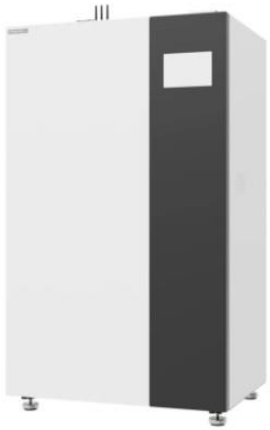


ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

G-Eco Core 80 Inverter heat pump with R290 refrigerant
Gebwell Oy



EPD HUB, HUB-8017
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 Core 80 Inverter heat pump with R290 refrigerant
Additional labels	-
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	No grouping
Variation in GWP-fossil for A1-A3 (%)	-
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	56,9

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit of finished product
Declared unit mass	619,5 kg
Mass of packaging	14,49 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	3990
GWP-total, A1-A3 ($kgCO_2e$)	3940
Secondary material, inputs (%)	52,0%
Secondary material, outputs (%)	65,5%
Total energy use, A1-A3 (kWh)	15139
Net freshwater use, A1-A3 (m^3)	82,5

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

Gebwell G-Eco Core 80 is an inverter-driven heat pump designed for use with the natural refrigerant R290 (propane).
- size 790 x 1060 x 1750 mm (depth*width*height)
- Weight 620 kg (without packaging)

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 G-Eco Core 80 delivers a supply water temperature of up to +75 °C, making it suitable also for applications that require higher temperatures, such as radiator heating systems or domestic hot water production. Thanks to the wide operating temperature range of the collector, –10…+30 °C, it is also suitable for applications such as heat recovery systems.
The G-Eco heat pumps are specifically designed for the R290 refrigerant. The properties of the refrigerant have been taken into consideration in the design, monitoring, and control of the unit. Thanks to its carefully soundproofed design, the operation of G-Eco Core 80 is very quiet, which is particularly important in buildings where the technical room is located near living spaces or recreational areas.

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

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	77,41	Europe
Minerals	0,04	-
Fossil materials	22,55	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	6,33

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	619,5 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 and use stage are excluded from this module.
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)

