-021025

General information

Product

Red and black bricks produced at Graasten Teglværk - Biogas

Owner of the declaration:

Graasten Teglværk A/S
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Program operator:

The Norwegian EPD Foundation
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Manufacturer:

Graasten Teglværk A/S

Declaration number:

NEPD-12067-12059

Place of production:

Graasten Teglværk A/S
Teglværksvej 14
6300 Gråsten, Denmark

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services. Ver. 2.0 March 2021

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:

40294619

Declared unit:

1 tonne Red and black bricks produced at Graasten Teglværk - Biogas

Issue date:

19.08.2025

Declared unit with option:

A1-A3, A4, A5, C1, C2, C3, C4, D

Valid to:

19.08.2030

Year of study:

2024

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:

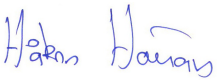
Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPDNorway's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Kristine Bjordal, Asplan Viak

(no signature required)

Approved:



Håkon Hauan, CEO EPD-Norge

Product

Product description:

Soft-stroked clay bricks in reddish and dark colors, with customizable formats. The clay bricks are fired in a kiln, with certified biogas. Certified green electricity is used at production site. About 83% of the pallets are reused.

Product specification

Materials	kg	%
Chemical	2,65	0,265
Clay	996,68	99,67
Filler	0,044	0,0044
Mineral	0,246	0,0246
Pigments	0,38	0,038
Total	1000,00	100,00

Packaging	kg	%
Packaging - Cardboard	0,10	0,37
Packaging - Plastic	0,57	2,11
Packaging - Plastic straps	0,04	0,14
Packaging - Wood	26,24	97,38
Total incl. packaging	1026,95	100,00

Technical data:

Bricks tested according to DS/EN 771-1.

Property	Color	Value	Unit
Density of declared product	Reddish/Dark	1550-1675	kg/m^3
Conversion factor to 1 m^2 of D108F bricks	Reddish	0.148	-
Conversion factor to 1 m^2 of D87F bricks	Reddish	0.120	-
Conversion factor to 1 m^2 of D108F bricks	Dark	0.158	-
Conversion factor to 1 m^2 of D87F bricks	Dark	0.132	-

Market:

Europe.

Reference service life, product

The reference service life of a brick is often assumed to be 150 years.

Reference service life, building or construction works

The reference service life of a building is often assumed to be 60 years.

LCA: Calculation rules

Declared unit:

1 tonne Red and black bricks produced at Graasten Teglværk - Biogas

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 when specific information are missing. 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 represents the production of the declared product and were collected for EPD development in the year of study, for a period of one year of production. 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.

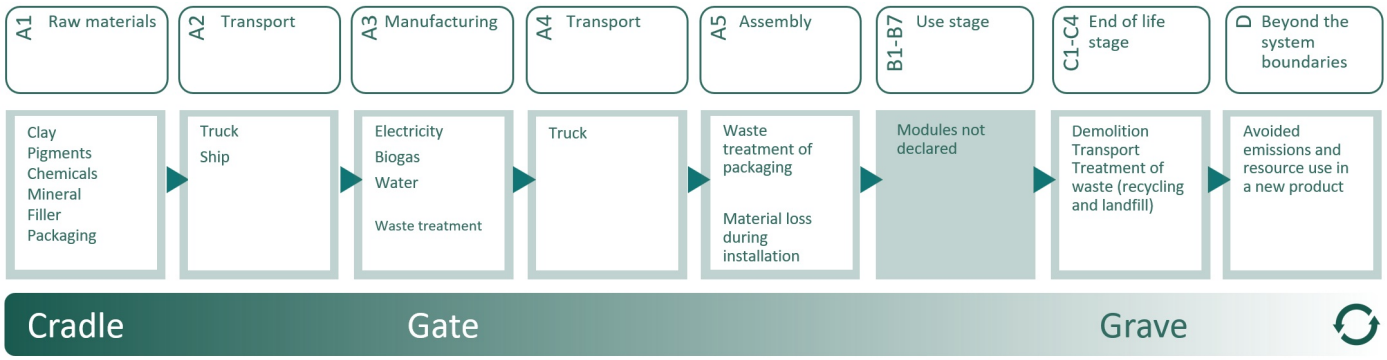
Materials	Source	Data quality	Year
Chemical	ecoinvent 3.6	Database	2019
Clay	ecoinvent 3.10.1	Database	2023
Filler	Modified ecoinvent 3.6	Database	2019
Mineral	Modified ecoinvent 3.6	Database	2020
Packaging - Cardboard	ecoinvent 3.6	Database	2019
Packaging - Plastic	ecoinvent 3.6	Database	2019
Packaging - Plastic straps	ecoinvent 3.6	Database	2019
Packaging - Wood	ecoinvent 3.6	Database	2019
Pigments	ecoinvent 3.6	Database	2019

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	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

System boundary:

The production of soft-stroked clay bricks begins with the transportation of various clays and sand to a box feeder. The materials are kneaded in a pan mill where rocks are crushed, and the mixture is refined to a particle size of max. 0.8 mm to ensure a homogeneous consistency, aided by a swamp mixing system. Depending on the final product, the refined clay is either extruded and cut for machine-made bricks or shaped using a soft-stroke press for handmade-like facing bricks. The freshly formed bricks are placed on dry laths and transported via overhead trolleys to drying chambers. Once dried, the bricks are loaded onto kiln trucks and pass through a tunnel oven for 64 hours. During this process, the clay goes through calcination, in which the calcium carbonate is broken in calcium oxide and carbon dioxide. After firing, the bricks are packed and transported to customers.
The flowchart below illustrates the processes included in the system boundaries for the analysis:



Additional technical information:

Not applicable.

