

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

G-Eco Pro Inverter heat pump with R290 refrigerant
Gebwell Oy



EPD HUB, HUB-8016
Published on 03.11.2026, last updated on 03.11.2026, valid until 02.11.2031

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	Gebwell Oy
Address	Patruunapolku 5, 79100 Leppävirta, Finland
Contact details	info@gebwell.fi
Website	www.gebwell.fi

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
c-PCR	
Sector	Manufactured 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	Tiina Vatanen, Gebwell Oy
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Yazan Badour 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	G-Eco Pro Inverter heat pump with R290 refrigerant
Additional labels	G-Eco Pro 120 HT and Pro 120 Inverter heat pump with R290 refrigerant
Product reference	-
Place(s) of raw material origin	Europe
Place of production	Leppävirta, Finland
Place(s) of installation and use	Europe
Place(s) of end-of-life	
Period for data	Calendar year 2025
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3 (%)	2,1
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	43,8

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit of finished product
Declared unit mass	798 kg
Mass of packaging	18,034 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	4900
GWP-total, A1-A3 ($kgCO_2e$)	4920
Secondary material, inputs (%)	35,2
Secondary material, outputs (%)	76,9
Total energy use, A1-A3 (kWh)	17 600
Net freshwater use, A1-A3 (m^3)	90,8

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Gebwell Oy, part of the Gebwell Group, is a Finnish company located in Leppävirta, specializing in the manufacturing of equipment for district heating and geothermal heating and cooling. All products—including ground source heat pumps, storage tanks, and district heating substations—are designed and produced in the company's facilities in Leppävirta. Gebwell's product development focuses on reliability and solutions tailored to the demanding
Nordic climate. The company's vision is to be a forerunner in the heat pump and district heating sector, providing innovative answers to energy challenges.
Gebwell is committed to maintaining high standards of quality and environmental performance throughout its operations. The company operates certified management systems in accordance with ISO 9001 (Quality Management) and ISO 14001 (Environmental Management).

PRODUCT DESCRIPTION

The product group covered by this EPD consists of G Eco Pro heat pumps. The representative product is the G Eco Pro 120 HT. The representative product has overall dimensions of approximately 1250 mm × 750 mm × 1870 mm (D × W × H) and a weight of 798 kg (without packaging). Other products within the group share the same design, material composition, manufacturing process and functionality, with variations limited to minor differences in component mass.
Gebwell G-Eco Pro is an inverter-driven heat pump designed for use with the natural refrigerant R290 (propane).
Refrigerant R290 (propane) has a 100 year global warming potential (GWP_{100}) of 0.02 kg CO_2 eq/kg refrigerant, based on Regulation (EU) 2024/573 Annex VI (IPCC AR6) values, and an ozone depletion potential (ODP) of zero (no impact).
The unit uses a continuously variable inverter-controlled compressor, allowing the heat output to modulate according to the building's real-time thermal load. Inverter control ensures stable operation without unnecessary cycling, improving part-load efficiency and maintaining consistent supply temperatures. G-Eco Pro can be integrated into the Gebwell Smart cloud environment. Through the browser-based Smart Hub interface, system parameters, operating states, alarms, and controller settings can be monitored and adjusted remotely. Remote access also allows firmware updates to be applied without on-site intervention. Operational data stored in the cloud can be used for diagnostics and long-term performance analysis. The compressor module of the G-Eco Pro is structurally isolated to reduce mechanical transmission and airborne noise. The entire refrigeration circuit is designed specifically for R290 operation, including component selection, safety structures, and charge optimisation.
The G-Eco Pro 120 HT heat pump produces a supply temperature of up to +75 °C, making it highly suitable for domestic hot water production. Thanks to its wider brine circuit operating range of –10…+30 °C, the unit is also increasingly well suited for heat recovery applications.
Gebwell G-Eco Pro is an inverter-driven heat pump that includes the pumping system (indoor unit). External components required for ground heating—such as pipes and the ground well—are not included in this product. These elements are considered part of the construction project.

