PRODUCT ENVIRONMENTAL PROFILE

61AQ_100P,
Has a compliant
environmental declaration

PEP ecopassport®

61AQ_100P

Nominal cooling capacity : 32 - 76 kW
Nominal heating capacity : 38 - 96 kW

TABLE OF CONTENTS

1 – GENERAL INFORMATIONS

1.1 – Commercial reference of the reference product

Reference product:	61AQ_100P
Options considered:	None
References covered:	61AQ_040P - 61AQ_050P - 61AQ_060P - 61AQ_080P - 61AQ_100P - 61AQ_120P
Nominal capacity of the device:	91.499 kW- (77 % Nominal heating capacity + 23% Nominal cooling capacity)
Product family:	Thermodynamic generators with electric compression
Product sub-category:	Heat pumps
Product category:	Reversible heat pump - Technology: Air to water - Reversible - Without production of domestic hot water - Nominal capacity 91.499 kW - SEER: 4.44 - SCOP: 4.18 – Refrigerant: R290 Refill threshold: 90%
Homogeneous environmental family:	The reference device is part of a range comprising several sizes with identical functions, meeting the same standards, identical technology and manufacturing processes, and operating in a similar way.

1.2 – Functional Unit

“To produce 1 kW of heating or 1 kW of cooling according to the appropriate usage scenario defined in the EN 14825 standard and during the 22 years reference lifetime of the product.”

1.3 – Additional environmental information

The environmental impacts are calculated using a Life Cycle Analysis of the product in accordance with ISO standards 14040 and 14044. All the stages of the manufacture, distribution, installation (packaging end of life), maintenance and end of life of the product are included in this study.

1.4 - Manufacturing

- Production

The Life Cycle Analysis on which this Product Environmental Profile (PEP) is based was conducted with respect to the criteria set by PCR–ed4-EN-2021 09 06 and PSR-0013-ed3.0-EN-2023-06-06 for the PEP ecopassport® programm.

The environmental analysis was conducted for the whole of the following life cycle: production, distribution, installation, use and end of life. The following environmental declaration conforms to the cut rule that stipulates a precision of +/- 5% on the mass of the modelled product. For transport: if the origin of the components is known, the precise values are used. Otherwise, the unfavourable assumption indicated in the general rules (PCR) is used.

The product family is designed and assembled at the Carrier Montluel production plant with the following certifications : ISO 14001 ; ISO 50001. The parts are manufactured in China, Europe and France.

- Energy model

Electricity Mix; Low voltage; 2020; France, FR

1.5 - Distribution

- Production

Transportation from the production plant to the installation site is defined based on the product order book. The distribution scenario (destinations) is provided in the "1.11 Sales Scenarios" section of this document.

- Energy model

Electricity Mix; Low voltage; 2020; Europe, EU-27

1.6 - Installation

- Production

Installation operations are required for the products in this range; their flow and material consumption has been taken into account. Processing of the packaging and connection to the hydraulic system are taken into account at this stage. The refrigerant is charged during production, no additional refrigerant charging was considered in the installation stage. The unit is installed on the floor on a concrete slab. For the geographical representativeness of this step, please refer to the section "1.11 Sales scenarios".

- Energy model

Electricity Mix; Low voltage; 2020; Europe, EU-27

1 – GENERAL INFORMATIONS

1.7 - Use

- Production

The standard scenario used to calculate the environmental impacts related to consumption of the product is defined in regulation no. 2016/2281. According to the NF EN 14825 standard, for a comfort application, the seasonal performances (SEER – Seasonal Energy Efficiency Ratio & SCOP – Seasonal COefficient of Performance) of the reversible heat pump are characterised by taking into account the operation time according to the load rate of the product after a typical heating/cooling season in Europe. An electric mix is used, this represents the customer countries as a proportion of the sales volumes. This scenario is specific to each product range and indicated in the « 1.11 Sales scenarios » section. The usage phase also takes into account the maintenance operations. The mandatory site inspections are scheduled annually. Components with a shorter service life than the product must be replaced, which means the environmental impact of production, distribution and processing of these maintenance components must be taken into account. Refrigerant leaks resulting in recharging, production, transport or processing are taken into account.
For the energy consumption calculation, the operation time for an reversible heat pump > 12 kW is 2666 hours/year.

