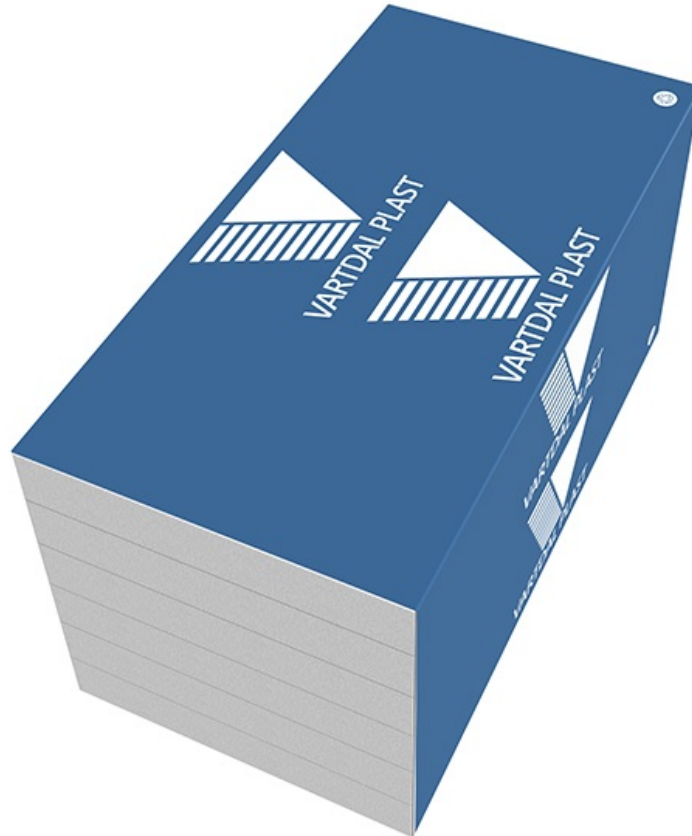


Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

VARTDAL R-EPS HVIT 100%



The Norwegian EPD Foundation

Owner of the declaration:

Vartdal Plastindustri AS

Product:

VARTDAL R-EPS HVIT 100%

Declared unit:

1 m²

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR.

NPCR 012:2022 Part B for Thermal insulation products

Program operator:

The Norwegian EPD Foundation

Declaration number:

NEPD-8928-8589

Registration number:

NEPD-8928-8589

Issue date:

04.02.2025

Valid to:

04.02.2030

EPD software:

LCAno EPD generator ID: 429285

General information

Product

VARTDAL R-EPS HVIT 100%

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 977 22 020
web: www.epd-norge.no

Declaration number:

NEPD-8928-8589

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR.
NPCR 012:2022 Part B for Thermal insulation products

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 m² VARTDAL R-EPS HVIT 100%

Declared unit with option:

A1,A2,A3,A4,A5,C1,C2,C3,C4,D

Functional unit:

1 m² Vartdal R-EPS HVIT 100% S80 insulation board with the thickness of 38 mm at R=1 m²K/W, transportation to site, waste handling and recovery.

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

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:

Elisabet Amat, GREENIZE projects

(no signature required)

Owner of the declaration:

Vartdal Plastindustri AS
Contact person: Mounir El'Mourabit
Phone: +47 70 04 83 00
e-mail: vartdal@vartdalplast.no

Manufacturer:

Vartdal Plastindustri AS

Place of production:

Vartdal Plastindustri AS
Vartdalsstranda 1072
6170 Vartdal, Norway

Management system:

ISO 14001, ISO 9001

Organisation no:

970890513

Issue date:

04.02.2025

Valid to:

04.02.2030

Year of study:

2024

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804:2012+A2:2019 and seen in a building context.

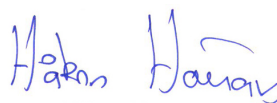
Development and verification of EPD:

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: Ole Morten Brøste

Reviewer of company-specific input data and EPD: Mounir El'Mourabit

Approved:



Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Vartdal R-EPS Hvit 100% is made from 100% mechanically recycled raw materials. The insulation boards are available in several thicknesses and dimensions. Please use the conversion table on page 4 to get the correct data for your project. The calculations are based on averages in the production.