LCA: Scenarios and additional technical information

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

- Module A4 contains a weighed average distance based on the three major European customers.
- Module A5 include a material loss during installation of 3%, according to the PCR for Construction Clay Products.
- Modules C and D represents the end-of-life scenario for clay-based products in Denmark, as described in the PCR, with 99% going to recycling and 1% to landfill.

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, over 32 tonnes, EURO 6 (km) - Europe	53,3 %	200,00	0,023	l/tkm	4,60

Assembly (A5)	Unit	Value			
Waste, packaging, pallet, EUR wooden pallet, single use, average treatment (kg)	kg	26,24			
Waste, packaging, plastic film (LDPE), to average treatment (kg)	kg	0,569			
Waste, packaging, PET straps, to average treatment (kg)	kg	0,037			
Waste, packaging, core board, to average treatment (kg)	kg	0,099			
Material loss during installation, clay-based products, including waste treatment (tonne)	Tonne	0,03			

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) - Europe	36,7 %	40,00	0,043	l/tkm	1,72

Waste processing (C3)	Unit	Value			
Waste treatment of clay-based product after demolition (kg)	kg	990,00			

Disposal (C4)	Unit	Value			
Landfilling of masses (kg)	kg	10,00			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity, in Norway (MJ)	MJ	18,11			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	273,98			
Substitution of aggregates (kg)	kg	990,00			

LCA: Results

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

Environmental impact										
	Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
	GWP-total	kg CO_2 -eq	3.42E+01	1.79E+01	4.25E+01	0.00E+00	6.71E+00	7.70E-01	8.22E-02	-3.96E+00
	GWP-fossil	kg CO_2 -eq	3.52E+01	1.79E+01	2.57E+00	0.00E+00	6.71E+00	7.03E-01	8.20E-02	-3.85E+00
	GWP-biogenic	kg CO_2 -eq	-1.03E+00	7.66E-03	3.99E+01	0.00E+00	2.78E-03	6.37E-02	9.58E-05	-4.85E-02
	GWP-luluc	kg CO_2 -eq	5.17E-02	5.45E-03	2.00E-03	0.00E+00	2.39E-03	9.73E-04	2.02E-05	-5.63E-02
	ODP	kg CFC11 -eq	1.69E-06	4.31E-06	3.47E-07	0.00E+00	1.52E-06	1.39E-07	3.11E-08	-1.16E-01
	AP	mol H+ -eq	2.52E-01	5.76E-02	1.58E-02	0.00E+00	1.93E-02	5.69E-03	7.30E-04	-3.35E-02
	EP-FreshWater	kg P -eq	4.66E-03	1.42E-04	1.56E-04	0.00E+00	5.36E-05	4.44E-05	9.30E-07	-2.01E-04
	EP-Marine	kg N -eq	6.57E-02	1.26E-02	5.01E-03	0.00E+00	3.82E-03	1.67E-03	2.71E-04	-1.14E-02
	EP-Terrestial	mol N -eq	8.44E-01	1.41E-01	5.78E-02	0.00E+00	4.27E-02	1.92E-02	2.99E-03	-1.29E-01
	POCP	kg NMVOC -eq	2.51E-01	5.52E-02	1.66E-02	0.00E+00	1.63E-02	5.14E-03	8.56E-04	-3.47E-02
	ADP-minerals&metals[1]	kg Sb-eq	7.73E-04	3.19E-04	5.03E-05	0.00E+00	1.85E-04	8.92E-06	7.39E-07	-2.17E-04
	ADP-fossil[1]	MJ	4.26E+02	2.91E+02	3.38E+01	0.00E+00	1.01E+02	2.18E+01	2.26E+00	-6.11E+01
	WDP[1]	m^3	1.18E+03	2.23E+02	1.31E+02	0.00E+00	9.81E+01	2.41E+03	1.39E+01	-2.08E+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

Not applicable.

