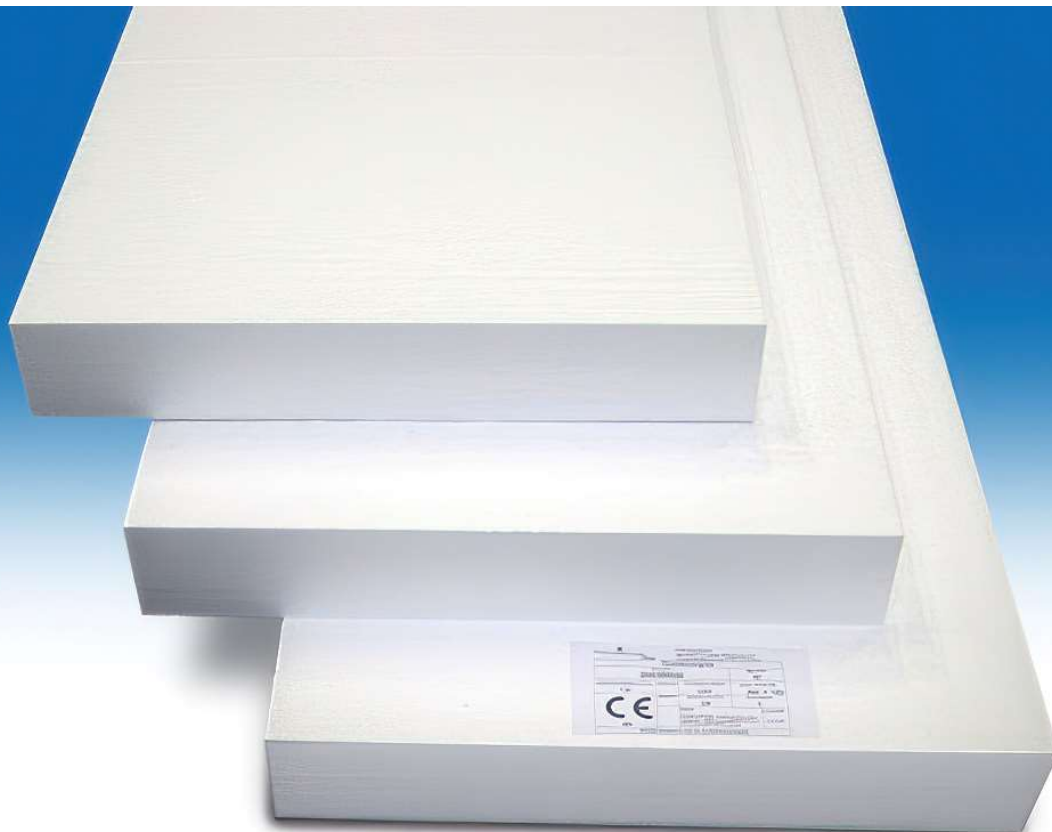


Environmental Product Declaration

In accordance with ISO14025:2006 and EN15804:2012+A2:2019

EPS – Thermal insulation for buildings, 16 kg/m³, 24 kg/m³ and 30 kg/m³



Owner of the declaration:

Tempra ehf.
Íshella 8, 221 Hafnarfjörður
Iceland

Product name:

EPS – Thermal insulation for buildings

Declared unit:

1 m² of EPS insulation panel with thermal resistance of R=1 (m² K)/W

Product category /PCR:

NPCR 012 Part B

Program holder and publisher:

The Norwegian EPD foundation
Post Box 5250 Majorstuen,
0303 Oslo, Norway

Declaration number:

NEPD-6298-5556-EN

Registration number:

NEPD-6298-5556-EN

Issue date:

18.03.2024

Valid to:

18.03.2029

General information

Product:

EPS – Thermal insulation for buildings

Program operator:

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

Declaration number:

NEPD-6298-5556-EN

This declaration is based on Product Category Rules:

NPCR Part A: Construction products and services, Version 2.0, published 24.03.2021, and NPCR 012 Part B for thermal insulation products, Version 2.0, published 31.03.2022

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, life cycle assessment data and evidences.

