Environmental Product Declaration (EPD)
according to ISO 14025 and EN 50693

KOMBISAVE+ - Universal Protection and Control Unit

Registration number:	EPD-Kiwa-EE-000448-EN
Issue date:	14-08-2025
Valid until:	14-08-2030
Declaration owner:	NSE AG
Publisher:	Kiwa-Ecobility Experts
Program operator:	Kiwa-Ecobility Experts
Status:	Verified

1 General information

1.1 PRODUCT

KOMBISAVE+ - Universal Protection and Control Unit

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-000448-EN

1.3 VALIDITY

Issue date: 14-08-2025

Valid until: 14-08-2030

1.4 PROGRAM OPERATOR

Kiwa-Ecobility Experts
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Germany

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(Head of program operations, Kiwa-Ecobility Experts)

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(Verification body, Kiwa-Ecobility Experts)

1.5 OWNER OF THE DECLARATION

Declaration owner: NSE AG

Address: Bremgarterstrasse 54, 5610 Wohlen, CH

E-mail: info@nse.ch

Website: www.nse.ch

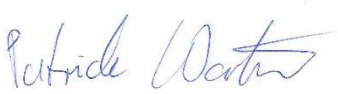
Production location: NSE AG

Address production location: Bremgarterstrasse 54, 5610 Wohlen, CH

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 50693:2022 serves as the core PCR.

☐ Internal X External



Patrick Wortner, PeoplePlanetProfit GmbH & Co. KG

(Third party verifier)

1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The program 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-EE GPI R.3.0 (2025)

Kiwa-Ecobility Experts, General Programme Instructions “Product Level”, SOP EE 1201_R.3.0 (03.06.2025)

Kiwa-EE GPI R.3.0 Annex B1 (2025)

Kiwa-Ecobility Experts, General Programme Instructions “Product Level” – Annex B1 Environmental Information Programme, according to EN 15804 / ISO 21930, SOP EE 1203_R.3.0 (03.06.2025)

EN 50693 Product category rules for life cycle assessments of electronic and electrical products and systems

EPDItaly007 Core PCR EN 50693 - ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS, REV. 3

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 50693:2022. For the evaluation of the comparability, the following aspects have to be considered in particular: PSR used, functional unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PSRs and general program instructions of different EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 50693:2022 and ISO 14025.

1.10 CALCULATION BASIS

LCA method: EN50693

LCA software*: Simapro 9.6, R<THINK

Characterization method: R<THINK characterization method (see references for more details

LCA database profiles: ecoinvent (for version see references)

Version database: v3.19 (20250306)

** 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 'KOMBISAVE+ - Universal Protection and Control Unit' with the calculation identifier ReTHiNK-105855.

2 Product

2.1 PRODUCT DESCRIPTION

This EPD is performed based on the representative product - KOMBISAVE+ RF (X2-I4U4X-B2C2-RS-EE), and covers the following product categories:

- KOMBISAVE+ RN (overcurrent and motor protection)
- KOMBISAVE+ RF (distance protection with ground fault detection)
- KOMBISAVE+ RL (line differential and distance protection)
- KOMBISAVE+ RQ (differential protection for two-winding transformers).

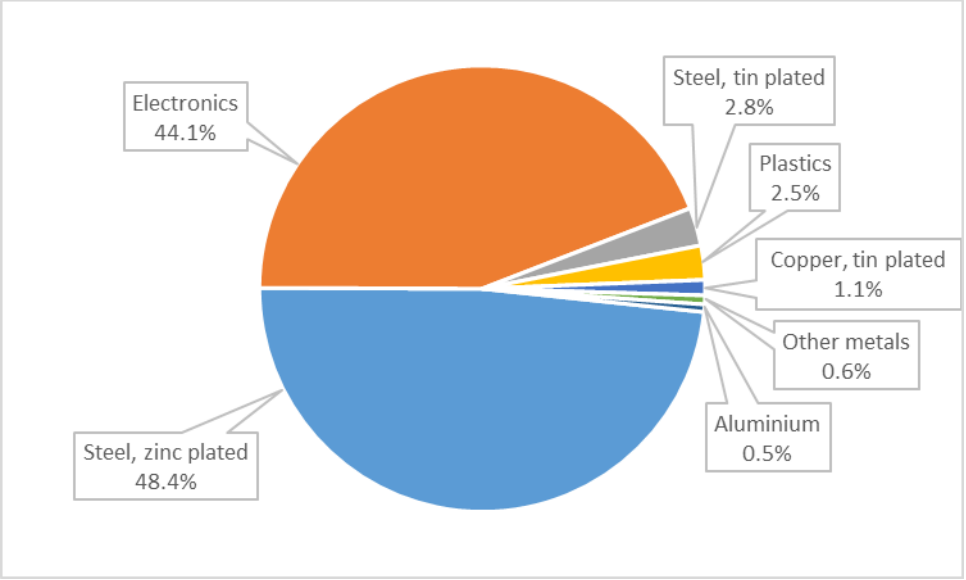
The heaviest variant (KOMBISAVE+ RF X2-I4U5X-B4C2-RS-SO) is 0.217 kg (i.e. 4 %) heavier than the representative variant (5.473 kg, incl. packaging). But was less often sold in 2024 than the representative variant.

