



ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

MIX SHUNT U/H/L DN15-DN50
HögforsGST Oy



EPD HUB, HUB-7629

Published on 24.09.2026, last updated on 24.09.2026, valid until 23.09.2031

Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1.



Created with One Click LCA



GENERAL INFORMATION

MANUFACTURER

Manufacturer	HögforsGST Oy
Address	Koskentie 65, 79100, Leppävirta, FINLAND
Contact details	info.fi@hogforsgst.com
Website	https://hogforsgst.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	
Scope of the EPD	Cradle to gate with options, A4-A5, B2, B4, B6 and modules C1-C4, D
EPD author	Lotta Viitanen, Heli Päckilä, Merja Karhunen HögforsGST Oy
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☒ External verification
EPD verifier	Elena Antuña-Bernardo as an authorized verifier for EPD Hub

This EPD is intended for business-to-business communication. The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	MIX SHUNT U/H/L DN15-DN50
Additional labels	MIX DN15 (U/H/L), MIX DN20 (U/H/L), MIX DN25 (U/H/L), MIX DN32 (U/H/L), MIX DN40 (U/H/L), MIX DN50 (U/H/L)
Product reference	MIX 50U-H-2-CS
Place(s) of raw material origin	EU
Place of production	LEPPÄVIRTA, FINLAND
Place(s) of installation and use	EU
Period for data	Calender year 2025
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3 (%)	+ 15%
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	79,2

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
Mass of packaging	0,468 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	3,54
GWP-total, A1-A3 (kgCO ₂ e)	2,73
Secondary material, inputs (%)	48,8
Total energy use, A1-A3 (kWh)	60,1
Net freshwater use, A1-A3 (m ³)	0,04

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

HögforsGST is a Finnish company specializing in the design, manufacture, and marketing of high-quality heating and cooling systems. As the leading provider of smart energy solutions in the Nordic region, HögforsGST helps reduce both emissions and energy costs through innovative, modern technologies.

HögforsGST MIX shunt groups are manufactured at the factory and company headquarters in Leppävirta, Finland. The company's strong domestic sales network is complemented by subsidiaries in Sweden, Norway and Germany, which enables us to serve a growing international customer base.

PRODUCT DESCRIPTION

Product description

HögforsGST MIX shunt groups are prefabricated, high-quality mixing circuits for heating, cooling, and heat recovery systems. The products are intended for secondary control circuits in building heating systems, providing demand-driven energy distribution. The system is engineered to optimize energy efficiency. The products comply with the EU Declaration of Conformity and meet the requirements of the Machinery Directive 2006/42/EU.

Applications

Secondary control circuits in building systems, including radiator heating, ventilation, and underfloor heating systems.

Physical properties of the product

Weight: 79 Kg

Width: 750 mm

Height: 1440 mm with the pump

Structural characteristics

The shunt group is supplied as a complete, factory-enclosed, and insulated unit designed for wall or floor mounting. The casing material is painted steel. The standard unit comes equipped with control valves, balancing valves, shut-off valves, thermometers, a drainage valve, and an integrated circulation pump.

The piping materials comply with standard specifications EN 10217-2 / P235GH for carbon steel or EN 1.4301 / AISI 304 for stainless steel. The compact design ensures minimal thermal losses and requires no scheduled maintenance, while all primary metal components are fully separable and highly recyclable at the end of life.

Technical scope

Products are supplied in connection sizes DN10–100, operating within a maximum pressure rating of 1.0 MPa (PN10) and an operating temperature range of +2°C to +90°C. DN10–50 models are available in U, H, and L pipe configurations, while DN65–100 models are available in U pipe configuration.

Further information can be found at:

<https://hogforsgst.com>

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	90	EU
Minerals	4,1	EU
Fossil materials	5,9	EU
Bio-based materials	0	

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	-
Biogenic carbon content in packaging, kg C	2,174

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg
Mass per declared unit	1 kg
Functional unit	To produce a 1 kW heating or cooling power for a reference lifetime of 25 years
Reference service life	25 years

SUBSTANCES, REACH - VERY HIGH CONCERN

Substances of very high concern	EC	CAS
Lead as an alloying element in components	231-100-4	CAS 7439-92-1

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	ND	x	ND	x	ND	x	ND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Not declared = ND

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

A market-based approach is used in modelling the electricity mix utilized in the factory.