Consumption of the device over its reference lifetime:
Consumption = 1229670.6 kWh
- consumption national = 1229670.6 kWh,
- consumption continental = 0 kWh,
- consumption world = 0 kWh,
- refrigerant refill = 2.4 kg,
- refrigerant emissions = 2 kg.

- Energy model

For national mix, the chosen module is: Electricity Mix; Low voltage; 2018; France, FR (reference year: 2020)

1.8 – End of life

- Production

The Carrier group is a partner with the collection organization Eco-systèmes pro, which is in charge of dismantling our end-of-life machines in France. The product end of life follows the ESR data:
- stage 1: the equipment is collected with a truck transport.
- stage 2: decontamination, crushing then sorting of the various materials.
- stage 3: specific processing of the electronic components, electrical heaters, cables, bulbs and screens.
- stage 4: recycling of other materials, with a truck transport.
- stage 5: incineration without energy recovery of components with no re-use value, with a truck transport.
- stage 6: offloading of the rest of the material, with a truck transport.

- Energy model

Electricity Mix; Low voltage; 2020; France, FR

1.9 - PEP ecopassport program hypothesis

The life cycle analysis was carried out according to the hypothesis and scenarios provided by the PEP ecopassport program.

This LCA follows the EF 3.1 method of the European Commission's “Joint Research Centre”.

Activity area:	Collective residential / Tertiary
Expected lifetime:	22 years
Annual operating time in heating mode:	2066 hours
Eurovent operating time in heating mode:	-
Annual operating time in cooling mode:	600 hours
Annual operating time in cooling mode:	-
Annual operating time:	2666 hours
Average extracted air flow:	- m^3/h
Pressure loss Δp:	-
Momentary refrigerant leaks:	1.2%
Refill threshold:	90%
Number of engine changes during the life cycle:	0
Number of filter changes during the life cycle:	0

1 – GENERAL INFORMATIONS

1.10 – Technical description of the device

AquaSnap® heat pumps are a solution for heating applications where installers, engineering and design departments, and building owners.
Its modular design allows configurations adapted to user needs.
The optional variable speed fans and pumps with Carrier Greenspeed® control logic make this product a solution for partial load operation while achieving high SCOP, SEER or IPLV value.
In addition, the AquaSnap® range with Greenspeed® intelligence operates from -20°C to +46°C as standard.

TEWI (Total Equivalent Warming Impact):	Direct effect:	Indirect effect:
82 tCO2 eq	0 tCO2 eq	82 tCO2 eq
Calorific value of the device:	1,3 MJ/kg	
Maximum electrical input power:	- kW	
Cooling capacity:	76 kW	SEER : 4,44
Heating capacity:	96 kW	SCOP : 4,18
Sensitive capacity:	- kW	
Refrigerant:	R290	GWP = 0,02
Liquid waste (condensates):	- m3	
Water consumption of the device:	0 m3	

1.11 – Sales scenarios

Sales of the device are distributed as follows:

Country name	Share in sales (%)	
France	100	%
Europe	0	%
World	0	%

This distribution affects the distance travelled during the phase and the electric mix used during the usage phase.

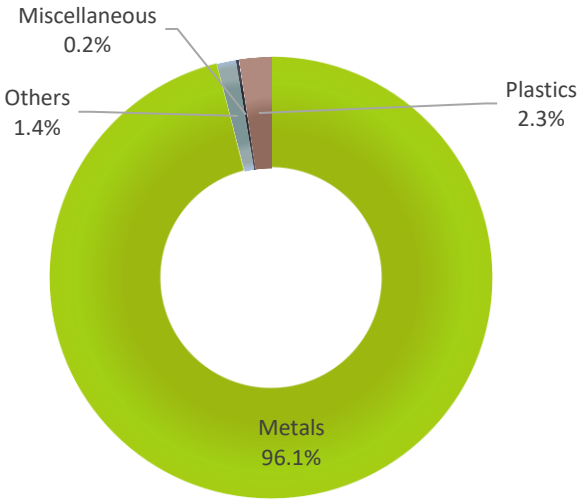
2 – COMPONENT MATERIALS

2.1 – Reference product

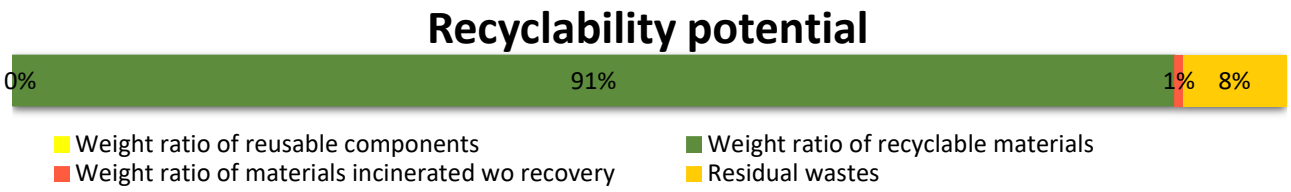
Modelled total weight:

