Iskraemeco, d.d.

ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME: MT880–T1

SITE: Savska loka 4, 4000 Kranj, Slovenia

In accordance with ISO 14025 and EN 50693

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration Number	EPDISKRAEMECO_MT880, ver. 4
Registration Number	EPDITALY0559

Issue date	6 / 12 / 2023
Valid to	6 / 12 / 2028

GENERAL INFORMATION

EPD OWNER	
Name of the company	Iskraemeco, d.d.
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PROGRAM OPERATOR	
EPDItaly	Via Gaetano De Castillia n° 10 - 20124 Milan, Italy
INFORMATION ON THE EPD	
Product name(s)	MT880–T1
Site(s)	Savska loka 4, 4000 Kranj, Slovenia
Short description and technical information of the product(s)	This LCA study has been developed for the MT880–T1 meter (UN CPC code: 4621 “Electricity distribution or control apparatus”); geographical scope: Slovenia & Chile. It is a modular, transformer-connected meter with a display and communication module. The average weight of MT880-T1 is 1,7 kg, dimensions 255 mm x 177 mm x 91 mm. MT880-T1 belongs to the ICG group of meters. The meter is RoHS and REACH compliant. The product is not considered as a construction product. The MT880-T1 meter is designed for industrial and commercial applications with an accuracy class MID C and is intended for more precise energy measurement. It measures active, reactive, and apparent energy/demand in two directions and in four quadrants. The meter measures consumed energy in three-phase four-wire or three-phase three-wire networks. It is connected indirectly through measurement transformers.
Field of application of the product(s)	The product covered in the EPD is 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 EPDItaly 007 electronic and electrical products and systems (Rev.3 13/01/2023). PCR EPDItaly 011 Electronic and electrical products and systems – meters (Rev.0 16/03/2020)
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 EPDItaly 007 electronic and electrical products and systems (Rev.3 13/01/2023) PCR EPDItaly 011 Electronic and electrical products and systems – meters (Rev.0 16/03/2020)
EPDItaly Regulation (version, date of publication or update)	General Program Instructions of EPDItaly REV 5.2 of 16/02/2022
Project Report LCA	MT880-T1 meter LCA document REV.4 6/12/2023
Independent Verification Statement	The PCR review was performed by Ing. Luca Giacomello, Arch. Michele Paleari, Ing. Balazs Sara - info@epditaly.it. Independent verification of the declaration and data carried out according to ISO 14025: 2010. ☐ Internal ☑ External Third-party verification carried out by: ICMQ S.p.A., via Gaetano De Castillia n ° 10 - 20124 Milan, Italy. Accredited by Accredia.
Comparability Statement	Environmental statements published within the same product category, but from different programs, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804: 2012 + A2: 2019.
Liability Statement	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. EPDItaly disclaims any responsibility for the information, data and results provided by the EPD Owner for life cycle assessment.

EPD scope, type and market applicability

This declaration is a cradle-to-grave product-specific EPD and refers to the geographical area of Slovenia and Chile.

Company

Since the company's founding in 1945, Iskraemeco employees have been transforming their invaluable experience, innovation, and thorough understanding of our customers' needs into comprehensive energy management solutions. As the world transitions to a more sustainable future, energy and water solutions are becoming increasingly important. Since 2007 we have been part of Elsewedy Electric Group with whom we share a common vision of a smart, digital, and green future. We are developing intelligent digital solutions and services for the energy and water sector by combining our extensive experience and industry expertise with cutting-edge IoT and AI technologies.

Sustainable development is embedded in the company strategy. With a three-tier sustainability model, we enable utilities to implement a wholesome sustainable approach into their processes. We are committed to protecting the environment by preventing or mitigating adverse environmental impacts and improving energy performance to create added value for us, our customers, and other stakeholders. We are compliant with all the relevant legislation. Iskraemeco has implemented and certified environmental and energy management systems according to international standards ISO 14001 and ISO 50001. We closely observe the guidelines of socially responsible behaviour as laid down in ISO 26000. The company also holds certificates ISO 9001, ISO 45001, ISO 27001 and has laboratories accredited according to ISO 17020 and ISO 17025. Iskraemeco's environmental and energy policy as well as sustainability policy are available at: www.iskraemeco.com.

Product

Iskraemeco is committed to always delivering high-quality, customized solutions and services. Our robust portfolio of smart meters, communication tools, software suites, and services lets us predict future needs for efficient energy and water management.