The environmental impacts in the manufacturing stage include the manufacturing of raw materials, packaging materials, and all energy and materials used in the factory in addition to transportation of raw materials, packaging materials, ancillary materials and manufacturing waste.

The supplier-specific EPD datasets represent actual suppliers used by HögforsGST during the reference period. Supplier relationships have been verified against purchasing records and bills of materials. Where manufacturer-specific EPDs were available from our suppliers, these were preferred over generic datasets in accordance with EN 15804 requirements. Manufacturing processes consist of the in-house fabrication of custom pipe components, which includes cutting, bending, end treatment, drilling, and welding. This is followed by final assembly, pressure testing, insulation, quality control, and packaging. Packing materials -mainly wood, and plastics are selected to ensure adequate protection during transport while minimizing waste.

Electricity consumption at the manufacturing site in Finland is based on certified renewable energy. Average annual consumption data from production is used. To account for transformation and distribution losses from the high-voltage grid to the manufacturing site, a 3% grid loss factor has been explicitly included in the electricity consumption inventory in accordance with the Finnish national grid average.

Raw materials, purchased components, packaging materials and ancillary materials are transported to the Leppävirta manufacturing facility. Transport modes and distances are based on supplier-specific data and purchasing records where available.

Transport distances for raw materials were determined based on the actual locations of our suppliers and transportation routes to the manufacturing facility in Leppävirta, Finland. The calculated transport distances vary between 2 km and 1900 km, reflecting the geographical distribution of suppliers.

Production losses from cutting, drilling, bending, welding and assembly are included based on manufacturing data for the reference year 2025. The principal production waste consists of metal scrap. The production loss rate applied in the assessment was 10,57 %. Any material losses generated during production are sorted and directed to appropriate recycling streams.

In ancillary materials argon is used for welding with steel being consumed in the welding process.

The use of green energy in manufacturing is demonstrated through contractual instruments (GOs, RECs, etc.), and its use is ensured throughout the validity period of this EPD.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

Transportation impacts arise from the delivery of the finished product from the Finnish production facility to the installation site. Fuel consumption and exhaust emissions are included in the assessment. Exact delivery locations vary by project; the transport distance is calculated as an average based on HögforsGST's logistics data.

Transport from the manufacturing plant to the construction site is assumed to take place by truck (Euro 6 emission class), and the transport distance has been calculated on a case-by-case basis.

The waste generated during installation is plastic film and pallets used in packaging. There are no significant emissions or resource use during the installation process. Packaging materials (wooden pallets, plastic wrap) are expected to be disposed of via local waste management or recycling services.

Eurostat scenarios have been used to model packaging waste. In those scenarios, some packaging waste is recycled, some is incinerated and the rest is landfilled. In those scenarios, average transportation distance to waste treatment site is assumed to be 50 km by lorry.

PRODUCT USE AND MAINTENANCE (B1-B7)

The product is designed for a reference service life of 25 years. Module B1 does not generate direct emissions to air, soil or water during normal operation. No scheduled maintenance, repair, replacement or refurbishment activities are required during normal operation. Therefore, modules B2-B5 do not generate significant material consumption, energy use, water use or waste generation and their environmental impacts are considered negligible.

Module B6 (Operational energy use) is declared for the product. The operational energy consumption accounts for the electricity required by the integrated circulation pump during the product's reference service life (RSL).

Lifetime electricity consumption is 415.09 kWh per kg declared unit, based on 5000 operating hours per year and a 25-year service life using Swedish medium-voltage electricity.

Other stage modules (B1-B5, B7) are not declared as the product requires no significant material replacements or maintenance during its standard service life.

Module B7 is not applicable as the product does not consume freshwater during operation.

Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

The energy consumption to remove the product at the end of its lifetime is negligible (C1). The transport distance to landfill is 50 km.

