PRODUCT ENVIRONMENTAL PROFILE

AQUACIAT^{POWER} ILD

Rated cooling capacity 160-500 kW
Rated heating capacity 170 -530 kW

CONTENTS

1. General Information

1.1 - Product description

Product family

Reversible heat pump

Technical description

- Low R-32 refrigerant charge
- Scroll compressors
- Greenspeed® variable-speed fans (model 30RQP)
- Brazed-plate heat exchangers with reduced pressure drops
- Self-regulating microprocessor control with Greenspeed® intelligence
- Colour touch screen with web connectivity options
- Internal timer: switches the chiller on/off and controls operation at a second setpoint
- Setpoint automatically offset based on the outdoor air temperature or room air temperature (via an option)
- Floating high pressure (HP) management
- Variable-speed fan control
- Cooling demand limitation.

Category

Thermodynamic generators with electric compression for room cooling and/or heating.

Reference product

The most representative product in the studied range is the AQUACIATPOWERILD1000R with the high seasonal energy efficiency option.

1.2 Functional unit

Producing 1 kW of cooling and/or heating, based on the appropriate usage scenario defined in standard EN 14825 and throughout the product's reference service life (RSL).

The PEP was created using a reference average power supply value of 1 kW based on the cooling and heating capacities. The actual impact of the life cycle stages of the product when installed in a real-life situation should be calculated by the user of the PEP by multiplying the theoretical impact by the rated heating and cooling capacity in kW.

2. Environmental information

2.1 - Life cycle analysis methodology

Manufacture

The Life Cycle Analysis on which this Product Environmental Profile (PEP) is based was conducted with respect to the criteria imposed by PCR–ed3FR-FR-2015 04 02 and PSR-0013-ed2.0-FR-2019 12 06 of the PEP ecopassport® programme

The environmental analysis was conducted for the whole of the following life cycle: production, distribution, installation, use and end of life.

Energy model

The origin of the electricity consumed by the production site is 100% hydraulic.

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 AQUACIATPOWERILD product is designed on a CARRIER site which holds the following certifications: ISO 14001, ISO 50001.

Distribution

Energy model

No energy resources are used at this stage, since the transport models already include fuel.

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 description of each product.

Installation

Energy model

No energy resources are used at this stage, since the transport models already include fuel.

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.

Use

Energy model

The standard scenario used to calculate the environmental impacts related to consumption of the product is defined in regulation nos. 813/2013 & 2016/2281. According to the NF EN 14825 standard, for a comfort application, the seasonal performance (SCOP – Seasonal Coefficient of Performance & SEER – Seasonal Energy Efficiency Ratio) of the reversible heat pump is characterised by taking into account the operation time according to the load rate of the product after a typical heating & cooling season in Europe (average climate). To calculate the energy consumption, the operation time for a reversible air-to-water heat pump is 2066h/year in heating mode and 600h/year in cooling mode.

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 "Sales scenario" 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.

End of life

The AQUACIATPOWERILD range contains components (PCBs, LCD screen, batteries) that must be separated from the waste flow to optimise end-of-life processing. They are processed using the specific Eco'DEEE method.

CARRIER partners the Eco-systèmes pro collection organisation, which dismantles our machines in France at the end of their life.

Energy model

No energy resources are used at this stage, since the transport models already include fuel.

3. Reference product ILD1000R

3.1 - Product description

In accordance with the documents that provide the framework for the life cycle analysis, the reference service life (RSL) was set on the basis of the target customers.

The environmental indicators are normalised to the functional unit by dividing by the machine capacity.

Power in heating mode: 275.00 kW SCOP: 3.63 Reference Service Life: 22 years

Capacity in cooling mode: 254.00 kW SEER: 4.33 Customer type: Residential sector

Fluid emission level: 0.53% of total load/year collective housing/service sector

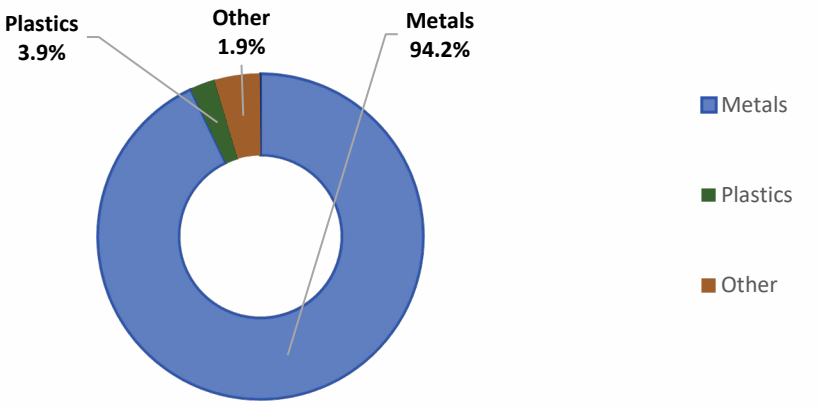
Fluid type: R32 (GWP = 675 tCO_2eq)

3.2 - Component materials (Product drained)

Actual mass of the unit: 1796.00 kg

Total modelled mass: 1741.15 kg, i.e. a total of 96.95% of the total mass including the product, its packaging and the additional components supplied with the reference product.

