



ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME

IE.5E, IE.5T, IE.7

SITE

Iskraemeco, d.d., Savska loka 4, 4000 Kranj, Slovenia

Iskraemeco Energy Measurements S.A.E., Plot 1, Pyramids

Industrial West Park, 10th of Ramadan City, Cairo, Egypt

In accordance with ISO 14025 and EN 50693

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration Number	IE.X meters
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GENERAL INFORMATION

EPD OWNER	
Name of the company	Iskraemeco, d.d.
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PROGRAM OPERATOR	
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INFORMATION ON THE EPD	
Product name (s)	IE.5E, IE.5T, IE.7
Site (s)	Iskraemeco, d.d., Savska loka 4, 4000 Kranj, Slovenia Iskraemeco Energy Measurements S.A.E., Plot 1, Pyramids Industrial West Park, 10th of Ramadan City, Cairo, Egypt
Short description and technical information of the product (s)	Products are built on a modular and scalable architecture, offering flexibility for various applications from residential to industrial use. Designed for both direct and transformer-connected setups, the IE.X meters meet the highest standards in accuracy and operational performance, offering reliable solutions for diverse energy management needs.
Field of application of the product (s)	The products covered in the EPD are an integral part of the smart grid infrastructure, whether in a power substation or residential setting, enabling the real-time measurements needed to monitor equipment health, grid congestion and stability, and system control.
Product (s) reference standards (if any)	PCR EPDIItaly 007 Electronic and electrical products and systems (Rev.3.1 12/11/2024). PCR EPDIItaly 011 Electronic and electrical products and systems – meters (Rev.1.0 01/07/2024) EN 50693:2019 Product category rules for life cycle assessments of electronic and electrical products and systems
CPC Code (number) https://unstats.un.org/unsd/classifications/Econ	4621 “Electricity distribution or control apparatus”
VERIFICATION INFORMATION	
PCR (title, version, date of publication or update)	PCR EPDIItaly 007 electronic and electrical products and systems (Rev.3.1 12/11/2024). PCR EPDIItaly 011 Electronic and electrical products and systems – meters (Rev.1.0 01/07/2024)
EPDIItaly Regulation (version, date of publication or update)	General Program Instructions of EPDIItaly REV 6.0 of 30/10/2023
Project Report LCA	Life Cycle Assessment Report “IE.5E, IE.5T, IE.7” 2024

Independent Verification Statement	<p>The PCR review was performed by - info@epditaly.it.</p> <p>Independent verification of the declaration and data, carried out according to ISO 14025: 2010.</p> <p><input type="checkbox"/> Internal <input checked="" type="checkbox"/> External</p> <p>Third party verification carried out by: ICMQ S.p.A., via Gaetano De Castillia n ° 10 - 20124 Milan, Italy. Accredited by Accredia.</p>
Comparability Statement	<p>Environmental statements published within the same product category, but from different programs, may not be comparable.</p>
Liability Statement	<p>The EPD Owner releases EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence.</p> <p>EPDItaly disclaims any responsibility for the information, data and results provided by the EPD Owner for life cycle assessment.</p>

1. Introduction

The Environmental Product Declaration (EPD) for the IE.5E, IE.5T and IE.7 meter produced in Slovenia and Egypt in 2024 for the European market is prepared according to ISO 14025 standard. It is a product specific EPD. It complies with the product category rules PCR EPD Italy 007 Electronic and electrical products and systems and PRC EPD Italy 011 Meters. The results are based on the Life cycle assessment (LCA) report conducted in accordance with the EN ISO 14040 and EN ISO 14044 standards.

The meters covered by this EPD are devices used to monitor and measure electricity consumption with a service life of 20 years and are not defined as construction products, therefore EN 50693 is applied.

2. Information about the manufacturer

Iskraemeco manufactures energy and water management solutions. The main production and final assembly plants are in Kranj, Slovenia (Iskraemeco, d.d.) and Cairo, Egypt (ISKRAEMECO Energy Measurement S.A.E.).

The company adheres to strict environmental policies, aiming to mitigate climate impact and improve energy efficiency. Full environmental and energy policies are available at Iskraemeco-Environmental-and-Energy-Policy.pdf and Elsewedy Group Environmental Policy (2022).

The Slovenia and Egypt facilities are certified for ISO 14001, ISO 9001, ISO 45001 and ISO 27001 standards. Its laboratories are accredited under ISO 17025. The Slovenian location is also certified for ISO 50001.

3. EPD scope

For the EPD a cradle-to-grave approach was used, and all life cycle stages mentioned in the table below were included in the assessment. Specifically raw materials and components in upstream module, energy (electricity, heat, compressed air), water, chemicals, packaging, generated waste and wastewater in core module depending on facility location were considered. In downstream module transportation from production facility to installation site, waste generated during installation, electricity consumption during use stage and treatment of waste meter were considered.