This EPD has been developed specifically for the Enel Chile. It concerns the MT880-T1 meter, a modular, transformer-connected meter belonging to the ICG group of meters. MT880 is designed for industrial and commercial applications with an accuracy class up to 0.5S (MID C) and is intended for more precise energy measurement. It measures active, reactive, and apparent energy/demand in two directions and in four quadrants. The meter measures consumed energy in three-phase four-wire or three-phase three-wire networks. It is connected indirectly through measurement transformers. The measuring and technical characteristics of the meter comply with the IEC 62052-11, IEC 62053-21, IEC 62063-22, IEC 62053-23, IEC 62053-24, EN 50470-1, EN 50470-3 standards. Meters are designed and manufactured in compliance with ISO 9001 requirements as well as other Iskraemeco standards.

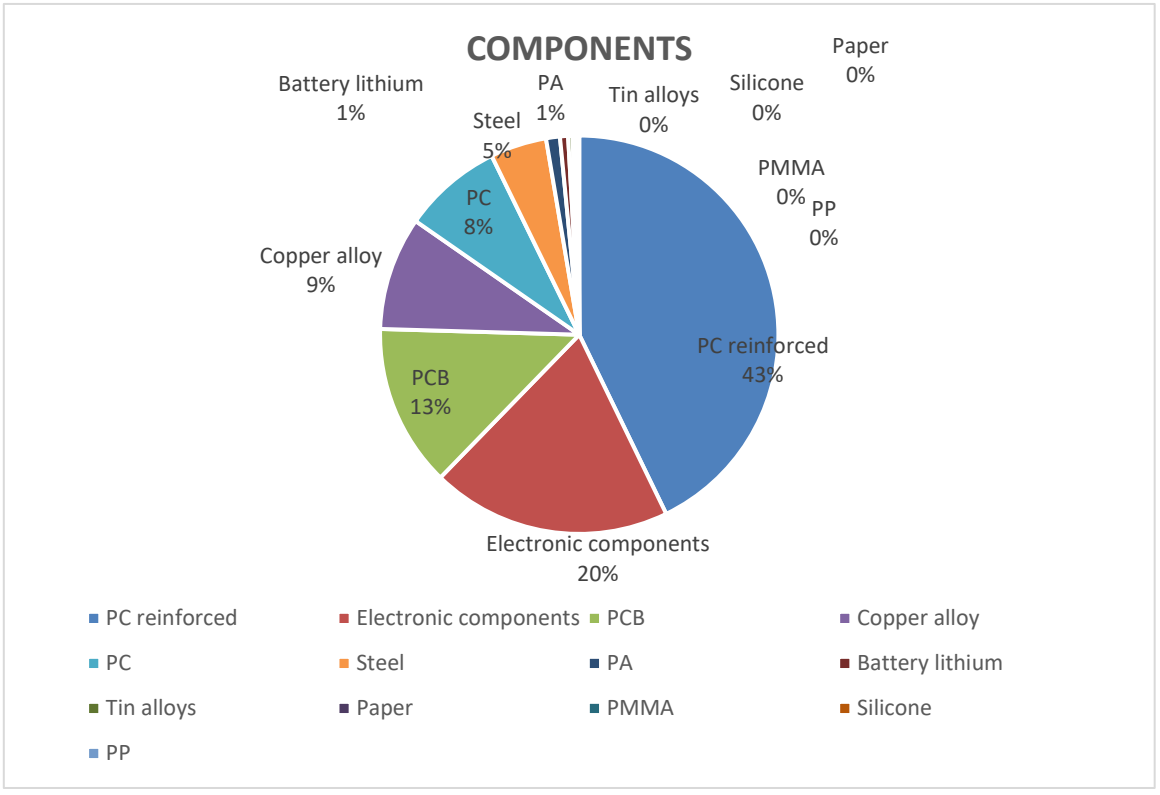
Nominal voltage	3x240 V/415 V
Frequency	50 Hz
Performing class	MID meters: C
Current intensity	I nom = 5 A, I max = 10 A