PEP material category	Material	Mass (kg)	Percentage
Metals	Steel	965.32	55.4%
Metals	35% recycled steel	289.44	16.6%
Metals	Aluminium	177.07	10.2%
Metals	Copper	82.90	4.8%
Metals	Cast iron	82.15	4.7%
Metals	Zinc	43.10	2.5%
Refrigerant	R32	32	-
Other	Miscellaneous	6.06	0.3%
Other	Solid wood for pallets	28.12	1.6%
Plastics	Fibreglass	8.78	0.5%
Plastics	Polypropylene (PP)	14.25	0.8%
Plastics	Low-density polyethylene (LDPE) film	11.52	0.7%
Plastics	Polyurethane glue	9.01	0.5%
Plastics	Low-density polyethylene (LDPE) film	8.00	0.5%
Plastics	Styrene butadiene rubber (SBR)	6.55	0.4%
Plastics	Polyamide 6.6 resin (PA6.6)	5.14	0.3%
Plastics	Silicone rubber	3.76	0.2%
Total		1741.15	100.0%



3.3 - Sales scenario

Sales of the AQUACIATPOWERILD product are distributed as follows:

Country name	%
Europe	100.00%

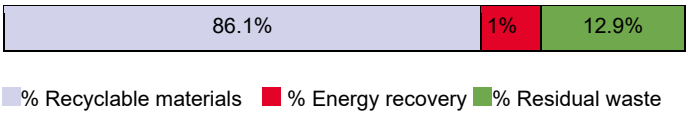
This distribution affects the distance travelled during the distribution phase and the electric mix used during the usage phase.

3.4 - Recyclability rate

% Recyclable materials	86.1%
% Energy recovery	1%
% Residual waste	12.9%

The products' recyclability potential was evaluated using the "Eco'DEEE method for calculating recyclability and recovery".

(Version V1, 20 Sep. 2008 presented to ADEME [French environment and energy management agency]).



3.5 - Environmental impacts

A life cycle analysis identifies a product's potential environmental impacts.

Environmental impacts per kW corresponding to the functional unit

List of references in paragraph: 6.1 Environmental references and indicators

Reference	Total	Manufacture	Distribution	Installation	Use	End of life
1	8.4859E+03	7.4929E+02	1.4055E+00	1.1731E-02	7.7293E+03	5.9169E+00
2	7.6502E-02	7.5826E-02	2.8478E-09	2.8704E-11	6.7568E-04	3.7741E-09
3	3.2501E+01	6.0086E-01	6.3158E-03	5.2341E-05	3.1893E+01	2.7816E-04
4	2.0070E+00	7.9729E-02	1.4514E-03	1.2031E-05	1.9258E+00	6.7123E-05
5	1.7888E+00	3.3790E-02	4.4879E-04	3.7396E-06	1.7545E+00	1.9762E-05
6	2.0644E-03	1.3863E-03	5.6258E-08	4.6810E-10	6.7808E-04	2.3593E-09
7	8.7626E+04	7.9891E+02	1.9750E+01	1.6415E-01	8.6806E+04	8.8689E-01
8	3.5015E+05	3.4391E+04	2.3118E+02	1.9227E+00	3.1552E+05	1.0210E+01
9	3.6949E+05	3.9973E+04	5.7625E+01	4.8833E-01	3.2946E+05	2.9176E+00
10	1.9458E+04	4.0181E+01	2.6490E-02	2.2030E-04	1.9418E+04	1.1871E-03
11	8.9392E+00	8.9392E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	1.9467E+04	4.9120E+01	2.6490E-02	2.2030E-04	1.9418E+04	1.1871E-03
13	1.3446E+05	1.1534E+03	1.9851E+01	1.6550E-01	1.3329E+05	9.0596E-01
14	3.6816E+02	3.6803E+02	0.0000E+00	0.0000E+00	1.3390E-01	0.0000E+00
15	1.3483E+05	1.5214E+03	1.9851E+01	1.6550E-01	1.3329E+05	9.0596E-01
16	6.8769E-01	6.6874E-01	0.0000E+00	0.0000E+00	1.8946E-02	0.0000E+00
17	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	2.7722E+04	4.6386E-01	1.2581E-04	3.0838E-04	2.7722E+04	4.9745E-05
20	1.0616E+02	1.0209E+02	0.0000E+00	7.1207E-06	3.9887E+00	8.3833E-02
21	2.8552E+04	4.4699E+01	4.9948E-02	4.8198E-04	2.8507E+04	2.8247E-03
22	1.9055E+01	1.6774E-02	3.5575E-05	3.0243E-07	1.9038E+01	2.8716E-06
23	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
24	4.0163E-03	4.0163E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
25	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
26	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
27	1.5430E+05	1.5705E+03	1.9877E+01	1.6572E-01	1.5271E+05	9.0715E-01