Phase	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End-of-life stage – de-installation
Phase declared	X	X	X	X	X

Table 1 – IE.5E, IE.5T, IE.7 meter's system boundaries LCA study according to EN 50693:2019

The functional unit for the assessment was one single meter. Specific data was collected for the year 2024 (January – December). Mainly primary data were collected. If they were not available, secondary - general data were used. In cases where allocation was unavoidable, allocation to a single meter based on number of produced meters was applied.

The potential benefits like re-use, recycling and potential energy recovery were not included in the environmental impact evaluation.

4. Description of the products and manufacturing process

The IE.X series meters are part of Iskraemeco's advanced eIoT platform, designed for energy generation, transmission, distribution, and consumption. This product family includes IE.5 meters for residential applications and IE.7 meters for commercial and industrial use, offering both direct and transformer-connected configurations. The meters are modular and scalable, supporting advanced functions like near real-time data management, energy forecasting, and fault detection through the Iskraemeco Measuring Operating System (eMOS).

The meters are compatible with modern IoT systems, supporting NB-IoT and LTE-M communication technologies and using the DLMS/COSEM protocol (IEC 62056 series). They meet key performance classifications under international standards: IEC 62052-11, IEC 62052-21, IEC 62053-21, IEC 62053-22, IEC 62053-23, and IEC 62053-24, covering active and reactive energy measurement across different accuracy classes.

Meter technical specification	IE.5E meter	IE.5T meter	IE.7 meter
Nominal voltage*	230 V, 240 V	3x240/415 V, 3x230/400 V, 3x230 V	3x230/400 V, 3x230 V
Frequency*	50 Hz, 60 Hz	50 Hz	50 Hz, 60 Hz
Performing class	Class B	Class B	Class C
Current intensity* - reference current - (maximum current)	5 (85) A, 5 (100) A	5 (85) A, 5 (100) A, 10 (120) A	1 (10) A
Mass (kg)	0,765	1,480	1,123

*maximum values for different model types are showed

Table 2 – IE.5E, IE.5T, IE.7 meter technical specification

The products are compliant with RoHS directive and REACH Regulation. IE.5E and IE.7 contain a lithium battery, while IE.5T does not have any batteries included.

The material composition of IE.5E, IE.5T, IE.7 meters and packaging (Slovenian type) according to IEC 62474 are presented in the tables below.

IE.5E composition	ID	Cat2	Mass (g)	Mass (%)
Material – class name				
Polycarbonate (PC)	M-254	M-25 Filled thermoplastics resin	391,9	51
Electronic components	/	/	228,4	30
Stainless steel	M-100	M-10 Steels and ferrous materials	65,7	9
Polycarbonate (PC)	M-204	M-20 Unfilled thermoplastics resin	25,3	3
Copper alloy*	M-121	M-12 Non-ferrous metals and alloys	23,4	3
Printed circuit board (PCB)	/	/	20,6	3
Battery lithium	/	/	10,0	1
Paper	M-341	M-34 Natural materials	0,1	0

*copper alloy include copper, brass, new silver and CuBe

IE.5E packaging	ID	Cat2	Mass (g)
Material – class name			
Wood	M-340	M-34 Natural materials	60,2
Paper	M-341	M-34 Natural materials	63,9

Table 3 – IE.5E Meter and packaging material declaration according to IEC 62474

IE.5T composition	ID	Cat2	Mass (g)	Mass (%)
Material – class name				
Polycarbonate (PC)	M-254	M-25 Filled thermoplastics resin	714,5	48
Electronic components	/	/	470,2	32
Stainless steel	M-100	M-10 Steels and ferrous materials	193,5	13
Printed circuit board (PCB)	/	/	48,9	3
Copper alloy*	M-121	M-12 Non-ferrous metals and alloys	28,5	2
Polycarbonate (PC)	M-204	M-20 Unfilled thermoplastics resin	24,3	2
Paper	M-341	M-34 Natural materials	0,1	0
Aluminium	M-120	M-12 Non-ferrous metals and alloys	0,1	0

*copper alloy include copper, brass, new silver and CuBe

IE.5T packaging	ID	Cat2	Mass* (g)
Material – class name			
Wood	M-340	M-34 Natural materials	103,4
Paper	M-341	M-34 Natural materials	95,5

Table 4 – IE.5T Meter and packaging material declaration according to IEC 62474

IE.7 meter composition Material – class name	ID	Cat2	Mass (g)	Mass (%)
Polycarbonate (PC)	M-254	M-25 Filled thermoplastics resin	645,3	57
Electronic components	/	/	235,1	21
Copper alloy*	M-121	M-12 Non-ferrous metals and alloys	135,1	13
Printed circuit board (PCB)	/	/	47,6	4
Polycarbonate (PC)	M-204	M-20 Unfilled thermoplastics resin	25,3	2
Stainless steel	M-100	M-10 Steels and ferrous materials	23,1	2
Battery lithium	/	/	10,0	1
Plastic	/	/	1,5	0
Paper	M-341	M-34 Natural materials	0,1	0

*copper alloy include copper, brass, new silver and CuBe

IE.7 packaging Material – class name	ID	Cat2	Mass (g)
Wood	M-340	M-34 Natural materials	103,4
Paper	M-341	M-34 Natural materials	95,5

Table 5 – IE.7 Meter and packaging material declaration according to IEC 62474

Electronic components, some semi-finished parts are in general purchased from European suppliers, most of metal and plastic parts and chemicals are purchased in Slovenia. Manufacturing includes assembling of PCB on SMT and THT lines, PCB testing, meter assembling, acceptance testing and packing. Manufacturing processes are the same for both locations, but packaging mass is different.