Additional environmental impact indicators										
Indicator		**Unit**	A1-A3	A4	A5	C1	C2	C3	C4	D
	PM	Disease incidence	4.77E-06	1.64E-06	2.79E-07	0.00E+00	4.11E-07	9.11E-08	1.56E-08	-1.23E-06
	IRP[2]	kgBq U235 -eq	1.62E+00	1.27E+00	1.42E-01	0.00E+00	4.43E-01	3.66E-01	1.03E-02	-4.97E-01
	ETP-fw[1]	CTUe	5.65E+02	2.12E+02	3.57E+01	0.00E+00	7.52E+01	1.55E+01	1.23E+00	-1.63E+02
	HTP-c[1]	CTUh	4.39E-08	0.00E+00	2.41E-09	0.00E+00	0.00E+00	9.90E-10	5.00E-11	-4.24E-09
	HTP-nc[1]	CTUh	9.71E-07	2.05E-07	8.89E-08	0.00E+00	8.22E-08	1.39E-08	8.90E-10	-1.67E-07
	SQP[1]	dimensionless	4.51E+03	3.33E+02	1.53E+02	0.00E+00	7.10E+01	1.23E+01	8.69E+00	-6.48E+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	A1-A3	A4	A5	C1	C2	C3	C4	D
	PERE	MJ	6.02E+02	3.66E+00	1.87E+01	0.00E+00	1.45E+00	1.12E+01	8.08E-02	-1.49E+02
	PERM	MJ	3.66E+02	0.00E+00	-3.55E+02	0.00E+00	0.00E+00	-6.16E-01	0.00E+00	0.00E+00
	PERT	MJ	9.68E+02	3.66E+00	-3.36E+02	0.00E+00	1.45E+00	1.06E+01	8.08E-02	-1.49E+02
	PENRE	MJ	4.01E+02	2.91E+02	3.30E+01	0.00E+00	1.01E+02	2.18E+01	2.26E+00	-6.32E+01
	PENRM	MJ	2.50E+01	0.00E+00	-2.43E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRT	MJ	4.26E+02	2.91E+02	8.76E+00	0.00E+00	1.01E+02	2.18E+01	2.26E+00	-6.32E+01
	SM	kg	8.33E-02	0.00E+00	2.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	RSF	MJ	1.02E+03	1.28E-01	3.05E+01	0.00E+00	5.20E-02	0.00E+00	1.68E-03	-2.08E-01
	NRSF	MJ	1.71E-01	4.29E-01	8.07E-02	0.00E+00	1.86E-01	0.00E+00	3.62E-03	-8.51E+00
	FW	m^3	4.61E-01	3.31E-02	2.25E-02	0.00E+00	1.08E-02	3.74E-02	2.78E-03	-1.58E+00

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	A1-A3	A4	A5	C1	C2	C3	C4	D
	HWD	kg	1.63E+00	1.59E-02	4.96E-02	0.00E+00	5.23E-03	2.18E-03	0.00E+00	-1.03E-02
	NHWD	kg	3.13E+01	2.53E+01	2.91E+01	0.00E+00	4.93E+00	6.89E-02	1.00E+01	-8.17E-01
	RWD	kg	1.09E-03	1.98E-03	1.20E-04	0.00E+00	6.91E-04	2.31E-04	0.00E+00	-4.23E-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	A5	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	1.07E-01	0.00E+00	3.01E+01	0.00E+00	0.00E+00	9.90E+02	0.00E+00	0.00E+00
	MER	kg	6.44E-02	0.00E+00	2.60E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EEE	MJ	5.41E-02	0.00E+00	1.81E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EET	MJ	8.18E-01	0.00E+00	2.74E+02	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	1.57E-02
Biogenic carbon content in accompanying packaging	kg C	1.09E+01

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

Additional requirements

Greenhouse gas emissions from the use of energy in the manufacturing phase

The EPD provides in the main result tables environmental impact categories based on a market-based approach. For the sake of transparency, the information below is provided to make it able for EPD users to understand the effect of these methodological choices. The table below shows calculation of GWP values for energy resources used in the manufacturing process (A3) for each approach.

Energy Source	Data Source	Amount	Unit	GWPtotal (kg CO2 eq/unit)	Sum (kg CO2 eq)
Location based approach					
market for electricity, low voltage | electricity, low voltage | Cutoff, S - DK	ecoinvent 3.6	0	kWh	0.338	
heat production, natural gas, at industrial furnace >100kW | heat, district or industrial, natural gas | Cutoff, S - Europe without Switzerland	ecoinvent 3.6	0	MJ	0.0704	
Market based approach					
Electricity, low voltage, wind power, onshore, with guarantee of origin (01.01.2024 - 31.12.2024) - Denmark	ecoinvent 3.6	70.928	kWh	0.0169	1.1986832
Bionatural gas, certified, (01.01.2024 - 31.12.2024) - Europe	ecoinvent 3.11	2273.04	MJ	0.0213	48.415752

The electricity guarantee of origin certificate utilized in this EPD is provided by Energi Denmark A/S, for the period 01.01.2024 to 31.12.2024, with 100% wind power. The bionatural gas certificate covers 100% of the gas used in the facility and it is provided by Centrica Energy Trading A/S, for the period of 01.01.2024 to 31.12.2024.

Dangerous substances

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

Indoor environment

Not applicable.

Additional Environmental Information

Additional environmental impact indicators required in NPCR Part A for construction products									
Indicator	**Unit**	A1-A3	A4	A5	C1	C2	C3	C4	D
GWPIOBC	kg CO_2 -eq	6,81E+01	1,76E+01	7,56E-01	0,00E+00	6,59E+00	7,04E-01	8,21E-02	-1,70E+02

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.

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