Product specification

The following material list refers to a KOMBISAVE+ RF with the hardware code X2-I4U4X-B2C2-RS-EE (i.e. the reference product), including accessories but not packaging. The labels on the device are neglected.

The composition of the product is described in the following table:

Materials	Weight [kg]	Weight [%]
Steel, zinc plated	2.2851	48.38%
Electronics	2.0818	44.08%
Steel, tin plated	0.1305	2.76%
Plastics	0.1171	2.48%
Copper, tin plated	0.0528	1.12%
Other metals	0.0302	0.64%
Aluminium	0.0255	0.54%
Total	4.7230	100 %



The total packaging weighs 0.75 kg, consisting of 0.738 kg (98.4%) cardboard or paper, 0.01 kg (1.3%) low-density polyethylene (PE-LD), and 0.002 kg (0.3%) made up of other plastics and adhesives.

2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The main task of the KOMBISAVE+ is to protect the components of a power grid and its surroundings against power system faults. The available protection functions of the KOMBISAVE+ depend on the variant (RN, RF, RL or RQ) and include overcurrent protection, distance protection, ground fault protection, switch-on-to-fault protection, transformer differential protection, motor protection and line differential protection, among others. These protection functions can be activated and configured individually.

The KOMBISAVE+ is delivered with a standard factory configuration. This standard configuration comprises the settings, the selection of protective functions, and the configuration of the optocoupler inputs, LEDs, relays outputs, etc. It is essential that the configuration is adapted to the specific use case.

Input and output signals can be linked with protection and control functions via a comprehensive I/O-matrix.

In the event of a fault in the protected object or in the protection unit, depending on the protection functions configured, an OFF command is generated, and a relay is activated if configured. The device is mainly deployed in Germany, Austria and Switzerland.

2.3 REFERENCE SERVICE LIFE (RSL)

RSL PRODUCT

20 years.

USED RSL (YR) IN THIS CALCULATION

20 years (results for an evaluation over a 10-year use period are additionally listed in section 6.2)

2.4 TECHNICAL DATA

Weight: 4.723 kg (product only) and 5.473 kg (including packaging)

Universal protection and control unit with

- 4 current inputs with optionally 4 or 5 voltage inputs or 8 current inputs

- 14 or 22 binary inputs with optionally 4 Pt100 inputs or 30 binary inputs

- 16, 17 or 23 binary outputs

- USB service interface

- RS-485 communication interface

- optionally an optical serial interface or an electrical or optical Ethernet interface with optional switch

2.5 SUBSTANCES OF VERY HIGH CONCERN

According to manufacturer, no substance present in the product with concentration exceeding 0.1% of the total weight is included on the 'List of Substances of Very High Concern' (SVHC) for authorization under REACH legislation.

2.6 DESCRIPTION PRODUCTION PROCESS

The product is manufactured using a variety of raw materials, including steel, PCBs, plastics and copper alloys. The PCB production takes place at external suppliers. All these components are then transported from suppliers to the assembly facility located in Wohlen. At the Wohlen factory, the final product is assembled through mechanical operations such as fixing, soldering and screwing. The assembled units are packaged using cardboard boxes for delivery to the installation site.

2.7 CONSTRUCTION DESCRIPTION

The installation of the product can be carried out using manual operations, no external material or energy inputs are required.

3 Calculation rules

3.1 FUNCTIONAL UNIT

1 piece of KOMBISAVE+

The primary function of the device is to protect power grids against power system faults. It has four voltage and four current inputs, 30 binary inputs, 17 binary outputs and an Ethernet interface. It uses an auxiliary voltage of 110 V DC and is designed for 24/7 use over a 20-year service life.

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	Piece
Weight per reference unit	4.723	kg
Conversion factor to 1 kg	0.211726	p

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

The EPD covers the cradle to grave of the product and the following life cycle stages according to EN 50693 are included:

The life cycle stages corresponding to EN15804+A2 are as shown below:

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

Manufacturing			Distribu-tion	Install-ation	Use							End of life				Benefits and loads
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

The modules of the EN15804+A2 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

This EPD is representative for KOMBISAVE+ - Universal Protection and Control Unit, a product of NSE AG. The results of this EPD are representative for European Union, especially for DACH region.

3.5 CUT-OFF CRITERIA

According to EN 50693, the cut-off criteria are set to a maximum of 5 % of the overall environmental impacts.

Number of resources used and waste generated in production at NSE AG (Wohlen) is allocated based on annual production volume. For the end-of-life calculation Polluter Pay Principle is used as required by PCR EPDItaly007. Environmental impact from

recovery and recycling processes are considered in separate benefits & loads beyond system boundary section. The reported originate from the waste treatment processes, needed until the material is reaching end-of-waste status and leaving the system boundary. The environmental burdens of recycling and energy recovery processes are allocated to the product that generates the waste, while the product system that uses the exported energy and recycled materials receives it burden-free.