Material PEP category	Material	Mass (kg)	Percentage
Metals	Galvanised steel	408.08	42.2%
Metals	Steel	168.14	17.4%
Metals	Stainless steel	134.63	13.9%
Metals	Copper	102.47	10.6%
Metals	Aluminium	86.30	8.9%
Metals	Cast iron	21.00	2.2%
Plastics	Polyamide 6.6 (PA 6.6)	12.01	1.2%
Metals	Brass	9.32	1.0%
Others	Refrigerant R290	8.00	0.8%
Others	Wood ; for palet	3.72	0.4%
Plastics	Polypropylene (PP)	3.70	0.4%
Plastics	Polyester	3.61	0.4%
Plastics	Polyvinylchloride (PVC)	2.42	0.3%
Others	Printed Wire Board (PWB)	2.00	0.2%
Plastics	Ethylene Propylene Diene rubber (EPDM)	0.90	< 0.1%
Miscellaneous	Miscellaneous	1.78	0.2%
Total		968.08	100.0%

2.2 – Component materials



Recyclability rate : 91%



The recyclability potential of the products has been assessed using the "Eco'WEEE recyclability and recovery calculation method"

3 – ENVIRONMENTAL IMPACTS

Per kW corresponding to the functional unit

Environmental indicators		Total	Manu facturing	Distribution	Installation	Use ∑ B1 à B7	End of life	Potential benefits Module D
Climate change – total	kg CO2 eq.	1.33E+03	1.00E+02	6.40E-01	1.21E+00	1.21E+03	1.70E+01	-4.02E+01
Climate change - fossil fuels	kg CO2 eq.	1.26E+03	9.98E+01	6.40E-01	1.20E+00	1.14E+03	1.61E+01	-3.90E+01
Climate change - biogenics	kg CO2 eq.	6.87E+01	3.10E-01	0*	0*	6.76E+01	8.22E-01	-1.21E+00
Climate change - land use and land use transformation	kg CO2 eq.	2.39E-05	6.57E-06	9.67E-07	0*	1.64E-05	0*	0.00E+00
Ozone depletion	kg.eq.CFC-11	1.93E-05	4.42E-06	7.76E-09	8.05E-08	1.35E-05	1.30E-06	-1.58E-06
Acidification (AP)	mole of H+ eq	6.73E+00	9.29E-01	1.01E-03	6.22E-03	5.67E+00	1.29E-01	-7.05E-01
Freshwater eutrophication	kg P eq.	3.87E-02	3.48E-04	0*	0*	3.79E-02	5.32E-04	-5.06E-02
Marine aquatic eutrophication	kg of N eq.	9.31E-01	1.03E-01	1.83E-04	1.21E-03	7.82E-01	4.45E-02	-5.26E-02
Terrestrial eutrophication	mole of N eq	1.44E+01	1.15E+00	2.01E-03	1.34E-02	1.30E+01	1.48E-01	-6.29E-01
Photochemical ozone formation	kg of NMVOC eq.	2.70E+00	3.48E-01	6.50E-04	3.87E-03	2.30E+00	4.85E-02	-2.02E-01
Depletion of abiotic resources - elements	kg.eq..Sb	7.80E-03	6.31E-03	0*	0*	1.37E-03	1.17E-04	-2.31E-03
Depletion of abiotic resources - fossil fuels	MJ	1.62E+05	3.14E+03	0*	0*	1.59E+05	2.25E+02	-4.30E+02
Water scarcity	m3	1.28E+04	3.66E+01	0*	0*	2.23E+02	1.26E+04	-3.26E+04
Emission of fine particles	incidence of diseases	1.92E-04	5.68E-06	0*	3.48E-08	1.85E-04	1.03E-06	-3.63E-06
Ionizing radiation, human health	kBq of U235 eq.	2.07E+04	3.70E+01	0*	0*	2.06E+04	0*	-6.57E+00
Ecotoxicity, fresh water	CTUe	4.91E+03	2.59E+03	1.87E+01	1.46E+00	2.15E+03	1.51E+02	-2.15E+02
Human toxicity, cancer effects	CTUh	8.13E-07	5.27E-07	1.25E-10	8.38E-11	2.03E-07	8.31E-08	-4.60E-07
Human toxicity, non-cancer effects	CTUh	1.06E-05	4.48E-06	2.39E-09	5.33E-09	5.32E-06	7.60E-07	-6.41E-06
Impacts related to land use/soil quality	-	1.09E+02	9.44E+00	0*	0*	5.82E+01	4.15E+01	-1.31E+02
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	1.81E+04	7.61E+01	0*	0*	1.80E+04	3.64E+01	-1.10E+02
Use of renewable primary energy resources used as raw materials	MJ	1.57E+00	1.57E+00	0*	0*	0*	0*	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.81E+04	7.77E+01	0*	0*	1.80E+04	3.64E+01	-1.10E+02
Use of non-renewable primary energy, excluding non- renewable primary energy resources used as raw materials	MJ	1.62E+05	3.13E+03	0*	0*	1.59E+05	2.25E+02	-4.30E+02
Use of non-renewable primary energy resources used as raw materials	MJ	2.13E+01	1.62E+01	0*	2.73E+00	2.40E+00	0*	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.62E+05	3.14E+03	0*	0*	1.59E+05	2.25E+02	-4.30E+02
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of 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
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
Net use of fresh water	m3	3.13E+02	8.53E-01	0*	0*	5.22E+00	3.07E+02	-7.76E+02
Total use of primary energy during the life cycle	MJ	1.80E+05	3.22E+03	0*	0*	1.77E+05	2.61E+02	-5.40E+02
Hazardous waste disposed of	kg	2.74E+02	2.24E+02	0*	0*	4.96E+01	0*	-1.02E-16
Non-hazardous waste disposed of	kg	2.82E+02	5.34E+01	5.94E-02	1.02E-01	2.29E+02	0*	-2.04E-16
Radioactive waste disposed of	kg	8.35E-02	2.84E-02	4.70E-05	2.91E-05	5.50E-02	0*	0.00E+00
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
Materials for recycling	kg	3.63E-05	3.63E-05	0*	0*	0*	0*	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the product	kg of C.	4.86E-04	4.86E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg of C.	1.61E-02	1.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