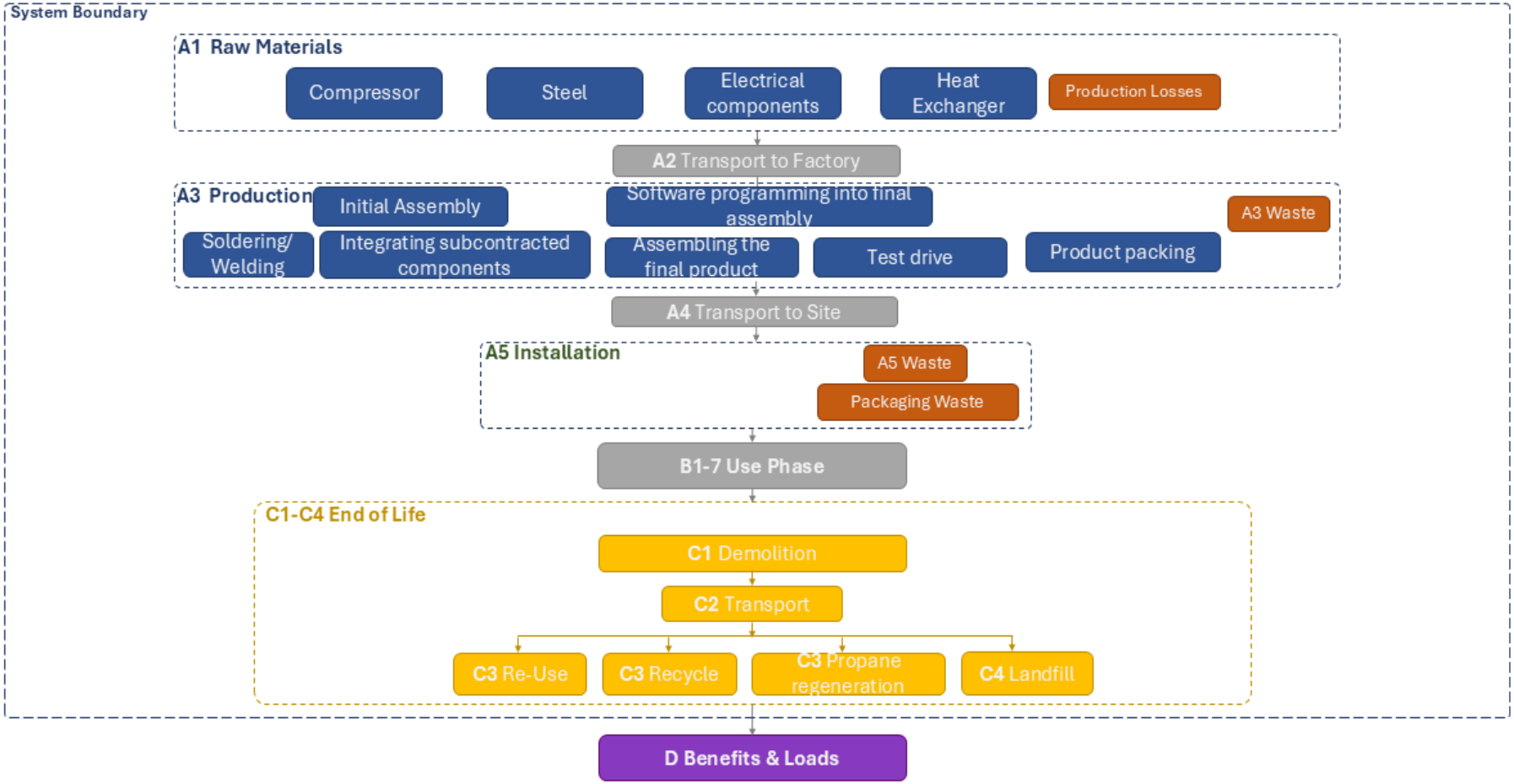
The use stage includes product use and maintenance over the 22-year reference service life. The product is inspected annually to verify its operational condition and refrigerant circuit tightness. Maintenance-related transport is included in module B2 according to the applicable PEP PSR-0013 scenario.
Energy consumption during the use stage (B6) includes electricity required for space heating and domestic hot water production. The calculation is performed according to PEP PSR-0013 using the product-specific seasonal performance data. For the G-Eco Core 80 reference product, the medium-temperature application (55 °C) is applied, with a rated/design heating output of 80.2 kW and a SCOP of 4.26. The calculation uses the PEP default equivalent heating time, control correction factor and a reference service life of 22 years.
For domestic hot water production, a COP of 3.264 at B0/W45 is used as a calculated scenario value. As a directly measured B0/W45 value was not available, the COP was derived by linear interpolation from the measured rated-condition B0/W35 and B0/W55 performance data. The interpolation and underlying measured data are documented in the LCA calculation documentation.
The resulting electricity consumption is modelled in module B6 using the selected electricity supply scenario. Actual energy consumption during operation may vary depending on system design, operating conditions, control settings, building heat demand and domestic hot water demand.
Air, soil, and water impacts during the use phase have not been studied.
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): The total amount of excluded materials is 0.015% of the product mass. The excluded material consists of stickers. Stickers were excluded due to their negligible mass and the lack of sufficiently representative data. The cut-off criteria were applied accordingly.
Excluded life cycle stages:
For the G-Eco Core 80 reference product, domestic hot water energy consumption was calculated using an estimated COP at a 45 °C outlet temperature. As a directly measured EN 14511 COP at B0/W45 was not available, the value was derived by linear interpolation between the measured rated-condition B0/W35 and B0/W55 test points.
The heating capacity and input power were interpolated separately, resulting in an estimated heating capacity of 83.9195 kW and input power of 25.710 kW at B0/W45. The resulting COP used in the B6 scenario is 3.264. This value is used as a transparent scenario assumption for the EPD calculation and is not presented as a directly measured EN 14511 test result.