Reference	Use (B1)	Maintenance (B2)	Repair (B3)	Replacement (B4)	Refurbishment (B5)	Energy use during the usage stage (B6)*	Water use during the usage stage (B7)
1	8.3305E+01	1.1007E-01	0.0000E+00	1.3771E-01	0.0000E+00	7.6458E+03	0.0000E+00
2	1.7760E-04	2.2183E-10	0.0000E+00	7.6253E-09	0.0000E+00	4.9807E-04	0.0000E+00
3	4.1880E-06	5.0387E-04	0.0000E+00	1.5613E-04	0.0000E+00	3.1893E+01	0.0000E+00
4	9.6924E-07	1.1661E-04	0.0000E+00	4.0748E-05	0.0000E+00	1.9256E+00	0.0000E+00
5	1.9657E-03	3.6761E-05	0.0000E+00	4.9038E-05	0.0000E+00	1.7524E+00	0.0000E+00
6	1.3734E-05	4.3822E-09	0.0000E+00	4.0872E-09	0.0000E+00	6.6433E-04	0.0000E+00
7	1.7773E+01	1.5385E+00	0.0000E+00	1.1035E+00	0.0000E+00	8.6786E+04	0.0000E+00
8	2.3282E+00	1.8008E+01	0.0000E+00	4.5356E+00	0.0000E+00	3.1549E+05	0.0000E+00
9	3.5288E+02	5.2800E+00	0.0000E+00	2.3821E+01	0.0000E+00	3.2907E+05	0.0000E+00
10	1.7151E-05	2.0634E-03	0.0000E+00	2.3750E-03	0.0000E+00	1.9418E+04	0.0000E+00
11	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

12	1.7151E-05	2.0634E-03	0.0000E+00	2.3750E-03	0.0000E+00	1.9418E+04	0.0000E+00
13	1.2852E-02	1.5463E+00	0.0000E+00	1.0618E+00	0.0000E+00	1.3328E+05	0.0000E+00
14	0.0000E+00	0.0000E+00	0.0000E+00	1.3390E-01	0.0000E+00	0.0000E+00	0.0000E+00
15	1.2852E-02	1.5463E+00	0.0000E+00	1.1957E+00	0.0000E+00	1.3328E+05	0.0000E+00
16	0.0000E+00	0.0000E+00	0.0000E+00	1.8946E-02	0.0000E+00	0.0000E+00	0.0000E+00
17	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	8.1457E-08	9.8002E-06	0.0000E+00	3.4358E-04	0.0000E+00	2.7722E+04	0.0000E+00
20	0.0000E+00	0.0000E+00	0.0000E+00	2.6869E-03	0.0000E+00	3.9860E+00	0.0000E+00
21	3.2338E-05	3.8907E-03	0.0000E+00	1.0271E-02	0.0000E+00	2.8507E+04	0.0000E+00
22	2.3032E-08	2.7711E-06	0.0000E+00	3.1789E-06	0.0000E+00	1.9038E+01	0.0000E+00
23	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
24	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
25	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
26	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
27	1.2869E-02	1.5483E+00	0.0000E+00	1.1981E+00	0.0000E+00	1.5270E+05	0.0000E+00

The Life Cycle Analysis was conducted using EIME© v5.8.1 software. With its database version: CODDE-2018-11 * 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 CIAT representative.

4. Extrapolation to the other sizes in the range

The studied ranges of the 1600R to 3520R are equipped with the "High rated energy efficiency" option.

4.1 - Extrapolation scenario

The mass extrapolation coefficient in the **manufacturing phase** is calculated using the mean capacity, as well as the formula below to obtain:

$$\frac{mass\ of\ product\ considered - total\ mass\ of\ EEE\ components\ (kg)}{total\ mass\ of\ reference\ product\ including\ packaging\ but\ excluding\ EEE\ components\ (kg)} \times \frac{Capacity\ of\ reference\ product\ (kW)}{Capacity\ of\ product\ considered\ (kW)}$$

Equation:1 Formula for calculating the mass coefficient in the manufacturing phase

Manufacture	Mass coefficient	Mass (kg)
ILD0602R	1.32	1384
ILD0700R	1.20	1389
ILD0800R	1.16	1598
ILD0900R	1.07	1617
ILD1000R	**1.00**	**1623**
ILD1150R	1.12	2169
ILD1250R	1.07	2218
ILD1400R	1.05	2431
ILD1500R	1.00	2437
ILD1600R	1.10	2901
ILD1750R	1.04	2924
ILD2000R	0.99	3156