Table 1 – Technical specifications of the meter

MT880-T1 meter composition Material – class name	ID	Cat2	Mass (g)	Mass (%)
Polycarbonate (PC)	M-254	M-25 Filled thermoplastics resin	715,4	42,8
Electronic components	/	/	325,4	19,5
Printed circuit board (PCB)	/	/	220,4	13,2
Copper alloy	M-121	M-12 Non-ferrous metals and alloys	153,8	9,2
Polycarbonate (PC)	M-204	M-20 Unfilled thermoplastics resin	135,2	8,1
Stainless steel	M-100	M-10 Steels and ferrous materials	76,4	4,6
Polyamide (PA)	M-258	M-25 Filled thermoplastics resin	18,8	1,1
Battery lithium	/	/	11,0	0,7
Tin and its alloys (Including Pb-free solders)	M-126	M-12 Non-ferrous metals and alloys	6,0	0,4
Paper	M-341	M-34 Natural materials	4,0	0,2
Polymethylmethacrylate (PMMA)	M-220	M-20 Unfilled thermoplastics resin	3,5	0,2
Silicone	M-321	M-32 Elastomers	0,8	0
Polypropylene (PP)	M-202	M-20 Unfilled thermoplastics resin	0,6	0

MT880-T1 packaging Material – class name	ID	Cat2	Mass (g)
Wood	M-340	M-34 Natural materials	210,0
Paper	M-341	M-34 Natural materials	187,3

Table 2 – M880-T1 meter's unit composition



METHODOLOGICAL FRAMEWORK DECLARATION

The study was carried out to evaluate the environmental impact of the production of MT880-T1 meters in the Kranj manufacturing plant only for Chile in the year 2022.

The study has been elaborated on the request of our customer with regard to the EPDItaly program operator rules defined in PCR EPDItaly 011 ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS – METERS (Rev.0 16/03/2020) and PCR EPDItaly 007 ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS (Rev.3 13/01/2023).

The primary goal of the LCA study is the EPD processing for the MT880-T1 meters produced for the Chilean market for B2B communication.

Functional unit

The system task of the study was the production of MT880-T1 meter in Iskraemeco and its life cycle in the Chilean market for meters produced in 2022. The meter monitors the consumption of electricity starting from the primary measurement of electrical power for a service life of 20 years. **The functional unit is one product unit.**

System boundary

The EPD analysis uses a cradle-to-grave system boundary. No known flows are deliberately excluded from this EPD. The system boundaries are defined according to the General Program Instructions of EPDItaly REV 5.2 of 16/02/2022 and of the PCR EPDItaly011 ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS – METERS (Rev.0 16/03/2020). The environmental impacts shown in the following chapters are schematically summarized in the figures below, showing all the life cycle phases foreseen by the PCR. The EN 50693 (2019) standard is applied.