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

Note on indicator consistency: A technical inconsistency between PENRT (total use of non-renewable primary energy) and ADP-fossil (abiotic depletion potential for fossil resources) has been identified in modules A1–A3 and EOL. LCA model analysis shows that the discrepancy originates from the specific characterization factors in the background environmental profiles of the primary raw materials and processes. These inconsistencies

are inherent to the third-party verified EPDs and background databases used and cannot be adjusted by the practitioner.

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	No grouping
Grouping method	Not applicable
Variation in GWP-fossil for A1-A3, %	-

There is no average result considered in this study since this EPD refers to one specific product produced in one production plant.

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	3,17E+03	3,08E+01	7,43E+02	3,94E+03	2,61E+01	2,34E+01	ND	1,96E+01	ND	0,00E+00	ND	1,54E+05	ND	0,00E+00	2,38E+01	1,86E+02	1,05E+02	-1,21E+03
GWP – fossil	kg CO_2e	3,20E+03	3,08E+01	7,65E+02	3,99E+03	2,61E+01	8,67E-01	ND	1,95E+01	ND	0,00E+00	ND	1,50E+05	ND	0,00E+00	2,38E+01	1,86E+02	1,05E+02	-1,20E+03
GWP – biogenic	kg CO_2e	-3,63E+01	6,72E-03	-2,22E+01	-5,85E+01	6,02E-03	2,25E+01	ND	4,51E-03	ND	0,00E+00	ND	5,59E+02	ND	0,00E+00	5,19E-03	-3,04E-02	-4,53E-03	-1,16E+00
GWP – LULUC	kg CO_2e	5,84E+00	1,37E-02	5,42E-01	6,40E+00	1,16E-02	5,36E-04	ND	8,71E-03	ND	0,00E+00	ND	3,02E+03	ND	0,00E+00	1,05E-02	1,29E-02	4,71E-03	-3,27E+00
Ozone depletion pot.	kg CFC-$_{11}$e	2,02E-03	4,48E-07	1,95E-05	2,04E-03	3,80E-07	6,84E-09	ND	2,84E-07	ND	0,00E+00	ND	2,85E-03	ND	0,00E+00	3,32E-07	1,82E-07	3,30E-07	-7,69E-06
Acidification potential	mol H^+e	2,39E+01	1,07E-01	3,58E+00	2,76E+01	9,08E-02	2,46E-03	ND	6,80E-02	ND	0,00E+00	ND	5,53E+02	ND	0,00E+00	7,92E-02	1,46E-01	5,67E-02	-8,55E+00
EP-freshwater[2)]	kg Pe	6,19E+01	3,24E-03	3,11E-01	6,22E+01	2,83E-03	1,24E-04	ND	2,12E-03	ND	0,00E+00	ND	4,06E+01	ND	0,00E+00	1,85E-03	7,11E-03	1,36E-03	-2,18E+00
EP-marine	kg Ne	4,22E+00	3,53E-02	6,24E-01	4,87E+00	3,00E-02	3,01E-03	ND	2,25E-02	ND	0,00E+00	ND	1,26E+02	ND	0,00E+00	2,57E-02	4,34E-02	9,01E-02	-1,78E+00
EP-terrestrial	mol Ne	3,73E+01	3,82E-01	9,17E+00	4,69E+01	3,25E-01	9,17E-03	ND	2,43E-01	ND	0,00E+00	ND	1,31E+03	ND	0,00E+00	2,79E-01	4,45E-01	2,19E-01	-2,19E+01
POCP ("smog")[3)]	kg NMVOCe	1,23E+01	1,57E-01	2,27E+00	1,47E+01	1,33E-01	3,15E-03	ND	9,96E-02	ND	0,00E+00	ND	3,93E+02	ND	0,00E+00	1,10E-01	1,24E-01	8,22E-02	-5,82E+00
ADP-minerals & metals[4)]	kg Sbe	1,21E+01	8,78E-05	1,20E-03	1,21E+01	7,47E-05	2,43E-06	ND	5,59E-05	ND	0,00E+00	ND	8,13E-01	ND	0,00E+00	7,80E-05	6,63E-04	4,18E-05	-6,70E-02
ADP-fossil resources	MJ	4,88E+04	4,40E+02	1,33E+04	6,26E+04	3,73E+02	5,99E+00	ND	2,79E+02	ND	0,00E+00	ND	6,83E+06	ND	0,00E+00	3,33E+02	1,55E+02	2,57E+02	-1,29E+04
Water use[5)]	m^3e depr.	1,66E+07	2,53E+00	2,88E+02	1,66E+07	2,18E+00	1,66E-01	ND	1,63E+00	ND	0,00E+00	ND	1,87E+05	ND	0,00E+00	1,55E+00	1,27E+01	6,09E+00	-4,77E+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	1,31E-04	3,02E-06	2,17E-05	1,56E-04	2,56E-06	3,97E-08	ND	1,91E-06	ND	0,00E+00	ND	4,58E-03	ND	0,00E+00	1,89E-06	1,73E-06	7,20E-07	-1,03E-04