3.6 DATA COLLECTION & REFERENCE TIME PERIOD

Primary data including all raw materials, packaging materials, energy consumption and ancillary materials was comprehensively collected for the reference year from 2024-01-01 to 2024-12-31.

3.7 ESTIMATES AND ASSUMPTIONS

- Due to the large number of suppliers and associated data limitations, transport has been modelled using generic profiles representative of typical supply chains where specific data was not available. A company-specific transport profile has been applied to reflect realistic sourcing practices. The following assumptions apply.
- For the end-of-life scenario, the EU scenarios have been selected, as the product market is in the EU.
- Module A4 (Transport) is calculated based on the assumption that the product is transported over a distance of 424 km using the profile (ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO).
- Module A5: No losses are expected in the installation of product.
- Among the B modules, only B6 (Operational energy) is considered relevant; all other B modules have been considered as not relevant due to a lack of significant impacts.
- Repairs have been excluded, as they are very rarely necessary.

3.8 DATA QUALITY

Both primary and secondary data have been used. All primary data were collected by the product manufacturer for the reference year 2024, covering the period from January to December. The main source of primary data is the bill of materials, supplemented by factory-specific data provided by the manufacturing facility in Wohlen.

For the data, which was needed for modelling but was not provided by the manufacturer and could not be influenced by them, generic data was used. Secondary data were sourced from the regularly updated Ecoinvent database (version 3.9.1), aligning with EN 50693 standards to ensure background data not exceeding 10 years.

R<THINK EPD web application was used to model the life cycle for the production and disposal of the declared product systems. To ensure that the results are comparable, consistent background data from the international database Ecoinvent was used in the LCA (e.g. data records on energy, transport, auxiliary materials, and suppliers). Almost all consistent data sets contained in the Ecoinvent database are documented and can be viewed online.

The scenarios included are currently in use and are representative for one of the most likely scenario alternatives. The data quality for all three representativeness categories (geographical, technical and time) can be described as good.

3.9 POWER MIX

Regarding the energy consumption of production, the market-based approach was used in the LCA: Electricity supply is based on the Switzerland residual grid mix, using the dataset "Electricity, low voltage {CH} | electricity, low voltage, residual mix. This mix has a total Global Warming Potential (GWP) of 0.026 CO_2 eq. per kWh.

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.

Description	Value and unit
Vehicle type used for transport	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)
Fuel type and consumption of vehicle	not available
Distance	424 km
Capacity utilization (including empty returns)	50% (Loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utlisation 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	0	%
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	0.750	kg

4.3 USE (B1)

No significant environment impact in the use stage modules, because there is no (significant) emission to air, soil or water.

4.4 MAINTENANCE (B2)

For maintenance no input or output flows are modelled.

4.5 REPAIR (B3)

Repairs are not applicable within the functional unit and to achieve the reference service life.

4.6 REFURBISHMENT (B5)

No refurbishment is needed.

4.7 OPERATIONAL ENERGY USE (B6)

The expected average energy consumption of the representative variant is 4.16 W. In this case, three output relays are permanently energized, the Ethernet interface is active, and the display is switched off.

Description	RSL (Years)	Energy consumed per Year	Total Amount	Unit
Energy needed for the operation	20.00	36.4416	728.832	kWh

4.8 OPERATIONAL WATER USE (B7)

No need of water use during the operation.

4.9 DE-CONSTRUCTION, DEMOLITION (C1)

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

4.10 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]	Reuse [km]
Steel waste scenario	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
EOL electronic components (3.9.1)	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
(ei3.9.1) aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
(ei3.9.1) plastics, via residue (NMD ID 43)	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	(ei3.9.1) 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.

Description	Value and Unit
Vehicle type used for transport	(ei3.9.1) 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

4.11 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 [%]
Steel waste scenario	EU	0	6	0	94	0
EoL electronic components (3.9.1)	EU	0	5	35	60	0
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	NL	0	0	100	0	0
(ei3.9.1) aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	NL	0	3	3	94	0
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	NL	0	5	0	95	0

(ei3.9.1) plastics, via residue (NMD ID 43)	NL	0	20	80	0	0
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	NL	0	5	5	90	0

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
Steel waste scenario	0	0.138	0.000	2.167	0.00
EoL electronic components (3.9.1)	0	0.117	0.822	1.409	0.00
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	0	0.000	0.001	0.000	0.00
(ei3.9.1) aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	0	0.001	0.001	0.024	0.00
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	0	0.000	0.000	0.000	0.00
(ei3.9.1) plastics, via residue (NMD ID 43)	0	0.003	0.012	0.000	0.00
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0	0.001	0.001	0.025	0.00
Total	**0**	**0.261**	**0.837**	**3.625**	**0.00**