Product specification

Expanded Polystyrene (EPS) is a widely-used material for thermal insulation in buildings, commonly applied in floors, walls, and ceilings. EPS is a lightweight polymer foam composed of air-filled polystyrene cells, with air making up 98% of its volume. This high air content gives EPS excellent insulating properties at a very low weight.

EPS also boasts additional beneficial properties, including low moisture absorption, a long service life, and high compressive strength. EPS is manufactured through permeating polystyrene beads with pentane, allowing the beads to expand when exposed to steam. These beads expand when exposed to steam. The expanded beads are then placed into a block molding machine, where steam and pressure shape them into large EPS blocks. The density of the blocks depends on the amount of EPS used in the mold. For example, a pressure class of 80 results in a block density of 80 kN/m², equivalent to approximately 15 kg/m³.

After molding, any remaining pentane is vented, and the blocks are cut into the desired shapes. For reference, a block with a density of 15,5 kg/m³ and a thickness of 38 mm weighs approximately 0.59 kg per declared unit.

Materials	kg	%
Plastic - Recycled	0,59	100,00
Total	0,59	100,00

Technical data:

CE marking: EPS insulation boards are CE certified according to NS-EN 13163

Typical size: 600 x 1200mm

Typical thickness: 10 mm - 600 mm

Bending strength: > 50 kN/m²

Compressive strength: 80 kN/m² (declared unit), see conversion factors for other values

Moisture absorption: < 5 vol%

Fire class: F

Market:

Norway

Reference service life, product

60 years

Reference service life, building or construction works

60 years

LCA: Calculation rules

Declared unit:

1 m² VARTDAL R-EPS HVIT 100%

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+A2. 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:

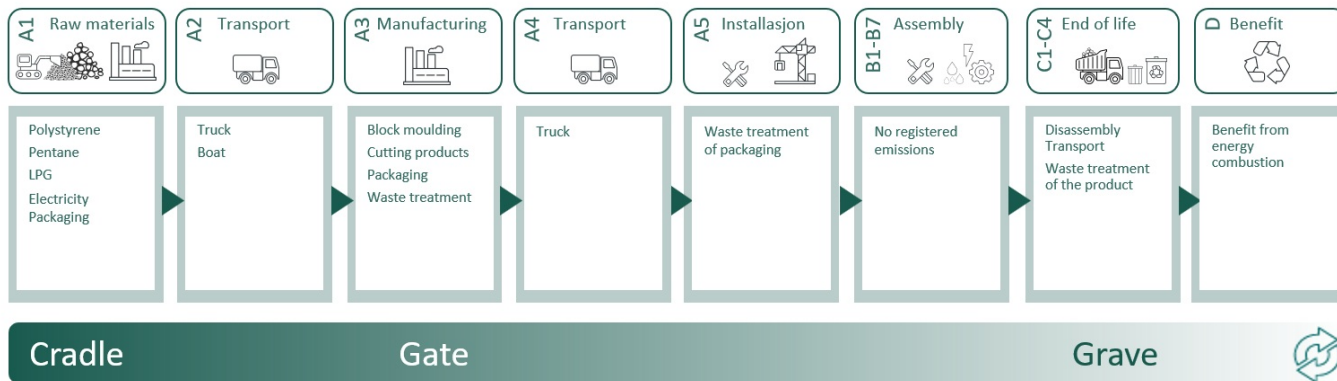
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

Materials	Source	Data quality	Year
Plastic - Recycled	Supplier Specific	Project EPD	2024

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:



Kvalitet	38mm	50mm	100mm	150mm	200mm
S60	0,82	1,08	2,16	3,25	4,33
S80	1,00	1,32	2,63	3,95	5,26
S100	1,16	1,53	3,06	4,58	6,11
S150	1,61	2,12	4,24	6,37	8,49
S200	1,92	2,53	5,05	7,58	10,10

Additional technical information:














