

# Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Smartgrid cabinet UNI-SIG, size 600



**EL-tjeneste as**

The Norwegian EPD Foundation

**Owner of the declaration:**

EL-tjeneste AS

**Product:**

Smartgrid cabinet UNI-SIG, size 600

**Declared unit:**

1 pcs

**This declaration is based on Product Category Rules:**

CEN Standard EN 15804:2012+A2:2019, EN 50693:2019 and PCR EPD Italy 007 serves as core PCR  
PCR EPDItaly015 - Electronic and electrical products and systems - Switchboards

**Program operator:**

The Norwegian EPD Foundation

**Declaration number:**

NEPD-9188-8766

**Registration number:**

NEPD-9188-8766

**Issue date:** 19.02.2025

**Valid to:** 19.02.2030

**EPD software:**

LCAno EPD generator ID: 795902

## General information

### Product

Smartgrid cabinet UNI-SIG, size 600

### Program operator:

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

### Declaration number:

NEPD-9188-8766

### This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019, EN 50693:2019 and PCR EPD Italy 007 serves as core PCR  
PCR EPDItaly015 - Electronic and electrical products and systems - Switchboards

### 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 pcs Smartgrid cabinet UNI-SIG, size 600

### Declared unit with option:

A1-A3,A4,A5,B6,C1,C2,C3,C4,D

### Functional unit:

Functional unit - 1 Smartgrid cabinet UNI-SIG, size 600mm , with a use rate of 99% and average load factor of 55.5 % (usage in average climate in Norway) is an assembly of electric and electronic devices delivering control, distribution and safety functions, manufactured and installed, used over a lifetime of 20 years, including waste treatment at end-of-life.

### General information on verification of EPD from EPD tools:

Independent verification of data, other environmental information and the declaration according to EN 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:

### Owner of the declaration:

EL-tjeneste AS  
Contact person: Andreas Iversen  
Phone: +47 976 74 000  
e-mail: [info@el-tjeneste.no](mailto:info@el-tjeneste.no)

### Manufacturer:

EL-tjeneste AS

### Place of production:

EL-tjeneste AS  
Jæktsmegata 4  
7725 Steinkjer, Norway

### Management system:

NS-EN ISO 14001: 2015 and NS-EN ISO 9001 : 2015

### Organisation no:

925140074

### Issue date:

19.02.2025

### Valid to:

19.02.2030

### Year of study:

2024

### Comparability:

EPD for electronic and electrical products and systems may not be comparable if they do not comply with similar PCR standards.

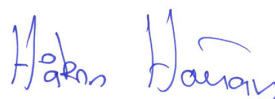
### Development and verification of EPD:

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: Zohaib Ali

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

### Approved:



Håkon Hauan  
Managing Director of EPD-Norway

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. Approval number: NEPDT57.

Third party verifier:

Elisabet Amat, GREENIZE projects

(no signature required)

## Product

### Product description:

Outdoor smartgrid cabinets for harsh Nordic environments. Sustainable design with high quality materials, that can be reused or easily separated for recycling at end of life. Functionality for surveillance of power grids by measuring electrical values, in addition to collection and distribution of signals from other grid-components. IT-grid versions has functionality for detecting ground faults and giving alarm.

### Product specification

Cabinets are made of seawater-resistant aluminium with roof and bottom in weather resistant reinforced polycarbonate. The cabinets are anodized brown, both for aesthetic reason and to improve corrosion resistance. Cabinets are made to provide a good climate for electronic components. To prevent condensation, cabinets are equipped with passive ventilation and heater, as well as insulated roof and drainage in the bottom.

Equipped with electrical components from well-known manufacturers.

Based on customer requirements, the cabinets can be equipped with metering systems (smart meters) and/or various sensors and sensorhubs for the customers own SCADA system. Wireless two-way communication connects the cabinet to the grid network for real-time monitoring through a vandal-proof antenna in the roof that provides radio and GSM transmission.