4.12 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]
Steel waste scenario	2.167	0.000
EoL electronic components (3.9.1)	1.409	2.058
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	0.020
(ei3.9.1) aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	0.024	0.000
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	0.000	0.000
(ei3.9.1) plastics, via residue (NMD ID 43)	0.000	0.260
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0.025	0.000
Total	**3.625**	**2.339**

5 Results

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 endpoints 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 1 Piece of KOMBISAVE+ - Universal Protection and Control Unit

CORE ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbreviation	Unit	Manufacturing				Distribution	Installation	Use		End of life				Benefits & Loads	Total
		A1	A2	A3	A1-A3	A4	A5	B1-B5, B7	B6	C1	C2	C3	C4	D	A1-C4
GWP-total	kg CO_2 eqv.	9.43E+01	5.98E-02	-6.24E-01	9.37E+01	3.46E-01	1.29E+00	0.00E+00	2.64E+02	0.00E+00	4.96E-02	2.06E+00	1.57E-02	1.35E+00	3.62E+02
GWP-f	kg CO_2 eqv.	9.39E+01	5.96E-02	5.63E-01	9.45E+01	3.44E-01	7.51E-02	0.00E+00	2.62E+02	0.00E+00	4.94E-02	2.06E+00	1.56E-02	1.33E+00	3.59E+02
GWP-b	kg CO_2 eqv.	2.25E-01	1.94E-05	-1.19E+00	-9.66E-01	1.12E-04	1.21E+00	0.00E+00	1.43E+00	0.00E+00	1.61E-05	2.77E-04	1.07E-05	1.29E-02	1.68E+00
GWP-luluc	kg CO_2 eqv.	1.62E-01	2.13E-04	3.90E-03	1.66E-01	1.23E-03	4.77E-05	0.00E+00	6.55E-01	0.00E+00	1.76E-04	1.67E-04	1.49E-06	6.65E-03	8.22E-01
ODP	kg CFC 11 eqv.	3.89E-06	1.06E-09	2.07E-08	3.91E-06	6.13E-09	2.41E-09	0.00E+00	4.99E-06	0.00E+00	8.79E-10	2.50E-09	7.70E-11	-3.25E-08	8.91E-06
AP	mol H^+ eqv.	9.09E-01	2.85E-04	5.52E-03	9.15E-01	1.65E-03	2.90E-04	0.00E+00	1.50E+00	0.00E+00	2.37E-04	9.29E-04	2.06E-05	1.77E-02	2.42E+00
EP-fw	kg P eqv.	1.20E-02	5.93E-07	5.34E-05	1.21E-02	3.43E-06	7.42E-07	0.00E+00	2.59E-02	0.00E+00	4.92E-07	4.38E-06	4.92E-08	1.12E-03	3.80E-02
EP-m	kg N eqv.	1.19E-01	1.08E-04	1.28E-03	1.20E-01	6.27E-04	1.15E-04	0.00E+00	1.88E-01	0.00E+00	8.99E-05	3.31E-04	3.80E-05	4.36E-03	3.10E-01
EP-T	mol N eqv.	1.42E+00	1.16E-03	1.21E-02	1.43E+00	6.69E-03	1.22E-03	0.00E+00	2.20E+00	0.00E+00	9.59E-04	3.45E-03	8.73E-05	4.87E-02	3.64E+00
POCP	kg NMVOC eqv.	4.30E-01	3.95E-04	3.79E-03	4.35E-01	2.28E-03	4.10E-04	0.00E+00	7.05E-01	0.00E+00	3.27E-04	8.92E-04	3.40E-05	3.00E-03	1.14E+00
ADP-mm	kg Sb-eqv.	2.34E-02	1.87E-07	2.89E-05	2.35E-02	1.08E-06	2.02E-07	0.00E+00	3.13E-03	0.00E+00	1.55E-07	9.00E-07	7.23E-09	3.46E-03	2.66E-02
ADP-f	MJ	1.87E+03	8.54E-01	6.36E+01	1.93E+03	4.93E+00	5.48E-01	0.00E+00	5.93E+03	0.00E+00	7.08E-01	1.35E+00	6.52E-02	2.67E+01	7.87E+03
WDP	m^3 world eqv.	3.02E+01	4.66E-03	3.39E-01	3.06E+01	2.69E-02	6.36E-03	0.00E+00	6.69E+01	0.00E+00	3.86E-03	4.73E-02	1.46E-03	-1.64E+00	9.76E+01