Declared unit with option (A1-A3, A4, A5, C1-C4, D):

1 m² of EPS insulation panel with thermal

resistance of $R = 1 \frac{\text{m}^2\text{K}}{\text{W}}$

Functional unit

Verification:

Independent verification of the declaration and data, according to ISO14025:2010

internal External X

Jane Anderson

Dr Jane Anderson, ConstructionLCA Ltd
Independent verifier approved by EPD Norway

Owner of the declaration:

Tempra ehf.
Contact person: Helgi Halldórsson
Phone: +354 8995954
e-mail: helgi.halldorsson@tempra.is

Manufacturer:

Tempra ehf.
Íshella 8, 221 Hafnarfjörður, Iceland
Phone: +354 5205400
e-mail: tempra@tempra.is

Place of production:

Íshella 8, 221 Hafnarfjörður, Iceland

Management system:

ISO 14001:2015, Certificate No: EMS 762147

Organisation no:

600900-2180 (Icelandic identity number)

Issue date:

18.03.2024

Valid to:

18.03.2029

Year of study:

2023

Comparability:

EPD of construction products may not be able to compare if they do not comply with EN 15804 and are seen in a building context.

The EPD has been worked out by:

Björgvin Brynjarsson, EFLA Consulting Engineers, Iceland

Approved

Hakon Hausson

Manager of EPD Norway

Product

Product description:

Expanded Polystyrene (EPS) insulation panels for buildings. This EPD covers three density categories: 16 kg/m³, 24 kg/m³ and 30 kg/m³.

EPS insulation panels, derived from expanded polystyrene beads through a heat and steam expansion process, exhibit a closed-cell structure with approximately 95% air content by volume. The panels demonstrate high compressive strength and durability, offering good thermal insulation properties. EPS insulation panels have applications in various construction contexts, including walls, roofs, and floors.

The manufacturing process of EPS products begins with the feeding of polystyrene beads into a pre-expander machine, where they are exposed to steam, causing them to expand and become lighter. Subsequently, the beads are moulded into desired shapes using heat and pressure in a mould cavity, forming the final product. Once moulded, the EPS products are cooled to solidify their shape and structure. Excess material is trimmed, and the products are cut into specific sizes and shapes as required. Finally, the finished EPS products are packaged and prepared for distribution.

Product specification:

The following data is per declared unit.

Materials	Value			%
	16 kg/m ³	24 kg/m ³	30 kg/m ³	
Polystyrene	0.60 kg	0.81 kg	0.96 kg	94.4%
Air*	0.04 kg	0.05 kg	0.06 kg	5.6%

* During the production, PS beads which contain 5% pentane by weight are expanded with steam. During and after the expansion the pentane is released. By volume, EPS is 98% air and 2% PS.

Packaging*	Value		
	16 kg/m ³	24 kg/m ³	30 kg/m ³
LD-PE film	≈ 0 kg	≈ 0 kg	≈ 0 kg
Wooden Pallet	0.01 kg	0.01 kg	0,01 kg

* Average weight per functional unit

Technical data:

EPS insulation panels are CE certified according to EN 13163

Bulk density [kg/m ³]	Thermal conductivity [W/mK]	Thickness for R = 1 m ² K/W [m]	Area density for R = 1 m ² K/W [kg/m ²]	Compressive strength [kPa]
16	0,040	0,040	0,64	80
24	0,036	0,036	0,86	140
30	0,034	0,034	1,02	180

Market:

Iceland

Reference service life, product:

Same as construction where the product is used

Reference service life, building:

Same as construction where the product is used

LCA: Calculation rules

Declared unit:

1 m² of EPS insulation panel with thermal resistance of $R = 1 \frac{\text{m}^2\text{K}}{\text{W}}$

Cut-off criteria:

Cut-off criteria of no more than 1% of total mass input of each unit process required by NPCR 012 Part B was fulfilled. Total of neglected input flows per module are less than 5%, as specified by NPCR 012 Part B.

Allocation:

Energy use, auxiliary materials use, water use and waste production were allocated equally by mass among the products, i.e., depending on how large a fraction the production mass of each product is in the total production mass of the factory. Amounts of packaging materials used were allocated by volume among the products.

Data quality:

Data quality requirements are as in NPCR Part A for Construction products. Information about the EPS products' production was provided by the manufacturer, Tempra ehf. The inventory data used for the assessment is geographically and technically representative for the products that it covers since they are all produced in the factory that the data is retrieved from. The amount of raw materials is based on data for the production year 2021 while information on origin and suppliers is from 2022. There are little changes in production between years and the inventory data is very recent (2021/2022) and therefore temporally representative for the products as well.