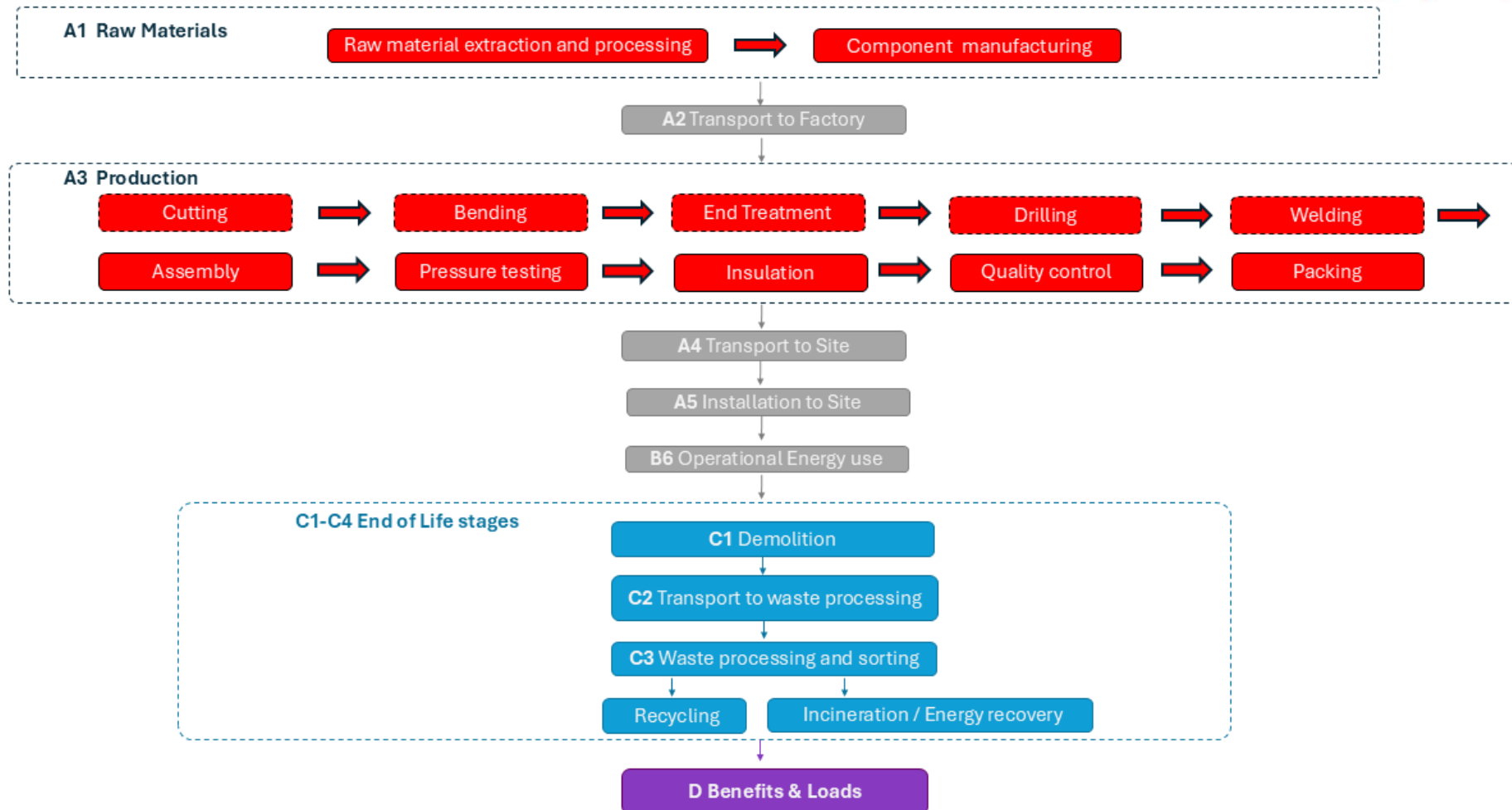
For recycling, a distance of 100km is assumed for glass and 250km for other components. A distance of 150 km is assumed for the incineration of rubber. (C2).

In accordance with standard European/Eurostat scenario assumptions. For waste processing (C3-C4), standard scenarios are applied: steel and cast iron are predicted to have a material recycling rate of 85%, aluminum 90%, and copper alloys 60%. Glass and insulation materials exhibit a 30% recycling rate and 70% landfill rate.

Rubber and plastic components are directed to energy recovery through incineration by 73% and landfill by 27%. To prevent double counting of pre-consumer recycled content in the product stage, base metal recycling benefits are excluded from Module D in accordance with internal manufacturer guidelines.

Module D includes the potential benefits and loads resulting from the recovery of materials and energy at the end of life. Steel, aluminium and copper are modelled as recyclable materials and are assumed to substitute the production of primary materials. The steel recycling scenario is based on World Steel Association data (2020), while the aluminium recycling scenario is based on Eurostat end-of-life scenarios (2020). Energy recovery has been considered for plastic materials. The net benefits and loads associated with material recycling and energy recovery are declared in Module D in accordance with EN 15804+A2.