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 EN 15804+A2

Abbreviation	Unit	Manufacturing				Distribution	Installation	Use		End of life				Benefits & Loads	Total
		A1	A2	A3	A1-A3	A4	A5	B1-B5, B7	B6	C1	C2	C3	C4	D	A1-C4
PM	disease incidence	5.34E-06	5.89E-09	7.25E-08	5.42E-06	3.40E-08	4.95E-09	0.00E+00	4.77E-06	0.00E+00	4.88E-09	6.49E-09	4.59E-10	2.14E-09	1.02E-05
IR	kBq U235 eqv.	2.19E+01	3.33E-04	1.58E+00	2.34E+01	1.92E-03	7.00E-04	0.00E+00	5.28E+01	0.00E+00	2.76E-04	4.04E-03	6.66E-05	2.22E-01	7.63E+01
ETP-fw	CTUe	2.41E+03	6.30E-01	6.51E+00	2.41E+03	3.64E+00	1.02E+00	0.00E+00	9.96E+02	0.00E+00	5.22E-01	2.14E+01	1.33E+00	2.35E+02	3.44E+03
HTP-c	CTUh	2.20E-07	3.16E-11	7.80E-10	2.20E-07	1.82E-10	9.74E-11	0.00E+00	1.22E-07	0.00E+00	2.62E-11	3.12E-10	2.90E-12	2.32E-08	3.43E-07
HTP-nc	CTUh	5.05E-06	6.86E-10	3.24E-08	5.08E-06	3.96E-09	7.05E-10	0.00E+00	4.86E-06	0.00E+00	5.69E-10	4.96E-08	1.77E-10	2.90E-07	1.00E-05
SQP	Pt	4.36E+02	6.74E-01	9.61E+01	5.33E+02	3.89E+00	2.10E-01	0.00E+00	1.16E+03	0.00E+00	5.59E-01	4.74E-01	1.51E-01	-1.73E+01	1.70E+03

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
ILCD type / level 2	Acidification 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.

INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI) PER 1 Piece of KOMBISAVE+ - Universal Protection and Control Unit

PARAMETERS DESCRIBING RESOURCE USE

Abbreviation	Unit	Manufacturing				Distribution	Installation	Use		End of life				Benefits & Loads	Total
		A1	A2	A3	A1-A3	A4	A5	B1-B5, B7	B6	C1	C2	C3	C4	D	A1-C4
PERE	MJ	2.81E+02	1.21E-02	1.59E+01	2.97E+02	6.97E-02	2.14E-02	0.00E+00	1.30E+03	0.00E+00	1.00E-02	1.39E-01	2.90E-03	-1.86E+00	1.59E+03
PERM	MJ	0.00E+00	0.00E+00	1.15E+01	1.15E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E+01
PERT	MJ	2.81E+02	1.21E-02	2.74E+01	3.09E+02	6.97E-02	2.14E-02	0.00E+00	1.30E+03	0.00E+00	1.00E-02	1.39E-01	2.90E-03	-1.86E+00	1.61E+03
PENRE	MJ	2.01E+03	8.55E-01	6.29E+01	2.07E+03	4.94E+00	5.48E-01	0.00E+00	5.93E+03	0.00E+00	7.09E-01	1.35E+00	6.52E-02	2.67E+01	8.01E+03
PENRM	MJ	8.53E+00	0.00E+00	7.27E-01	9.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.71E-02	9.26E+00
PENRT	MJ	2.02E+03	8.55E-01	6.36E+01	2.08E+03	4.94E+00	5.48E-01	0.00E+00	5.93E+03	0.00E+00	7.09E-01	1.35E+00	6.52E-02	2.67E+01	8.02E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.61E+00	2.06E-04	4.98E-02	1.66E+00	1.19E-03	2.92E-04	0.00E+00	4.69E+00	0.00E+00	1.71E-04	1.66E-03	7.46E-05	-1.90E-02	6.36E+00

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 AND OUTPUT FLOWS

Abbreviation	Unit	Manufacturing				Distribution	Installation	Use		End of life				Benefits & Loads	Total
		A1	A2	A3	A1-A3	A4	D	B1-B5, B7	B6	C1	C2	C3	C4	D	A1-C4
HWD	kg	3.31E-02	5.44E-06	6.55E-05	3.31E-02	3.15E-05	3.28E-06	0.00E+00	1.04E-02	0.00E+00	4.51E-06	1.63E-04	3.14E-07	-8.89E-05	4.38E-02
NHWD	kg	2.33E+01	5.64E-02	2.17E-01	2.36E+01	3.26E-01	2.15E-01	0.00E+00	2.37E+01	0.00E+00	4.68E-02	6.35E-02	2.61E-01	5.92E-01	4.82E+01
RWD	kg	1.26E-02	1.95E-07	8.42E-04	1.35E-02	1.13E-06	5.13E-07	0.00E+00	4.25E-02	0.00E+00	1.62E-07	2.61E-06	3.76E-08	1.43E-04	5.60E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E+00	0.00E+00	0.00E+00	2.77E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	6.20E-04	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E+00	6.20E-04
EEE	MJ	0.00E+00	0.00E+00	3.60E-04	3.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.53E-01	3.60E-04