The LCE FE software and Sphera's Managed LCA Content (MLC) databases (Professional database 2023) were used for the assessment for general background data. All appropriate processes, both background and foreground, were included in the EPS panels production model. The MLC is updated annually so the temporal representativeness of the data is high.

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

Product stage			Assembly stage		Use stage							End of life stage				Benefits & loads beyond system boundary
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	X	X	X	X	X	MNR	MNR	X	X	X	X	X

System boundary:

Included modules are A1-A3, A4-A5, B1-B5, C1-C4 and D, in accordance with NPCR 012 Part B for insulation materials. Figure 1 shows a visualization of the LCA system boundaries.

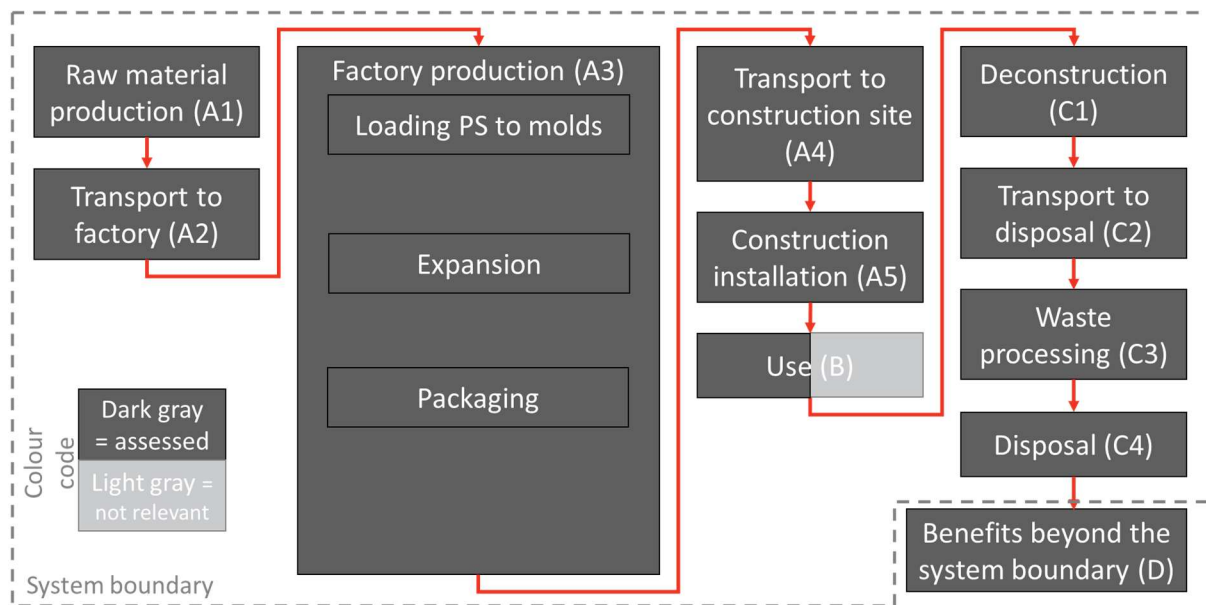


Figure 1 LCA system boundaries

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD. All relevant data is per declared unit.

Transport from production place to assembly/user (A4)

Transport from production place to assembly/user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy consumption	Unit	Value
Truck, Euro 0 – 6 mix, 12 - 14t gross weight	5 / 6 / 7*	50	Diesel	L/tkm	0,44 / 0,37 / 0,32*

* The capacity utilisation/fuel use for 16 kg/m³, 24 kg/m³, and 30 kg/m³, respectively

Assembly (A5)

	Unit	Value
Material loss	Kg	0,026 / 0,034 / 0,041*
Output materials from waste treatment	Kg	0

* The material loss for 16 kg/m³, 24 kg/m³, and 30 kg/m³, respectively

The product is factory made and ready to be used directly so there are no in situ impacts during installation. Impacts due to 4% material loss during installation is included. The treatment of plastic packaging is included. Plastic waste collected in Iceland is typically pre-sorted in Iceland, transported to mainland Europe, sorted more thoroughly and either recycled or incinerated. In this assessment it is assumed that the plastic is all incinerated, as a conservative approach. Wooden pallets are assumed to be reused.