In Iskraemeco manufacturing process, several different types of meters are manufactured simultaneously. Therefore, it is not possible to determine the exact amount of energy and water consumed in production for each meter. Consequently, the total energy and water consumption is allocated proportionally across the total production output of produced meters - based on number of produced meters. We did this, by dividing the total energy and water consumption by the number of produced meters.

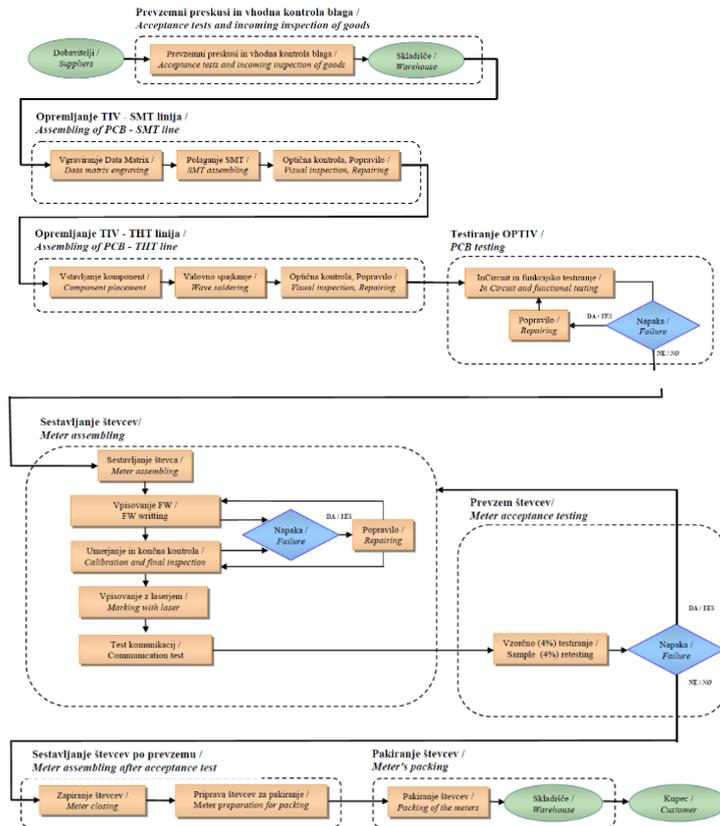


Figure 1 – IE.5E, IE.5T, IE.7 meter's main manufacturing processes

5. Transportation and installation

Transportation type of packed product to installation location depends on facility location. For calculation following scenario was adopted: from Slovenia only lorry EURO 6 was used (1.000km), from Egypt beside that also lorry EURO 3 (230 km) and ship (2.600 km) were used. Transportation type also defines packaging type. Therefore, quantity of waste generated at installation site differs regarding to production facility, but the waste type is the same (cardboard and wood).

6. Use Stage

Electricity consumed during the product's service life is presented in the table below, using the following formula for calculating and primary data of power used. No extraordinary maintenance operations are requested during entire reference service life of 20 years.

$$E_{use} [kWh] = \frac{P_{use} * 8760 * RSL}{1000}$$

Meter type	IE.5E	IE.5T	IE.7
P _{use} (W)	0,86	1,83 (0,57 +0,65 +0,61)	2,33 (0,71 + 0,84 + 0,76)
E _{use} (kWh)	150,7	320,6	408,2

Table 6 – Electricity consumed during the use stage for IE.5E, IE.5T, IE.7

7. LCA results

OpenLCA 2.4. was the software used to develop the model for calculating the environmental impacts of different indicators. The database used for model analysis was Ecoinvent 3.11. The database was used to make calculations for all stages.

The assessed potential environmental impacts through an LCA of the IE5.E, IE5.T, IE.7 meters produced in Slovenia and Egypt facilities are given in tables below. They were determined using the characterization factors and impact assessment methods specified in EN 15804:2012+A2:2019.