The Life Cycle Analysis was conducted using EIME software: EIME© v6.2.5. Whit its database version: CODDE-2024-04 (rev. 2024-06-04) * The results of this PEP represent the use of the product in countries with energy mixes of varying pollution levels, which significantly affects the product's environmental impact. To obtain the results that correspond to your product, please contact your Carrier representative.
The PEP was drawn up under the assumption 1 kW of heating or cooling power being supplied. The real impact of the stages of the life cycle of a product installed in an actual situation is calculated by the user of the PEP by multiplying the impact concerned by the total heating and cooling capacity in kW.
* Represents less than 0.01% of the total life cycle of the reference flow.
The -1/+1 valuation methodology was applied to determine biogenic carbon content.

Breakdown of the use phase – Per kW corresponding to the functional unit

Environmental indicators		Use B1	Maintenance B2	Repair B3	Replacement B4	Refurbishment B5	Operational energy use B6	Operational water use B7
Climate change – total	kg CO2 eq.	4.47E-04	3.65E+00	0.00E+00	0.00E+00	0.00E+00	1.21E+03	0.00E+00
Climate change - fossil fuels	kg CO2 eq.	4.47E-04	3.65E+00	0.00E+00	0.00E+00	0.00E+00	1.14E+03	0.00E+00
Climate change - biogenics	kg CO2 eq.	0.00E+00	1.84E-04	0.00E+00	0.00E+00	0.00E+00	6.76E+01	0.00E+00
Climate change - land use and land use transformation	kg CO2 eq.	0.00E+00	1.64E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ozone depletion	kg.eq.CFC-11	0.00E+00	1.25E-07	0.00E+00	0.00E+00	0.00E+00	1.34E-05	0.00E+00
Acidification (AP)	mole of H+ eq	0.00E+00	1.15E-02	0.00E+00	0.00E+00	0.00E+00	5.66E+00	0.00E+00
Freshwater eutrophication	kg P eq.	0.00E+00	1.50E-05	0.00E+00	0.00E+00	0.00E+00	3.78E-02	0.00E+00
Marine aquatic eutrophication	kg of N eq.	0.00E+00	2.67E-03	0.00E+00	0.00E+00	0.00E+00	7.79E-01	0.00E+00
Terrestrial eutrophication	mole of N eq	0.00E+00	2.93E-02	0.00E+00	0.00E+00	0.00E+00	1.30E+01	0.00E+00
Photochemical ozone formation	kg of NMVOC eq.	6.64E-03	8.60E-03	0.00E+00	0.00E+00	0.00E+00	2.28E+00	0.00E+00
Depletion of abiotic resources - elements	kg.eq..Sb	0.00E+00	1.08E-05	0.00E+00	0.00E+00	0.00E+00	1.36E-03	0.00E+00
Depletion of abiotic resources - fossil fuels	MJ	0.00E+00	8.12E+01	0.00E+00	0.00E+00	0.00E+00	1.59E+05	0.00E+00
Water scarcity	m3	0.00E+00	6.47E-01	0.00E+00	0.00E+00	0.00E+00	2.22E+02	0.00E+00
Emission of fine particles	incidence of diseases	0.00E+00	9.05E-08	0.00E+00	0.00E+00	0.00E+00	1.85E-04	0.00E+00
Ionizing radiation, human health	kBq of U235 eq.	0.00E+00	3.67E-01	0.00E+00	0.00E+00	0.00E+00	2.06E+04	0.00E+00