Use (B)

Since the reference service life of the insulation panels matches the lifetime of the building (> 60 years) and the product consumes neither energy nor water, the environmental impact of the whole use stage (B) is assumed to be zero.

End of Life (C1, C3, C4)

Energy use for the disassembly of the product at the end-of-life stage is assumed negligible, and impacts in phase C1 therefore assumed to be zero.

	Unit	Value		
		16 kg/m ³	24 kg/m ³	30 kg/m ³
Hazardous waste disposed	kg	0	0	0
Collected as mixed construction waste	kg	0	0	0
Reuse	kg	0	0	0
Recycling	kg	0	0	0
Energy recovery	kg	0,64	0,86	1,02
To landfill	kg	0	0	0

Transport to waste processing (C2)

Transport from production place to assembly/user (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy consumption	Unit	Value
Truck in Iceland,	55*	30	Diesel	L/tkm	0,023
Boat (Iceland to Rotterdam)	23**	2189	Heavy fuel oil	L/tkm	0,015
Truck in Europe	55*	424	Diesel	L/tkm	0,035

* A default value was used since no specific data for waste transport is available.

** This value is derived to match the output of the modelling software to the output of the carbon calculator by Eimskip (an Icelandic shipping company). The value may not reflect the real capacity utilisation.

It is assumed that EPS waste is sorted, transported to Europe where it goes through another sorting phase and then either recycled or burned. As a conservative approach it is assumed that all insulation waste is incinerated for energy recovery.

Benefits and loads beyond the system boundaries (D)

Benefits and loads beyond the system boundaries (D)	Unit	Value		
		16 kg/m ³	24 kg/m ³	30 kg/m ³
Substitution of electricity, in Europe	MJ	3,84E+00	5,16E+00	6,12E+00
Substitution of thermal energy, district heating, in Europe	MJ	6,84E+00	9,19E+00	1,09E+01

The energy recovered is assumed to replace electrical and thermal energy in the European energy grid, since the incineration is assumed to take place there.

LCA: Results

EPS Insulation panels, 16 kg/m³

All results are provided per declared unit.

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP - total	kg CO2 eq	1,58E+00	4,37E-02	9,72E-02	0,00E+00	1,01E-01	2,32E+00	2,82E-03	-8,07E-01
GWP - fossil	kg CO2 eq	1,60E+00	4,33E-02	7,58E-02	0,00E+00	1,01E-01	2,32E+00	2,81E-03	-8,03E-01
GWP - biogenic	kg CO2 eq	-2,21E-02	0,00E+00	2,21E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,69E-03
GWP - luluc	kg CO2 eq	5,33E-04	4,05E-04	3,75E-05	0,00E+00	2,66E-04	1,41E-04	8,87E-06	-5,26E-05
ODP	kg CFC11 eq	7,22E-11	5,69E-15	6,70E-10	0,00E+00	8,70E-15	1,63E-08	7,26E-15	-6,37E-12
AP	molc H+ eq	5,87E-03	1,28E-04	3,71E-04	0,00E+00	2,66E-03	8,62E-04	2,03E-05	-1,01E-03
EP- freshwater	kg P eq	5,79E-06	1,60E-07	1,58E-06	0,00E+00	1,21E-07	3,29E-05	5,75E-09	-1,31E-06
EP -marine	kg N eq	1,33E-03	5,64E-05	9,05E-05	0,00E+00	7,03E-04	2,51E-04	5,23E-06	-2,95E-04
EP - terrestrial	molc N eq	1,80E-02	6,39E-04	1,11E-03	0,00E+00	7,71E-03	2,79E-03	5,76E-05	-3,15E-03
POCP	kg NMVOC eq	2,61E-02	1,17E-04	1,15E-03	0,00E+00	1,90E-03	7,34E-04	1,58E-05	-8,21E-04
ADP-M&M ²	kg Sb-Eq	3,77E-07	2,90E-09	3,71E-08	0,00E+00	2,56E-09	5,38E-07	1,32E-10	-5,81E-08
ADP-fossil ²	MJ	5,04E+01	5,96E-01	2,17E+00	0,00E+00	1,28E+00	2,64E+00	3,80E-02	-1,48E+01
WDP ²	m ³	6,39E-01	5,29E-04	2,75E-02	0,00E+00	4,67E-04	2,19E-01	3,13E-04	-7,72E-02

GWP-total: Global Warming Potential; **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; See "additional Norwegian requirements" for indicator given as PO4 eq. **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009