7.1. CORE ENVIRONMENTAL IMPACT INDICATORS

7.1.1. SLOVENIA

7.1.1.1. IE.5E meter

Impact category	Impact indicators	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Climate change – Total	GWP-total	kg CO ₂ eq.	3,57E+01	1,66E-01	1,31E-03	5,13E+01	3,53E-02	8,72E+01
Climate change – fossil	GWP-fossil	kg CO ₂ eq.	3,72E+01	1,66E-01	1,31E-03	4,96E+01	3,45E-02	8,70E+01
Climate change – biogenic	GWP-biogenic	kg CO ₂ eq.	-1,65E+00	1,15E-04	9,44E-07	1,61E+00	7,71E-04	-4,25E-02
Climate change – Land use and change in land use	GWP-luclu	kg CO ₂ eq.	6,87E-02	5,59E-05	4,73E-07	1,46E-01	5,14E-05	2,15E-01
Ozone Depletion	ODP	kg CFC-11 eq.	1,69E-06	3,62E-09	2,86E-11	9,21E-07	5,69E-10	2,61E-06
Acidification	AP	moles H ⁺ eq.	3,35E-01	3,56E-04	6,07E-06	2,85E-01	1,83E-04	6,21E-01
Eutrophication aquatic freshwater	EP – freshwater	kg P eq.	5,28E-02	1,15E-05	9,79E-08	4,76E-02	6,88E-06	1,00E-01
Eutrophication aquatic marine	EP - marine	kg N eq.	5,49E-02	8,58E-05	2,38E-06	4,55E-02	4,93E-05	1,01E-01
Eutrophication terrestrial	EP - terrestrial	mol N eq.	5,93E-01	9,27E-04	2,59E-05	4,03E-01	5,04E-04	9,97E-01
Photochemical ozone formation	POCP	kg NMVOC eq.	1,80E-01	5,65E-04	9,07E-06	1,29E-01	1,61E-04	3,10E-01
Depletion of abiotic resources – minerals and materials	ADP MINERALS & METALS	kg Sb eq.	1,42E-02	5,83E-07	4,38E-09	6,73E-04	2,18E-07	1,48E-02
Depletion of abiotic resources - fossil resources	ADP FOSSIL	MJ, net calorific value	5,15E+02	2,36E+00	1,89E-02	1,14E+03	3,56E-01	1,66E+03
Water consumption	WDP	m ³	1,39E+01	1,25E-02	1,08E-04	3,20E+01	6,68E-03	4,59E+01

Table 7 – Core environmental impact indicators

7.1.1.2. IE.5T meter

Impact category	Impact indicators	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Climate change - total	GWP-total	kg CO ₂ eq.	4,76E+01	3,14E-01	2,09E-03	1,09E+02	3,79E-02	1,57E+02
Climate change - fossil	GWP-fossil	kg CO ₂ eq.	5,03E+01	3,13E-01	2,09E-03	1,05E+02	3,78E-02	1,56E+02
Climate change - biogenic	GWP-biogenic	kg CO ₂ eq.	-2,78E+00	2,18E-04	1,52E-06	3,43E+00	4,59E-05	6,46E-01
Climate change - land use and change in land use	GWP-luclu	kg CO ₂ eq.	9,08E-02	1,05E-04	7,58E-07	3,11E-01	6,26E-05	4,02E-01
Ozone Depletion	ODP	kg CFC-11 eq.	1,72E-06	6,83E-09	4,55E-11	1,96E-06	5,05E-10	3,68E-06
Acidification	AP	moles H ⁺ eq.	4,65E-01	6,73E-04	9,70E-06	6,07E-01	1,85E-04	1,07E+00
Eutrophication aquatic freshwater	EP - freshwater	kg P eq.	7,39E-02	2,17E-05	1,57E-07	1,01E-01	3,77E-06	1,75E-01
Eutrophication aquatic marine	EP - marine	kg N eq.	7,53E-02	1,62E-04	3,80E-06	9,68E-02	6,60E-05	1,72E-01
Eutrophication terrestrial	EP - terrestrial	mol N eq.	8,19E-01	1,75E-03	4,14E-05	8,57E-01	7,12E-04	1,68E+00
Photochemical ozone formation	POCP	kg NMVOC eq.	2,49E-01	1,07E-03	1,45E-05	2,74E-01	2,31E-04	5,24E-01
Depletion of abiotic resources - minerals and materials	ADP MINERALS & METALS	kg Sb eq.	1,96E-02	1,10E-06	6,98E-09	1,43E-03	9,40E-08	2,10E-02
Depletion of abiotic resources - fossil resources	ADP FOSSIL	MJ, net calorific value	7,04E+02	4,45E+00	3,01E-02	2,43E+03	4,25E-01	3,14E+03
Water consumption	WDP	m ³	1,90E+01	2,36E-02	1,73E-04	6,80E+01	3,12E-03	8,71E+01