For the **distribution phase**, the total mass of the product including packaging has been used for the calculations.
The mass extrapolation coefficient in the distribution phase is calculated using the mean capacity, as well as the formula below to obtain:

$$\frac{mass\ of\ product\ considered\ (kg)}{total\ mass\ of\ reference\ product\ (kg)} \times \frac{Capacity\ of\ reference\ product\ (kW)}{Capacity\ of\ product\ considered\ (kW)}$$

Equation 2: Formula for calculating the mass coefficient in the distribution phase

Distribution	Mass coefficient	Mass (kg)
ILD0602R	1.34	1582
ILD0700R	1.22	1587
ILD0800R	1.16	1796
ILD0900R	1.07	1819
ILD1000R	**1.00**	**1826**
ILD1150R	1.10	2399
ILD1250R	1.05	2448
ILD1400R	1.03	2668
ILD1500R	0.98	2674
ILD1600R	1.07	3164
ILD1750R	1.01	3187
ILD2000R	0.95	3430

For the **installation phase**, only the mass of the packaging was used for the calculations.
The mass extrapolation coefficient in the installation phase is calculated using the mean capacity, as well as the formula below to obtain:

$$\frac{\boldsymbol{mass\ of\ packaging\ of\ product\ considered\ (kg)}}{\boldsymbol{mass\ of\ packaging\ of\ the\ reference\ product\ (kg)}} \times \frac{\boldsymbol{Capacity\ of\ the\ reference\ product\ (kW)}}{\boldsymbol{Capacity\ of\ the\ product\ considered\ (kW)}}$$

Equation 3: Formula for calculating the mass coefficient in the installation phase

Installation	Mass coefficient	Mass (kg)
ILD0602R	1.55	30
ILD0700R	1.36	29
ILD0800R	1.14	29
ILD0900R	1.04	29
ILD1000R	**1.00**	**30**
ILD1150R	1.23	44
ILD1250R	1.15	44
ILD1400R	1.03	44
ILD1500R	0.98	44
ILD1600R	1.21	59
ILD1750R	1.14	59
ILD2000R	1.00	59

The energy coefficients in the **usage phase** are calculated using the consumption values, as well as the formula below to obtain:

$$\frac{\boldsymbol{C\ of\ the\ product\ considered\ (kWh)}}{\boldsymbol{C\ of\ the\ reference\ product\ (kWh)}} \times \frac{\boldsymbol{Capacity\ of\ the\ reference\ product\ (kW)}}{\boldsymbol{Capacity\ of\ the\ product\ considered\ (kW)}}$$

Equation 4: Formula for calculating the energy coefficient in the usage phase

Use	Energy coefficient	C [KWh] over 22 years
ILD0602R	1.01	2756008
ILD0700R	1.03	3085756
ILD0800R	1.02	3653754
ILD0900R	1.00	3926394
ILD1000R	**1.00**	**4217652**
ILD1150R	0.94	4729854
ILD1250R	0.92	4972536
ILD1400R	0.94	5657352
ILD1500R	0.94	5940539
ILD1600R	0.94	6464328
ILD1750R	0.95	6910597
ILD2000R	0.95	7846339

Calculation of the total energy consumption level of the unit over 22 years:

$$Ctot\ (kWh) = \left(\frac{Heating\ capacity}{SCOP} * heating\ operation\ time + \frac{Cooling\ capacity}{SEER} * Cooling\ operation\ time\right) * DVR$$

With:

- Annual cooling operation time = 600 hours
- Annual heating operation time = 2066 hours
- Machine Service Life (MSL) = 22 years

For the **end-of-life phase**, the mass of the packaging was subtracted from the total mass of the product.
The mass extrapolation coefficient in the end-of-life phase is calculated using the mean capacity, as well as the formula below to obtain:

$$\frac{\boldsymbol{mass\ of\ product\ considered, excluding\ packaging\ (kg)}}{\boldsymbol{mass\ of\ reference\ product, excluding\ packaging\ (kg)}} \times \frac{\boldsymbol{Capacity\ of\ the\ reference\ product\ (kW)}}{\boldsymbol{Capacity\ of\ the\ product\ considered\ (kW)}}$$