Further information can be found at:
www.gebwell.fi

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	92,79	Europe
Minerals	0,05	Europe
Fossil materials	7,16	Europe
Bio-based materials	0	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	8,23

1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 unit of finished product
Mass per declared unit	798 kg
Functional unit	1 unit
Reference service life	22 years

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

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

A5 is not fully declared. Waste processing (from collection through to end-of-waste or final disposal) and full energy and biogenic carbon balancing are accounted for. Storage, product wastage, and installation into the building are excluded.

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 product stage (A1-A3) includes raw material extraction and processing, transport of materials to the manufacturing site, and all manufacturing activities at Gebwell's production facility. Construction stage, use stage and end-of-life stages are excluded from this module description.
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 product is composed primarily of steel, insulation materials, elastomeric and electrical components. The declared product serves as the representative reference product for the product family. Other products covered by the EPD have equivalent design, materials and manufacturing processes, with differences mainly related to product weight.
The materials are transported to Gebwell production facility, where the main manufacturing processes include soldering, assembly final (include integration of refrigeration), software programming and testing. Eco-friendly refrigerant R290 is used in the product. The product contains propane (R290) refrigerant, which has a global warming potential (GWP100) of 0.02 kg CO_2e/kg according to IPCC AR6.
Electricity and district heating are consumed during manufacturing. A market-based, residual mix was used to model the grid mix utilized in the factory. Energy losses during electricity transmission are considered. Manufacturing ancillary materials are also included.
The study considers the losses of main raw materials occurring during the manufacturing process. Each part of the manufacturing process is considered separately, and waste disposal of the process is accounted based

on allocation of factory level waste. Production consists of soldering and assembly work mainly using tools and lifts. Therefore, production losses, waste and energy requirements are considered minimal.
Packaging materials including wooden pallets, cardboard and plastic film are included in the A3 manufacturing module.

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.
A5* partially declared - includes only packaging waste processing.
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.
A4: Based on a minimum transport distance of 21 km and a maximum of 2,700 km to customers, an average transport distance of 371 km has been used.
That well represents the typical transport distance within the Finnish and Europe markets. The transportation method is lorry. A vehicle capacity utilization rate of 100% (full load) is assumed. While actual load rates may vary, their impact is considered negligible due to the minor role of transportation emissions in the overall results. To ensure a conservative estimate, empty return trips are included, as modeled in the ecoinvent database. No product losses occur during transport, as the products are properly packaged.
A5: Gebwell does not carry out on-site installation. As installation practices vary depending on the site and are carried out under responsibility of builder. This phase has been excluded from the assessment. However, the environmental impacts related to packaging waste generated during installation are included in this stage (A5). All packaging waste is collected and transported for further treatment. An average transport distance of 50 km by freight transport to further treatment is assumed for all packaging waste streams.
Steel packaging: 81% is recycled, and 19% is landfilled. No incineration is reported.
Plastic packaging: 40% is recycled, 37% is incinerated with energy recovery, and 23% is landfilled.
Wooden packaging: 32% is recycled, 30% is incinerated with energy recovery, and 38% is landfilled.
Cardboard: 83 % is recycled, 8 % is incinerated, and 9% is landfilled.

PRODUCT USE AND MAINTENANCE (B1-B7)