Additional environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	7,06E-08	9,45E-10	5,47E-09	0,00E+00	4,46E-08	2,13E-08	2,49E-10	-8,56E-09
IRP ¹	kBq U235 eq.	3,24E-02	1,67E-04	1,72E-03	0,00E+00	2,59E-04	1,25E-02	5,00E-05	-1,92E-01
ETP-fw ²	CTUe	1,47E+02	4,27E-01	5,93E+00	0,00E+00	9,08E-01	5,77E-01	2,06E-02	-2,08E+00
HTP-c ²	CTUh	7,42E-10	8,68E-12	3,87E-11	0,00E+00	1,71E-11	2,17E-10	3,19E-12	-1,65E-10
HTP-nc ²	CTUh	2,19E-08	3,86E-10	9,96E-10	0,00E+00	6,18E-10	2,39E-09	3,37E-10	-4,04E-09
SQP ²	Dimensionless	7,82E+00	2,49E-01	3,93E-01	0,00E+00	1,66E-01	1,87E+00	9,23E-03	-2,86E+00

PM: Particulate matter emissions; **IRP:** Ionising radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality

¹ 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.

² 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

Resource use

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
RPEE	MJ	3,30E+01	4,34E-02	1,58E+00	0,00E+00	3,23E-02	1,69E-01	6,19E-03	-4,35E+00
RPEM	MJ	2,47E-01	0,00E+00	-2,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	3,33E+01	4,34E-02	1,34E+00	0,00E+00	3,23E-02	1,69E-01	6,19E-03	-4,35E+00
NRPE	MJ	2,39E+01	5,98E-01	2,19E+00	0,00E+00	1,28E+00	2,92E+01	3,81E-02	-1,49E+01
NRPM	MJ	2,66E+01	0,00E+00	-2,22E-02	0,00E+00	0,00E+00	-2,65E+01	0,00E+00	0,00E+00
TRPE	MJ	5,05E+01	5,98E-01	2,17E+00	0,00E+00	1,28E+00	2,64E+00	3,81E-02	-1,49E+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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	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
W	m ³	7,27E-02	4,75E-05	2,95E-03	0,00E+00	3,62E-05	5,13E-03	9,60E-06	-3,52E-03

RPEE Renewable primary energy resources used as energy carrier; **RPEM** Renewable primary energy resources used as raw materials; **TPE** Total use of renewable primary energy resources; **NRPE** Non-renewable primary energy resources used as energy carrier; **NRPM** Non-renewable primary energy resources used as materials; **TRPE** 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; **W** Use of net fresh water.

End of life – Waste

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HW	kg	6,79E-09	1,85E-12	2,72E-10	0,00E+00	4,02E-12	5,32E-12	8,29E-13	-7,78E-10
NHW	kg	2,60E-02	9,12E-05	1,04E-03	0,00E+00	1,41E-04	7,71E-03	1,90E-01	-7,35E-03
RW	kg	2,21E-04	1,12E-06	8,91E-06	0,00E+00	1,78E-06	1,42E-05	4,33E-07	-1,15E-03

HW Hazardous waste disposed; **NHW** Non-hazardous waste disposed; **RW** Radioactive waste disposed.

End of life – output flow

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	1,35E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	1,48E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	2,89E-03	0,00E+00	2,59E-02	0,00E+00	0,00E+00	6,34E-01	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	1,35E-02	0,00E+00	0,00E+00	3,84E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,84E+00	0,00E+00	0,00E+00

CR Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energy.

Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0
Biogenic carbon content in the accompanying packaging	kg C	6,03E-03

EPS Insulation Panels, 24 kg/m³

All results are provided per declared unit.