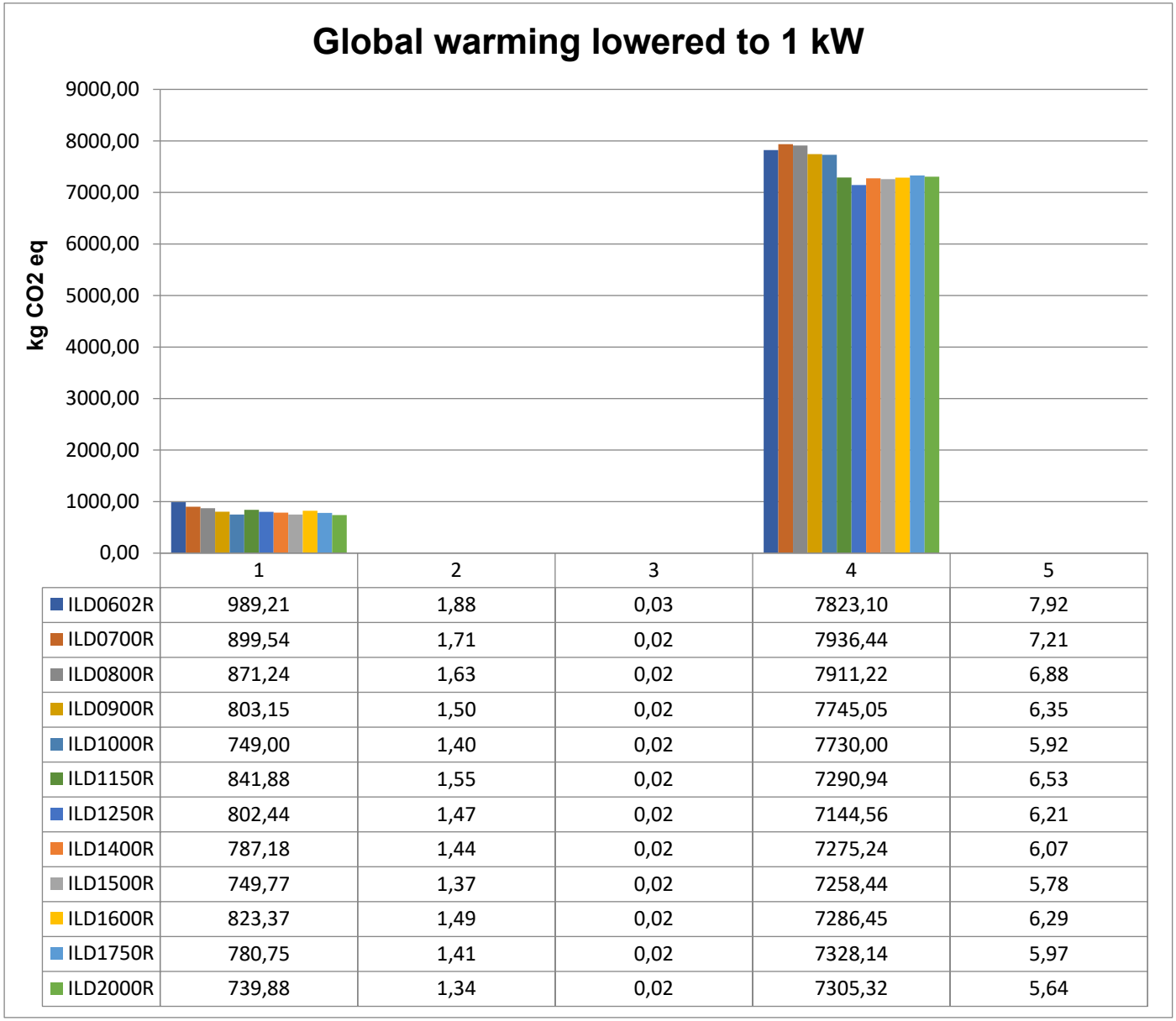
Equation 5: Formula for calculating the mass coefficient in the end-of-life phase

End of life	Mass coefficient	Mass (kg)
ILD0602R	1.34	1552
ILD0700R	1.22	1558
ILD0800R	1.16	1767
ILD0900R	1.07	1790
ILD1000R	**1.00**	**1796**
ILD1150R	1.10	2355
ILD1250R	1.05	2404
ILD1400R	1.03	2624
ILD1500R	0.98	2630
ILD1600R	1.06	3105
ILD1750R	1.01	3128
ILD2000R	0.95	3371

5. Representative graphics

5.1 - Graphic representing global warming lowered to 1 kW

Global warming: The process of global warming occurs when CO_2 (a greenhouse gas) emitted into the air collects and absorbs solar radiation from sunlight thereby warming the atmosphere.