The cabinets has a wide range of accessories which among other things covers most mounting methods needed in the power grid.

Materials	kg	%
Electronic - Heating element	0,30	2,80
Electronic - Wire	0,43	4,01
Electronic component	1,35	12,64
Ethylene propylene diene monomer (EPDM)	0,14	1,27
Plastic - Polyamide	0,05	0,47
Plastic - Polyethylene (LDPE)	0,01	0,11
Metal - Aluminium	7,14	66,73
Metal - Stainless steel	0,32	2,99
Plastic - Polycarbonate (PC)	0,96	8,97
Total	10,70	100,00

Packaging	kg	%
Packaging - Cardboard	0,80	39,02
Packaging - Wood	1,25	60,98
Total incl. packaging	12,75	100,00

### Technical data:

Technical Data	Value
Dimensions (WxDxH):	343x258x600mm
Weight	11-12kg
Main material	Aluminium
IP-rating	IP44

### Market:

Main market Norway/ Nordics, But can be sold to and used anywhere in the world.

### Reference service life, product

20 years

### Reference service life, building or construction works

Not applicable

## LCA: Calculation rules

### Declared unit:

1 pcs Smartgrid cabinet UNI-SIG, size 600

### 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:

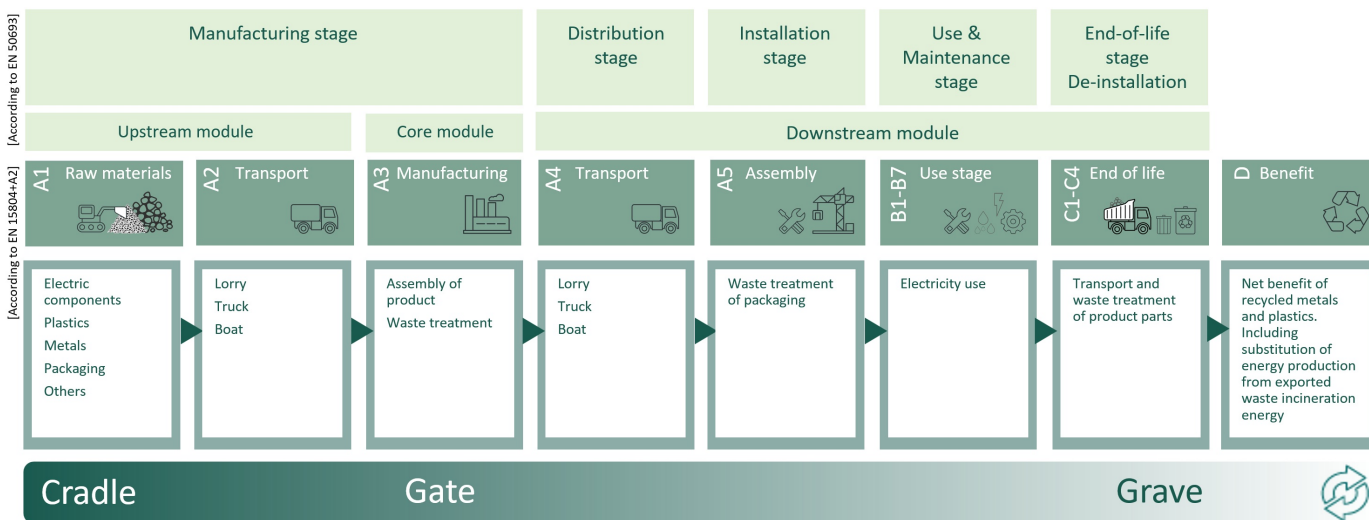
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