LIFE CYCLE FLOW DIAGRAM



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

All industrial processes from raw material acquisition and pre-processing, production, product distribution, installation, use/application of product and end-of-life management are included. For easier modelling and because of lack of accuracy in available modelling resources many constituents under 1% of product mass are excluded. These include some ancillary materials which are used in the production only in very small amounts and have no serious impact on the emissions of the product. Further, water used for cleaning and the maintenance of capital equipment, transportation and waste streams of the packaging materials used for delivering the raw materials to the factory are omitted since the quantified mass contribution is less than 1%.

The production of capital equipment, construction activities, and infrastructure, personnel-related activities, energy and water use related to company management and sales activities are excluded.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging material	No allocation
Ancillary materials	Physical Properties
Manufacturing energy and waste	Physical Properties

The reference service life (RSL) of the product is assumed to be 25 years. The operational energy use (B6) is estimated based on the circulation pump operating for 5000 hours per year within a standard heating system profile, utilizing the Swedish medium-voltage electricity. A technical inconsistency between PENRT (Total use of non-renewable primary energy) and ADP-fossil (Abiotic depletion potential for fossil resources) results in modules A1-A3 has been identified.

Following an update of the sand dataset, a contribution analysis shows that the remaining discrepancy originates from the specific characterization factors in the background environmental profiles of the primary raw materials (Pump). These inconsistencies are inherent to the third-party verified EPDs and background databases used and cannot be adjusted by the practitioner.

For the end-of-life stage, a transport distance of 50 km is assumed for materials directed to landfill or incineration, and 250 km for metals directed to material recycling facilities.

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	Multiple products
Grouping method	Based on worst-case results
Variation in GWP-fossil for A1-A3, %	+ 15%

The calculations for this EPD are based on the DN50 product, which represents the maximum size in the product range. For creating an average EPD, the difference between the minimum and maximum product sizes has been calculated and this percentage variation has been applied to derive representative average values for the entire product group.

EPD is covering nominal sizes DN15 to DN50, each available in three geometric variations (U-shape, H-shape, and L-shape). All products included in this declaration are manufactured using the same materials, identical production processes, and the same manufacturing facility.

The grouping covers:

DN15: MIX DN15 U, MIX DN15 H, MIX DN15 L

DN20: MIX DN20 U, MIX DN20 H, MIX DN20 L

DN25: MIX DN25 U, MIX DN25 H, MIX DN25 L

DN32: MIX DN32 U, MIX DN32 H, MIX DN32 L

DN40: MIX DN40 U, MIX DN40 H, MIX DN40 L

DN50: MIX DN50 U, MIX DN50 H, MIX DN50 L

A total of 18 products

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.5. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11/3.12 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11/3.12 environmental data sources follow the methodology 'allocation, Cut-off, EN 15804+A2'.

EN 15804:2012+A2:2019

EN 50693:2019

World Stainless 2024 <https://www.worldstainless.org/about-stainless/environment/recycling/#:~:text=The%20analysis%20concluded%20that%20on,in%20English%2C%20German%20and%20Chinese>

International Chromium Development Association (ICDA) 2023 <https://www.icdacr.com/2023/06/27/95-of-stainless-steel-is-recycled-at-the-end-of-its-life>

<https://worldsteel.org/wp-content/uploads/Life-cycle-inventory-LCI-study-2020-data-release.pdf>

<https://european-aluminium.eu/blog/enabling-the-circular-economy-with-aluminium/#:~:text=Aluminium%20recycling%20rates%20are%20already,boost%20the%20recycling%20of%20aluminium%2C>

https://ec.europa.eu/eurostat/databrowser/view/env_waspac_custom_8519242/default/table?lang=en

https://ec.europa.eu/eurostat/databrowser/view/env_waspac_custom_8519174/default/table?lang=en

Gervasio, H. & Dimova, S., JRC Technical report: Model for Life Cycle Assessment (LCA) of buildings, 2018)

