Environmental Product Declaration (EPD)
According to ISO 14025 and EN 15804

Blue e, 1 kW

Registration number:	EPD-Kiwa-EE-175929-en
Issue date:	28-06-2024
Valid until:	28-06-2029
Declaration owner:	RITTAL GmbH & Co. KG
Publisher:	Kiwa-Ecobility Experts
Program operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

Blue e, 1 kW

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-175929-en

1.3 VALIDITY

Issue date: 28-06-2024

Valid until: 28-06-2029

1.4 PROGRAM OPERATOR

Kiwa-Ecobility Experts
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13355 Berlin
DE

Raoul Mancke

(Head of programme operations, Kiwa-Ecobility Experts)

Dr. Ronny Stadie

(Verification body, Kiwa-Ecobility Experts)

1.5 OWNER OF THE DECLARATION

Manufacturer: RITTAL GmbH & Co. KG

Address: Auf dem Stützelberg , 35745 Herborn, Germany

E-mail: info@rittal.de

Website: www.rittal.com

Production location: Kelvin S.r.l., Valeggio

Address production location: Via degli imprenditori,15, 37067 Verona

1.6 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804:2012+A2:2019 serves as the core PCR.

☐ Internal ☑ External

Anne Kees Jeeninga, Advieslab

1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The programme operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

1.8 PRODUCT CATEGORY RULES

Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

Institut Bauen und Umwelt e.V (IBU) - Complementary Product Category Rule (c-PCR): Requirements on the EPD for Air conditioners (2021-08)

1.9 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804+A2. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data,

1 General information

background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

1.10 CALCULATION BASIS

LCA method R<THiNK: Ecobility Experts | EN15804+A2

LCA software*: Simapro 9.1

Characterization method: EN 15804 +A2 Method v1.0

LCA database profiles: EcoInvent version 3.6

Version database: v3.17 (2024-05-22)

** Simapro is used for calculating the characterized results of the Environmental profiles within R<THiNK.*

1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'Blue e, 1 kW ' with the calculation identifier ReTHiNK-75929.

