Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019 for:

Future Ventilation Unit: Liquid Circulation, i.e., Radiator Heat Recovery

KOJA Oy

EPD program:	RTS EPD
Program operator, publisher:	Rakennustieto Oy https://ymparisto.rakennustieto.fi/
Registration number	RTS_419_25
Approval date:	2025-10-08
Valid through:	2030-10-08

1. General information

Manufacturer information

Owner of the declaration
Koja Oy
Lentokentänkatu 7
PL 351, 33101 Tampere
Suomi

Manufacturer description
The Finnish Koja Group is a responsibly operating family business that offers smart and energy-efficient air handling and cooling solutions for ships and buildings, as well as fan solutions for industry.

Additional information
03 2825 111

Product information

Future Ventilation Unit
Liquid Circulation, i.e., Radiator Heat Recovery

Place of production
Jalasjärvi, Finland

Program information

Program operator, publisher
The Finnish Building Information Foundation RTS https://cer.rts.fi/epd-ymparistoseloste/
Rakennustieto Oy
PL 1004, 00101 Helsinki

Standards and Product Category Rules
The declaration has been prepared in accordance with the standard EN 15804:2012+A2:2019 and the additional requirements listed in the RTS PCR methodology guidelines (8/26/2020)

Declaration type
Product specific EPD

Author of the declaration
Ramboll Finland Oy, Itsehallintokuja 3, 02601 Espoo, Finland.
LCA consultants: Valtteri Kainila ja Saija Vatanen.

Declaration issue date and validity
Declaration issue date 8.10.2025. The declaration is valid 5 years.

Jukka Seppänen
RTS EPD Committee Secretary

Laura Apilo
Managing Director

Verification

The declaration has been verified according to EN 15804+A2 and RTS PCR (8/26/2020) protocol by an independent third party. The declaration was verified by Anni Viitala (Granlund Oy Oy). The verification was completed on 27.08.2025.

The declaration has been prepared in accordance with EN 15804:2019 (product group rules).	
Independent verification of the declaration and data, according to ISO14025:2010 is	
☐ **Internal**	☒ **External**
Third party verifier:	
Anni Viitala, Granlund Oy	

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context. EPDs within the same product category but from different programmes may not be comparable.

2. Product information

Products included in the declaration

The declaration presents results for one Future ventilation unit and its heat recovery solution: liquid circulation, i.e., radiator heat recovery. The declaration includes results for units exchanging 1 m³/s and 5 m³/s of air. The products do not include the required electrical automation.

Key environmental indicators per 1 kg for Radiator Unit (1 m³/s)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO2 ekv.	6,76E+00	1,07E-01	6,82E-03	6,87E+00	5,88E-02	9,16E-04	0,00E+00	2,72E-02	2,82E-02	2,68E-03	-1,42E+00
Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	kg Sb ekv.	5,19E-04	3,62E-07	2,13E-08	5,19E-04	2,05E-07	2,60E-09	0,00E+00	9,51E-08	1,05E-06	4,28E-09	-2,85E-04
Abiotic depletion for fossil resources potential (ADP-fossil)	MJ	7,97E+01	1,49E+00	9,88E-02	8,13E+01	8,27E-01	4,16E-03	0,00E+00	3,83E-01	2,13E-01	4,98E-02	-1,55E+01
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	m3 world ekv. deprived	3,16E+00	7,48E-03	3,67E-03	3,17E+00	4,21E-03	1,66E-04	0,00E+00	1,95E-03	5,06E-03	2,17E-03	-9,45E-01
Use of secondary material	kg	3,09E-01	6,38E-04	2,13E-05	3,10E-01	3,53E-04	1,06E-06	0,00E+00	1,63E-04	2,47E-04	1,34E-05	4,93E-01

Key environmental indicators per 1 kg for Radiator Unit (5 m^3/s)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO2 ekv.	7,02E+00	5,84E-02	5,43E-03	7,09E+00	6,18E-02	6,58E-04	0,00E+00	2,86E-02	2,39E-02	3,24E-03	-2,27E+00
Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	kg Sb ekv.	8,08E-04	1,98E-07	1,70E-08	8,08E-04	2,16E-07	1,87E-09	0,00E+00	1,00E-07	1,11E-06	6,78E-09	-6,48E-04
Abiotic depletion for fossil resources potential (ADP-fossil)	MJ	7,77E+01	8,16E-01	7,89E-02	7,86E+01	8,69E-01	2,99E-03	0,00E+00	4,03E-01	2,15E-01	5,83E-02	-2,62E+01
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	m3 world ekv. deprived	2,77E+00	4,09E-03	2,94E-03	2,77E+00	4,43E-03	1,19E-04	0,00E+00	2,05E-03	4,60E-03	2,52E-03	-1,95E+00
Use of secondary material	kg	1,77E-01	1,77E-01	3,49E-04	1,70E-05	3,71E-04	7,64E-07	0,00E+00	1,72E-04	2,60E-04	1,67E-05	5,66E-01