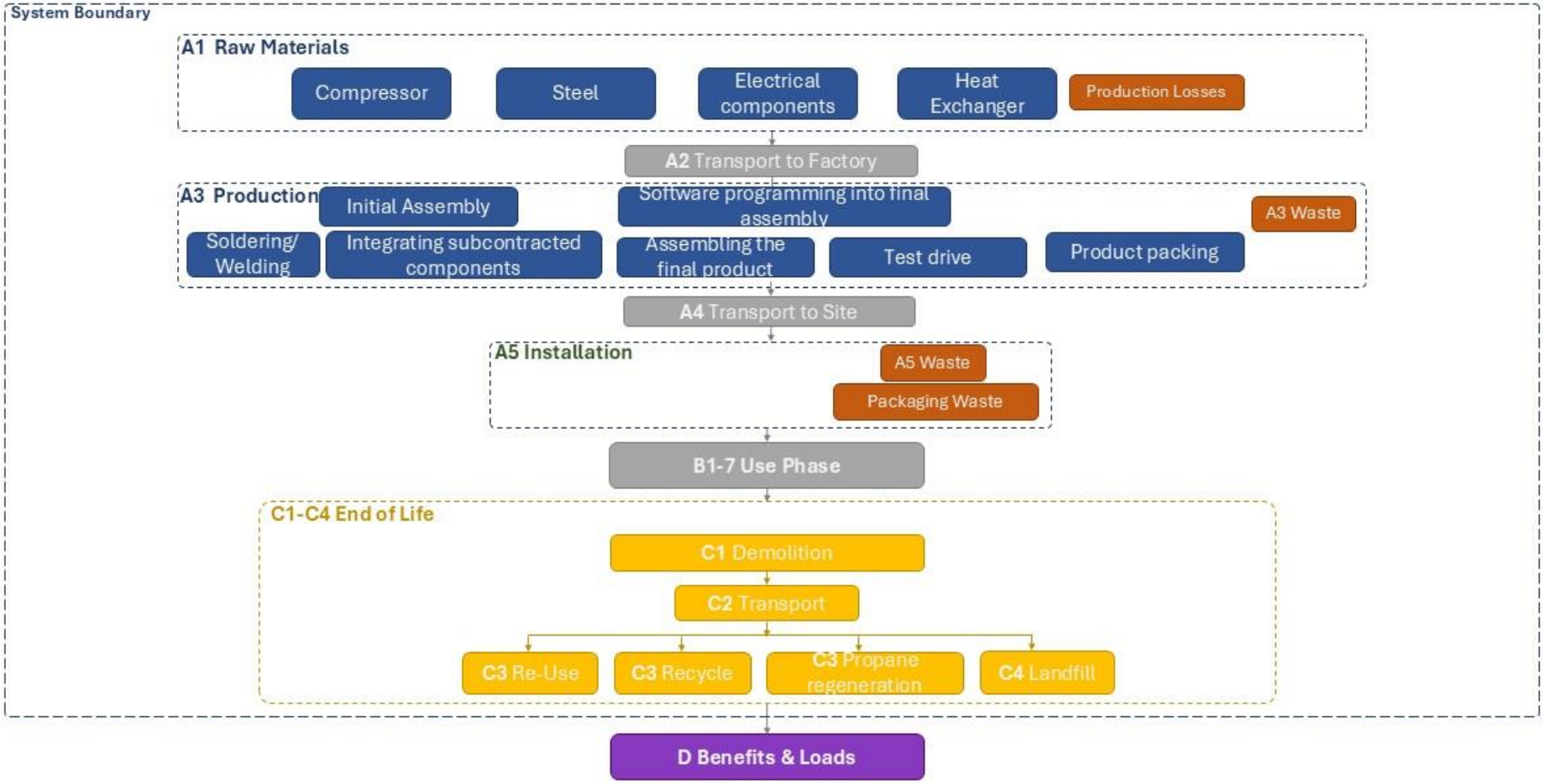
The G-Eco Pro 120 HT was selected as the reference product for the product family. The G-Eco Pro 120 and G-Eco Pro 120 HT belong to the same homogeneous environmental family, having the same function, product standard and manufacturing technology. The environmental impacts of the other product variants covered by the EPD are determined in accordance with the applicable extrapolation rules of PEP PSR-0013.
The use-stage energy consumption in module B6 was calculated using the product-specific SCOP determined for the colder climate and low-temperature application. The colder-climate scenario was deliberately selected to represent demanding operating conditions, as the products are designed for use in Finland and other Nordic markets where cold climatic conditions are relevant. The use of performance data determined under these demanding climatic conditions provides a representative basis for the intended Nordic applications while also supporting the assessment of the products within the broader European market scope.
The selected SCOP is based on the product-specific seasonal performance calculation and is applied consistently with the rated heating output, the PEP default equivalent heating time, the control correction factor and the 22-year reference lifetime. The use of the colder-climate scenario constitutes a documented deviation from the PEP default average-climate assumption. The selected climate, temperature application, SCOP and other