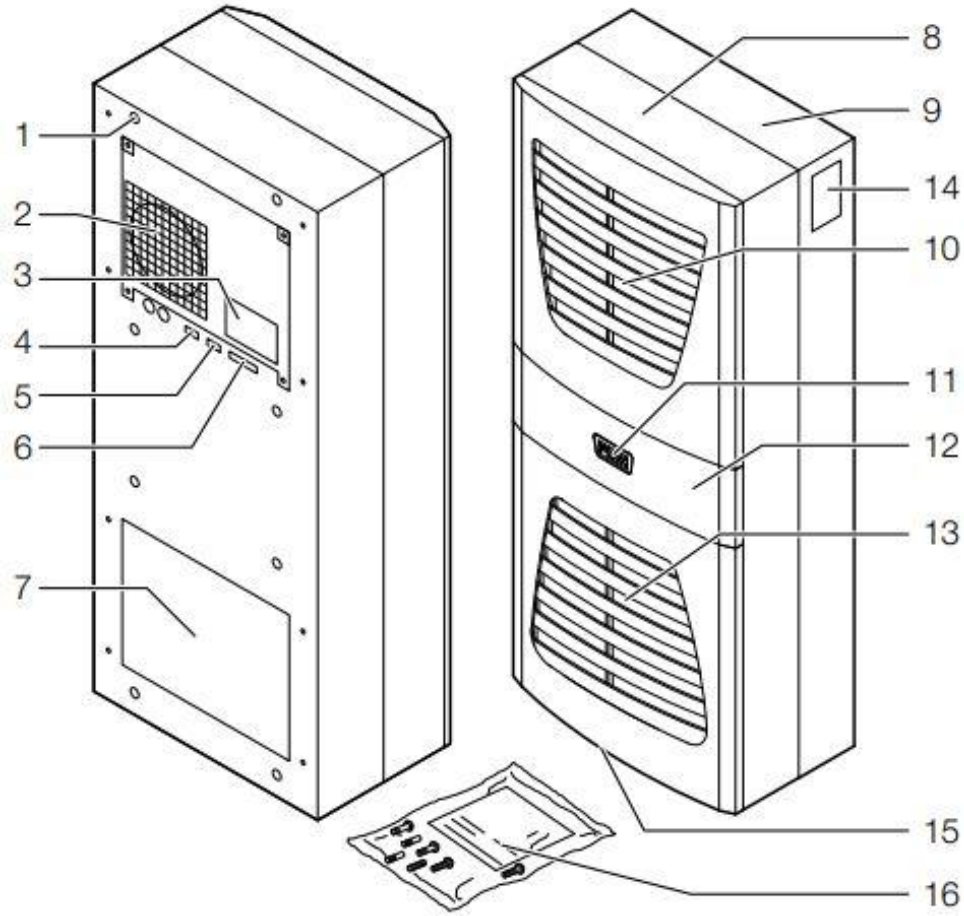
2 Product

2.1 PRODUCT DESCRIPTION

Energy-efficient Blue e is a wall-mounted cooling units in the output categories 300 W to 4000 W and with integral electrical condensate evaporator (from 1000 W). There are two separate cooling circuits installed in the cooling unit: one conventional refrigerant circuit (compression system) and one heat pipe integrated into the condenser and evaporator coil.

The air conditioning equipment to be used as a component part of another equipment, to cool electronic or mechanical components inside an electrical (enclosure) cabinet. The air conditioning unit maintains a cabinet to a set temperature between 20 °C to 55 °C. The unit will be operated within a maximum outdoor temperature ambient up to 55 °C.

Structure of the product
1. Blind rivet nut
2. Evaporator fan
3. Electrical wiring plan
4. X2 master-slave connection
5. X3 optional serial interface
6. X1 terminal strip
7. Air outlet hole
8. Front half of the enclosure
9. Rear half of the enclosure
10. Louvred grille for air outlet
11. Display
12. Infill panel
13. Louvred grille for air inlet
14. Rating plate
15. Condensate discharge
16. Dispatch bag



2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The cooling unit is only intended for cooling connected enclosures. The unit is designed solely for stationary use.

2 Product

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

A reference service life (RSL) of 10 years is assumed based on Rittal's experience and internal tests.

USED RSL (YR) IN THIS LCA CALCULATION:

10

2.4 TECHNICAL DATA

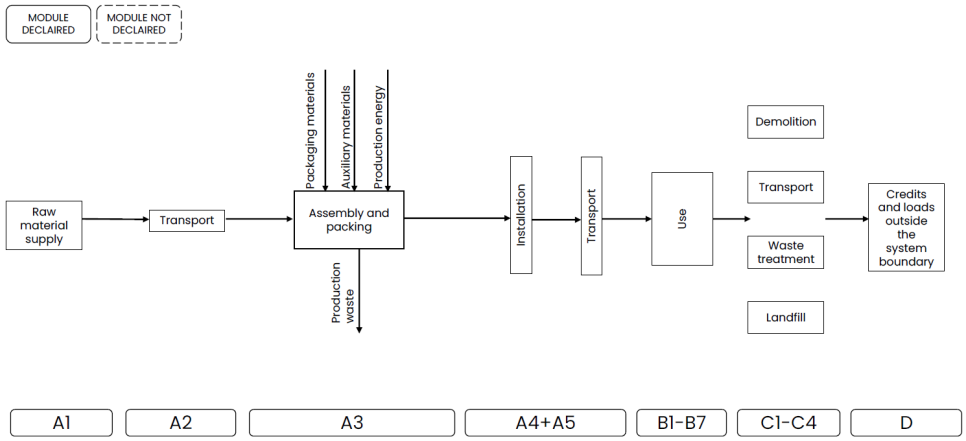
Dimensions [W x H x D]	400 mm x 950 mm x 260 mm
Air throughput (unimpeded air flow) External circuit	805 m³/h
Air throughput (unimpeded air flow) Internal circuit	600 m³/h
Useful cooling output	1,10 kWh
Air throughput	805 m³/h
Rated operating voltage	230 V, 50/60 Hz
Permissible operating pressure (p. max.)	28 bar
Refrigerant	R134a
Design	wall-mounted
Color	RAL 7035

2.5 SUBSTANCES OF VERY HIGH CONCERN

The product does not contain any substances from the candidate list of substances of very high concern for authorisation (SVHC).