3. Product description

Description of product and its use

The primary purpose of the Future product family's ventilation units is ventilation, replacing used air in a building or part of a building with fresh outdoor air. Ventilation units can perform multiple functions, such as air filtration, heat recovery, heating and cooling, as well as humidification and dehumidification. The Future series ventilation units are delivered as modular or pre-assembled units, and can be adapted to various buildings, environments, and usage needs. The unit is composed of steel modules, within which different components such as intake and exhaust air filters, heat recovery devices, heat exchangers, fans, and sound attenuation elements are installed. The example unit in this environmental declaration includes shut-off, filtration, heat recovery, post-heating, fan, and sound attenuation functions. Finished units can be delivered in parts, modules, or as complete assemblies. Some functions, such as the machine base, can be assembled and installed only at the construction site. The ventilation units of the Future product family can be equipped with electrical automation either at the factory or at the construction site.

More information about the units is available at: https://www.koja.fi/kiinteistot/tuotteet/

Physical properties

Product weights:
1 m3/s: 818 kg/unit
5 m3/s: 2713 kg/unit

Product raw materials

The main raw materials of the product are steel, copper, aluminum, and various mineral wools. In addition, the products contain small amounts of other materials, such as plastic and rubber parts

Information about recycled materials

Out of the used steel materials, only one type of steel sheet had manufacturer-specific information available (EPD). For others, generic data from Ecoinvent was used. With this manufacturer-specific information, it was confirmed that about 7% of the steel mass of the product currently under review consists of recycled raw material. For other materials, the modeling was done on the assumption that they are made of 100% virgin materials.

Information about packaging

Shrink wrap is used in the packaging of the products.

Raw-materials of the product and product information

Product raw-materials	Radiator Unit		Usability			Origin of the raw materials
	Amount p%* (1 m3/s)	Amount p%* (5 m3/s)	Renewable	Non-renewable	Recycled	
Steel	76	63	0 %	100 %	7 %	EU
Stone wool	6	5	0 %	100 %	0 %	EU
Aluminium	8	18	0 %	100 %	0 %	EU
Copper	4	9	0 %	100 %	0 %	EU
Plastic	1	0	0 %	100 %	0 %	EU
Rubber	<1	1	0 %	100 %	0 %	EU
Mineral wool	5	4	0 %	100 %	0 %	EU
Glass fibre	1	1	0 %	100 %	0 %	EU

*Order of magnitude, not exact composition

Main material composition of the product

Product main material compostition	Radiator Unit		Origin of the raw materials
	Amount p%* (1 m3/s)	Amount p%* (5 m3/s)	
Metals	88	90	EU
Stone-based materials (minerals)	11	10	EU
Fossil materials	1	1	EU
Bio-based materials	0	0	-

*Order of magnitude, not exact composition

Substances under European Chemicals Agency's REACH, SVHC restrictions

The products do not contain substances that exceed the registration limits of the European Chemicals Agency.

4. Life cycle assessment information

Scope of the life cycle assessment

Declared modules	Product stage			Construction stage		Use stage							End of life stage				Impacts beyond the system boundary		
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
	☒	☒	☒	☒	☒	ND	ND	ND	ND	ND	ND	ND	☒	☒	☒	☒	☒	☒	☒
Module	Raw material supply	Transport to manufacturing	Manufacturing	Transport to construction	Construction / installation processes	USe	Maintenance	Repair	Replacement	Refurbishment	Energy use	Wate use	De-construction / demolition	Transport at end-of-life	Waste processing	Disposal	Re-use	Recovery	Recycling

X = Module covered ND = Module not covered (not declared)

	Mandatory modules
	Mandatory as per the RTS PCR section 6.2.1 rules and terms
	Optional modules based on scenarios