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP - total	kg CO2 eq	2,10E+00	4,87E-02	1,20E-01	0,00E+00	1,36E-01	3,12E+00	3,79E-03	-1,08E+00
GWP - fossil	kg CO2 eq	2,14E+00	4,83E-02	1,01E-01	0,00E+00	1,36E-01	3,12E+00	3,78E-03	-1,08E+00
GWP - biogenic	kg CO2 eq	-1,99E-02	0,00E+00	1,99E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-4,96E-03
GWP - luluc	kg CO2 eq	-1,91E-02	4,52E-04	4,92E-05	0,00E+00	3,58E-04	1,89E-04	1,19E-05	-7,07E-05
ODP	kg CFC11 eq	6,35E-11	6,34E-15	8,93E-10	0,00E+00	1,17E-14	2,19E-08	9,75E-15	-8,56E-12
AP	molc H+ eq	7,79E-03	1,42E-04	4,93E-04	0,00E+00	3,57E-03	1,16E-03	2,72E-05	-1,36E-03
EP- freshwater	kg P eq	7,58E-06	1,78E-07	2,10E-06	0,00E+00	1,63E-07	4,43E-05	7,73E-09	-1,77E-06
EP -marine	kg N eq	1,76E-03	6,28E-05	1,20E-04	0,00E+00	9,45E-04	3,37E-04	7,03E-06	-3,96E-04
EP - terrestrial	molc N eq	2,39E-02	7,12E-04	1,48E-03	0,00E+00	1,04E-02	3,75E-03	7,74E-05	-4,24E-03
POCP	kg NMVOC eq	3,50E-02	1,30E-04	1,54E-03	0,00E+00	2,55E-03	9,87E-04	2,12E-05	-1,10E-03
ADP-M&M ²	kg Sb-Eq	5,04E-07	3,23E-09	4,96E-08	0,00E+00	3,44E-09	7,23E-07	1,77E-10	-7,81E-08
ADP-fossil ²	MJ	6,77E+01	6,64E-01	2,91E+00	0,00E+00	1,72E+00	3,55E+00	5,11E-02	-2,00E+01
WDP ²	m ³	8,57E-01	5,89E-04	3,68E-02	0,00E+00	6,28E-04	2,95E-01	4,21E-04	-1,04E-01

GWP-total: Global Warming Potential; **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; See "additional Norwegian requirements" for indicator given as PO4 eq. **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009

Additional environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	9,21E-08	1,05E-09	7,22E-09	0,00E+00	5,99E-08	2,86E-08	3,35E-10	-1,15E-08
IRP ¹	kBq U235 eq.	4,29E-02	1,86E-04	2,29E-03	0,00E+00	3,48E-04	1,67E-02	6,72E-05	-2,58E-01
ETP-fw ²	CTUe	1,97E+02	4,76E-01	7,96E+00	0,00E+00	1,22E+00	7,75E-01	2,76E-02	-2,80E+00
HTP-c ²	CTUh	9,94E-10	9,67E-12	5,19E-11	0,00E+00	2,30E-11	2,91E-10	4,29E-12	-2,21E-10
HTP-nc ²	CTUh	2,94E-08	4,30E-10	1,33E-09	0,00E+00	8,31E-10	3,22E-09	4,53E-10	-5,43E-09
SQP ²	Dimensionless	7,67E+00	2,78E-01	4,13E-01	0,00E+00	2,23E-01	2,51E+00	1,24E-02	-3,84E+00

PM: Particulate matter emissions; **IRP:** Ionising radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality

¹ 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.

² 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

Resource use

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
RPEE	MJ	4,42E+01	4,83E-02	2,01E+00	0,00E+00	4,33E-02	2,27E-01	8,32E-03	-5,84E+00
RPEM	MJ	2,22E-01	0,00E+00	-2,22E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	4,44E+01	4,83E-02	1,79E+00	0,00E+00	4,33E-02	2,27E-01	8,32E-03	-5,84E+00
NRPE	MJ	3,20E+01	6,67E-01	2,93E+00	0,00E+00	1,72E+00	3,93E+01	5,11E-02	-2,00E+01
NRPM	MJ	3,57E+01	0,00E+00	-1,99E-02	0,00E+00	0,00E+00	-3,57E+01	0,00E+00	0,00E+00
TRPE	MJ	6,77E+01	6,67E-01	2,91E+00	0,00E+00	1,72E+00	3,55E+00	5,11E-02	-2,00E+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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	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
W	m ³	9,76E-02	5,29E-05	3,96E-03	0,00E+00	4,86E-05	6,90E-03	1,29E-05	-4,73E-03

RPEE Renewable primary energy resources used as energy carrier; **RPEM** Renewable primary energy resources used as raw materials; **TPE** Total use of renewable primary energy resources; **NRPE** Non-renewable primary energy resources used as energy carrier; **NRPM** Non-renewable primary energy resources used as materials; **TRPE** 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; **W** Use of net fresh water.