5.2 INFORMATION ON BIOGENIC CARBON CONTENT PER PIECE

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	0.3287	kg C

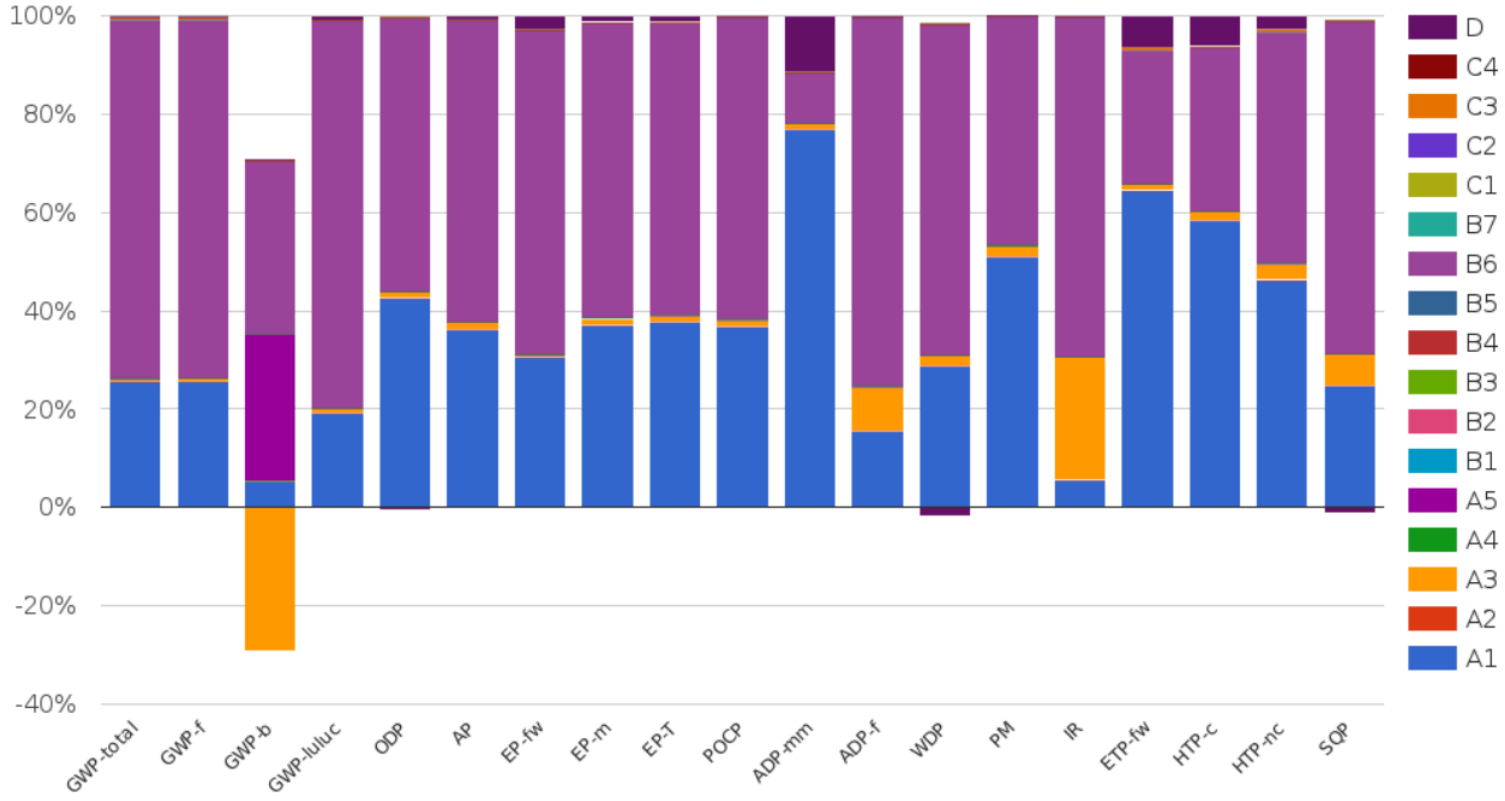
UPTAKE OF BIOGENIC CARBON DIOXIDE

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. One kilogram of biogenic carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

Uptake biogenic carbon dioxide	Amount	Unit
Packaging	1.205	kg CO_2 (biogenic)

6 Interpretation of results

6.1 CONTRIBUTION ANALYSIS



- The main contributor across all the categories is B6 (operational energy use), followed by A1 (Raw materials).
- In the impact category GWP-b, A5 has a significant impact, it is due to the biogenic carbon present in the packaging material.

Since RSL significantly impacts the module's operational energy use, the results for the same product with a 10-year RSL are provided below to allow for comparison with other products on the market that use a 10-year RSL in their EPDs.

6.2 Results declared for the RSL of 10 years

ENVIRONMENTAL IMPACT INDICATORS PER 1 Piece of KOMBISAVE+ - Universal Protection and Control Unit