Table 8 – Core environmental impact indicators

7.1.1.3. IE.7 meter

Impact category	Impact indicators	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Climate change - total	GWP-total	kg CO ₂ eq.	3,19E+01	2,47E-01	2,09E-03	1,39E+02	4,36E-02	1,71E+02
Climate change - fossil	GWP-fossil	kg CO ₂ eq.	3,49E+01	2,47E-01	2,09E-03	1,34E+02	4,27E-02	1,69E+02
Climate change - biogenic	GWP-biogenic	kg CO ₂ eq.	-3,14E+00	1,71E-04	1,52E-06	4,60E+00	7,85E-04	1,46E+00
Climate change - land use and change in land use	GWP-luclu	kg CO ₂ eq.	6,44E-02	8,31E-05	7,58E-07	3,98E-01	6,65E-05	4,63E-01
Ozone Depletion	ODP	kg CFC-11 eq.	1,56E-06	5,38E-09	4,55E-11	2,23E-06	7,06E-10	3,80E-06
Acidification	AP	moles H ⁺ eq.	3,63E-01	5,30E-04	9,70E-06	6,64E-01	2,31E-04	1,03E+00
Eutrophication aquatic freshwater	EP - freshwater	kg P eq.	4,70E-02	1,71E-05	1,57E-07	1,23E-01	7,98E-06	1,70E-01
Eutrophication aquatic marine	EP - marine	kg N eq.	5,06E-02	1,28E-04	3,80E-06	1,17E-01	6,62E-05	1,68E-01
Eutrophication terrestrial	EP - terrestrial	mol N eq.	5,51E-01	1,38E-03	4,14E-05	1,01E+00	6,87E-04	1,56E+00
Photochemical ozone formation	POCP	kg NMVOC eq.	1,74E-01	8,40E-04	1,45E-05	3,23E-01	2,21E-04	4,98E-01
Depletion of abiotic resources - minerals and materials	ADP MINERALS & METALS	kg Sb eq.	1,13E-02	8,67E-07	6,98E-09	2,96E-04	2,43E-07	1,15E-02
Depletion of abiotic resources - fossil resources	ADP FOSSIL	MJ, net calorific value	4,96E+02	3,51E+00	3,01E-02	3,13E+03	4,71E-01	3,63E+03
Water consumption	WDP	m ³	1,32E+01	1,86E-02	1,73E-04	8,28E+01	7,50E-03	9,60E+01

Table 9– Core environmental impact indicators

7.1.2. EGYPT

7.1.2.1. IE.5E meter

Impact category	Impact indicators	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Climate change – total	GWP-total	kg CO ₂ eq.	4,26E+01	2,61E-01	1,66E-03	5,13E+01	3,53E-02	9,42E+01
Climate change - fossil	GWP-fossil	kg CO ₂ eq.	4,58E+01	2,61E-01	1,66E-03	4,96E+01	3,45E-02	9,57E+01
Climate change - biogenic	GWP-biogenic	kg CO ₂ eq.	-3,24E+00	1,44E-04	1,25E-06	1,61E+00	7,71E-04	-1,63E+00
Climate change - land use and change in land use	GWP-luclu	kg CO ₂ eq.	7,14E-02	9,77E-05	6,10E-07	1,46E-01	5,14E-05	2,18E-01
Ozone Depletion	ODP	kg CFC-11 eq.	1,82E-06	5,11E-09	3,63E-11	9,21E-07	5,69E-10	2,75E-06
Acidification	AP	moles H ⁺ eq.	3,46E-01	1,38E-03	7,75E-06	2,85E-01	1,83E-04	6,33E-01
Eutrophication aquatic freshwater	EP - freshwater	kg P eq.	5,41E-02	1,90E-05	1,27E-07	4,76E-02	6,88E-06	1,02E-01
Eutrophication aquatic marine	EP - marine	kg N eq.	5,90E-02	3,78E-04	3,03E-06	4,55E-02	4,93E-05	1,05E-01
Eutrophication terrestrial	EP - terrestrial	mol N eq.	6,36E-01	4,14E-03	3,31E-05	4,03E-01	5,04E-04	1,04E+00
Photochemical ozone formation	POCP	kg NMVOC eq.	1,97E-01	1,54E-03	1,16E-05	1,29E-01	1,61E-04	3,28E-01
Depletion of abiotic resources - minerals and materials	ADP MINERALS & METALS	kg Sb eq.	1,42E-02	8,50E-07	5,56E-09	6,73E-04	2,18E-07	1,49E-02
Depletion of abiotic resources - fossil resources	ADP FOSSIL	MJ, net calorific value	5,75E+02	3,65E+00	2,40E-02	1,14E+03	3,56E-01	1,72E+03
Water consumption	WDP	m ³	1,47E+01	1,86E-02	1,39E-04	3,20E+01	6,68E-03	4,67E+01