Declared unit

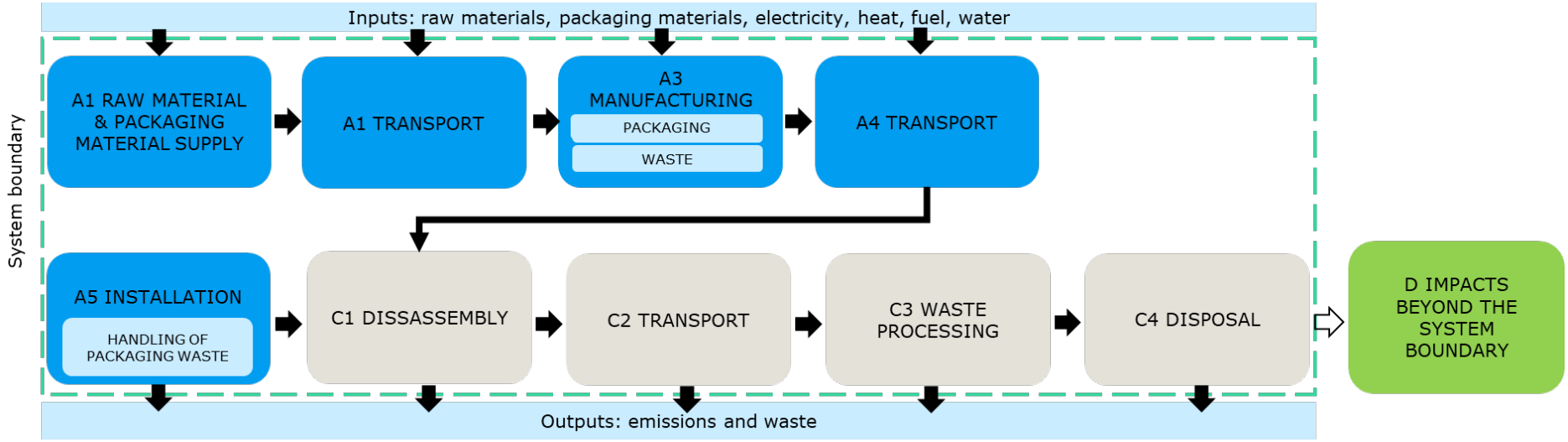
The reported unit is 1 radiator unit, with a capacity of 1 m³/s or 5 m³/s.

Geographical representativeness

The products are manufactured exclusively in Jalasjärvi, Finland, and the calculation scenarios are made with Finland as the target country and market area. Appendix 1 also presents a transportation scenario for Nordic countries.

System boundaries

The system boundaries for the EPD are of the type 'Cradle to gate with options, including modules C1-C4 and module D.' The product system being studied covers the product stage of the Future ventilation unit (A1-A3), transportation to the construction site (A4), construction site activities in terms of handling packaging waste (A5), and the end-of-life stage (C1-C4). Modules B1-B7 are not considered relevant. Additionally, impacts outside the lifecycle (D) are considered in the assessment. The production and manufacturing of machinery and equipment required during production (production utilities) are not taken into account, nor are employee transportation.



Allocation

Allocation has been made according to the standard ISO 14044:2006 and the standard EN 15804. Information on energy consumption, packaging materials, and production waste was obtained for all Future products produced at the entire plant for the last full production year of 2023. The input data has then been presented per production unit using the revenue data of Future products manufactured at the plant. Allocation was done based on revenue, as precise physical data, for example, the mass of all sold products, is not available. The process produces by-products such as metal scrap, including steel, aluminum, and copper. Some of the production emissions have been allocated to these streams. Other waste streams have been considered within the product system. In accordance with standard EN 15804, the biogenic carbon flows of packaging materials follow the physical mass flows of the production process.

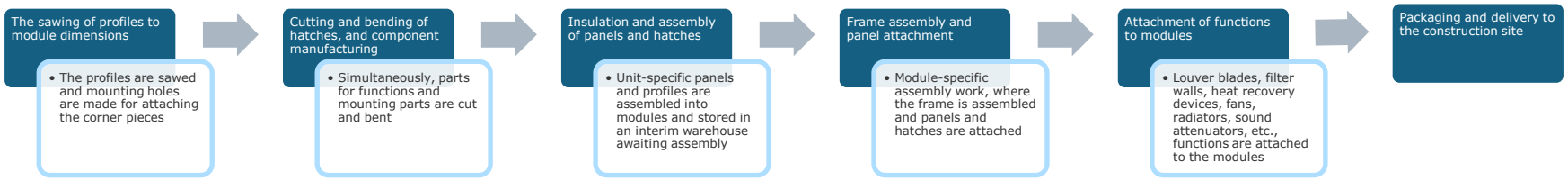
Cut-off criteria

The scope of the work follows the cut-off criteria set out in standard EN 15804 and the RTS protocol guidelines, and the lifecycle inventory data includes at least 95% of total inflows (mass and energy) per module. In this study, no input or output flows have been excluded.