Materials	Source	Data quality	Year
Electronic - Heating element	ecoinvent 3.6	Database	2019
Electronic - Wire	Product composition + ecoinvent 3.6	Supplier data + database	2019
Electronic component	ecoinvent 3.6	Database	2019
Electronic component	ecoinvent 3.6	Supplier data + database	2019
Ethylene propylene diene monomer (EPDM)	ecoinvent 3.6	Database	2019
Metal - Aluminium	Modified ecoinvent 3.6	Database	2019
Metal - Aluminium	NEPD-6270-5524-EN	EPD	2022
Metal - Stainless steel	Modified ecoinvent 3.6	Database	2019
Packaging - Cardboard	Modified ecoinvent 3.6	Database	2019
Packaging - Wood	ecoinvent 3.6	Database	2019
Plastic - Polyamide	ecoinvent 3.6	Database	2019
Plastic - Polycarbonate (PC)	ecoinvent 3.6	Database	2019
Plastic - Polyethylene (LDPE)	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	X	MND	X	X	X	X	X

**System boundary:**



**Additional technical information:**

## LCA: Scenarios and additional technical information

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

Module A4 = Average distribution to Norway and Nordic countries (300 km).

Module A5 = Installation is performed by manual labor, with the use of electrical machines, that fall under the cut-off criteria of 1% and is therefore neglected. Packaging of the final product consist of wooden pallet and plastic packaging.

Module B6 = The operational energy use of the switchgear is calculated based on the methodology provided in EPD Italy PCR -015 for switchboards. To calculate the electricity use of the switchgear, the following scenario parameters have been applied

$$\text{Euse [kWh]} = (\text{Puse} * 8760 * \text{RSL} * a) / 1000$$

Power consumption heater

$$\text{Puse for 3 Phase} = \text{Rtot} * I^2 = 2365.2$$

Power consumption power analyzer

$$\text{Puse for 3 Phase} = \text{Rtot} * I^2 = 630.72$$

$$\text{Euse [kWh]} = 2995.92$$

Module C1 = The de-installation of the switchgear is carried out manually, with the assistance of electrical tools. The energy consumption of portable electrical devices (e.g., drills) is typically low, falling below the 1% cut-off criterion, and is therefore disregarded.

Module C2 = Transportation from building site to the waste treatment facility with an average distance of 300km.














Modules C3 and C4 = Waste treatment of the product follows the default values provided in EN 50693, Product Category Rules for life cycle assessments of electronic and electrical products and systems, table G.4. This table specified how different types of raw materials used in A1 will likely be treated during the end-of-life of the product. Waste treatments in C3 include material recycling and incineration with and without energy recovery and fly ash extraction. Disposal in C4 consist of landfilling of different waste fractions and of ashes.

Module D = The recyclability of metals, plastics, and electronic components allows the producers a credit for the net scrap that is produced at the end of a product's life. The benefits from recycling of net scrap are described in formula from EN 15804:2012+A2:2019. Substitution of heat and electricity generated by the incineration with energy recovery of plastic insulation and other parts is also calculated in module D.

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 (km) - Europe	36,7 %	300	0,043	l/tkm	12,90
Assembly (A5)					
	Unit	Value			
Waste, packaging, pallet, EUR wooden pallet, single use, to average treatment (kg)	kg	1,25			
Waste, packaging, corrugated board box, 0% recycled, to average treatment (kg) - A5, inkl. 85 km transp.	kg	0,80			
Operational energy (B6)					
	Unit	Value			
Electricity, Norway (kWh)	kWh	2995,92			
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 %	300	0,043	l/tkm	12,90
Waste processing (C3)					
	Unit	Value			
Waste, Materials to recycling (kg)	kg	5,72			
Waste treatment per kg Non-hazardous waste, incineration with fly ash extraction - C3 (kg)	kg	1,25			
Waste treatment per kg used electronic components, manual seperation (kg)	kg	1,78			
Disposal (C4)					
	Unit	Value			
Waste, scrap steel, to landfill (kg)	kg	0,15			
Waste, scrap aluminium, to landfill (kg)	kg	2,35			
Landfilling of ashes from incineration of Non-hazardous waste, process per kg ashes and residues - C4 (kg)	kg	0,29			
Landfilling of plastic mixture (kg)	kg	1,23			
Benefits and loads beyond the system boundaries (D)					
	Unit	Value			
Substitution of primary steel with net scrap	kg	0,68			
Substitution of primary aluminium with net scrap	kg	4,99			
Substitution of electricity, in Norway (MJ)	MJ	0,74			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	11,30			