Ecotoxicity, fresh water	CTUe	0.00E+00	3.15E+02	0.00E+00	0.00E+00	0.00E+00	1.84E+03	0.00E+00
Human toxicity, cancer effects	CTUh	0.00E+00	2.12E-09	0.00E+00	0.00E+00	0.00E+00	2.01E-07	0.00E+00
Human toxicity, non-cancer effects	CTUh	0.00E+00	3.39E-08	0.00E+00	0.00E+00	0.00E+00	5.28E-06	0.00E+00
Impacts related to land use/soil quality	-	0.00E+00	5.12E-02	0.00E+00	0.00E+00	0.00E+00	5.81E+01	0.00E+00
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	0.00E+00	6.14E-01	0.00E+00	0.00E+00	0.00E+00	1.80E+04	0.00E+00
Use of 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
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	0.00E+00	6.14E-01	0.00E+00	0.00E+00	0.00E+00	1.80E+04	0.00E+00
Use of non-renewable primary energy, excluding non- renewable primary energy resources used as raw materials	MJ	0.00E+00	7.88E+01	0.00E+00	0.00E+00	0.00E+00	1.59E+05	0.00E+00
Use of non-renewable primary energy resources used as raw materials	MJ	0.00E+00	2.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	0.00E+00	8.12E+01	0.00E+00	0.00E+00	0.00E+00	1.59E+05	0.00E+00
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of 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
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
Net use of fresh water	m3	0.00E+00	3.45E-02	0.00E+00	0.00E+00	0.00E+00	5.19E+00	0.00E+00
Total use of primary energy during the life cycle	MJ	0.00E+00	8.18E+01	0.00E+00	0.00E+00	0.00E+00	1.77E+05	0.00E+00
Hazardous waste disposed of	kg	0.00E+00	4.50E-02	0.00E+00	0.00E+00	0.00E+00	4.95E+01	0.00E+00
Non-hazardous waste disposed of	kg	0.00E+00	1.01E+00	0.00E+00	0.00E+00	0.00E+00	2.28E+02	0.00E+00
Radioactive waste disposed of	kg	0.00E+00	7.97E-04	0.00E+00	0.00E+00	0.00E+00	5.42E-02	0.00E+00
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
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the product	kg of C.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg of C.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

The Life Cycle Analysis was conducted using EIME software: EIME© v6.2.5. Whit its database version: CODDE-2024-04 (rev. 2024-06-04) * The results of this PEP represent the use of the product in countries with energy mixes of varying pollution levels, which significantly affects the product's environmental impact. To obtain the results that correspond to your product, please contact your Carrier representative.
As part of the life cycle analysis of buildings, the environmental impacts of the use stage must be declared according to modules B1 to B7 (B1: use; B2: maintenance; B3: repair; B4: replacement; B5: rehabilitation; B6: energy use; B7: water use).