Life cycle stages (A-C, D):

Production (A1-A3)
A1: Raw material production includes the environmental impacts resulting from the acquisition, processing, and manufacturing of all raw materials and finished components used in the product.
A2: Transportation of raw materials to Koja's production facility in Jalasjärvi. Transportation methods (truck or ferry) and actual distances have been taken into account.
A3: Assessment covers the electricity and heating required during the production process, as well as auxiliary materials for production. Energy consumption is modeled to match the energy production mix purchased by the facility. Additionally, the assessment includes the transportation and waste management of production waste.

Manufacturing process description (A3)
Future product family's ventilation units consist of modules manufactured by Koja and technical machine parts sourced from suppliers. The modules are composed of profiles, panels, and small parts. For in-house production, the factory has cutting and bending automation lines for sheet metal processing. After the cutting and bending stages, the sheet metal parts are assembled into panels and filled with mineral wool. Then, the assembler constructs the machine frame from pre-cut profiles and corner pieces. The panels are attached to the frame with screws and glue and sealed with sealing compound. After this, functions such as shut-off operations, intake and exhaust air filters, heat recovery devices, heat exchangers, blowers, and sound damping elements are installed inside the frame. Some functions, like the machine base, can be assembled and installed on-site. Future product family's ventilation units can be equipped with electrical automation either at the factory or on-site. Below is a flowchart of the main production processes.



Transport to construction site (A4)
Finished products are transported within Finland, and transportation is modeled using an average transportation distance. Appendix 1 also presents a transportation scenario for the Nordic countries.

Construction site processes (A5)
In the modeling, the handling of waste generated from the product packaging is taken into account. The installation of the machine is assumed to be manual. The installation details are presented in the table.

Scenario information	Data quality
Additional materials used in installation	No additional materials
Water use	0 m3
Use of other resources	0 kg
Quantitative description of the amount and type (regional mix) of energy used in installation	0 kWh
Waste generated at the construction site caused by the product installation	Plastic waste 0,7 kg (1m3/s) and 1,68 kg (5 m3/s) depending on product size
Outflows caused by the processing of waste generated at the construction site	Plastic waste to energy recovery 0,17–0,40 kg depending on product size Plastic waste to material recycling 0,53-1,28 kg depending on product size
Direct emissions to air, soil and water	No direct emissions

End of life (C1-C4)
The primary target country for the product is Finland, but the end-of-life phase has been modeled according to the c-PCR guidelines provided by the manufacturer, based on the Eurovent – European Industry Association (2025) proposal, representing a European end-of-life scenario: The end-of-life phase has been modeled according to the c-PCR proposal by Eurovent – European Industry Association (2025).
C1: The product dismantling is included in the assessment. The products are assumed to be dismantled manually.
C2: The transportation of the dismantled product for processing is assessed based on the average waste transportation distance in Finland.
C3: The different materials of the product are processed according to the recommendation by the c-PCR proposal, either by recycling or energy recovery. The energy produced in energy recovery is captured.
C4: In line with the recommendation of the c-PCR proposal, waste fractions that end up in final disposal are directed to landfill placement.

The product reaches end-of-waste status before it is processed for material recovery or energy capture.

Benefits and burdens outside the system boundary (Module D):
The end-of-life treatment of the products is assumed to occur according to the c-PCR proposal (Eurovent 2025). The proposed end-of-life treatment scenarios according to the c-PCR are presented in the figure.

Material	Material recycling, %	Energy recovery, %	Disposal, %
Steel	80	0	20
Aluminium	80	0	20
Copper	70	0	30
Plastic	20	40	40
Rubber	0	50	50
Glass fiber	60	0	40

5. Indicators describing environmental impacts and use of natural resources

In the following tables, potential environmental impacts are reported per specified unit and life cycle stage. The impact categories presented here are consistent with RTS PCR protocol.

Results are presented in scientific notation. Example of data interpretation: 1.31E-2 = 1.31*10^-2 = 0.0131

The impact assessment of the results is relative. They do not indicate exceedance of limits, safety margins, or risks. According to standard EN 15804, environmental declarations of construction products are not necessarily comparable if they have not been prepared according to this standard or if a different declared unit has been used.