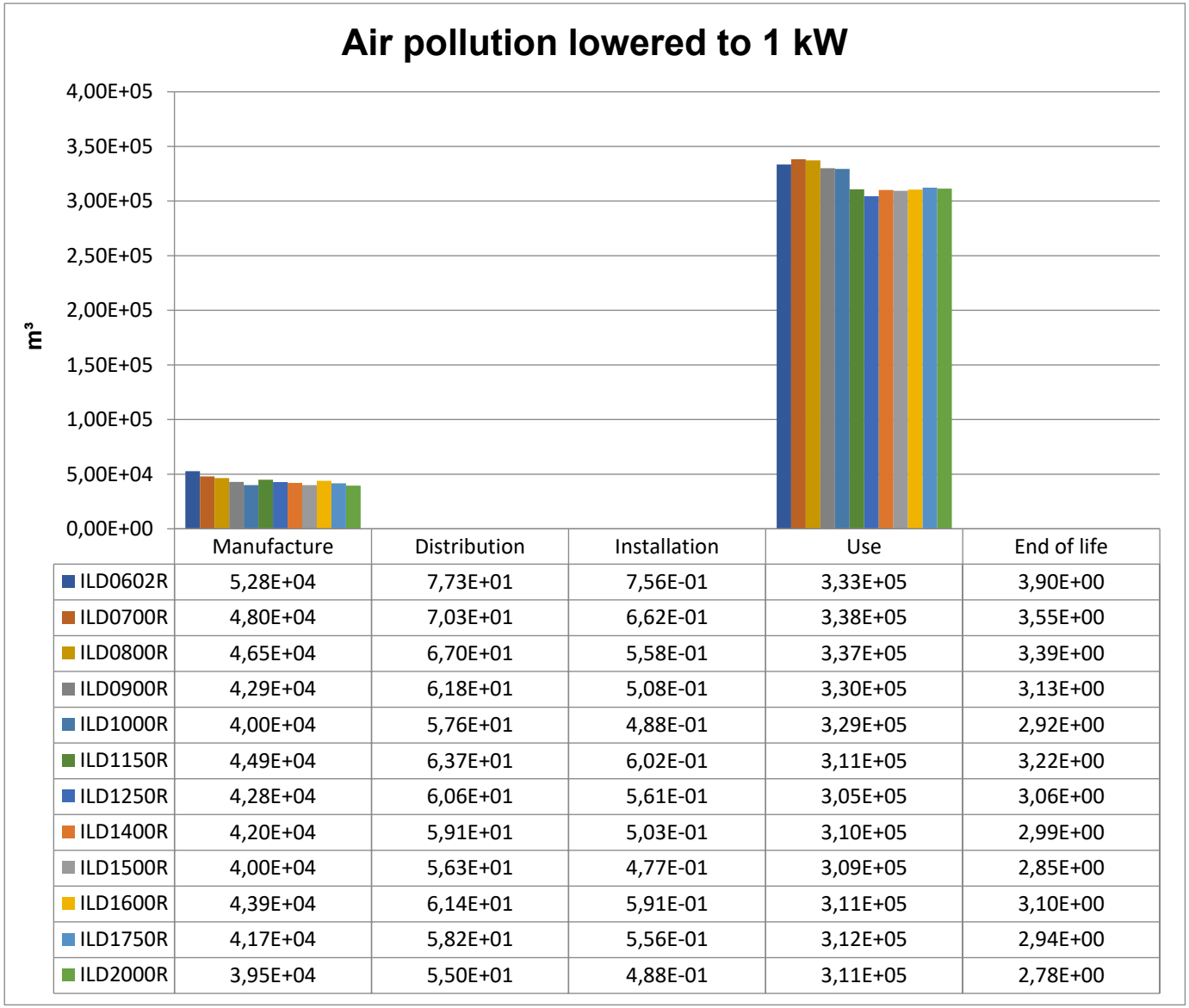


	1	2	3	4	5
ILD0602R	989,21	1,88	0,03	7823,10	7,92
ILD0700R	899,54	1,71	0,02	7936,44	7,21
ILD0800R	871,24	1,63	0,02	7911,22	6,88
ILD0900R	803,15	1,50	0,02	7745,05	6,35
ILD1000R	749,00	1,40	0,02	7730,00	5,92
ILD1150R	841,88	1,55	0,02	7290,94	6,53
ILD1250R	802,44	1,47	0,02	7144,56	6,21
ILD1400R	787,18	1,44	0,02	7275,24	6,07
ILD1500R	749,77	1,37	0,02	7258,44	5,78
ILD1600R	823,37	1,49	0,02	7286,45	6,29
ILD1750R	780,75	1,41	0,02	7328,14	5,97
ILD2000R	739,88	1,34	0,02	7305,32	5,64

5.2 – Graphic representing air pollution lowered to 1 kW

Air pollution: An indicator which is used to quantify the impact of the product on outdoor air quality.

The number of m^3 represents the volume of air which would be required to dilute the pollution generated so that this fell within the environmental regulatory thresholds.