3 – ENVIRONMENTAL IMPACTS

Per equipment corresponding to the reference unit (= for the declared unit - or declared product -) – 91.499 kW- (77 % Nominal heating capacity + 23% Nominal cooling capacity).

Environmental indicators		Total	Manu facturing	Distribution	Installation	Use ∑ B1 à B7	End of life	Potential benefits Module D
Climate change – total	kg CO2 eq.	1.22E+05	9.16E+03	5.85E+01	1.10E+02	1.11E+05	1.55E+03	-3.68E+03
Climate change - fossil fuels	kg CO2 eq.	1.16E+05	9.14E+03	5.85E+01	1.10E+02	1.05E+05	1.48E+03	-3.57E+03
Climate change - biogenics	kg CO2 eq.	6.29E+03	2.83E+01	0*	0*	6.18E+03	7.52E+01	-1.11E+02
Climate change - land use and land use transformation	kg CO2 eq.	2.19E-03	6.01E-04	8.85E-05	0*	1.50E-03	0*	0.00E+00
Ozone depletion	kg.eq.CFC-11	1.77E-03	4.05E-04	7.10E-07	7.37E-06	1.24E-03	1.19E-04	-1.44E-04
Acidification (AP)	mole of H+ eq	6.16E+02	8.50E+01	9.24E-02	5.69E-01	5.18E+02	1.18E+01	-6.45E+01
Freshwater eutrophication	kg P eq.	3.54E+00	3.18E-02	0*	0*	3.46E+00	4.86E-02	-4.63E+00
Marine aquatic eutrophication	kg of N eq.	8.52E+01	9.43E+00	1.68E-02	1.10E-01	7.16E+01	4.07E+00	-4.81E+00
Terrestrial eutrophication	mole of N eq	1.31E+03	1.05E+02	1.84E-01	1.23E+00	1.19E+03	1.36E+01	-5.75E+01
Photochemical ozone formation	kg of NMVOC eq.	2.47E+02	3.19E+01	5.95E-02	3.54E-01	2.10E+02	4.44E+00	-1.85E+01
Depletion of abiotic resources - elements	kg.eq..Sb	7.14E-01	5.78E-01	0*	0*	1.26E-01	1.07E-02	-2.11E-01
Depletion of abiotic resources - fossil fuels	MJ	1.48E+07	2.88E+05	0*	0*	1.45E+07	2.06E+04	-3.93E+04
Water scarcity	m3	1.17E+06	3.35E+03	0*	0*	2.04E+04	1.15E+06	-2.98E+06
Emission of fine particles	incidence of diseases	1.76E-02	5.20E-04	0*	3.18E-06	1.70E-02	9.47E-05	-3.32E-04
Ionizing radiation, human health	kBq of U235 eq.	1.89E+06	3.38E+03	0*	0*	1.89E+06	0*	-6.01E+02
Ecotoxicity, fresh water	CTUe	4.49E+05	2.37E+05	1.71E+03	1.33E+02	1.97E+05	1.38E+04	-1.96E+04
Human toxicity, cancer effects	CTUh	7.44E-05	4.82E-05	1.15E-08	7.66E-09	1.85E-05	7.60E-06	-4.21E-05
Human toxicity, non-cancer effects	CTUh	9.67E-04	4.10E-04	2.19E-07	4.88E-07	4.87E-04	6.96E-05	-5.86E-04
Impacts related to land use/soil quality	-	9.98E+03	8.64E+02	0*	0*	5.32E+03	3.80E+03	-1.19E+04
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	1.66E+06	6.96E+03	0*	0*	1.65E+06	3.33E+03	-1.01E+04
Use of renewable primary energy resources used as raw materials	MJ	1.44E+02	1.44E+02	0*	0*	0*	0*	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.66E+06	7.11E+03	0*	0*	1.65E+06	3.33E+03	-1.01E+04
Use of non-renewable primary energy, excluding non- renewable primary energy resources used as raw materials	MJ	1.48E+07	2.86E+05	0*	0*	1.45E+07	2.06E+04	-3.93E+04
Use of non-renewable primary energy resources used as raw materials	MJ	1.95E+03	1.48E+03	0*	2.49E+02	2.20E+02	0*	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.48E+07	2.88E+05	0*	0*	1.45E+07	2.06E+04	-3.93E+04
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of 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
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
Net use of fresh water	m3	2.86E+04	7.81E+01	0*	0*	4.78E+02	2.80E+04	-7.10E+04
Total use of primary energy during the life cycle	MJ	1.65E+07	2.95E+05	0*	0*	1.62E+07	2.39E+04	-4.94E+04
Hazardous waste disposed of	kg	2.50E+04	2.05E+04	0*	0*	4.54E+03	0*	-9.35E-15
Non-hazardous waste disposed of	kg	2.58E+04	4.89E+03	5.43E+00	9.36E+00	2.09E+04	0*	-1.87E-14
Radioactive waste disposed of	kg	7.64E+00	2.60E+00	4.30E-03	2.67E-03	5.04E+00	0*	0.00E+00
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
Materials for recycling	kg	3.32E-03	3.32E-03	0*	0*	0*	0*	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the product	kg of C.	4.45E-02	4.45E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg of C.	1.47E+00	1.47E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