5.1 Radiator unit 1 m3/s

Core environmental impact indicators

Impact category	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO2 eq.	5,62E+03	5,53E+03	8,71E+01	5,58E+00	4,81E+01	7,49E-01	0,00E+00	2,23E+01	2,30E+01	2,19E+00	-1,16E+03
Global Warming Potential fossil fuels (GWP-fossil)	kg CO2 eq.	5,60E+03	5,51E+03	8,71E+01	5,57E+00	4,81E+01	7,49E-01	0,00E+00	2,23E+01	2,30E+01	2,19E+00	-1,16E+03
Global Warming Potential biogenic (GWP-biogenic)	kg CO2 eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Global Warming Potential land use and land use change (GWP-luluc)	kg CO2 eq.	1,42E+01	1,41E+01	2,79E-02	5,64E-03	1,50E-02	3,62E-04	0,00E+00	6,94E-03	1,61E-02	1,19E-03	-8,20E+00

Impact category	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq.	2,65E-04	2,63E-04	1,88E-06	1,04E-07	1,05E-06	3,59E-09	0,00E+00	4,87E-07	1,73E-07	4,59E-08	-3,25E-05
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	6,90E+01	6,86E+01	3,58E-01	1,55E-02	1,48E-01	1,04E-03	0,00E+00	6,83E-02	1,49E-01	1,22E-02	-2,12E+01
Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	kg P eq.	4,41E+00	4,41E+00	5,72E-03	1,51E-03	3,22E-03	1,31E-04	0,00E+00	1,49E-03	8,46E-03	2,66E-04	-1,37E+00
Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine)	kg N eq.	7,29E+00	7,17E+00	1,11E-01	7,42E-03	4,94E-02	3,05E-04	0,00E+00	2,29E-02	3,38E-02	1,11E-02	-1,53E+00
Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	mol N eq.	1,47E+02	1,46E+02	1,22E+00	4,36E-02	5,37E-01	2,17E-03	0,00E+00	2,49E-01	3,75E-01	5,00E-02	-1,80E+01
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.	2,42E+01	2,37E+01	4,67E-01	3,30E-02	2,25E-01	6,99E-04	0,00E+00	1,04E-01	1,11E-01	1,77E-02	-6,10E+00
Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	kg Sb eq.	4,25E-01	4,24E-01	2,96E-04	1,74E-05	1,68E-04	2,13E-06	0,00E+00	7,78E-05	8,59E-04	3,50E-06	-2,33E-01

Impact category	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Abiotic depletion for fossil resources potential (ADP-fossil)	MJ	6,65E+04	6,52E+04	1,22E+03	8,08E+01	6,76E+02	3,40E+00	0,00E+00	3,13E+02	1,74E+02	4,07E+01	-1,27E+04
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	m3e depr.	2,59E+03	2,59E+03	6,12E+00	3,00E+00	3,45E+00	1,36E-01	0,00E+00	1,60E+00	4,13E+00	1,78E+00	-7,73E+02

Indicators describing the use of natural resources

Use of natural resources	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	9,74E+03	9,71E+03	2,18E+01	6,79E+00	1,23E+01	7,15E-01	0,00E+00	5,71E+00	3,20E+01	5,32E-01	-2,88E+03
Renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources	MJ	9,74E+03	9,71E+03	2,18E+01	6,79E+00	1,23E+01	7,15E-01	0,00E+00	5,71E+00	3,20E+01	5,32E-01	-2,88E+03
Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials	MJ	6,46E+04	6,33E+04	1,22E+03	8,08E+01	6,76E+02	3,40E+00	0,00E+00	3,13E+02	1,74E+02	4,07E+01	-1,27E+04
Nonrenewable primary energy resources used as raw materials	MJ	5,84E+02	5,84E+02	0,00E+00	0,00E+00	0,00E+00	-3,48E+01	0,00E+00	0,00E+00	-3,26E+02	-2,24E+02	0,00E+00

Total use of non renewable primary energy resources	MJ	6,51E+04	6,38E+04	1,22E+03	8,08E+01	6,76E+02	-3,14E+01	0,00E+00	3,13E+02	-1,52E+02	-1,83E+02	-1,27E+04
Use of renewable secondary fuels	MJ	1,21E+00	1,20E+00	5,35E-03	6,67E-04	3,05E-03	1,71E-05	0,00E+00	1,41E-03	9,34E-03	2,18E-04	-8,40E-02
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	m3	5,88E+01	5,86E+01	1,41E-01	6,68E-02	7,96E-02	2,84E-03	0,00E+00	3,69E-02	8,69E-02	-5,52E-02	-1,79E+01
Use of secondary materials	kg	2,54E+02	2,53E+02	5,22E-01	1,74E-02	2,88E-01	8,69E-04	0,00E+00	1,34E-01	2,02E-01	1,10E-02	4,03E+02