2.6 DESCRIPTION PRODUCTION PROCESS

The assembly, manufacturing and functional test of Blue e, 1kW takes place at the production and development site in Verona (Italy). Rittal only do the the assambly of ready manufactured components.



2.7 CONSTRUCTION DESCRIPTION

During the construction phase no additional materials or energy are required. The product is manually mounted to the wall.

According to Rittal there are the following assembly steps for Blue e, 1 kW
1. Fitting the cooling unit
2. Making the cut-outs
3. External mounting of the cooling unit
4. Partial internal mounting of the cooling unit
5. Full internal mounting of the cooling unit
6. Connecting the condensate discharge
7. Making the electrical connection
8. Installing the filter media
9. Fitting the cooling unit

3 Calculation rules

3.1 DECLARED UNIT

Unit of product

According to the PCR B "Part B: Requirements for the EPD for Air conditioners" the declared unit is 1 product unit. A cooling device with a weight of approx. 32 kg and a cooling output of 1.1 kW. The product complies with EN 60335 and EN 14511.

Reference unit: piece (p)

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	p
Weight per reference unit	32.498	kg
Conversion factor to 1 kg	0.030771	p

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with options LCA. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	ND	ND	ND	ND	ND	X	ND	X	X	X	X	X

The modules of the EN15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

3.4 REPRESENTATIVENESS

The input data are representative for Blue e, 1 kW, a product of RITTAL GmbH & Co. KG. The data are representative for Europe.

3.5 CUT-OFF CRITERIA

Product Stage (A1-A3)

All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5 % of energy use and mass.

3 Calculation rules

Since this EPD is a declaration at product level, capital goods for the production site are not taken into account, nor are packaging materials for the raw and auxiliary materials.

The following processes are excluded:

- Manufacturing of equipment used in production, buildings or any other capital asset
- Transportation of personnel to the plant
- The transportation of personnel within the plant
- Research and development activities
- Long-term emissions
- Electrical safety test

Construction process stage (A4-A5)

All input flows (e.g. transportation to the construction site, additional raw material use for construction, installation energy (use)of energy use for assembly , etc.) and output flows (e.g. construction waste, packaging waste, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5 % of energy use and mass

Use stage (B6)

All (known) input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. emissions to soil, air and water, construction waste, packaging waste, end-of-life waste, etc.) related to the building fabric are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5 % of energy use and mass.

End of life stage (C1-C4)

All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5 % of energy use and mass.

Benefits and Loads beyond the system boundary (Module D)

All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

3.6 ALLOCATION

Allocation has not been applied in this LCA.

3.7 DATA COLLECTION & REFERENCE TIME PERIOD

All process-specific data were collected for the operating year 2022.

3.8 ESTIMATES AND ASSUMPTIONS

All material flows that contribute to more than 1 % of the total mass, energy, or environmental impact of the system have been considered in the LCA, and all datasets chosen for the modules A1-A3 refer to the Rest-of-the-World, GLO or Europe.

Rittal GmbH & Co. KG delivers its product to different countries, so the calculation of transport to construction site (A4) was done by taking the average distance, weighted by the proportion of product shipped to each country. For module A4, a data set for a non-specific truck was used.

Considering the optimum working conditions of the product for cooling demands and product's service life (10 years), product's energy use (module B6) is determined. European electricity grid mix is considered. The numbers for this are calculated based on the following formula:

Total energy consumption in kWh = Electricity consumption in kWh × (Operating hours / day) × (Operating days / year) x RSL

Where, based on experience and internal tests, the cooling unit will be used for 10 years mainly in industrial halls for 6 hours a day, 5 days a week.