calculation parameters are transparently reported in the LCA report and the EPD.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

C1: Consumption of energy and natural resources in demolition process is assumed to be negligible.
C2-C4: Waste materials are transported to appropriate treatment facilities. The transport scenario assumes an average distance of 50 km by truck, in line with EN 15804 recommendations. Transportation emissions are included in the life cycle assessment. Materials are sorted, compacted, and prepared for recycling, incineration, or disposal. The following treatment scenarios are applied:
Steel & Galvanized Steel: 85% recycled, 15% landfilled.
Stainless Steel: 95% recycled.
Copper and brass: 80% recycled, 20% landfilled.
Aluminium: ~70% recycled. Assumption based on general aluminium recycling rates.
Plastics: 50% of plastic waste is incinerated with energy recovery and 25% is incinerated without energy recovery and 25% landfilled.
Electronics waste is treated through a combination of recycling, incineration, and landfilling, depending on the material composition.
Exported energy, both electricity and thermal, is calculated based on established efficiency
metrics.
Residual materials that are not suitable for recycling or energy recovery are sent to landfill:
Steel & Metals: 5–15% of total mass landfilled depending on material type.
Plastics: 25% landfilled.
D: Due to the material and energy recovery potential of components in the end-of-life product and packaging, recycled raw materials lead to avoided virgin material production. Additionally, energy recovered through incineration offsets electricity and heat production (D). These benefits and associated environmental loads are accounted for in Module.

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.

Materials excluded from the study (A1): Total amout of materials excluded is 0,05%.
That is divided as follows: Stickers: 0.019% and electronic components: 0.032%. These materials have been excluded due to their negligible mass or lack of sufficient data. Cut-off criteria were applied accordingly.
Excluded life cycle stages:
The EPD excludes stages B1–B7. These stages, including energy consumption, are highly site-specific and may vary significantly depending on location, operational circumstances, and specific parameters.

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

Electricity consumption during the use stage (module B6) was modelled using the Finnish residual electricity mix at medium voltage. Finland was selected as the representative use-stage electricity scenario consistently with the colder-climate operating scenario used for the B6 energy consumption calculation. The electricity supply contract of the end user is not controlled by the manufacturer, and therefore no specific renewable electricity procurement or Guarantees of Origin were assumed. The geographical scope of the EPD is Europe, while Finland is used as the representative use-stage scenario for the B6 calculation.
For the G-Eco Pro 120 HT reference product, domestic hot water energy consumption was calculated using the product-specific COP according to EN 14511 at the 10/45 °C test point. At this operating point, the reported heating capacity is 158.2 kW and the input power is 40.3 kW.

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	Multiple products
Grouping method	Based on a representative product
Variation in GWP-fossil for A1-A3, %	2,1

The product is representative of the product group, as it shares the same material composition, manufacturing processes, and functionality. Variations within the group are limited to minor component mass differences. The reference product G-Eco Pro 120 HT has a product mass of 798 kg. Due to differences in the compressor and condenser, the G-Eco Pro 120 variant has an approximately 6 kg lower BOM mass. This is resulting in only a 2.1% difference in Global Warming Potential (GWP). This confirms that environmental impacts within the product group are primarily influenced by small differences in material quantity, while all other characteristics remain equivalent.

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‘.