Waste categories

Waste category	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	1,47E+03	1,47E+03	1,57E+00	5,07E-01	8,70E-01	1,79E-02	0,00E+00	4,03E-01	1,30E+00	2,32E+00	-3,79E+02
Non-hazardous waste	kg	2,77E+04	2,77E+04	3,74E+01	1,57E+01	2,10E+01	1,11E+00	0,00E+00	9,73E+00	5,20E+01	7,00E+01	-8,63E+03
Radioactive waste	kg	1,36E-01	1,35E-01	4,29E-04	2,38E-04	2,44E-04	1,86E-05	0,00E+00	1,13E-04	4,14E-04	9,18E-06	-1,16E-02

Other environmental indicators describing output flows

Indicator	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,30E-01	0,00E+00	0,00E+00	5,40E+02	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	4,41E-01	0,00E+00	0,00E+00	1,55E+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	8,60E-01	0,00E+00	0,00E+00	3,02E+01	0,00E+00	0,00E+00

Additional environmental impact indicators

Indicator	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Potential incidence of disease due to PM emissions (PM)	Incidence of disease	5,99E-04	5,93E-04	5,84E-06	1,74E-07	3,30E-06	6,28E-09	0,00E+00	1,53E-06	1,99E-06	2,66E-07	-1,07E-04
Potential Human exposure efficiency relative to U235 (IRP)	kBq U235 ekv.	3,83E+02	3,80E+02	1,73E+00	9,85E-01	9,83E-01	7,25E-02	0,00E+00	4,55E-01	1,62E+00	3,73E-02	-4,45E+01
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	6,99E+04	6,97E+04	1,74E+02	2,63E+01	9,83E+01	1,92E+00	0,00E+00	4,55E+01	1,16E+02	2,51E+03	-1,70E+04
Potential Comparative Toxic Unit for humans (HTP-c)	CTUh	7,72E-06	7,71E-06	1,42E-08	1,86E-09	7,71E-09	1,33E-10	0,00E+00	3,57E-09	1,16E-08	4,94E-10	-2,51E-06
Potential Comparative Toxic Unit for humans (HTP-nc)	CTUh	3,16E-04	3,15E-04	7,00E-07	5,21E-08	3,96E-07	4,25E-09	0,00E+00	1,84E-07	7,63E-07	4,50E-08	-1,95E-04
Potential soil quality index (SQP)	Pt	2,49E+04	2,42E+04	6,02E+02	1,12E+01	3,44E+02	1,04E+00	0,00E+00	1,59E+02	3,16E+02	7,90E+01	-7,08E+03

Biogenic carbon content	Amount per declared unit
Biogenic carbon content in product	0 kg
Biogenic carbon content in packaging	0 kg

5.2 Radiator unit 5m3/s

Core environmental impact indicators

Impact category	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO2 eq.	1,92E+04	1,90E+04	1,58E+02	1,47E+01	1,68E+02	1,79E+00	0,00E+00	7,77E+01	6,50E+01	8,78E+00	-6,15E+03
Global Warming Potential fossil fuels (GWP-fossil)	kg CO2 eq.	1,92E+04	1,90E+04	1,58E+02	1,47E+01	1,68E+02	1,78E+00	0,00E+00	7,77E+01	6,49E+01	8,78E+00	-6,09E+03
Global Warming Potential biogenic (GWP-biogenic)	kg CO2 eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Global Warming Potential land use and land use change (GWP-luluc)	kg CO2 eq.	4,93E+01	4,92E+01	5,09E-02	1,49E-02	5,22E-02	8,62E-04	0,00E+00	2,42E-02	5,32E-02	5,52E-03	-6,20E+01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq.	4,11E-04	4,07E-04	3,41E-06	2,76E-07	3,67E-06	8,54E-09	0,00E+00	1,70E-06	5,76E-07	1,77E-07	-5,48E-05
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	2,90E+02	2,89E+02	6,67E-01	4,12E-02	5,15E-01	2,47E-03	0,00E+00	2,38E-01	5,14E-01	4,97E-02	-1,52E+02
Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	kg P eq.	1,88E+01	1,88E+01	1,04E-02	4,01E-03	1,12E-02	3,11E-04	0,00E+00	5,20E-03	2,86E-02	1,55E-03	-8,55E+00