LCA: Scenarios and additional technical information

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

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (kgkm)	36,7 %	300	0,043	l/tkm	12,90
Assembly (A5)					
Unit	Value				
Waste, packaging, plastic film (LDPE), to average treatment (kg) - A5, inkl. 85 km transp.	kg/DU	0,040			
De-construction demolition (C1)					
Unit	Value				
Waste treatment, Insulation, Recycled as PS, Norway (kg)	kg	0,59			
Transport to waste processing (C2)					
Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)	
Truck, over 32 tonnes, EURO 5 (kgkm)	53,3 %	83	0,023	l/tkm	1,91
Waste processing (C3)					
Unit	Value				
Recycling of PS	kg	0,059			
Waste, Polystyrene, incineration	kg	0,53			
Disposal (C4)					
Unit	Value				
Landfilling of ashes from incineration of Polystyrene (PS), process per kg ashes and residues (kg)	kg	0,017			
Benefits and loads beyond the system boundaries (D)					
Unit	Value				
Substitution of expandable polystyrene, EPS, granulate	kg	0,059			
Substitution of electricity (MJ)	MJ	0,93			
Substitution of thermal energy, district heating (MJ)	MJ	14,15			

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	A2	A3	A4	A5	C1	C2	C3	C4	D
 GWP-total	kg CO ₂ -eq	4,03E-01	1,27E-01	2,78E-01	2,89E-02	3,17E-03	0,00E+00	4,45E-03	1,69E+00	9,07E-04	-3,07E-01
 GWP-fossil	kg CO ₂ -eq	4,01E-01	1,27E-01	2,77E-01	2,89E-02	3,17E-03	0,00E+00	4,45E-03	1,69E+00	9,07E-04	-3,03E-01
 GWP-biogenic	kg CO ₂ -eq	1,26E-03	5,17E-05	2,11E-04	1,20E-05	4,37E-07	0,00E+00	1,83E-06	1,17E-05	4,81E-07	-1,63E-03
 GWP-luluc	kg CO ₂ -eq	1,45E-03	4,69E-05	5,92E-05	1,03E-05	2,43E-07	0,00E+00	1,30E-06	1,85E-06	1,39E-07	-2,83E-03
 ODP	kg CFC11-eq	5,65E-08	2,86E-08	5,10E-08	6,55E-09	1,90E-10	0,00E+00	1,03E-09	1,21E-09	9,70E-11	-5,98E-03
 AP	mol H ⁺ -eq	3,11E-03	5,51E-04	3,21E-03	8,31E-05	3,91E-06	0,00E+00	1,87E-05	2,01E-04	3,19E-06	-1,43E-03
 EP-FreshWater	kg P -eq	2,05E-05	9,90E-07	2,24E-06	2,31E-07	6,52E-09	0,00E+00	3,39E-08	1,20E-07	1,23E-08	-1,12E-05
 EP-Marine	kg N -eq	6,59E-04	1,20E-04	1,22E-03	1,64E-05	3,57E-06	0,00E+00	5,63E-06	9,68E-05	9,97E-07	-3,35E-04
 EP-Terrestrial	mol N -eq	7,33E-03	1,33E-03	1,33E-02	1,84E-04	1,40E-05	0,00E+00	6,22E-05	1,04E-03	1,13E-05	-3,62E-03
 POCP	kg NMVOC-eq	2,19E-03	4,41E-04	2,37E-02	7,04E-05	4,60E-06	0,00E+00	2,00E-05	2,49E-04	3,13E-06	-1,32E-03
 ADP-minerals&metals ¹	kg Sb-eq	6,18E-06	3,38E-06	1,19E-06	7,99E-07	1,69E-08	0,00E+00	7,60E-08	5,23E-08	5,08E-09	-8,58E-07
 ADP-fossil ¹	MJ	7,04E+00	1,91E+00	3,68E+00	4,37E-01	1,31E-02	0,00E+00	6,92E-02	1,04E-01	8,25E-03	-6,06E+00
 WDP ¹	m ³	-1,69E+01	1,78E+00	1,12E+01	4,23E-01	4,62E-02	0,00E+00	5,31E-02	2,30E-01	8,55E-02	-1,48E+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 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	A1	A2	A3	A4	A5	C1	C2	C3	C4	D	
 PM	Disease incidence	2,16E-08	7,58E-09	6,59E-08	1,77E-09	7,00E-11	0,00E+00	3,92E-10	8,48E-10	4,00E-11	-4,81E-08	
 IRP ²	kgBq U235 -eq	1,80E-02	8,34E-03	1,44E-02	1,91E-03	5,90E-05	0,00E+00	3,03E-04	1,73E-04	3,91E-05	-7,52E-03	
 ETP-fw ¹	CTUe	5,51E+00	1,40E+00	2,52E+00	3,24E-01	1,25E-02	0,00E+00	5,06E-02	2,50E-01	1,52E-02	-7,25E+00	
 HTP-c ¹	CTUh	4,67E-10	0,00E+00	1,33E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,10E-11	1,00E-12	-1,61E-10	
 HTP-nc ¹	CTUh	5,30E-09	1,54E-09	3,45E-09	3,54E-10	1,20E-11	0,00E+00	4,90E-11	2,81E-09	2,80E-11	-6,55E-09	
 SQP ¹	dimensionless	5,60E+00	1,29E+00	6,80E-01	3,06E-01	2,28E-02	0,00E+00	7,94E-02	1,24E-02	2,28E-02	-7,85E+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 = 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	A2	A3	A4	A5	C1	C2	C3	C4	D	
 PERE	MJ	8,05E-01	2,67E-02	7,48E-01	6,26E-03	3,30E-04	0,00E+00	8,71E-04	2,99E-03	4,81E-04	-7,27E+00	
 PERM	MJ	9,84E-01	0,00E+00	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	7,94E-01	2,67E-02	7,48E-01	6,26E-03	3,30E-04	0,00E+00	8,71E-04	2,99E-03	4,81E-04	-7,27E+00	
 PENRE	MJ	7,77E+00	1,91E+00	3,68E+00	4,37E-01	1,31E-02	0,00E+00	6,92E-02	1,04E-01	8,25E-03	-6,06E+00	
 PENRM	MJ	2,51E-01	0,00E+00	0,00E+00	0,00E+00	-1,70E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 PENRT	MJ	6,91E+00	1,91E+00	3,68E+00	4,37E-01	-1,69E+00	0,00E+00	6,92E-02	1,04E-01	8,25E-03	-6,06E+00	
 SM	kg	5,90E-01	0,00E+00	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	3,14E-03	9,49E-04	1,54E-03	2,24E-04	8,65E-06	0,00E+00	3,05E-05	8,32E-05	1,20E-05	-1,27E-03	
 NRSF	MJ	5,39E-03	3,35E-03	1,14E-02	8,00E-04	2,27E-05	0,00E+00	1,02E-04	0,00E+00	1,90E-03	-4,30E-01	
 FW	m ³	2,38E-03	1,99E-04	8,38E-03	4,68E-05	6,91E-06	0,00E+00	7,88E-06	2,93E-04	7,58E-06	-1,26E-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 = 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	A2	A3	A4	A5	C1	C2	C3	C4	D	
	HWD	kg	3,87E-03	9,75E-05	3,71E-04	2,25E-05	0,00E+00	0,00E+00	3,79E-06	0,00E+00	1,51E-02	-1,43E-04
	NHWD	kg	3,18E-01	8,91E-02	3,00E-02	2,13E-02	4,00E-02	0,00E+00	6,02E-03	0,00E+00	7,45E-03	-3,01E-02
	RWD	kg	2,55E-05	1,30E-05	2,16E-05	2,98E-06	0,00E+00	0,00E+00	4,73E-07	0,00E+00	4,98E-08	-6,17E-06