ENVIRONMENTAL IMPACT DATA

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	3,27E+00	7,37E-02	-6,16E-01	2,73E+00	3,01E-01	8,21E-01	ND	0,00E+00	ND	0,00E+00	ND	1,30E+01	ND	0,00E+00	2,79E-02	1,35E-01	2,90E-03	-2,46E+00
GWP – fossil	kg CO ₂ e	3,28E+00	7,37E-02	1,80E-01	3,54E+00	3,01E-01	2,35E-02	ND	0,00E+00	ND	0,00E+00	ND	1,11E+01	ND	0,00E+00	2,79E-02	1,36E-01	2,90E-03	-2,24E+00
GWP – biogenic	kg CO ₂ e	-2,02E-02	1,60E-05	-7,97E-01	-8,17E-01	5,62E-05	7,97E-01	ND	0,00E+00	ND	0,00E+00	ND	4,64E-01	ND	0,00E+00	6,30E-06	-2,06E-04	-2,03E-07	-2,12E-01
GWP – LULUC	kg CO ₂ e	5,58E-03	3,29E-05	6,96E-04	6,31E-03	1,18E-04	2,47E-05	ND	0,00E+00	ND	0,00E+00	ND	1,42E+00	ND	0,00E+00	1,24E-05	2,35E-05	8,72E-07	-7,90E-03
Ozone depletion pot.	kg CFC-11e	1,25E-07	1,08E-09	5,43E-09	1,31E-07	5,58E-09	2,56E-10	ND	0,00E+00	ND	0,00E+00	ND	3,82E-07	ND	0,00E+00	4,05E-10	2,75E-10	3,93E-11	-1,64E-08
Acidification potential	mol H ⁺ e	4,22E-02	2,52E-04	9,80E-04	4,34E-02	2,73E-03	8,95E-05	ND	0,00E+00	ND	0,00E+00	ND	7,10E-02	ND	0,00E+00	9,42E-05	2,36E-04	1,01E-05	-5,28E-02
EP-freshwater ²⁾	kg Pe	1,57E-03	6,26E-06	6,81E-05	1,64E-03	1,73E-05	4,47E-06	ND	0,00E+00	ND	0,00E+00	ND	4,18E-03	ND	0,00E+00	2,17E-06	1,23E-05	1,31E-07	-5,17E-03
EP-marine	kg Ne	4,15E-03	8,31E-05	2,63E-04	4,50E-03	6,83E-04	9,10E-05	ND	0,00E+00	ND	0,00E+00	ND	2,09E-02	ND	0,00E+00	3,08E-05	5,52E-05	4,09E-05	-4,01E-03
EP-terrestrial	mol Ne	4,92E-02	9,03E-04	2,89E-03	5,30E-02	7,55E-03	3,65E-04	ND	0,00E+00	ND	0,00E+00	ND	2,07E-01	ND	0,00E+00	3,35E-04	6,20E-04	4,18E-05	-5,02E-02
POCP (“smog”) ³⁾	kg NMVOCe	1,48E-02	3,72E-04	1,25E-03	1,64E-02	2,49E-03	1,20E-04	ND	0,00E+00	ND	0,00E+00	ND	4,92E-02	ND	0,00E+00	1,36E-04	1,81E-04	1,52E-05	-1,50E-02
ADP-minerals & metals ⁴⁾	kg Sbe	5,88E-04	2,07E-07	3,67E-06	5,92E-04	8,17E-07	4,47E-08	ND	0,00E+00	ND	0,00E+00	ND	2,51E-04	ND	0,00E+00	8,27E-08	1,29E-06	2,38E-09	-6,49E-04
ADP-fossil resources	MJ	4,31E+01	1,07E+00	1,27E+02	1,71E+02	4,10E+00	2,28E-01	ND	0,00E+00	ND	0,00E+00	ND	1,82E+03	ND	0,00E+00	3,99E-01	2,64E-01	3,41E-02	-2,57E+01
Water use ⁵⁾	m ³ e depr.	1,10E+00	5,48E-03	1,27E-01	1,23E+00	1,81E-02	8,11E-03	ND	0,00E+00	ND	0,00E+00	ND	7,78E+01	ND	0,00E+00	1,93E-03	1,07E-02	8,81E-04	-1,42E+00