The Life Cycle Analysis was conducted using EIME software: EIME© v6.2.5. Whit its database version: CODDE-2024-04 (rev. 2024-06-04) * The results of this PEP represent the use of the product in countries with energy mixes of varying pollution levels, which significantly affects the product's environmental impact. To obtain the results that correspond to your product, please contact your Carrier representative.
* Represents less than 0.01% of the total life cycle of the reference flow.
The -1/+1 valuation methodology was applied to determine biogenic carbon content.

3 – ENVIRONMENTAL IMPACTS

Breakdown of the use phase - Per equipment corresponding to the reference unit (= for the declared unit - or declared product -) – 91.499 kW- (77 % Nominal heating capacity + 23% Nominal cooling capacity).

Environmental indicators		Use B1	Maintenance B2	Repair B3	Replacement B4	Refurbishment B5	Operational energy use B6	Operational water use B7
Climate change – total	kg CO2 eq.	4.09E-02	3.34E+02	0.00E+00	0.00E+00	0.00E+00	1.11E+05	0.00E+00
Climate change - fossil fuels	kg CO2 eq.	4.09E-02	3.34E+02	0.00E+00	0.00E+00	0.00E+00	1.04E+05	0.00E+00
Climate change - biogenics	kg CO2 eq.	0.00E+00	1.69E-02	0.00E+00	0.00E+00	0.00E+00	6.18E+03	0.00E+00
Climate change - land use and land use transformation	kg CO2 eq.	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ozone depletion	kg.eq.CFC-11	0.00E+00	1.14E-05	0.00E+00	0.00E+00	0.00E+00	1.23E-03	0.00E+00
Acidification (AP)	mole of H+ eq	0.00E+00	1.05E+00	0.00E+00	0.00E+00	0.00E+00	5.17E+02	0.00E+00
Freshwater eutrophication	kg P eq.	0.00E+00	1.37E-03	0.00E+00	0.00E+00	0.00E+00	3.46E+00	0.00E+00
Marine aquatic eutrophication	kg of N eq.	0.00E+00	2.44E-01	0.00E+00	0.00E+00	0.00E+00	7.13E+01	0.00E+00
Terrestrial eutrophication	mole of N eq	0.00E+00	2.68E+00	0.00E+00	0.00E+00	0.00E+00	1.19E+03	0.00E+00
Photochemical ozone formation	kg of NMVOC eq.	6.08E-01	7.87E-01	0.00E+00	0.00E+00	0.00E+00	2.09E+02	0.00E+00
Depletion of abiotic resources - elements	kg.eq..Sb	0.00E+00	9.86E-04	0.00E+00	0.00E+00	0.00E+00	1.25E-01	0.00E+00
Depletion of abiotic resources - fossil fuels	MJ	0.00E+00	7.43E+03	0.00E+00	0.00E+00	0.00E+00	1.45E+07	0.00E+00
Water scarcity	m3	0.00E+00	5.92E+01	0.00E+00	0.00E+00	0.00E+00	2.03E+04	0.00E+00
Emission of fine particles	incidence of diseases	0.00E+00	8.28E-06	0.00E+00	0.00E+00	0.00E+00	1.69E-02	0.00E+00
Ionizing radiation, human health	kBq of U235 eq.	0.00E+00	3.36E+01	0.00E+00	0.00E+00	0.00E+00	1.89E+06	0.00E+00
Ecotoxicity, fresh water	CTUe	0.00E+00	2.88E+04	0.00E+00	0.00E+00	0.00E+00	1.68E+05	0.00E+00
Human toxicity, cancer effects	CTUh	0.00E+00	1.94E-07	0.00E+00	0.00E+00	0.00E+00	1.84E-05	0.00E+00
Human toxicity, non-cancer effects	CTUh	0.00E+00	3.10E-06	0.00E+00	0.00E+00	0.00E+00	4.84E-04	0.00E+00
Impacts related to land use/soil quality	-	0.00E+00	4.68E+00	0.00E+00	0.00E+00	0.00E+00	5.32E+03	0.00E+00
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	0.00E+00	5.62E+01	0.00E+00	0.00E+00	0.00E+00	1.65E+06	0.00E+00
Use of 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
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	0.00E+00	5.62E+01	0.00E+00	0.00E+00	0.00E+00	1.65E+06	0.00E+00
Use of non-renewable primary energy, excluding non- renewable primary energy resources used as raw materials	MJ	0.00E+00	7.21E+03	0.00E+00	0.00E+00	0.00E+00	1.45E+07	0.00E+00
Use of non-renewable primary energy resources used as raw materials	MJ	0.00E+00	2.20E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	0.00E+00	7.43E+03	0.00E+00	0.00E+00	0.00E+00	1.45E+07	0.00E+00
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of 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
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
Net use of fresh water	m3	0.00E+00	3.16E+00	0.00E+00	0.00E+00	0.00E+00	4.75E+02	0.00E+00
Total use of primary energy during the life cycle	MJ	0.00E+00	7.49E+03	0.00E+00	0.00E+00	0.00E+00	1.62E+07	0.00E+00
Hazardous waste disposed of	kg	0.00E+00	4.11E+00	0.00E+00	0.00E+00	0.00E+00	4.53E+03	0.00E+00
Non-hazardous waste disposed of	kg	0.00E+00	9.20E+01	0.00E+00	0.00E+00	0.00E+00	2.08E+04	0.00E+00
Radioactive waste disposed of	kg	0.00E+00	7.30E-02	0.00E+00	0.00E+00	0.00E+00	4.96E+00	0.00E+00
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
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the product	kg of C.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg of C.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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As part of the life cycle analysis of buildings, the environmental impacts of the use stage must be declared according to modules B1 to B7 (B1: use; B2: maintenance; B3: repair; B4: replacement; B5: rehabilitation; B6: energy use; B7: water use).