Table 10 – Core environmental impact indicators

7.1.2.2. IE.5T meter

Impact category	Impact indicators	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Climate change - total	GWP-total	kg CO ₂ eq.	5,57E+01	4,63E-01	1,66E-03	1,09E+02	3,79E-02	1,65E+02
Climate change - fossil	GWP-fossil	kg CO ₂ eq.	5,86E+01	4,63E-01	1,66E-03	1,05E+02	3,78E-02	1,65E+02
Climate change - biogenic	GWP-biogenic	kg CO ₂ eq.	-2,97E+00	2,56E-04	1,25E-06	3,43E+00	4,59E-05	4,53E-01
Climate change - land use and change in land use	GWP-luclu	kg CO ₂ eq.	9,21E-02	1,73E-04	6,10E-07	3,11E-01	6,26E-05	4,03E-01
Ozone Depletion	ODP	kg CFC-11 eq.	1,84E-06	9,06E-09	3,63E-11	1,96E-06	5,05E-10	3,81E-06
Acidification	AP	moles H ⁺ eq.	4,75E-01	2,45E-03	7,75E-06	6,07E-01	1,85E-04	1,08E+00
Eutrophication aquatic freshwater	EP - freshwater	kg P eq.	7,51E-02	3,37E-05	1,27E-07	1,01E-01	3,77E-06	1,76E-01
Eutrophication aquatic marine	EP - marine	kg N eq.	7,90E-02	6,70E-04	3,03E-06	9,68E-02	6,60E-05	1,77E-01
Eutrophication terrestrial	EP - terrestrial	mol N eq.	8,59E-01	7,35E-03	3,31E-05	8,57E-01	7,12E-04	1,72E+00
Photochemical ozone formation	POCP	kg NMVOC eq.	2,64E-01	2,73E-03	1,16E-05	2,74E-01	2,31E-04	5,41E-01
Depletion of abiotic resources - minerals and materials	ADP MINERALS & METALS	kg Sb eq.	1,97E-02	1,51E-06	5,56E-09	1,43E-03	9,40E-08	2,11E-02
Depletion of abiotic resources - fossil resources	ADP FOSSIL	MJ, net calorific value	7,59E+02	6,47E+00	2,40E-02	2,43E+03	4,25E-01	3,20E+03
Water consumption	WDP	m ³	1,96E+01	3,30E-02	1,39E-04	6,80E+01	3,12E-03	8,77E+01

Table 11 – Core environmental impact indicators

7.1.2.3. IE.7 meter

Impact category	Impact indicators	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Climate change - total	GWP-total	kg CO ₂ eq.	3,99E+01	3,63E-01	1,66E-03	1,39E+02	4,36E-02	1,79E+02
Climate change - fossil	GWP-fossil	kg CO ₂ eq.	4,32E+01	3,62E-01	1,66E-03	1,34E+02	4,27E-02	1,77E+02
Climate change - biogenic	GWP-biogenic	kg CO ₂ eq.	-3,34E+00	2,00E-04	1,25E-06	4,60E+00	7,85E-04	1,27E+00
Climate change - land use and change in land use	GWP-luclu	kg CO ₂ eq.	6,57E-02	1,35E-04	6,10E-07	3,98E-01	6,65E-05	4,64E-01
Ozone Depletion	ODP	kg CFC-11 eq.	1,69E-06	7,09E-09	3,63E-11	2,23E-06	7,06E-10	3,93E-06
Acidification	AP	moles H ⁺ eq.	3,73E-01	1,92E-03	7,75E-06	6,64E-01	2,31E-04	1,04E+00
Eutrophication aquatic freshwater	EP - freshwater	kg P eq.	4,83E-02	2,64E-05	1,27E-07	1,23E-01	7,98E-06	1,71E-01
Eutrophication aquatic marine	EP - marine	kg N eq.	5,42E-02	5,24E-04	3,03E-06	1,17E-01	6,62E-05	1,72E-01
Eutrophication terrestrial	EP - terrestrial	mol N eq.	5,89E-01	5,75E-03	3,31E-05	1,01E+00	6,87E-04	1,60E+00
Photochemical ozone formation	POCP	kg NMVOC eq.	1,89E-01	2,14E-03	1,16E-05	3,23E-01	2,21E-04	5,14E-01
Depletion of abiotic resources - minerals and materials	ADP MINERALS & METALS	kg Sb eq.	1,13E-02	1,18E-06	5,56E-09	2,96E-04	2,43E-07	1,16E-02
Depletion of abiotic resources - fossil resources	ADP FOSSIL	MJ, net calorific value	5,51E+02	5,06E+00	2,40E-02	3,13E+03	4,71E-01	3,69E+03
Water consumption	WDP	m ³	1,37E+01	2,58E-02	1,39E-04	8,28E+01	7,50E-03	9,66E+01

Table 12 – Core environmental impact indicators

7.2. Parameters describing resources use

7.2.1. SLOVENIA

7.2.1.1. IE.5E meter

PARAMETERS	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material (PENRE)	MJ, net calorific value	5,15E+02	2,36E+00	1,89E-02	1,14E+03	3,56E-01	1,66E+03
Use of renewable primary energy excluding renewable primary energy resources used as raw material (PERE)	MJ, net calorific value	9,57E+01	3,89E-02	3,43E-04	3,09E+02	3,66E-02	4,04E+02
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable primary energy resources used as raw material (PERM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ, net calorific value	5,15E+02	2,36E+00	1,89E-02	1,14E+03	3,56E-01	1,66E+03
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value	9,57E+01	3,89E-02	3,43E-04	3,09E+02	3,66E-02	4,04E+02
Net use of fresh water (FW)	m ³	3,33E-01	2,89E-04	2,50E-06	7,44E-01	1,57E-04	1,08E+00
Use of secondary raw materials (MS)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels (NRSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 13 – Parameters describing resources use