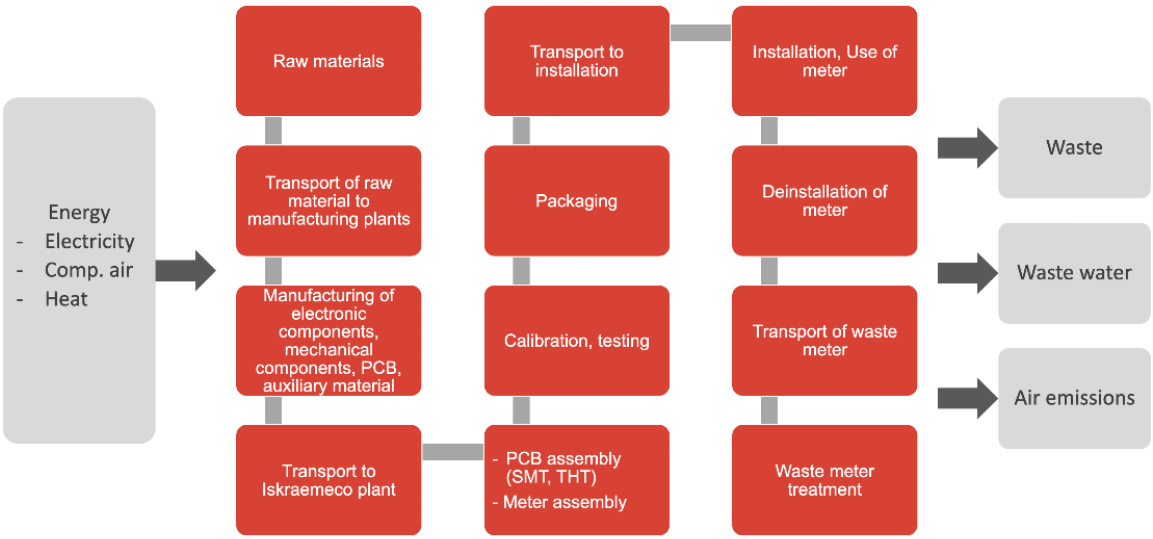


Figure 1 – MT880-T1 meter's LCA phases

Manufacturing stage		Distribution stage	Installation stage	Use and maintenance stage	End-of-life stage – deinstallation
Upstream module	Core module	Downstream module			
Extraction of raw materials, including waste recycling process and the production of semi-finished and ancillary products	Manufacturing of the product constituents, including all the stages	According to EN 50693			
Transport of raw materials to the manufacturing company	Product assembly				
	Packaging				
	Waste recycling processes				

Table 3 – MT880-T1 meter's system boundaries LCA study according to EN 50693 (2019)