Impact category	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine)	kg N eq.	2,74E+01	2,72E+01	2,06E-01	1,96E-02	1,72E-01	7,26E-04	0,00E+00	7,98E-02	1,15E-01	1,89E-02	-9,20E+00
Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	mol N eq.	4,29E+02	4,26E+02	2,25E+00	1,15E-01	1,87E+00	5,17E-03	0,00E+00	8,69E-01	1,29E+00	1,99E-01	-1,11E+02
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.	9,34E+01	9,24E+01	8,60E-01	8,74E-02	7,84E-01	1,67E-03	0,00E+00	3,63E-01	3,83E-01	6,86E-02	-3,74E+01
Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	kg Sb eq.	2,19E+00	2,19E+00	5,36E-04	4,60E-05	5,86E-04	5,07E-06	0,00E+00	2,71E-04	3,02E-03	1,84E-05	-1,76E+00
Abiotic depletion for fossil resources potential (ADP-fossil)	MJ	2,13E+05	2,11E+05	2,21E+03	2,14E+02	2,36E+03	8,10E+00	0,00E+00	1,09E+03	5,82E+02	1,58E+02	-7,11E+04
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	m3e depr.	7,53E+03	7,51E+03	1,11E+01	7,98E+00	1,20E+01	3,23E-01	0,00E+00	5,57E+00	1,25E+01	6,83E+00	-5,28E+03

Indicators describing the use of natural resources

Use of natural resources	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	2,90E+04	2,89E+04	3,95E+01	1,80E+01	4,30E+01	1,70E+00	0,00E+00	1,99E+01	1,06E+02	2,71E+00	-1,98E+04
Renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources	MJ	2,90E+04	2,89E+04	3,95E+01	1,80E+01	4,30E+01	1,70E+00	0,00E+00	1,99E+01	1,06E+02	2,71E+00	-1,98E+04
Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials	MJ	2,09E+05	2,06E+05	2,21E+03	2,14E+02	2,36E+03	8,11E+00	0,00E+00	1,09E+03	5,82E+02	1,58E+02	-7,11E+04
Nonrenewable primary energy resources used as raw materials	MJ	5,84E+02	5,84E+02	0,00E+00	0,00E+00	0,00E+00	-3,48E+01	0,00E+00	0,00E+00	-3,26E+02	-2,24E+02	0,00E+00
Total use of non renewable primary energy resources	MJ	2,09E+05	2,07E+05	2,21E+03	2,14E+02	2,36E+03	-2,67E+01	0,00E+00	1,09E+03	2,57E+02	-6,56E+01	-7,11E+04

Use of renewable secondary fuels	MJ	2,77E+00	2,76E+00	9,69E-03	1,76E-03	1,06E-02	4,07E-05	0,00E+00	4,93E-03	3,29E-02	8,55E-04	-4,30E-01
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	m3	1,83E+02	1,83E+02	2,56E-01	1,78E-01	2,78E-01	6,76E-03	0,00E+00	1,29E-01	2,57E-01	-4,74E-01	-1,26E+02
Use of secondary materials	kg	4,82E+02	4,81E+02	9,48E-01	4,60E-02	1,01E+00	2,07E-03	0,00E+00	4,66E-01	7,05E-01	4,54E-02	1,54E+03

Waste categories

Waste category	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	4,76E+03	4,76E+03	2,85E+00	1,33E+00	3,03E+00	4,27E-02	0,00E+00	1,41E+00	4,50E+00	2,14E+01	-1,99E+03
Non-hazardous waste	kg	8,54E+04	8,53E+04	6,78E+01	4,16E+01	7,33E+01	2,64E+00	0,00E+00	3,40E+01	1,74E+02	4,57E+02	-5,52E+04
Radioactive waste	kg	3,20E-01	3,18E-01	7,78E-04	6,30E-04	8,52E-04	4,43E-05	0,00E+00	3,95E-04	1,27E-03	5,04E-05	-1,13E-01

Other environmental indicators describing output flows

Indicator	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,28E+00	0,00E+00	0,00E+00	1,91E+03	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	1,06E+00	0,00E+00	0,00E+00	2,76E+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	2,08E+00	0,00E+00	0,00E+00	5,38E+01	0,00E+00	0,00E+00