End of life – Waste

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HW	kg	7,89E-09	2,06E-12	3,16E-10	0,00E+00	5,40E-12	7,15E-12	1,11E-12	-1,05E-09
NHW	kg	3,26E-02	1,02E-04	1,31E-03	0,00E+00	1,90E-04	1,04E-02	2,56E-01	-9,88E-03
RW	kg	2,93E-04	1,25E-06	1,18E-05	0,00E+00	2,39E-06	1,91E-05	5,82E-07	-1,55E-03

HW Hazardous waste disposed; **NHW** Non-hazardous waste disposed; **RW** Radioactive waste disposed.

End of life – output flow

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	1,22E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	1,33E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	2,56E-03	0,00E+00	3,46E-02	0,00E+00	0,00E+00	8,51E-01	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,16E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,19E+00	0,00E+00	0,00E+00

CR Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energy.

Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0
Biogenic carbon content in the accompanying packaging	kg C	5,44E-03

EPS Insulation Panels, 30 kg/m³

All results are provided per declared unit.

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP - total	kg CO2 eq	2,52E+00	4,94E-02	1,36E-01	0,00E+00	1,61E-01	3,70E+00	4,50E-03	-1,29E+00
GWP - fossil	kg CO2 eq	2,53E+00	4,90E-02	1,20E-01	0,00E+00	1,61E-01	3,70E+00	4,48E-03	-1,28E+00
GWP - biogenic	kg CO2 eq	-1,72E-02	0,00E+00	1,72E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,89E-03
GWP - luluc	kg CO2 eq	8,06E-04	4,58E-04	5,78E-05	0,00E+00	4,24E-04	2,24E-04	1,41E-05	-8,38E-05
ODP	kg CFC11 eq	6,25E-11	6,44E-15	1,06E-09	0,00E+00	1,39E-14	2,60E-08	1,16E-14	-1,02E-11
AP	molc H+ eq	9,20E-03	1,44E-04	5,83E-04	0,00E+00	4,24E-03	1,37E-03	3,23E-05	-1,61E-03
EP- freshwater	kg P eq	8,90E-06	1,81E-07	2,49E-06	0,00E+00	1,93E-07	5,25E-05	9,16E-09	-2,09E-06
EP -marine	kg N eq	2,08E-03	6,37E-05	1,42E-04	0,00E+00	1,12E-03	4,00E-04	8,34E-06	-4,70E-04
EP -terrestrial	molc N eq	2,82E-02	7,23E-04	1,75E-03	0,00E+00	1,23E-02	4,44E-03	9,18E-05	-5,03E-03
POCP	kg NMVOC eq	4,14E-02	1,32E-04	1,82E-03	0,00E+00	3,03E-03	1,17E-03	2,52E-05	-1,31E-03
ADP-M&M ²	kg Sb-Eq	5,98E-07	3,28E-09	5,88E-08	0,00E+00	4,08E-09	8,57E-07	2,10E-10	-9,26E-08
ADP-fossil ²	MJ	8,02E+01	6,74E-01	3,44E+00	0,00E+00	2,04E+00	4,21E+00	6,06E-02	-2,37E+01
WDP ²	m ³	1,02E+00	5,98E-04	4,40E-02	0,00E+00	7,44E-04	3,50E-01	5,00E-04	-1,23E-01

GWP-total: Global Warming Potential; **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; See "additional Norwegian requirements" for indicator given as PO4 eq. **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009

Additional environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1,08E-07	1,07E-09	8,49E-09	0,00E+00	7,11E-08	3,40E-08	3,97E-10	-1,37E-08
IRP ¹	kBq U235 eq.	5,06E-02	1,89E-04	2,70E-03	0,00E+00	4,13E-04	1,99E-02	7,97E-05	-3,06E-01
ETP-fw ²	CTUe	2,36E+02	4,83E-01	9,52E+00	0,00E+00	1,45E+00	9,19E-01	3,28E-02	-3,32E+00
HTP-c ²	CTUh	1,18E-09	9,81E-12	6,15E-11	0,00E+00	2,73E-11	3,45E-10	5,09E-12	-2,63E-10
HTP-nc ²	CTUh	3,49E-08	4,36E-10	1,58E-09	0,00E+00	9,85E-10	3,81E-09	5,37E-10	-6,44E-09
SQP ²	Dimensionless	7,48E+00	2,82E-01	4,26E-01	0,00E+00	2,64E-01	2,98E+00	1,47E-02	-4,56E+00

PM: Particulate matter emissions; **IRP:** Ionising radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality

¹ 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.