7.2.1.2. IE.5T meter

PARAMETERS	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material (PENRE)	MJ, net calorific value	7,04E+02	4,45E+00	3,01E-02	2,43E+03	4,25E-01	3,14E+03
Use of renewable primary energy excluding renewable primary energy resources used as raw material (PERE)	MJ, net calorific value	1,41E+02	7,35E-02	5,52E-04	6,57E+02	1,02E-02	7,97E+02
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable primary energy resources used as raw material (PERM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ, net calorific value	7,04E+02	4,45E+00	3,01E-02	2,43E+03	4,25E-01	3,14E+03
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value	1,41E+02	7,35E-02	5,52E-04	6,57E+02	1,02E-02	7,97E+02
Net use of fresh water (FW)	m ³	4,70E-01	5,45E-04	4,00E-06	1,58E+00	7,40E-05	2,05E+00
Use of secondary raw materials (MS)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels (NRSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 14 – Parameters describing resources use

7.2.1.3. IE.7 meter

PARAMETERS	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material (PENRE)	MJ, net calorific value	4,96E+02	3,51E+00	3,01E-02	3,13E+03	4,71E-01	3,63E+03
Use of renewable primary energy excluding renewable primary energy resources used as raw material (PERE)	MJ, net calorific value	1,14E+02	5,78E-02	5,52E-04	7,08E+02	3,99E-02	8,21E+02
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable primary energy resources used as raw material (PERM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ, net calorific value	4,96E+02	3,51E+00	3,01E-02	3,13E+03	4,71E-01	3,63E+03
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value	1,14E+02	5,78E-02	5,52E-04	7,08E+02	3,99E-02	8,21E+02
Net use of fresh water (FW)	m ³	3,18E-01	4,29E-04	4,00E-06	1,93E+00	1,77E-04	2,24E+00
Use of secondary raw materials (MS)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels (NRSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 15 – Parameters describing resources use

7.2.2. EGYPT

7.2.2.1. IE.5E meter

PARAMETERS	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material (PENRE)	MJ, net calorific value	5,75E+02	3,65E+00	2,40E-02	1,14E+03	3,56E-01	1,72E+03
Use of renewable primary energy excluding renewable primary energy resources used as raw material (PERE)	MJ, net calorific value	1,24E+02	5,59E-02	4,49E-04	3,09E+02	3,66E-02	4,33E+02
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable primary energy resources used as raw material (PERM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ, net calorific value	5,75E+02	3,65E+00	2,40E-02	1,14E+03	3,56E-01	1,72E+03
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value	1,24E+02	5,59E-02	4,49E-04	3,09E+02	3,66E-02	4,33E+02
Net use of fresh water (FW)	m ³	3,36E-01	4,36E-04	3,21E-06	7,44E-01	1,57E-04	1,08E+00
Use of secondary raw materials (MS)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels (NRSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 16 – Parameters describing resources use

7.2.2.2. IE.5T meter

PARAMETERS	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material (PENRE)	MJ, net calorific value	7,59E+02	6,47E+00	2,40E-02	2,43E+03	4,25E-01	3,20E+03
Use of renewable primary energy excluding renewable primary energy resources used as raw material (PERE)	MJ, net calorific value	1,46E+02	9,92E-02	4,49E-04	6,57E+02	1,02E-02	8,03E+02
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable primary energy resources used as raw material (PERM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ, net calorific value	7,59E+02	6,47E+00	2,40E-02	2,43E+03	4,25E-01	3,20E+03
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value	1,46E+02	9,92E-02	4,49E-04	6,57E+02	1,02E-02	8,03E+02
Net use of fresh water (FW)	m ³	4,70E-01	7,73E-04	3,21E-06	1,58E+00	7,40E-05	2,05E+00
Use of secondary raw materials (MS)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels (NRSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 17 – Parameters describing resources use

7.2.2.3. IE.7 meter

PARAMETERS	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material (PENRE)	MJ, net calorific value	5,51E+02	5,06E+00	2,40E-02	3,13E+03	4,71E-01	3,69E+03
Use of renewable primary energy excluding renewable primary energy resources used as raw material (PERE)	MJ, net calorific value	1,19E+02	7,76E-02	4,49E-04	7,08E+02	3,99E-02	8,27E+02
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable primary energy resources used as raw material (PERM)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ, net calorific value	5,51E+02	5,06E+00	2,40E-02	3,13E+03	4,71E-01	3,69E+03
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value	1,19E+02	7,76E-02	4,49E-04	7,08E+02	3,99E-02	8,27E+02
Net use of fresh water (FW)	m ³	3,18E-01	6,05E-04	3,21E-06	1,93E+00	1,77E-04	2,24E+00
Use of secondary raw materials (MS)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels (RSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels (NRSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 18 – Parameters describing resources use