1. https://worldsteel.org/wp-content/uploads/Life-cycle-inventory-LCI-study-2020-data-release.pdf
2. https://www.worldstainless.org/about-stainless/environment/recycling/#:~:text=The%20analysis%20concluded%20that%20on,in%20English%2C%20German%20and%20Chinese.
3. 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/
4. Copper, aluminium, steel, ferrous metals waste and other other non-ferrous metals waste and glass recycling rates rates are considered according to EN 50693.
5. Brass Recycling rate is considered according to Copper Alliance (2021).
6. Plastics Europe (2020) https://plasticseurope.org/knowledge-hub/plastics-the-facts-2020/;
7. C2 transport: 50 km assumed (source: Gervasio, H. & Dimova, S., JRC Technical report: Model for Life Cycle Assessment (LCA) of buildings, 2018)
8. Equanimator Ltd for Zero Waste Europe, 2023 https://zerowasteeurope.eu/wp-content/uploads/2023/01/Debunking-Efficient-Recovery-Full-Report-EN.docx.pdf
9. Bitumen European waterproofing association (EWA) EPD, 2022 (expert judgement assumption by EWA Technical Committee)
10. EUROSTAT – Packaging Waste Statistics:
- Steel: https://ec.europa.eu/eurostat/databrowser/view/env_waspac__custom_13967225
- Plastic: https://ec.europa.eu/eurostat/databrowser/view/env_waspac__custom_8519242
- Wood: https://ec.europa.eu/eurostat/databrowser/view/env_waspac__custom_8519174
11. Zero Waste Europe – Energy Recovery Efficiency:
12. Debunking Efficient Recovery: The Performance of EU Incineration Facilities, 2023
- https://zerowasteeurope.eu/wp-content/uploads/2023/01/Debunking-Efficient-Recovery-Full-Report-EN.d…