During the use phase (B1) carbon dioxide emissions due to refrigerant leakage are 0 % because the unit is hermetically sealed. It does not need to be refilled with refrigerant. If a leak does occurs, the unit will not be operational and must be serviced.

For the end-of-life, waste scenarios from the Dutch Nationale Milieudatabase (NMD) waste scenarios were used.

3.9 DATA QUALITY

To ensure the comparability of the results, only consistent background data from the Ecoinvent data-base version 3.6 (2019) was used in the LCA (e.g. data sets on energy, transports, auxiliary and operating materials). The database is regularly checked and thus

3 Calculation rules

complies with the requirements of EN 15804 (background data not older than 10 years). Almost all consistent data sets contained in the Ecoinvent database version 3.6 are documented and can be viewed in the online documentation. The raw material data were converted into reference flows (input per declared unit). The general rule was followed that specific data from specific production processes or average data derived from specific processes must have priority in the calculation of an LCA. Data for processes over which the manufacturer has no influence were assigned generic data.

The LCA calculation was carried out using Nibe's LCA & EPD tool R<THiNK.

3.10 GUARANTEES OF ORIGIN

The company supplies the energy from the national grid. The electricity mix was chosen according to the geographic reference space and time reference. A local based approach was chosen and no guaranties of origin are needed.

4 Scenarios and additional technical information

4.1 TRANSPORT TO CONSTRUCTION SITE (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD.

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default) | market group for (GLO)
Fuel type and consumption of vehicle	not available
Distance	2400 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.2 ASSEMBLY (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module A5.

FLOWS ENTERING THE SYSTEM

There are no significant environment impacts as a result of materials or energy used in the construction stage (A5).

FLOWS LEAVING THE SYSTEM

The following output flows leaving the system at module A5 are assumed.

Description	Value	Unit
Output materials as result of loss during construction	3	%
Output materials as result of waste processing of materials used for installation/assembly at the building site	0.000	kg
Output materials as result of waste processing of used packaging	4.837	kg

4.3 OPERATIONAL ENERGY USE (B6)

Description	Service cycle (yr)	Number of cycles (n)	Amount per cycle	Total Amount	Unit
energy consumption for RSL 10 years	10	1.00	9984	9,984.00	kWh

4 Scenarios and additional technical information

4.4 DE-CONSTRUCTION, DEMOLITION (C1)

No inputs are needed for the product at the de-construction / demolition phase

4.5 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
Metals, others (i.a. fasteners, fittings) (NMD ID 50)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
plastics, via residue (NMD ID 43)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
EoL electronics - passive components	n.a.	0	100	150	50	0
finishes (adhered to wood, plastic, metal) (NMD ID 2)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
copper (i.a. sheets, pipes) (NMD ID 41)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
PVC, pipes (NMD ID 64)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
glass (i.a. flat glass) (NMD ID 28)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

4 Scenarios and additional technical information

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default) | market group for (GLO)
Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.6 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables.
First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	NL	0	10	85	5	0
Metals, others (i.a. fasteners, fittings) (NMD ID 50)	NL	0	5	5	90	0
plastics, via residue (NMD ID 43)	NL	0	20	80	0	0
aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	NL	0	3	3	94	0
EoL electronics - passive components	NL	0	5	35	60	0
finishes (adhered to wood, plastic, metal) (NMD ID 2)	NL	0	0	100	0	0
copper (i.a. sheets, pipes) (NMD ID 41)	NL	0	5	0	95	0
PVC, pipes (NMD ID 64)	NL	0	10	20	70	0
glass (i.a. flat glass) (NMD ID 28)	NL	0	30	0	70	0
elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	NL	0	10	85	5	0