## 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	B6	C1	C2	C3	C4	D	
 GWP-total	kg CO <sub>2</sub> -eq	8,66E+01	6,25E-01	3,30E+00	7,29E+01	0	6,25E-01	3,18E+00	1,76E-01	-4,62E+01	
 GWP-fossil	kg CO <sub>2</sub> -eq	8,89E+01	6,25E-01	4,66E-02	7,06E+01	0	6,25E-01	3,18E+00	1,76E-01	-4,52E+01	
 GWP-biogenic	kg CO <sub>2</sub> -eq	-2,52E+00	2,59E-04	3,25E+00	1,95E+00	0	2,59E-04	6,67E-04	1,21E-04	-2,05E-01	
 GWP-luluc	kg CO <sub>2</sub> -eq	1,99E-01	2,22E-04	1,29E-05	2,91E-01	0	2,22E-04	4,71E-04	1,63E-05	-8,46E-01	
 ODP	kg CFC11 -eq	8,80E-06	1,42E-07	8,11E-09	4,84E-06	0	1,42E-07	2,92E-08	1,39E-08	-4,78E-03	
 AP	mol H+ -eq	8,99E-01	1,80E-03	3,32E-04	5,52E-01	0	1,80E-03	1,59E-03	3,71E-04	-3,05E-01	
 EP-FreshWater	kg P -eq	8,31E-03	4,99E-06	5,09E-07	5,08E-03	0	4,99E-06	1,48E-05	7,54E-07	-1,77E-03	
 EP-Marine	kg N -eq	1,01E-01	3,55E-04	1,36E-04	6,07E-02	0	3,55E-04	3,54E-04	2,79E-04	-3,89E-02	
 EP-Terrestrial	mol N -eq	1,18E+00	3,97E-03	1,46E-03	7,90E-01	0	3,97E-03	3,79E-03	1,49E-03	-4,27E-01	
 POCP	kg NMVOC -eq	3,90E-01	1,52E-03	3,83E-04	2,12E-01	0	1,52E-03	9,76E-04	4,53E-04	-1,45E-01	
 ADP-minerals&metals <sup>1</sup>	kg Sb-eq	1,60E-02	1,73E-05	8,60E-07	5,27E-03	0	1,73E-05	1,50E-06	3,72E-07	5,45E-05	
 ADP-fossil <sup>1</sup>	MJ	1,25E+03	9,45E+00	5,76E-01	9,64E+02	0	9,45E+00	3,52E+00	1,11E+00	-5,72E+02	
 WDP <sup>1</sup>	m <sup>3</sup>	2,70E+04	9,14E+00	8,38E-01	1,68E+05	0	9,14E+00	1,95E+00	2,27E+01	-2,54E+04	

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<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