Additional environmental impact indicators

Indicator	Unit	A1-A3	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Potential incidence of disease due to PM emissions (PM)	Incidence of disease	2,02E-03	2,01E-03	1,06E-05	4,61E-07	1,15E-05	1,50E-08	0,00E+00	5,33E-06	7,00E-06	1,02E-06	-6,15E-04
Potential Human exposure efficiency relative to U235 (IRP)	kBq U235 ekv.	8,98E+02	8,92E+02	3,13E+00	2,60E+00	3,43E+00	1,73E-01	0,00E+00	1,59E+00	4,97E+00	2,03E-01	-4,34E+02
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	2,60E+05	2,60E+05	3,15E+02	6,91E+01	3,43E+02	4,57E+00	0,00E+00	1,59E+02	3,68E+02	1,91E+04	-1,11E+05
Potential Comparative Toxic Unit for humans (HTP-c)	CTUh	2,99E-05	2,99E-05	2,57E-08	4,89E-09	2,69E-08	3,17E-10	0,00E+00	1,25E-08	3,81E-08	2,60E-09	-1,88E-05
Potential Comparative Toxic Unit for humans (HTP-nc)	CTUh	1,77E-03	1,77E-03	1,27E-06	1,38E-07	1,38E-06	1,01E-08	0,00E+00	6,41E-07	2,60E-06	2,95E-07	-1,48E-03
Potential soil quality index (SQP)	Pt	9,18E+04	9,07E+04	1,09E+03	2,97E+01	1,20E+03	2,49E+00	0,00E+00	5,56E+02	1,11E+03	2,99E+02	-4,56E+04

Biogenic carbon content	Amount per declared unit
Biogenic carbon content in product	0 kg
Biogenic carbon content in packaging	0 kg

6. Scenarios and additional technical information

Additional technical information, manufacturing energy use (A1-A3)

Parameter	Amount	Data quality
Manufacturing electricity	0.032 kg CO_2 ekv. /kWh	The distribution of electricity production in the review year was as follows: 2.6% geothermal energy, 1.0% solar energy, 14.0% hydropower, 8.8% bioenergy, 6.7% wind energy, and 67.0% nuclear power. Electricity production has been modeled using the reported distribution of electricity production.
Manufacturing heating	0.011 kg CO_2 ekv. /kWh	99.1% of heat production is generated from bio-based materials at the combined heat and power plant, and 0.9% from oil.

Additional technical information, transport to the construction site (A4)

Parameter	Amount	Data quality
The type of fuel and consumption of the used vehicle.	diesel 0.02 kg/tonne*km	Truck, Euro 6, gross weight >32t / payload capacity 24,7
Transport distance	261 km	Weighted average distance from Koja manufacturing to customers in Finland
Specific emissions	0.0653 kg CO2 ekv./1 tonne*km	Truck, Euro 6, gross weight >32t / payload capacity 24,7
Capacity utilization rate	61 %	Truck

End-of-life

Process description	Unit	Value
The product disassembly process and resulting construction waste categorized as follows:	kg collected separately	818 (1 m3/s) 2713 (5 m3/s)
	kg collected as mixed waste	0
The construction waste utilization process and resulting construction waste categorized as follows:	kg components for re-use (same use case)	0
	kg material recovery	539,7 (1 m3/s) 1912,8 (5 m3/s)
	kg for energy recovery	3,9 (1 m3/s) 7 (5 m3/s)
The construction waste disposal process and the amount of waste for final disposal.	kg of product or material for final disposal.	234 (1 m3/s) 793,5 (5 m3/s)
Assumptions used in scenario creation, e.g., traffic.		Transport distance 121 km

7. References

Ecoinvent version 3.11, Allocation, cut-off, EN15804

EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

Eurovent – European Industry Association. 2025. Eurovent Recommendation on complementary Product Category Rules for ventilation units.

Future ilmanvaihtokone LTO-ratkaisuiden LCA taustaraportti. 2024.

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

RTS EPD Guideline 19.2.2021. Building Information Foundation sr, PT 18 RT EPD Committee.

RTS PCR 26.08.2020 RTS PCR protocol. Building Information Foundation sr, PT 18 RT EPD Committee.

Umberto 11, version 11.15.1

Appendix 1: Additional transport scenario (Nordics)

Transport to the construction site (A4)

Parameter	Amount	Data quality
The type of fuel and consumption of the used vehicle.	diesel 0.02 kg/tonne*km	Truck, Euro 6, gross weight >32t / payload capacity 24.7 tons
	heavy fuel oil 0.0023 kg/tonne*km	Container ship, payload capacity 5,000-200,000 dwt (deadweight tonnage), ocean-going
Transport distance	668 km	Truck: Average distance for land transport from Jalasjärvi to the capitals of Sweden, Norway, and Denmark
	261 km	Container ship: Distance from Turku port to Stockholm
Specific emissions	0.0653 kg CO_2 ekv./1 tonne*km	Truck, Euro 6, gross weight >32t / payload capacity 24.7 tons
	0.00831 kg CO_2 ekv./1 tonne*km	Container ship, payload capacity 5,000-200,000 dwt (deadweight tonnage), ocean-going
Capacity utilization rate	61 %	Truck
	70 %	Container ship