4 Scenarios and additional technical information

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.000	0.316	2.684	0.158	0.000
Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0.000	1.059	1.059	19.062	0.000
plastics, via residue (NMD ID 43)	0.000	0.008	0.034	0.000	0.000
aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	0.000	0.011	0.011	0.343	0.000
EoL electronics - passive components	0.000	0.316	2.214	3.795	0.000
finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	0.000	0.758	0.000	0.000
copper (i.a. sheets, pipes) (NMD ID 41)	0.000	0.030	0.000	0.564	0.000
PVC, pipes (NMD ID 64)	0.000	0.001	0.002	0.006	0.000
glass (i.a. flat glass) (NMD ID 28)	0.000	0.002	0.000	0.004	0.000
elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.000	0.006	0.054	0.003	0.000
Total	**0.000**	**1.749**	**6.815**	**23.935**	**0.000**

4.7 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.158	81.625
Metals, others (i.a. fasteners, fittings) (NMD ID 50)	19.018	0.000
plastics, via residue (NMD ID 43)	0.000	1.031
aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	0.343	0.000
EoL electronics - passive components	3.237	0.000
finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	26.682
copper (i.a. sheets, pipes) (NMD ID 41)	0.511	0.000
PVC, pipes (NMD ID 64)	0.006	0.036
glass (i.a. flat glass) (NMD ID 28)	0.004	0.000
elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.003	1.456
Total	**23.279**	**110.829**

5 Results

For the impact assessment, the characterization factors of the LCIA method EN 15804 +A2 Method v1.0 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER PIECE

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
AP	mol H+ eqv.	2.11E+0	1.45E-2	7.57E-2	2.20E+0	7.01E-2	7.03E-2	2.50E+1	0.00E+0	1.87E-3	4.13E-3	1.19E-4	-1.83E-1
GWP-total	kg CO2 eqv.	1.85E+2	2.50E+0	1.47E+1	2.02E+2	1.21E+1	1.49E+1	4.42E+3	0.00E+0	3.23E-1	9.39E+0	5.96E-2	-4.00E+1
GWP-b	kg CO2 eqv.	2.74E+0	1.15E-3	-7.36E+0	-4.61E+0	5.58E-3	7.49E+0	1.29E+2	0.00E+0	1.49E-4	4.55E-4	4.95E-4	2.98E-1
GWP-f	kg CO2 eqv.	1.82E+2	2.50E+0	2.21E+1	2.07E+2	1.21E+1	7.39E+0	4.29E+3	0.00E+0	3.23E-1	9.39E+0	5.91E-2	-4.03E+1
GWP-luluc	kg CO2 eqv.	2.14E-1	9.17E-4	2.25E-2	2.38E-1	4.43E-3	7.39E-3	9.97E+0	0.00E+0	1.18E-4	6.63E-4	4.89E-6	-7.20E-3
EP-m	kg N eqv.	2.39E-1	5.11E-3	1.94E-2	2.63E-1	2.47E-2	9.54E-3	3.17E+0	0.00E+0	6.60E-4	1.11E-3	5.09E-5	-3.15E-2
EP-fw	kg P eqv.	2.37E-2	2.52E-5	3.49E-4	2.41E-2	1.22E-4	7.32E-4	4.58E-1	0.00E+0	3.26E-6	2.62E-5	2.04E-7	-1.40E-3
EP-T	mol N eqv.	2.94E+0	5.64E-2	2.18E-1	3.21E+0	2.72E-1	1.15E-1	3.91E+1	0.00E+0	7.28E-3	1.24E-2	4.69E-4	-3.80E-1
ODP	kg CFC 11 eqv.	1.35E-5	5.52E-7	3.05E-4	3.19E-4	2.67E-6	9.71E-6	3.61E-4	0.00E+0	7.13E-8	2.36E-7	4.66E-9	-1.67E-6
POCP	kg NMVOC eqv.	9.92E-1	1.61E-2	6.78E-2	1.08E+0	7.78E-2	3.74E-2	9.92E+0	0.00E+0	2.08E-3	3.33E-3	1.45E-4	-1.97E-1