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO₄e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	2,24E-07	7,34E-09	1,57E-08	2,48E-07	1,88E-08	1,57E-09	ND	0,00E+00	ND	0,00E+00	ND	1,19E-06	ND	0,00E+00	2,58E-09	3,09E-09	2,28E-10	-2,30E-07
Ionizing radiation ⁶⁾	kBq 11235e	2,31E-01	9,20E-04	1,79E-02	2,50E-01	4,46E-03	5,94E-04	ND	0,00E+00	ND	0,00E+00	ND	1,32E+02	ND	0,00E+00	3,40E-04	1,95E-03	2,39E-05	-1,30E-01
Ecotoxicity (freshwater)	CTUe	1,40E+02	1,67E-01	2,04E+00	1,42E+02	4,87E-01	2,68E-01	ND	0,00E+00	ND	0,00E+00	ND	5,17E+01	ND	0,00E+00	6,09E-02	1,11E+00	3,60E+01	-5,26E+02
Human toxicity, cancer	CTUh	3,65E-08	1,20E-11	7,85E-10	3,73E-08	5,35E-11	8,01E-12	ND	0,00E+00	ND	0,00E+00	ND	6,67E-09	ND	0,00E+00	4,65E-12	1,76E-11	4,30E-13	-5,65E-09
Human tox. non-cancer	CTUh	3,69E-07	6,84E-10	2,65E-09	3,72E-07	2,22E-09	4,26E-10	ND	0,00E+00	ND	0,00E+00	ND	3,29E-07	ND	0,00E+00	2,56E-10	1,14E-09	4,76E-11	-4,88E-07
SQP ⁷⁾	-	1,94E+01	1,07E+00	6,40E+01	8,45E+01	1,98E+00	2,11E-01	ND	0,00E+00	ND	0,00E+00	ND	4,60E+02	ND	0,00E+00	3,45E-01	4,79E-01	6,89E-02	-2,05E+01

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy ⁸⁾	MJ	9,07E+00	1,46E-02	1,21E+01	2,11E+01	6,19E-02	-6,74E+00	ND	0,00E+00	ND	0,00E+00	ND	1,17E+03	ND	0,00E+00	5,48E-03	4,50E-02	3,71E-04	-4,23E+00
Renew. PER as material	MJ	0,00E+00	0,00E+00	6,98E+00	6,98E+00	0,00E+00	-6,98E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,85E+00
Total use of renew. PER	MJ	9,07E+00	1,46E-02	1,90E+01	2,81E+01	6,19E-02	-1,37E+01	ND	0,00E+00	ND	0,00E+00	ND	1,17E+03	ND	0,00E+00	5,48E-03	4,50E-02	3,71E-04	-2,38E+00
Non-re. PER as energy	MJ	5,69E+01	1,07E+00	1,37E+02	1,95E+02	4,10E+00	-2,30E-02	ND	0,00E+00	ND	0,00E+00	ND	1,82E+03	ND	0,00E+00	3,99E-01	-7,43E-01	-6,20E-01	-2,57E+01
Non-re. PER as material	MJ	4,18E-02	0,00E+00	7,29E-01	7,71E-01	0,00E+00	-7,29E-01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	-1,95E-02	-2,23E-02	2,31E-01
Total use of non-re. PER	MJ	5,69E+01	1,07E+00	1,38E+02	1,96E+02	4,10E+00	-7,52E-01	ND	0,00E+00	ND	0,00E+00	ND	1,82E+03	ND	0,00E+00	3,99E-01	-7,63E-01	-6,43E-01	-2,55E+01
Secondary materials	kg	4,88E-01	4,52E-04	2,75E-02	5,16E-01	1,88E-03	1,59E-04	ND	0,00E+00	ND	0,00E+00	ND	2,24E-01	ND	0,00E+00	1,73E-04	3,16E-04	9,20E-06	7,23E-01
Renew. secondary fuels	MJ	1,85E-03	5,77E-06	2,36E-01	2,38E-01	1,95E-05	1,64E-06	ND	0,00E+00	ND	0,00E+00	ND	7,73E-04	ND	0,00E+00	2,20E-06	1,44E-05	1,87E-07	-3,67E-04
Non-ren. secondary fuels	MJ	1,93E-24	0,00E+00	0,00E+00	1,93E-24	0,00E+00	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	3,09E-02	1,56E-04	1,12E-02	4,23E-02	4,91E-04	-5,71E-04	ND	0,00E+00	ND	0,00E+00	ND	1,81E+00	ND	0,00E+00	5,69E-05	2,23E-04	-6,01E-05	-3,57E-02