7.3. Waste production descriptive parameters

7.3.1. SLOVENIA

7.3.1.1. IE.5E meter

Impact category	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Hazardous landfill waste (HWD)	kg	2,83E+00	2,43E-03	2,00E-05	1,34E+00	1,26E-03	4,18E+00
Non-hazardous waste disposed (NHWD)	kg	4,22E+01	2,60E-02	2,05E-04	1,10E+01	1,92E-02	5,33E+01
Radioactive waste disposed (RWD)	kg	1,08E-03	7,02E-07	6,50E-09	8,21E-03	3,80E-07	9,29E-03
Materials for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse (CRU)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (ETE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electricity energy (EEE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 19 – Waste production descriptive parameters

7.3.1.2. IE.5T meter

Impact category	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Hazardous landfill waste (HWD)	kg	4,96E+00	4,59E-03	3,20E-05	2,86E+00	9,09E-04	7,82E+00
Non-hazardous waste disposed (NHWD)	kg	5,82E+01	4,90E-02	3,27E-04	2,34E+01	1,23E-02	8,16E+01
Radioactive waste disposed (RWD)	kg	1,39E-03	1,33E-06	1,05E-08	1,75E-02	1,67E-07	1,89E-02
Materials for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse (CRU)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (ETE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electricity energy (EEE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 20 – Waste production descriptive parameters

7.3.1.3. IE.7 meter

Impact category	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use Maintenance stage	End of life stage	Total
Hazardous landfill waste (HWD)	kg	2,52E+00	3,61E-03	3,20E-05	2,95E+00	1,46E-03	5,47E+00
Non-hazardous waste disposed (NHWD)	kg	3,89E+01	3,86E-02	3,27E-04	1,99E+01	2,04E-02	5,88E+01
Radioactive waste disposed (RWD)	kg	1,01E-03	1,04E-06	1,05E-08	2,27E-02	4,37E-07	2,38E-02
Materials for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse (CRU)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (ETE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electricity energy (EEE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 21 – Waste production descriptive parameters

7.3.2. EGYPT

7.3.2.1. IE.5E meter

Impact category	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Hazardous landfill waste (HWD)	kg	3,43E+00	4,17E-03	2,57E-05	1,34E+00	1,26E-03	4,78E+00
Non-hazardous waste disposed (NHWD)	kg	4,79E+01	3,83E-02	2,62E-04	1,10E+01	1,92E-02	5,89E+01
Radioactive waste disposed (RWD)	kg	1,04E-03	9,69E-07	8,57E-09	8,21E-03	3,80E-07	9,25E-03
Materials for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse (CRU)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (ETE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electricity energy (EEE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 22 – Waste production descriptive parameters

7.3.2.2. IE.5T meter

Impact category	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Hazardous landfill waste (HWD)	kg	5,54E+00	7,40E-03	2,57E-05	2,86E+00	9,09E-04	8,41E+00
Non-hazardous waste disposed (NHWD)	kg	6,36E+01	6,79E-02	2,62E-04	2,34E+01	1,23E-02	8,71E+01
Radioactive waste disposed (RWD)	kg	1,34E-03	1,72E-06	8,57E-09	1,75E-02	1,67E-07	1,88E-02
Materials for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse (CRU)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (ETE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electricity energy (EEE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 23 – Waste production descriptive parameters

7.3.3.3. IE.7 meter

Impact category	UNIT	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of life stage	Total
Hazardous landfill waste (HWD)	kg	3,10E+00	5,79E-03	2,57E-05	2,95E+00	1,46E-03	6,06E+00
Non-hazardous waste disposed (NHWD)	kg	4,43E+01	5,31E-02	2,62E-04	1,99E+01	2,04E-02	6,43E+01
Radioactive waste disposed (RWD)	kg	9,67E-04	1,34E-06	8,57E-09	2,27E-02	4,37E-07	2,37E-02
Materials for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse (CRU)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (ETE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electricity energy (EEE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 24 – Waste production descriptive parameters

8. Interpretation

The LCA revealed that the use stage contributes the most (55% to 80%) to the meter's global warming potential. Therefore, measures to minimize this impact should be considered during the design and development phase.

9. References

PCR EPDIItaly011 Electronic and electrical products and systems – Meters (Rev 1.0 01/07/2024)

PCR EPDIItaly007 Electronic and electrical products and systems (Rev 3.1. 12/11/2024)

General Program Instructions of EPDIItaly REV 6.0 of 30/10/2023

EN 50693:2019 Product category rules for life cycle assessments of electronic and electrical products and systems

OpenLCA 2.4

Ecoinvent 3.11

ISO 14040 Environmental management – Life cycle assessment – Principles and framework

ISO 14044 Environmental management – Life cycle assessment – Requirements and guidelines

EN 15804:2012+A2:2019 Sustainability of construction rules - Environmental product declaration

IEC 62474 Material declaration for Products of and for the Electrotechnical Industry

ISO 14001 Environmental management systems

ISO 50001 Energy management systems

ISO 9001 Quality management systems

Life Cycle Assessment Report “IE.5E, IE.5T, IE,7” 2024, rev 2

ISO 14025 Environmental labels and declarations — Type III environmental declarations — Principles and procedures