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

5 Results

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
ADP-f	MJ	2.46E+3	3.77E+1	2.87E+2	2.79E+3	1.82E+2	9.21E+1	8.82E+4	0.00E+0	4.87E+0	6.92E+0	3.51E-1	-3.55E+2
ADP-mm	kg Sb-eqv.	3.98E-2	6.34E-5	1.11E-4	4.00E-2	3.06E-4	1.21E-3	3.12E-2	0.00E+0	8.19E-6	1.22E-5	1.27E-7	1.03E-3
WDP	m3 world eqv.	6.49E+1	1.35E-1	4.64E+0	6.97E+1	6.52E-1	2.16E+0	9.88E+2	0.00E+0	1.74E-2	3.61E-1	4.95E-3	-6.89E+0

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
ETP-fw	CTUe	2.24E+4	3.36E+1	2.22E+2	2.27E+4	1.63E+2	6.98E+2	6.04E+4	0.00E+0	4.34E+0	9.65E+1	8.15E+0	-1.55E+3
PM	disease incidence	1.27E-5	2.25E-7	1.18E-6	1.41E-5	1.09E-6	4.82E-7	6.55E-5	0.00E+0	2.91E-8	3.78E-8	2.37E-9	-2.30E-6
HTP-c	CTUh	6.39E-7	1.09E-9	1.36E-8	6.54E-7	5.27E-9	3.14E-8	1.56E-6	0.00E+0	1.41E-10	3.83E-9	1.48E-11	-2.20E-8
HTP-nc	CTUh	2.44E-5	3.68E-8	1.76E-7	2.46E-5	1.78E-7	7.52E-7	5.32E-5	0.00E+0	4.75E-9	4.00E-8	1.06E-9	4.73E-6
IR	kBq U235 eqv.	8.40E+0	1.58E-1	5.06E-1	9.06E+0	7.64E-1	3.07E-1	7.62E+2	0.00E+0	2.04E-2	2.83E-2	1.65E-3	3.26E-1
SQP	Pt	1.00E+3	3.27E+1	1.06E+3	2.09E+3	1.58E+2	6.94E+1	2.15E+4	0.00E+0	4.23E+0	3.49E+0	8.46E-1	-3.84E+2

ETP-fw=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP)

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None

5 Results

ILCD classification	Indicator	Disclaimer
ILCD type / level 2	AAcidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
PERE	MJ	2.49E+2	4.72E-1	1.02E+2	3.52E+2	2.28E+0	1.07E+1	1.67E+4	0.00E+0	6.10E-2	6.95E-1	1.66E-2	-6.90E+1

PERE=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

5 Results

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
PERM	MJ	0.00E+0	0.00E+0	6.55E+1	6.55E+1	0.00E+0	1.96E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	2.49E+2	4.72E-1	1.68E+2	4.18E+2	2.28E+0	1.27E+1	1.67E+4	0.00E+0	6.10E-2	6.95E-1	1.66E-2	-6.90E+1
PENRE	MJ	2.49E+3	4.01E+1	3.07E+2	2.84E+3	1.94E+2	9.42E+1	9.25E+4	0.00E+0	5.17E+0	7.37E+0	3.73E-1	-3.71E+2
PENRM	MJ	1.26E+2	0.00E+0	5.94E+0	1.32E+2	0.00E+0	3.95E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-4.97E+0
PENRT	MJ	2.62E+3	4.01E+1	3.13E+2	2.97E+3	1.94E+2	9.82E+1	9.25E+4	0.00E+0	5.17E+0	7.37E+0	3.73E-1	-3.76E+2
SM	Kg	6.55E-1	0.00E+0	1.69E-2	6.72E-1	0.00E+0	2.02E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	1.97E+0	4.60E-3	1.27E-1	2.10E+0	2.22E-2	6.66E-2	7.38E+1	0.00E+0	5.94E-4	1.14E-2	4.18E-4	-1.56E-1