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_2e	3,89E+03	1,02E+02	9,26E+02	4,92E+03	3,26E+01	3,24E+01	ND	1,96E+01	ND	0,00E+00	ND	1,69E+05	ND	0,00E+00	3,23E+01	8,77E+01	5,72E+01	-1,22E+03
GWP – fossil	kg CO_2e	3,84E+03	1,02E+02	9,57E+02	4,90E+03	3,26E+01	7,21E-01	ND	1,95E+01	ND	0,00E+00	ND	1,65E+05	ND	0,00E+00	3,23E+01	8,77E+01	5,71E+01	-1,22E+03
GWP – biogenic	kg CO_2e	5,03E+01	2,27E-02	-3,14E+01	1,89E+01	7,38E-03	3,17E+01	ND	4,51E-03	ND	0,00E+00	ND	6,13E+02	ND	0,00E+00	7,06E-03	-3,79E-02	1,58E-03	-2,34E+00
GWP – LULUC	kg CO_2e	6,22E+00	5,06E-02	3,93E-01	6,66E+00	1,46E-02	7,02E-04	ND	8,71E-03	ND	0,00E+00	ND	3,32E+03	ND	0,00E+00	1,43E-02	1,84E-02	5,91E-03	-2,30E+00
Ozone depletion pot.	kg $CFC\text{-}_{11}$e	1,91E-03	1,51E-06	2,22E-05	1,94E-03	4,81E-07	8,37E-09	ND	2,84E-07	ND	0,00E+00	ND	3,13E-03	ND	0,00E+00	4,52E-07	2,06E-07	4,56E-07	-6,78E-06
Acidification potential	mol H^+e	3,75E+01	3,48E-01	4,48E+00	4,24E+01	1,11E-01	3,19E-03	ND	6,80E-02	ND	0,00E+00	ND	6,07E+02	ND	0,00E+00	1,08E-01	1,83E-01	6,24E-02	-1,10E+01
EP-freshwater[2)]	kg Pe	1,28E+01	8,02E-03	3,97E-01	1,32E+01	2,54E-03	1,59E-04	ND	2,12E-03	ND	0,00E+00	ND	4,45E+01	ND	0,00E+00	2,51E-03	1,04E-02	1,69E-03	-4,26E+00
EP-marine	kg Ne	6,17E+00	1,14E-01	1,27E+00	7,55E+00	3,65E-02	3,33E-03	ND	2,25E-02	ND	0,00E+00	ND	1,39E+02	ND	0,00E+00	3,49E-02	4,45E-02	4,36E-02	-2,47E+00
EP-terrestrial	mol Ne	5,83E+01	1,24E+00	1,15E+01	7,10E+01	3,97E-01	1,19E-02	ND	2,43E-01	ND	0,00E+00	ND	1,44E+03	ND	0,00E+00	3,80E-01	4,87E-01	2,22E-01	-3,32E+01
POCP ("smog")[3)]	kg NMVOCe	1,76E+01	5,12E-01	2,84E+00	2,09E+01	1,64E-01	4,13E-03	ND	9,96E-02	ND	0,00E+00	ND	4,31E+02	ND	0,00E+00	1,50E-01	1,41E-01	9,51E-02	-7,87E+00
ADP-minerals & metals[4)]	kg Sbe	6,56E+01	2,85E-04	4,58E-02	6,56E+01	9,09E-05	2,87E-06	ND	5,59E-05	ND	0,00E+00	ND	8,93E-01	ND	0,00E+00	1,06E-04	9,89E-04	5,49E-05	-1,13E-01
ADP-fossil resources	MJ	4,62E+04	1,48E+03	1,66E+04	6,43E+04	4,73E+02	7,53E+00	ND	2,79E+02	ND	0,00E+00	ND	7,50E+06	ND	0,00E+00	4,53E+02	2,02E+02	3,63E+02	-1,23E+04
Water use[5)]	m^3e depr.	2,01E+07	7,34E+00	3,42E+02	2,01E+07	2,34E+00	2,04E-01	ND	1,63E+00	ND	0,00E+00	ND	2,05E+05	ND	0,00E+00	2,10E+00	6,94E+00	2,94E+00	-3,70E+02

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	2,09E-04	1,02E-05	2,74E-05	2,47E-04	3,26E-06	8,60E-08	ND	1,91E-06	ND	0,00E+00	ND	5,03E-03	ND	0,00E+00	2,57E-06	2,46E-06	9,16E-07	-1,18E-04
Ionizing radiation[6)]	kBq U235e	1,88E+06	1,29E+00	4,23E+02	1,88E+06	4,12E-01	2,12E-02	ND	2,34E-01	ND	0,00E+00	ND	4,32E+05	ND	0,00E+00	3,67E-01	1,33E+00	2,95E-01	-2,41E+01
Ecotoxicity (freshwater)	CTUe	1,61E+05	2,17E+02	4,61E+03	1,66E+05	6,69E+01	9,42E+01	ND	5,79E+01	ND	0,00E+00	ND	5,01E+05	ND	0,00E+00	7,17E+01	2,21E+02	6,60E+02	-5,26E+04
Human toxicity, cancer	CTUh	2,05E+02	1,68E-08	1,19E-07	2,05E+02	5,38E-09	5,44E-10	ND	3,07E-09	ND	0,00E+00	ND	4,61E-05	ND	0,00E+00	5,50E-09	1,84E-08	1,88E-08	-6,75E-07
Human tox. non-cancer	CTUh	3,77E+03	9,56E-07	5,75E-06	3,77E+03	3,06E-07	2,63E-08	ND	1,73E-07	ND	0,00E+00	ND	1,75E-03	ND	0,00E+00	2,84E-07	1,01E-06	1,95E-07	-1,73E-05
SQP[7)]	-	1,72E+04	1,49E+03	7,06E+03	2,57E+04	4,76E+02	6,84E+00	ND	2,78E+02	ND	0,00E+00	ND	2,41E+06	ND	0,00E+00	2,71E+02	3,69E+02	6,90E+01	-8,03E+03