² 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

Resource use

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
RPEE	MJ	5,29E+01	4,91E-02	2,32E+00	0,00E+00	5,14E-02	2,69E-01	9,87E-03	-6,93E+00
RPEM	MJ	1,92E-01	0,00E+00	-1,92E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	5,31E+01	4,91E-02	2,13E+00	0,00E+00	5,14E-02	2,69E-01	9,87E-03	-6,93E+00
NRPE	MJ	3,79E+01	6,77E-01	3,47E+00	0,00E+00	2,05E+00	4,65E+01	6,06E-02	-2,37E+01
NRPM	MJ	4,23E+01	0,00E+00	-2,09E-02	0,00E+00	0,00E+00	-4,23E+01	0,00E+00	0,00E+00
TRPE	MJ	8,03E+01	6,77E-01	3,45E+00	0,00E+00	2,05E+00	4,21E+00	6,06E-02	-2,37E+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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	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
W	m ³	1,16E-01	5,37E-05	4,71E-03	0,00E+00	5,77E-05	8,18E-03	1,53E-05	-5,61E-03

RPEE Renewable primary energy resources used as energy carrier; **RPEM** Renewable primary energy resources used as raw materials; **TPE** Total use of renewable primary energy resources; **NRPE** Non-renewable primary energy resources used as energy carrier; **NRPM** Non-renewable primary energy resources used as materials; **TRPE** 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; **W** Use of net fresh water.

End of life – Waste

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HW	kg	8,80E-09	2,10E-12	3,52E-10	0,00E+00	6,41E-12	8,48E-12	1,32E-12	-1,24E-09
NHW	kg	3,77E-02	1,03E-04	1,52E-03	0,00E+00	2,25E-04	1,23E-02	3,03E-01	-1,17E-02
RW	kg	3,46E-04	1,27E-06	1,40E-05	0,00E+00	2,84E-06	2,26E-05	6,90E-07	-1,84E-03

HW Hazardous waste disposed; **NHW** Non-hazardous waste disposed; **RW** Radioactive waste disposed.

End of life – output flow

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	1,05E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	1,27E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	2,52E-03	0,00E+00	4,09E-02	0,00E+00	0,00E+00	1,01E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,12E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,09E+01	0,00E+00	0,00E+00

CR Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energy.

Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0
Biogenic carbon content in the accompanying packaging	kg C	4,69E-03

Additional requirements

Location based electricity mix from the use of electricity in manufacturing

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 (foreground/core) per functional unit.

National electricity grid	Data source	Foreground / core [kWh]			GWP _{total} [kg CO ₂ -eq/kWh]	SUM [kg CO ₂ -eq]		
		16 kg/m ³	24 kg/m ³	30 kg/m ³		16 kg/m ³	24 kg/m ³	30 kg/m ³
IS: Electricity grid mix	Sphera	3,44E-03	3,25E-03	3,90E-03	0,0403	9,38E-02	1,26E-01	1,51E-01

Guarantees of origin from the use of electricity in the manufacturing phase

Guarantees of origin not applied.

Additional environmental impact indicators required for construction products

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.

Parameter		Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-IOBC	16 kg/m ³	kg	1,60E+00	4,37E-02	7,58E-02	0,00E+00	1,01E-01	3,32E-01	2,82E-03	-8,03E-01
	24 kg/m ³	kg	2,12E+00	4,87E-02	1,01E-01	0,00E+00	1,36E-01	3,12E+00	3,79E-03	-1,08E+00
	30 kg/m ³	kg	2,53E+00	4,94E-02	1,20E-01	0,00E+00	1,61E-01	3,70E-00	4,50E-03	-1,28E+00

GWP-IOBC Global warming potential calculated according to the principle of instantaneous oxidation.

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

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

Indoor environment




Not relevant

Carbon footprint

Carbon footprint has not been worked out for the product.

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	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
NPCR Part A	Construction products and services, Version 2.0, published 24.03.2021
NPCR 012	Part B for thermal insulation products, Version 2.0, published 31.03.2022
ISO 14001:2015 Certificate of Registration for Tempra ehf. Certificate No: EMS 762147. https://www.tempra.is/static/files/Vottanir/ems-762147-en.pdf	

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