PERE=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
HWD	Kg	1.08E-2	9.56E-5	4.55E-4	1.13E-2	4.62E-4	4.31E-4	5.88E-2	0.00E+0	1.23E-5	2.28E-3	4.54E-7	-6.39E-4
NHWD	Kg	3.44E+1	2.39E+0	1.09E+0	3.79E+1	1.16E+1	1.85E+0	2.98E+2	0.00E+0	3.09E-1	2.13E-1	1.44E+0	-4.47E+0
RWD	Kg	7.37E-3	2.48E-4	6.04E-4	8.22E-3	1.20E-3	3.00E-4	6.26E-1	0.00E+0	3.20E-5	2.65E-5	2.25E-6	-1.66E-5

HWD=hazardous waste disposed | **NHWD**=non hazardous waste disposed | **RWD**=radioactive waste disposed

5 Results

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.99E+0	0.00E+0	0.00E+0	0.00E+0	2.01E+1	0.00E+0	0.00E+0
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.13E+1
EEE	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.98E+1

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

5 Results

5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER PIECE

BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per piece:

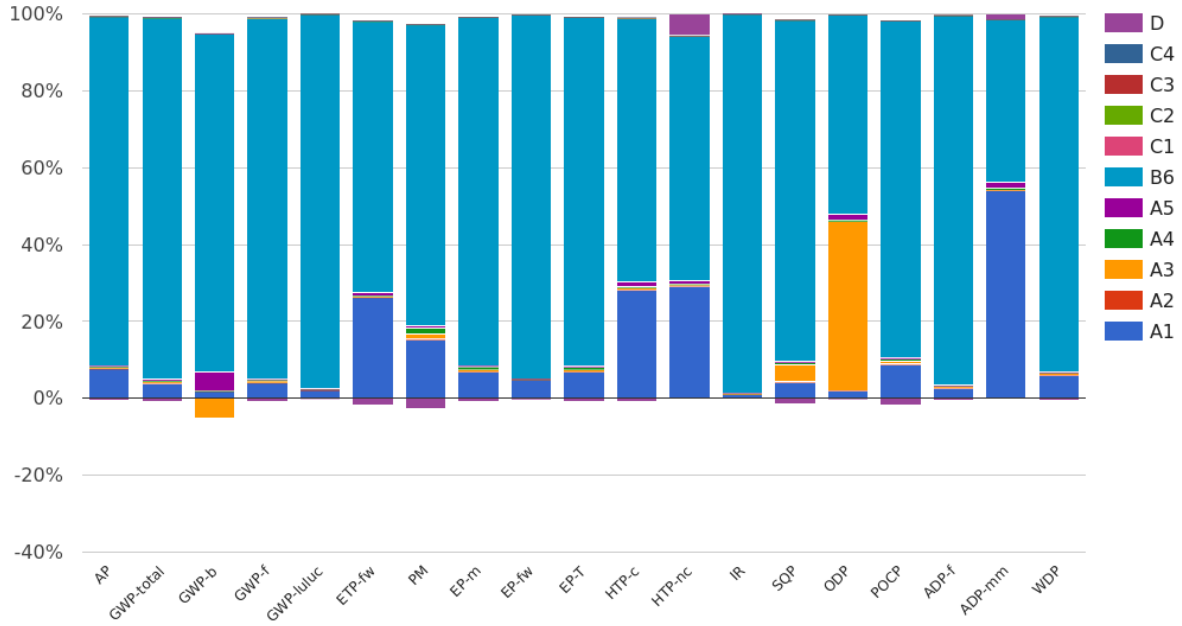
Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	2.043	kg C

UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results.

Uptake Biogenic Carbon dioxide	Amount	Unit
Packaging	7.492	kg CO2 (biogenic)

6 Interpretation of results



For an easier understanding, the results are presented graphically in order to be able to see correlations and connections between the data more clearly.

As can be seen in the graph, Module B6 (Operational energy use) has the biggest influence in all environmental impact categories. After that, Module A1 (Raw material preparation) has the biggest influence in most of the categories.

7 References

ISO 14040
ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044
ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

ISO 14025
ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A2
EN 15804+A2: 2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

General PCR Ecobility Experts
Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

Institut Bauen und Umwelt e.V (IBU)
Complementary Product Category Rule (c-PCR): Requirements on the EPD for Air conditioners (2021-08)

8 Contact information

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