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	1,50E+08	2,03E+01	7,58E+02	1,50E+08	6,48E+00	-2,66E+02	ND	3,88E+00	ND	0,00E+00	ND	2,67E+06	ND	0,00E+00	6,22E+00	3,40E+01	5,24E+00	-2,79E+03
Renew. PER as material	MJ	9,67E+01	0,00E+00	1,88E+02	2,85E+02	0,00E+00	-1,88E+02	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	-4,83E+01	-4,83E+01	1,15E+01
Total use of renew. PER	MJ	1,50E+08	2,03E+01	9,47E+02	1,50E+08	6,48E+00	-4,54E+02	ND	3,88E+00	ND	0,00E+00	ND	2,67E+06	ND	0,00E+00	6,22E+00	-1,44E+01	-4,31E+01	-2,78E+03
Non-re. PER as energy	MJ	4,47E+04	1,48E+03	1,62E+04	6,24E+04	4,73E+02	3,48E+00	ND	2,79E+02	ND	0,00E+00	ND	7,50E+06	ND	0,00E+00	4,53E+02	-8,05E+02	-4,52E+02	-1,23E+04
Non-re. PER as material	MJ	1,08E+03	0,00E+00	1,54E+01	1,09E+03	0,00E+00	-1,94E+01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	-2,78E+02	-7,97E+02	4,07E+00
Total use of non-re. PER	MJ	4,58E+04	1,48E+03	1,62E+04	6,35E+04	4,73E+02	-1,60E+01	ND	2,79E+02	ND	0,00E+00	ND	7,50E+06	ND	0,00E+00	4,53E+02	-1,08E+03	-1,25E+03	-1,23E+04
Secondary materials	kg	2,77E+02	6,29E-01	2,57E+00	2,81E+02	2,01E-01	7,55E-03	ND	1,17E-01	ND	0,00E+00	ND	7,89E+02	ND	0,00E+00	2,04E-01	2,42E-01	1,71E-01	4,40E+02
Renew. secondary fuels	MJ	1,50E+01	7,99E-03	2,01E-01	1,52E+01	2,56E-03	6,68E-05	ND	1,52E-03	ND	0,00E+00	ND	2,66E+00	ND	0,00E+00	2,59E-03	1,08E-02	1,07E-03	-2,67E-01
Non-ren. secondary fuels	MJ	4,67E+00	0,00E+00	5,48E+01	5,95E+01	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	8,65E+01	2,19E-01	4,09E+00	9,08E+01	6,99E-02	-1,42E-02	ND	4,00E-02	ND	0,00E+00	ND	6,51E+03	ND	0,00E+00	6,01E-02	1,60E-01	2,57E-02	-1,45E+01

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	4,65E+02	2,69E+00	1,01E+02	5,69E+02	8,01E-01	7,51E-02	ND	1,78E+00	ND	0,00E+00	ND	1,02E+04	ND	0,00E+00	7,91E-01	2,44E+00	1,13E+00	-5,84E+02
Non-hazardous waste	kg	1,49E+04	5,01E+01	2,10E+03	1,70E+04	1,48E+01	2,55E+01	ND	3,52E+01	ND	0,00E+00	ND	2,37E+05	ND	0,00E+00	1,48E+01	6,81E+01	9,20E+01	-3,28E+02
Radioactive waste	kg	6,00E+00	3,15E-04	1,03E-01	6,10E+00	1,01E-04	5,27E-06	ND	5,59E-05	ND	0,00E+00	ND	9,28E+01	ND	0,00E+00	8,99E-05	3,39E-04	7,21E-05	-6,00E-03