	Manufacture	Distribution	Installation	Use	End of life
ILD0602R	5,28E+04	7,73E+01	7,56E-01	3,33E+05	3,90E+00
ILD0700R	4,80E+04	7,03E+01	6,62E-01	3,38E+05	3,55E+00
ILD0800R	4,65E+04	6,70E+01	5,58E-01	3,37E+05	3,39E+00
ILD0900R	4,29E+04	6,18E+01	5,08E-01	3,30E+05	3,13E+00
ILD1000R	4,00E+04	5,76E+01	4,88E-01	3,29E+05	2,92E+00
ILD1150R	4,49E+04	6,37E+01	6,02E-01	3,11E+05	3,22E+00
ILD1250R	4,28E+04	6,06E+01	5,61E-01	3,05E+05	3,06E+00
ILD1400R	4,20E+04	5,91E+01	5,03E-01	3,10E+05	2,99E+00
ILD1500R	4,00E+04	5,63E+01	4,77E-01	3,09E+05	2,85E+00
ILD1600R	4,39E+04	6,14E+01	5,91E-01	3,11E+05	3,10E+00
ILD1750R	4,17E+04	5,82E+01	5,56E-01	3,12E+05	2,94E+00
ILD2000R	3,95E+04	5,50E+01	4,88E-01	3,11E+05	2,78E+00

6. Glossary

6.1 - Additional data

Model	Heating capacity (kW)	Cooling capacity (kW)	Mass of refrigerant (kg)
ILD0602R	178	164	26.5
ILD0700R	197	181	26.5
ILD0800R	237	215	32
ILD0900R	256	236	32
ILD1000R	**275**	**254**	**32**
ILD1150R	317	302	43
ILD1250R	336	324	44
ILD1400R	387	362	56
ILD1500R	406	381	56
ILD1600R	441	413	63
ILD1750R	467	439	63
ILD2000R	537	500	72

This study used the Indicators for PEP ecopassport® - PCR 3 - 2015.

6.2 - Environmental references and indicators

Reference	Indicator	Unit
1	Global warming *	kg.equivalent.CO_2
2	Depletion of the ozone layer *	kg.equivalent.CFC11
3	Acidification of soil and water *	kg.equivalent.SO2
4	Eutrophication of water *	kg.equivalent.P04 3-
5	Photochemical ozone creation *	kg.equivalent.C2H4
6	Depletion of abiotic resources *	kg.equivalent.Sb
7	Depletion of abiotic resources - fossil fuels	MJ
8	Water pollution	m3
9	Air pollution	m3
10	Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ
11	Use of renewable primary energy resources as raw materials	MJ
12	Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ
13	Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ
14	Use of non-renewable primary energy resources as raw materials	MJ
15	Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ
16	Use of secondary materials	kg
17	Use of renewable secondary fuels	MJ
18	Use of non-renewable secondary fuels	MJ
19	Net use of fresh water *	m3
20	Hazardous waste disposed	kg
21	Non-hazardous waste disposed	kg
22	Radioactive waste disposed	kg
23	Components for reuse	kg
24	Materials for recycling	kg
25	Materials for energy recovery	kg
26	Exported energy	MJ per energy carrier
27	Life cycle total use of primary energy *	MJ

6.3 - Mandatory indicators

- **GWP (Global Warming Potential):** this indicator is used to calculate the global warming potential caused by emissions in the air contributing to the greenhouse effect. It is expressed in kg CO_2 eq. In accordance with F-Gas regulation. (Regulation 517/2014).
- **ODP (Ozone Depletion):** this indicator is used to calculate the contribution to depletion of the stratospheric ozone layer by atmospheric emissions. It is expressed in kg CFC-11 eq. The calculation methodology comes from the WMO (World Meteorological Organization, CML 2012).
- **A (Acidification of soil and water):** this indicator is used to calculate the acidification of the soil and water. It is expressed in kg SO_2 eq. The calculation methodology was developed by Huijbregts (CML, 2012).
- **EP (Eutrophication):** this indicator is used to calculate the eutrophication (enrichment with nutrients) of oceans and lakes by effluent. It is expressed in PO_{43-} eq. Eutrophication of water courses results from excessive enrichment with nutrient molecules (organic molecules) in the environment. Phosphorus, nitrogen, carbon and potassium allow the development of algae and aquatic species that can lead to a reduction in the oxygen level and an unbalanced biocoenosis. The calculation methodology was developed by Heijungs et al. 1992 (CML, 2012).
- **POCP (Photochemical Oxidation):** this indicator, expressed in kg C_2H_4 eq., is used to calculate the amount of ozone produced in the troposphere due to the action of solar radiation on oxidising gas emissions (known as summer smog; see summer peak ozone levels). The calculation methodology was developed by Jenkin & Hayman - Derwent et al. (CML, 2012).
- **ADPe (Depletion of Abiotic Resources - Elements:** this indicator is used to calculate the depletion of non-renewable mineral resources by taking into account the extent of natural reserves. It is expressed in equivalents of kilograms of antimony (kg eq Sb). The calculation methodology was developed by Oers et al. (CML, 2012).
- **EP (Total use of primary energy):** total use of primary energy during the life cycle (in MJ).
- **NUFW (Net use of fresh water):** This indicator represents the net consumption of fresh water used for the system (in m^3). In EIME, fresh water is broken down into river, lake, underground and surface water, as well as water of unspecified origin. Water extracted and discharged into these environments with the same quality level is not covered by this indicator.