4 – EXTRAPOLATION TO THE OTHER SIZES IN THE RANGE

		Capacity kW	Manufacturing	Distribution	Installation	B1	B6	End of life	Module D
	61AQ_040P	37	1.304	1.304	0	1.289	1.021	1.304	1.304
	61AQ_050P	46	1.063	1.063	0	1.032	1.021	1.063	1.063
	61AQ_060P	57	0.928	0.928	0	0.83	0.987	0.928	0.928
	61AQ_080P	73	1.225	1.225	0	1.248	0.998	1.225	1.225
REF	**61AQ_100P**	**91**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
	61AQ_120P	113	0.889	0.889	0	0.812	0.988	0.889	0.889

Extrapolation coefficients are given for the environmental impact of the functional unit, i.e. the emission of 1 kW of heating or cooling power. For each stage of the life cycle, the environmental impacts of the product concerned are calculated by multiplying the impacts of the declaration corresponding to the reference product by the extrapolation coefficient. The "Total" column should be calculated by adding the environmental impacts of each stage of the life cycle.

The impacts between the functional unit (1 kW) and the declared product (reference product) respect for each stage of the life cycle, the following relationship:
Environmental impacts of the PEP (for 1 kW) = Environmental impacts of the reference product / Power of the reference product

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Vérifier accreditation number: **VH39**	Information and reference documents: **www.pep-ecopassport.org**
Date of issue: **7-2025**	Validity period: **5 years**
Independent verification of the declaration and data, in compliance with ISO 14025: 2006	
Internal : ☐	**External :** ☒
The PCR review was conducted by a panel of experts chaired by Julie ORGELET (DDemain)	
PEP are compliant with NF C08-100-1 :2016 and EN 50693 :2019 or NF E38-500 :2022 **The elements of the present PEP cannot be compared with elements from another program.**	
Document in compliance with ISO 14025: 2006 "Environmental labels and declarations. **Type III environmental déclarations"**	

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