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	1,07E+01	0,00E+00	8,77E-05	1,07E+01	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	9,49E+01	0,00E+00	4,61E-03	9,49E+01	0,00E+00	9,78E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	6,14E+02	0,00E+00	0,00E+00
Materials for energy rec	kg	2,84E+00	0,00E+00	3,45E-03	2,84E+00	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	1,68E+00	0,00E+00	0,00E+00	1,68E+00	0,00E+00	1,95E+01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,49E+02	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	8,18E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,05E+02	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	1,13E+01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,44E+02	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Radioactive waste, high	kg	1,39E-02	9,22E-05	1,83E-02	3,23E-02	2,96E-05	1,46E-06	ND	1,62E-05	ND	0,00E+00	ND	1,65E+01	ND	0,00E+00	2,68E-05	8,67E-05	2,04E-05	-2,61E-03
Radioactive waste, int/low	kg	3,32E+02	2,22E-04	8,19E-02	3,32E+02	7,12E-05	3,81E-06	ND	3,97E-05	ND	0,00E+00	ND	7,63E+01	ND	0,00E+00	6,32E-05	2,53E-04	5,17E-05	-3,38E-03

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_2e	3,84E+03	1,02E+02	9,58E+02	4,90E+03	3,26E+01	7,21E-01	ND	1,96E+01	ND	0,00E+00	ND	1,68E+05	ND	0,00E+00	3,23E+01	8,77E+01	5,72E+01	-1,22E+03

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

Scenario parameter	Value
Electricity data source and quality	Electricity, medium voltage, residual mix, Finland, Ecoinvent
Electricity CO2e / kWh	0.51kg
District heating data source and quality	District Heat, Finland, 2022, Finland, One Click LCA
District heating CO2e / kWh	0.18kg
Propane data source and quality	Propane, burned in building machine, World, Ecoinvent
Propane CO2e/MJ	0.0945 kg

Transport scenario documentation - A4 (Transport resources)

1. Market for transport, freight, lorry >32 metric ton, EURO5, 371.0 km

Transport to the building site (A4) - Scenario documentation

Scenario parameter	Value
Capacity utilization (including empty return) %	50
Bulk density of transported products	372
Volume capacity utilization factor	1

Installation at the building site (A5) - Scenario documentation

Scenario parameter	Value
Energy: type and consumption (MJ or kWh)	-
Water use (m^3)	-
Ancillary materials: type and mass (kg)	-
Waste materials: type and mass (kg)	Wood: 10,06 kg Cardboard: 7,41 kg Plastic: 0,1 kg Steel: 0,46 kg
Waste materials: output routes	Wood: 32 % recycled, 30 % incinerated, 38 % land filled. Cardboard: 83 % recycled, 8 % incinerated, 9% land filled. Plastic:40 % recycled, 37 % incinerated, 23 % land filled. Metal scrap: 81 % recycled, 19 % land filled.
Direct emissions (kg)	-

Use stages scenario documentation - B2 Maintenance

Scenario information	Value
Maintenance process description	There is annual inspection of the heat pump for operational condition and leak tightness. One service visit per year over the 22-year reference lifetime. A 100 km return trip by passenger car is assumed per inspection in accordance with the PEP PSR maintenance transport scenario. Total service transport: 2,200 passenger-km.
Maintenance cycle (per RSL)	1
Energy use (kWh/cycle)	-
Water use (m3 or litres/cycle)	-
Ancillary materials (kg/cycle)	-
Waste materials (kg/cycle)	-

End of life (C1-C4) - Scenario documentation

Scenario information	Value
Collection process: collected separately (kg)	798kg
Collection process: Mixed waste (kg)	0kg
Recovery: re-use (kg)	0
Recovery: recycling (kg)	614
Recovery: energy recovery (kg)	0
Disposal (kg)	0
Scenario assumptions e.g. transportation (mode, km) & other	Landfill, incineration and recycling 50 km.

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 are 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

Yazan Badour as an authorized verifier for EPD Hub Limited 03.11.2026



VERIFIED ISO 14025