CORE ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbreviation	Unit	Manufacturing				Distribution	Installation	Use		End of life				Benefits & Loads	Total
		A1	A2	A3	A1-A3	A4	A5	B1-B5, B7	B6	C1	C2	C3	C4	D	A1-C4
GWP-total	kg CO_2 eqv.	9.43E+01	5.98E-02	-6.23E-01	9.37E+01	3.46E-01	1.29E+00	0.00E+00	1.32E+02	0.00E+00	4.96E-02	2.06E+00	1.57E-02	1.35E+00	2.30E+02
GWP-f	kg CO_2 eqv.	9.39E+01	5.96E-02	5.65E-01	9.45E+01	3.44E-01	7.51E-02	0.00E+00	1.31E+02	0.00E+00	4.94E-02	2.06E+00	1.56E-02	1.33E+00	2.28E+02
GWP-b	kg CO_2 eqv.	2.25E-01	1.94E-05	-1.19E+00	-9.66E-01	1.12E-04	1.21E+00	0.00E+00	7.17E-01	0.00E+00	1.61E-05	2.77E-04	1.07E-05	1.29E-02	9.62E-01
GWP-luluc	kg CO_2 eqv.	1.62E-01	2.13E-04	3.90E-03	1.66E-01	1.23E-03	4.69E-05	0.00E+00	3.27E-01	0.00E+00	1.76E-04	1.67E-04	1.49E-06	6.65E-03	4.95E-01
ODP	kg CFC 11eqv.	3.89E-06	1.06E-09	2.16E-08	3.91E-06	6.13E-09	2.50E-09	0.00E+00	2.49E-06	0.00E+00	8.79E-10	2.50E-09	7.70E-11	-3.33E-08	6.42E-06
AP	mol H^+ eqv.	9.09E-01	2.85E-04	5.53E-03	9.15E-01	1.65E-03	2.90E-04	0.00E+00	7.50E-01	0.00E+00	2.37E-04	9.29E-04	2.06E-05	1.77E-02	1.67E+00
EP-fw	kg P eqv.	1.20E-02	5.93E-07	5.36E-05	1.21E-02	3.43E-06	7.44E-07	0.00E+00	1.30E-02	0.00E+00	4.92E-07	4.38E-06	4.92E-08	1.12E-03	2.51E-02
EP-m	kg N eqv.	1.19E-01	1.08E-04	1.28E-03	1.20E-01	6.27E-04	1.15E-04	0.00E+00	9.42E-02	0.00E+00	8.99E-05	3.31E-04	3.80E-05	4.36E-03	2.16E-01
EP-T	mol N eqv.	1.42E+00	1.16E-03	1.21E-02	1.43E+00	6.69E-03	1.22E-03	0.00E+00	1.10E+00	0.00E+00	9.59E-04	3.45E-03	8.73E-05	4.87E-02	2.54E+00
POCP	kg NMVOCeqv.	4.30E-01	3.95E-04	3.79E-03	4.35E-01	2.28E-03	4.09E-04	0.00E+00	3.53E-01	0.00E+00	3.27E-04	8.92E-04	3.40E-05	3.01E-03	7.91E-01
ADP-mm	kg Sb-eqv.	2.34E-02	1.87E-07	2.90E-05	2.35E-02	1.08E-06	2.18E-07	0.00E+00	1.56E-03	0.00E+00	1.55E-07	9.00E-07	7.23E-09	3.46E-03	2.50E-02
ADP-f	MJ	1.87E+03	8.54E-01	6.36E+01	1.93E+03	4.93E+00	5.48E-01	0.00E+00	2.96E+03	0.00E+00	7.08E-01	1.35E+00	6.52E-02	2.67E+01	4.91E+03
WDP	m^3 world eqv.	3.02E+01	4.66E-03	3.39E-01	3.06E+01	2.69E-02	6.43E-03	0.00E+00	3.35E+01	0.00E+00	3.86E-03	4.73E-02	1.46E-03	-1.64E+00	6.41E+01

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 EN 15804+A2

Abbreviation	Unit	Manufacturing				Distribution	Installation	Use		End of life				Benefits & Loads	Total
		A1	A2	A3	A1-A3	A4	A5	B1-B5, B7	B6	C1	C2	C3	C4	D	A1-C4
PM	disease incidence	5.34E-06	5.89E-09	7.24E-08	5.42E-06	3.40E-08	4.94E-09	0.00E+00	2.38E-06	0.00E+00	4.88E-09	6.49E-09	4.59E-10	2.16E-09	7.85E-06
IR	kBq U235 eqv.	2.19E+01	3.33E-04	1.58E+00	2.34E+01	1.92E-03	7.21E-04	0.00E+00	2.64E+01	0.00E+00	2.76E-04	4.04E-03	6.66E-05	2.22E-01	4.99E+01
ETP-fw	CTUe	2.41E+03	6.30E-01	6.62E+00	2.41E+03	3.64E+00	1.03E+00	0.00E+00	4.98E+02	0.00E+00	5.22E-01	2.14E+01	1.33E+00	2.35E+02	2.94E+03
HTP-c	CTUh	2.20E-07	3.16E-11	7.81E-10	2.20E-07	1.82E-10	9.75E-11	0.00E+00	6.12E-08	0.00E+00	2.62E-11	3.12E-10	2.90E-12	2.32E-08	2.82E-07
HTP-nc	CTUh	5.05E-06	6.86E-10	3.25E-08	5.08E-06	3.96E-09	7.40E-10	0.00E+00	2.43E-06	0.00E+00	5.69E-10	4.96E-08	1.77E-10	2.90E-07	7.57E-06
SQP	Pt	4.36E+02	6.74E-01	9.61E+01	5.33E+02	3.89E+00	2.10E-01	0.00E+00	5.80E+02	0.00E+00	5.59E-01	4.74E-01	1.51E-01	-1.73E+01	1.12E+03