Ionizing radiation[6)]	kBq U235e	1,55E+06	3,70E-01	3,29E+02	1,55E+06	3,13E-01	2,44E-02	ND	2,34E-01	ND	0,00E+00	ND	3,94E+05	ND	0,00E+00	2,70E-01	1,02E+00	2,27E-01	-5,02E+01
Ecotoxicity (freshwater)	CTUe	1,04E+05	8,84E+01	3,68E+03	1,08E+05	7,73E+01	8,45E+00	ND	5,79E+01	ND	0,00E+00	ND	4,56E+05	ND	0,00E+00	5,28E+01	3,91E+02	1,40E+03	-2,74E+04
Human toxicity, cancer	CTUh	1,11E+02	4,86E-09	9,62E-08	1,11E+02	4,10E-09	3,16E-10	ND	3,07E-09	ND	0,00E+00	ND	4,20E-05	ND	0,00E+00	4,04E-09	2,04E-08	1,57E-08	-8,24E-07
Human tox. non-cancer	CTUh	2,31E+03	2,75E-07	4,56E-06	2,31E+03	2,32E-07	1,62E-08	ND	1,73E-07	ND	0,00E+00	ND	1,59E-03	ND	0,00E+00	2,09E-07	9,58E-07	3,50E-07	-2,16E-05
SQP[7)]	-	1,23E+04	4,39E+02	3,95E+03	1,67E+04	3,72E+02	5,67E+00	ND	2,78E+02	ND	0,00E+00	ND	2,20E+06	ND	0,00E+00	1,99E+02	2,50E+02	6,25E+01	-6,20E+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	1,24E+08	6,11E+00	5,92E+02	1,24E+08	5,18E+00	-2,04E+02	ND	3,88E+00	ND	0,00E+00	ND	2,43E+06	ND	0,00E+00	4,57E+00	2,39E+01	4,13E+00	-2,74E+03
Renew. PER as material	MJ	7,55E+02	0,00E+00	1,80E+02	9,35E+02	0,00E+00	-1,80E+02	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	-3,78E+02	-3,78E+02	9,92E+00
Total use of renew. PER	MJ	1,24E+08	6,11E+00	7,72E+02	1,24E+08	5,18E+00	-3,84E+02	ND	3,88E+00	ND	0,00E+00	ND	2,43E+06	ND	0,00E+00	4,57E+00	-3,54E+02	-3,74E+02	-2,73E+03
Non-re. PER as energy	MJ	3,80E+04	4,40E+02	1,29E+04	5,14E+04	3,73E+02	-6,16E+00	ND	2,79E+02	ND	0,00E+00	ND	6,83E+06	ND	0,00E+00	3,33E+02	-2,25E+03	-2,10E+03	-1,29E+04
Non-re. PER as material	MJ	3,12E+03	0,00E+00	1,07E+01	3,13E+03	0,00E+00	-1,30E+01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	-1,55E+03	-1,57E+03	5,08E+00
Total use of non-re. PER	MJ	4,12E+04	4,40E+02	1,29E+04	5,45E+04	3,73E+02	-1,91E+01	ND	2,79E+02	ND	0,00E+00	ND	6,83E+06	ND	0,00E+00	3,33E+02	-3,80E+03	-3,66E+03	-1,29E+04
Secondary materials	kg	3,12E+02	1,84E-01	1,02E+01	3,22E+02	1,56E-01	6,35E-03	ND	1,17E-01	ND	0,00E+00	ND	7,18E+02	ND	0,00E+00	1,50E-01	1,82E-01	1,26E-01	3,35E+02
Renew. secondary fuels	MJ	5,45E+01	2,40E-03	6,78E-01	5,52E+01	2,03E-03	6,24E-05	ND	1,52E-03	ND	0,00E+00	ND	2,42E+00	ND	0,00E+00	1,91E-03	7,90E-03	1,12E-03	-2,51E-01
Non-ren. secondary fuels	MJ	9,33E+00	0,00E+00	2,53E+02	2,62E+02	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	7,92E+01	6,33E-02	3,24E+00	8,25E+01	5,35E-02	-1,07E-02	ND	4,00E-02	ND	0,00E+00	ND	5,93E+03	ND	0,00E+00	4,42E-02	2,48E-01	-2,57E-02	-1,27E+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	5,35E+02	2,61E+00	7,88E+01	6,17E+02	2,38E+00	6,17E-02	ND	1,78E+00	ND	0,00E+00	ND	9,28E+03	ND	0,00E+00	5,81E-01	3,97E+00	1,97E+00	-6,28E+02
Non-hazardous waste	kg	8,77E+03	5,14E+01	1,66E+03	1,05E+04	4,71E+01	2,11E+01	ND	3,52E+01	ND	0,00E+00	ND	2,16E+05	ND	0,00E+00	1,09E+01	1,02E+02	2,40E+02	-2,22E+03
Radioactive waste	kg	5,57E+00	8,88E-05	8,02E-02	5,65E+00	7,47E-05	6,18E-06	ND	5,59E-05	ND	0,00E+00	ND	8,45E+01	ND	0,00E+00	6,61E-05	2,61E-04	5,58E-05	-1,27E-02