6.4 - Optional indicators

- **ADPf (Depletion of Abiotic Resources - Fossil Fuels:** This indicator is used to calculate the consumption of non-renewable fossil fuel resources. It is expressed in equivalents of kilograms of antimony (kg eq Sb). The calculation methodology was developed by Oers et al. (CML, 2012).
- **WP (Water Pollution):** this indicator, expressed as a critical volume (m^3), is used to calculate water pollution by taking into account the authorised effluent concentration limits. The methodology comes from the DHUP (French directorate of housing, urbanism and landscape)based on the recommendations of the AIMCC (French construction industry trade association)
- **AP (Air Pollution):** this indicator, expressed as a critical volume (m^3), is used to calculate ambient air pollution (troposphere) by taking into account the authorised concentration limits for atmospheric emissions. The methodology comes from the DHUP (French directorate of housing, urbanism and landscape)based on the recommendations of the AIMCC (French construction industry trade association).
- **REP (Use of renewable primary energy excluding renewable primary energy resources used as raw materials)** in MJ.
- **REM (Use of renewable primary energy used as raw materials):** in MJ.
- **RE (Total use of renewable primary energy resources):** primary energy and primary energy resources used as raw materials (in MJ).
- **NREP (Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials)** in MJ.
- **NREM (Use of non-renewable primary energy used as raw materials):** in MJ.
- **NRE (Total use of non-renewable primary energy resources):** (primary energy and primary energy resources used as raw materials) (in MJ).
- **USM (Use of Secondary Materials):** This indicator represents the amount of secondary material used for the system (in kg). This indicator increases if a material has a recycled content other than zero. For example, the use of 1 kg of 80% recycled plastic will add 0.8 kg to this indicator.
- **URSF (Use of renewable secondary fuels):** in MJ.
- **URSF (Use of non-renewable secondary fuels):** in MJ.
- **HWD (Hazardous Waste Disposed):** The results of this indicator correspond to the weight of hazardous waste expressed in kilograms. This indicator, which is a flow indicator, does not introduce the concept of relativity between the various contributors. For example, at equal weight, toxic waste from the chemical industry has the same impact as red sludge. The objective of this indicator is to identify the amount of waste generated and understand the issues affecting its treatment.
- **NHWD (Non-Hazardous Waste Disposed):** The results of this indicator correspond to the weight of non-hazardous waste expressed in kilograms. This indicator, which is a flow indicator, does not introduce the concept of relativity between the various contributors. For example. at equal weight, untreated sludge has the same impact as concrete. The objective of this indicator is to identify the amount of waste generated and understand the issues affecting its treatment
- **RWD (Radioactive Waste Disposed):** The results of this indicator correspond to the weight of radioactive waste expressed in kilograms. This indicator, which is a flow indicator, does not introduce the concept of relativity between the various contributors. For example, at equal weight, uranium has the same impact as plutonium. The objective of this indicator is to identify the amount of waste generated and understand the issues affecting its treatment.
- **CRU (Components For Reuse):** This indicator represents the amount of components intended for reuse (in kg). In EIME, this indicator increases if a component is used and the "Reuse" box is checked.
- **MRE (Materials For Recycling):** This indicator represents the amount of materials sent for recycling at end of life, where the "end-of-waste" status is reached. This indicator, expressed in kilograms, only takes into account the amount intended for recycling and not the associated impacts, in accordance with the stocks method.
- **MER (Materials for Energy Recovery):** These materials are identified by an energy recovery efficiency of over 60%, in line with existing regulations. This indicator, expressed in kilograms, only takes into account the amount intended for energy recovery and not the associated impacts, in accordance with the stocks method.
- **EE (Exported Energy):** Exported energy is the energy generated form burning waste and from landfill (in MJ).

6.5 - Glossary

- **LCI (Life Cycle Inventory):** This document references all the life stages of a product (production, distribution, installation, use and end of life). This inventory contains the product composition (materials, weights, processes, provenances, recycled proportion of materials, energy consumption for the assembly, etc.), the predicted sales destinations, the installation processes, the usage scenario and the end of life scenario.
- **LCA (Life Cycle Analysis):** Process used to compile the LCI. It results in the creation of an environmental report.
- **PCR (Product Category Rules):** Documents providing the rules for the LCA for a specific product category. These rules are general and supported by PSRs.
- **PSR (Product Specific Rules):** Documents containing the specific rules for creating an LCA. This document supports the PCR. The EIME methodology applies a weighting of 1 for each indicator, with all indicators considered together and equally critical. An eco-design process involves reducing them all to a minimum and avoiding the transfer of pollution.

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