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	A2	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	0,00E+00	0,00E+00
	MFR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,04E-02	0,00E+00	0,00E+00	5,90E-02	0,00E+00	0,00E+00
	MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,00E-06	0,00E+00	0,00E+00	5,31E-01	0,00E+00	0,00E+00
	EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,07E-06	0,00E+00	0,00E+00	9,36E-01	0,00E+00	0,00E+00
	EET	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,65E-05	0,00E+00	0,00E+00	1,42E+01	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 = $9,0 \cdot 10^{-3} = 0,009$

*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 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).

Electricity mix	Source	Amount	Unit
Electricity, Norway, medium voltage (kWh)	ecoinvent 3.6	21,18	g CO ₂ -eq/kWh

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	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWPIOBC	kg CO ₂ -eq	3,95E-01	1,27E-01	2,78E-01	2,89E-02	3,17E-03	0,00E+00	4,45E-03	1,69E+00	9,41E-04	-3,06E-01

GWPI-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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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.

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Vold et. al., (2022) EPD generator for NPCR 012 Thermal insulation, Background information for EPD generator application and LCA data, LCA.no report number: 07.22.

NPCR Part A: Construction products and services. Ver. 2.0. April 2021, EPD-Norge.

NPCR 012 Part B for Part B for Thermal insulation products, Ver. 2.0, 31.03.2022, EPD Norway.

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