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	4,27E+01	0,00E+00	0,00E+00	4,27E+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	7,94E+01	0,00E+00	0,00E+00	7,94E+01	0,00E+00	8,03E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	4,06E+02	0,00E+00	0,00E+00
Materials for energy rec	kg	4,70E+00	0,00E+00	5,77E-03	4,71E+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	2,56E-01	0,00E+00	0,00E+00	2,56E-01	0,00E+00	1,61E+01	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	7,48E+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	6,76E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	3,15E+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	9,34E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	ND	0,00E+00	0,00E+00	4,34E+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	1,21E-02	2,57E-05	1,43E-02	2,65E-02	2,16E-05	1,54E-06	ND	1,62E-05	ND	0,00E+00	ND	1,50E+01	ND	0,00E+00	1,97E-05	6,51E-05	1,58E-05	-4,59E-03
Radioactive waste, int/low	kg	2,74E+02	6,30E-05	6,39E-02	2,74E+02	5,31E-05	4,64E-06	ND	3,97E-05	ND	0,00E+00	ND	6,95E+01	ND	0,00E+00	4,64E-05	1,96E-04	4,00E-05	-8,10E-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	3,20E+03	3,08E+01	7,65E+02	4,00E+03	2,61E+01	8,67E-01	ND	1,96E+01	ND	0,00E+00	ND	1,53E+05	ND	0,00E+00	2,38E+01	1,86E+02	1,05E+02	-1,21E+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, diesel, EURO 5, 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	352
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: 7,56 kg Cardboard: 5,86 kg Plastic: 0,3 kg Steel: 0,77 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)	619,5
Collection process: Mixed waste (kg)	0
Recovery: re-use (kg)	0
Recovery: recycling (kg)	406
Recovery: energy recovery (kg)	0
Disposal (kg)	140
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