Additional environmental impact indicators											
Indicator	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	
 PM	Disease incidence	7,29E-06	3,83E-08	4,21E-09	3,96E-06	0	3,83E-08	1,08E-08	6,73E-09	-3,20E-06	
 IRP <sup>2</sup>	kgBq U235 -eq	9,68E+00	4,13E-02	2,21E-03	1,75E+01	0	4,13E-02	1,55E-02	6,78E-03	-2,46E+00	
 ETP-fw <sup>1</sup>	CTUe	7,84E+03	7,00E+00	6,91E-01	4,39E+03	0	7,00E+00	1,20E+01	1,46E+03	-7,17E+02	
 HTP-c <sup>1</sup>	CTUh	3,06E-07	0,00E+00	5,70E-11	2,10E-07	0	0,00E+00	2,95E-10	7,40E-11	-1,16E-07	
 HTP-nc <sup>1</sup>	CTUh	8,38E-06	7,65E-09	2,71E-09	4,94E-06	0	7,65E-09	7,28E-09	1,44E-09	-1,23E-06	
 SQP <sup>1</sup>	dimensionless	8,01E+02	6,61E+00	3,43E-01	4,86E+02	0	6,61E+00	5,64E-01	3,38E+00	-1,16E+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<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	A5	B6	C1	C2	C3	C4	D	
 PERE	MJ	6,78E+02	1,35E-01	1,11E-02	1,25E+04	0	1,35E-01	3,83E-01	1,23E-01	-2,11E+02	
 PERM	MJ	3,01E+01	0,00E+00	-3,01E+01	0,00E+00	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 PERT	MJ	7,08E+02	1,35E-01	-3,01E+01	1,25E+04	0	1,35E-01	3,83E-01	1,23E-01	-2,11E+02	
 PENRE	MJ	1,23E+03	9,45E+00	5,76E-01	9,66E+02	0	9,45E+00	3,65E+00	1,11E+00	-5,72E+02	
 PENRM	MJ	5,67E+01	0,00E+00	0,00E+00	0,00E+00	0	0,00E+00	-6,12E+01	0,00E+00	0,00E+00	
 PENRT	MJ	1,29E+03	9,45E+00	5,76E-01	9,66E+02	0	9,45E+00	-5,76E+01	1,11E+00	-5,72E+02	
 SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 RSF	MJ	1,88E+00	4,84E-03	3,36E-04	9,81E+00	0	4,84E-03	9,82E-03	2,55E-03	-5,71E-02	
 NRSF	MJ	3,43E+00	1,73E-02	3,11E-03	2,44E+01	0	1,73E-02	0,00E+00	1,52E-03	7,55E-01	
 FW	m <sup>3</sup>	4,88E+00	1,01E-03	3,73E-04	9,33E+01	0	1,01E-03	2,55E-03	1,42E-03	-1,12E+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<sup>-3</sup> = 0,009






\*INA Indicator Not Assessed

End of life - Waste											
Indicator	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	
	HWD	kg	4,33E-01	4,87E-04	0,00E+00	6,19E-01	0	4,87E-04	0,00E+00	2,56E-01	1,83E-01
	NHWD	kg	2,82E+01	4,59E-01	2,05E+00	7,43E+01	0	4,59E-01	1,26E+00	3,79E+00	-1,32E+01
	RWD	kg	6,10E-03	6,44E-05	0,00E+00	8,64E-03	0	6,44E-05	0,00E+00	2,35E-06	-2,31E-03

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	A5	B6	C1	C2	C3	C4	D	
	CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	6,26E-01	0,00E+00	7,44E-01	0,00E+00	0	0,00E+00	5,72E+00	1,10E-04	0,00E+00
	MER	kg	4,68E-02	0,00E+00	1,24E+00	0,00E+00	0	0,00E+00	1,26E+00	2,70E-06	0,00E+00
	EEE	MJ	3,64E-02	0,00E+00	9,08E-01	0,00E+00	0	0,00E+00	4,36E-04	1,75E-04	0,00E+00
	EET	MJ	5,51E-01	0,00E+00	1,37E+01	0,00E+00	0	0,00E+00	6,60E-03	2,65E-03	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	8,87E-01

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>

## 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 (kWh)	ecoinvent 3.6	24,33	g CO <sub>2</sub> -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-A3	A4	A5	B6	C1	C2	C3	C4	D
GWPIOBC	kg CO <sub>2</sub> -eq	8,96E+01	6,25E-01	4,66E-02	7,27E+01	0	6,25E-01	1,82E+00	1,79E-01	-4,45E+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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