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)

INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI) PER 1 Piece of KOMBISAVE+ - Universal Protection and Control Unit

PARAMETERS DESCRIBING RESOURCE USE

Abbreviation	Unit	Manufacturing				Distribution	Installation	Use		End of life				Benefits & Loads	Total
		A1	A2	A3	A1-A3	A4	A5	B1-B5, B7	B6	C1	C2	C3	C4	D	A1-C4
PERE	MJ	2.81E+02	1.21E-02	1.59E+01	2.97E+02	6.97E-02	2.13E-02	0.00E+00	6.48E+02	0.00E+00	1.00E-02	1.39E-01	2.90E-03	-1.86E+00	9.46E+02
PERM	MJ	0.00E+00	0.00E+00	1.15E+01	1.15E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E+01
PERT	MJ	2.81E+02	1.21E-02	2.74E+01	3.09E+02	6.97E-02	2.13E-02	0.00E+00	6.48E+02	0.00E+00	1.00E-02	1.39E-01	2.90E-03	-1.86E+00	9.57E+02
PENRE	MJ	2.01E+03	8.55E-01	6.30E+01	2.07E+03	4.94E+00	5.49E-01	0.00E+00	2.96E+03	0.00E+00	7.09E-01	1.35E+00	6.52E-02	2.67E+01	5.04E+03
PENRM	MJ	8.53E+00	0.00E+00	7.27E-01	9.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.71E-02	9.26E+00
PENRT	MJ	2.02E+03	8.55E-01	6.37E+01	2.08E+03	4.94E+00	5.49E-01	0.00E+00	2.96E+03	0.00E+00	7.09E-01	1.35E+00	6.52E-02	2.67E+01	5.05E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.61E+00	2.06E-04	4.98E-02	1.66E+00	1.19E-03	2.94E-04	0.00E+00	2.35E+00	0.00E+00	1.71E-04	1.66E-03	7.46E-05	-1.90E-02	4.01E+00

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 AND OUTPUT FLOWS

Abbreviation	Unit	Manufacturing				Distribution	Installation	Use		End of life				Benefits & Loads	Total
		A1	A2	A3	A1-A3	A4	A5	B1-B5, B7	B6	C1	C2	C3	C4	D	A1-C4
HWD	kg	3.31E-02	5.44E-06	6.52E-05	3.31E-02	3.15E-05	3.25E-06	0.00E+00	5.22E-03	0.00E+00	4.51E-06	1.63E-04	3.14E-07	-8.84E-05	3.85E-02
NHWD	kg	2.33E+01	5.64E-02	2.17E-01	2.36E+01	3.26E-01	2.15E-01	0.00E+00	1.19E+01	0.00E+00	4.68E-02	6.35E-02	2.61E-01	5.92E-01	3.63E+01
RWD	kg	1.26E-02	1.95E-07	8.42E-04	1.35E-02	1.13E-06	5.44E-07	0.00E+00	2.13E-02	0.00E+00	1.62E-07	2.61E-06	3.76E-08	1.43E-04	3.47E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E+00	0.00E+00	0.00E+00	2.77E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	6.20E-04	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E+00	6.20E-04
EEE	MJ	0.00E+00	0.00E+00	3.60E-04	3.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.53E-01	3.60E-04

HWD=hazardous waste disposed | **NHWD**=non-hazardous waste disposed | **RWD**=radioactive waste disposed **CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

INFORMATION ON BIOGENIC CARBON CONTENT PER PIECE

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	0.3287	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. One kilogram of biogenic carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

Uptake biogenic carbon dioxide	Amount	Unit
Packaging	1.205	kg CO_2 (biogenic)

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 14044:2006

ISO 14025

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

EN 50693

EN 50693:2022: Product category rules for life cycle assessments of electronic and electrical products and systems

EN 15804+A2

EN 15804:2012+A2:2019/AC:2021: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

Kiwa-EE GPI R.3.0 (2025)

Kiwa-Ecobility Experts, General Programme Instructions “Product Level”, SOP EE 1201_R.3.0 (03.06.2025)

Kiwa-EE GPI R.3.0 Annex B1 (2025)

Kiwa-Ecobility Experts, General Programme Instructions “Product Level” – Annex B1 Environmental Information Programme — according to EN 15804 / ISO 21930, SOP EE 1203_R.3.0 (03.06.2025)

EPDItaly007

Core PCR EN 50693 - ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS, REV. 3

Background database

ecoinvent version 3.9.1, December 2022

R<THINK characterization method

ecoinvent 3.9.1: EN 15804+A1 indicators (CML-IA Baseline v3.09), EN 15804+A2 indicators (EF 3.1)

NMD Determination Method V1.1 (March 2022)

IEC/TR 62635

Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment.

8 Contact information

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