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	4,24E+00	2,95E-03	2,20E-02	4,27E+00	5,73E-03	1,55E-03	ND	0,00E+00	ND	0,00E+00	ND	8,86E+00	ND	0,00E+00	6,83E-04	5,31E-03	4,64E-05	-9,00E-01
Non-hazardous waste	kg	8,38E+00	5,65E-02	8,40E-01	9,28E+00	1,12E-01	6,17E-01	ND	0,00E+00	ND	0,00E+00	ND	3,29E+01	ND	0,00E+00	1,27E-02	1,05E-01	9,76E-02	-2,04E+01
Radioactive waste	kg	6,47E-04	2,24E-07	1,71E-04	8,19E-04	1,11E-06	1,48E-07	ND	0,00E+00	ND	0,00E+00	ND	2,82E-02	ND	0,00E+00	8,33E-08	4,98E-07	5,83E-09	-3,39E-05

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	6,83E-03	0,00E+00	0,00E+00	6,83E-03	0,00E+00	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	4,31E-02	0,00E+00	1,71E-02	6,02E-02	0,00E+00	1,52E-01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	8,06E-01	0,00E+00	0,00E+00
Materials for energy rec	kg	2,61E-03	0,00E+00	0,00E+00	2,61E-03	0,00E+00	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	5,35E-02	0,00E+00	0,00E+00	5,35E-02	0,00E+00	7,68E-01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	3,75E-01	0,00E+00	0,00E+00
Exported energy – Electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,26E-01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,58E-01	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,42E-01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,17E-01	0,00E+00	0,00E+00

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ⁹⁾	kg CO ₂ e	3,29E+00	7,37E-02	1,81E-01	3,54E+00	3,01E-01	2,35E-02	ND	0,00E+00	ND	0,00E+00	ND	1,25E+01	ND	0,00E+00	2,79E-02	1,36E-01	2,90E-03	-2,25E+00

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO₂ is set to zero

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

1. Electricity production, hydro, run-of-river, Finland, Ecoinvent
2. Electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted, Finland, Ecoinvent
3. District Heat, Finland, 2018, Finland

Transport scenario documentation - A4 (Transport resources)

1. Market for transport, freight, lorry 16-32 metric ton, EURO6
2. Market for transport, freight, sea, ferry

Transport to the building site (A4) - Scenario documentation

Scenario parameter	Value
Capacity utilization (including empty return) %	61
Bulk density of transported products	367
Volume capacity utilization factor	1

Installation at the building site (A5) - Scenario documentation

Scenario parameter	Value
Energy: type and consumption (MJ or kWh)	No significant auxiliary energy is consumed during the installation process on site. Hand tools and manual labor are primarily utilized.
Water use (m ³)	Water is not consumed during the installation of the product on site.
Ancillary materials: type and mass (kg)	Minor ancillary materials such as screws and fasteners are below the 1% cut-off criteria and are excluded from the assessment.
Waste materials: type and mass (kg)	Wood packaging waste Plastic packaging waste
Waste materials: output routes	Wood packaging waste: 32% recycled, 30% incinerated 30% landfilled. Plastic packaging waste: 40% recycled, 37% incinerated, 23% recycled
Direct emissions (kg)	There are no direct emissions to air, soil or water generated by the product during the installation process or its standard operation.

Use stages scenario documentation - B2 Maintenance

Scenario information	Value
Maintenance process description	-
Maintenance cycle (per RSL)	0
Energy use (kWh/cycle)	-
Water use (m3 or litres/cycle)	-
Ancillary materials (kg/cycle)	-
Waste materials (kg/cycle)	-

Use stages scenario documentation - B4 Replacement

Scenario information	Value
Replacement cycle (per RSL)	0
Activity type, Energy use (kWh)	-
Exchange of worn parts, mass (kg)	-

End of life (C1-C4) - Scenario documentation

Scenario information	Value
Collection process: collected separately (kg)	1 kg
Collection process: Mixed waste (kg)	0
Recovery: re-use (kg)	0
Recovery: recycling (kg)	0,81
Recovery: energy recovery (kg)	0
Disposal (kg)	0,1
Scenario assumptions e.g. transportation (mode, km) & other	Deconstruction (C1) is assumed to be performed with low energy requirements using standard hand tools. For end-of-life transportation (C2), the transport distances from the deconstruction site to the respective waste management and recycling facilities are modeled using standard European scenarios: a default distance of 50 km is applied for materials directed to landfill and incineration, and 250 km for metals directed to sorting and pressing facilities for material recycling. All transport is modeled via standard freight trucks.

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance is filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools

Tool verifier: Magaly Gonzalez Vazquez

Tool verification validity: 27 March 2025 - 26 March 2028

Elena Antuña-Bernardo as an authorized verifier for EPD Hub Limited
24.09.2026