MT880-T1 meter production cycle at the Kranj manufacturing plant

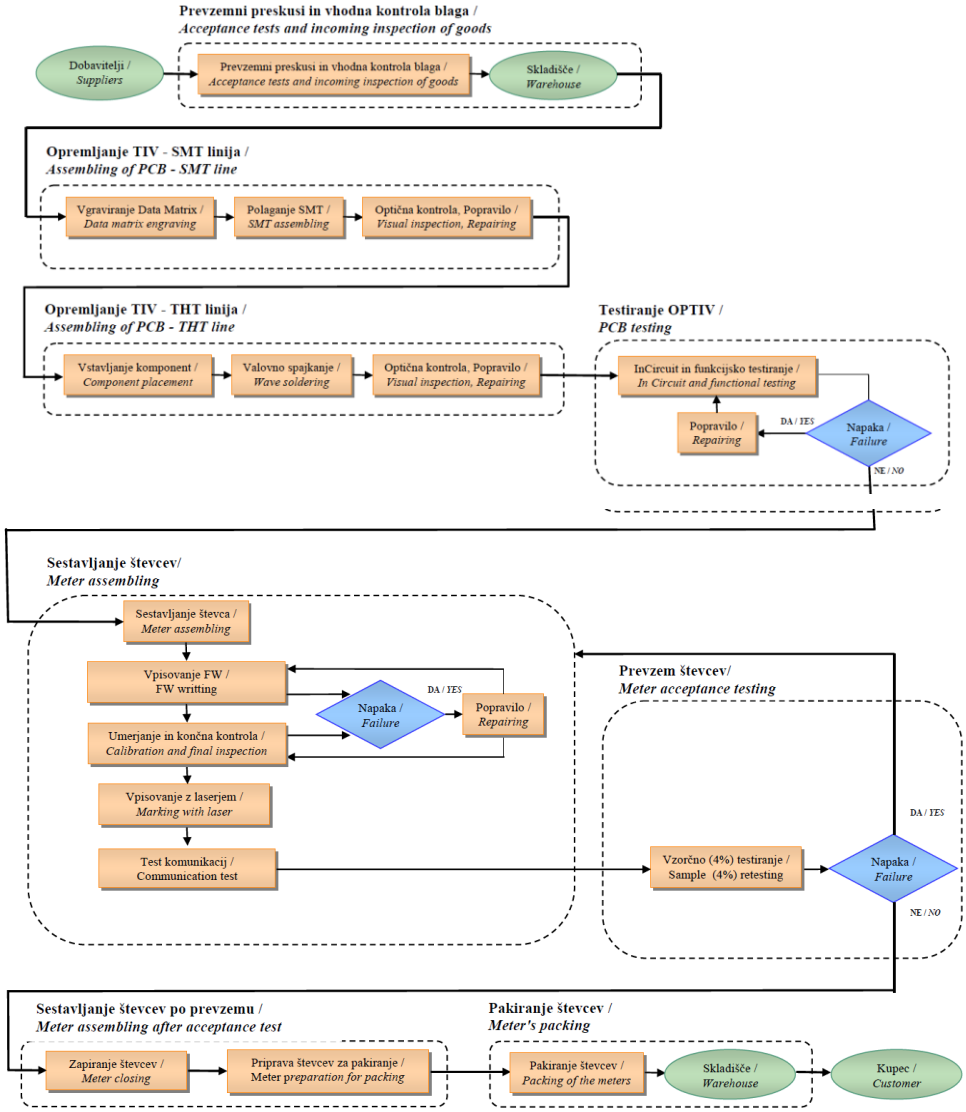


Figure 2 – MT880-T1 meter's main manufacturing processes at the company

Manufacturing

This module corresponds to the LCA cradle-to-gate analysis and considers the impacts related to the production of the meter, starting from the raw materials up to the moment the product can be marketed. Specifically, at least the following flows have been considered: raw material transformation and final assembly of the meter; both impacts related to material and energy transformation (electricity, heat); primary information as number and weight of meter and Printed Circuit Board (PCB) components to know how electronic components and in particular PCBs have been implemented. Where details of PCB components are not available, information coming from commercial database has been described.

Transportations of raw materials and semi-finished products along the entire supply chain have been considered.

Meter components (plastic and electronic) are usually purchased from European suppliers and rarely from approved non-European suppliers. Suppliers mainly purchase these components from China and Taiwan. The main type of transport is by ship and then by EURO 5 trucks. Assembly is done in one production plant so transport among several sites is not applicable.

Primary data for the transportation of electronic and mechanical components, PCBs, semi-finished products cannot be assigned to a specific product. As allocation cannot be avoided, we assessed the percentage by dividing the mass of specific product by the total weight of products manufactured in 2022.

MT880-T1 meters are packed individually in cardboard boxes and stacked into larger cardboard transport boxes (100 pieces). Paper sheets are placed on the bottom and top of the transport box. Transport boxes are stacked on EURO wooden pallets.

We evaluate the waste generation process during the manufacturing stage, including its transportation to the disposal site.

The meter contains a wide variety of metals, metal-alloys, plastics and other materials. The treatment process steps aim to liberate, separate and refine these materials. During the recycling process, different treatment technologies are used. A cascade of treatment operators forms a chain of treatment activities, where interim fractions are processed by downstream operators, which are situated in other countries. None of the materials can be landfilled. This means the end-of-life choice for all materials that are recycled is incineration.

Primary data for generating waste cannot be assigned to the specific product. As allocation cannot be avoided, we assessed the percentage by dividing the mass of specific product by total weight of products manufactured in 2022. The final procedure of waste treatment is managed by an external waste management company.

Primary data for chemicals and water consumption cannot be assigned to a specific product. As allocation cannot be avoided, we assessed the percentage by dividing the mass of specific product by total weight of products manufactured in 2022.

Distribution, installation, use, maintenance and end of life

Distribution includes the impacts related to the distribution of the product at the installation site. Because we do not have primary data on logistics in Chile, an overland distribution scenario of 300 km has been adopted and an EURO 4 category vehicle has been considered.

The installation module includes impacts arising from the installation of the meter at the operational site. We considered only the end of life of the packaging while scrap and general waste are not generated during the installation stage. We did not find primary data on the treatment of waste packaging in Chile. According to Chilean legislation, meter packaging should be recycled. We considered a scenario of 90% of wood and cardboard boxes being recycled.

As regards the use and maintenance module, we considered the energy consumed by the meter to operate during its entire reference service life (20 years). No extraordinary maintenance operations are requested (included in cut-off criteria). Electricity consumed during the product's service life is 377 kWh, using the following formula for calculating and data used. Meters were tested for power consumption at nominal voltage. The meter is smart and operates in idle mode for the most of the time with some peaks in power relating to when it transmits its reading. For energy consumed value Chilian electricity emission factor was used.

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

MT880-T1	Unit
RLS	20 years
P_{use}	2,15 W (0,72 W + 0,72 W + 0,71 W)
E_{use}	**377 kWh**

The end-of-life module includes the operations from the decommissioning stage to the actual disposal of the meter at the end of its service life. Operations to remove the meter have been included in the cut-off. We considered the following operations: transportation of the meter to the collection site, meter disassembly operations and distribution and destination of the various material flows sent for recycling or disposal.

Data categories and used software and database

The inventory analysis has been conducted using specific data provided by ISKRAEMECO, d.d. as regards the production and assembly of meters, as well as the packaging and distribution of the product.

We used international databases (Ecoinvent 3.6) regarding the production processes of raw materials and semi-finished products, packaging materials, electricity and means of transport, as well as the end of life of the product.

We used Company data for recycling and disposal of waste produced from the manufacturing stage.

We used the following scenario for end-of-life waste management.

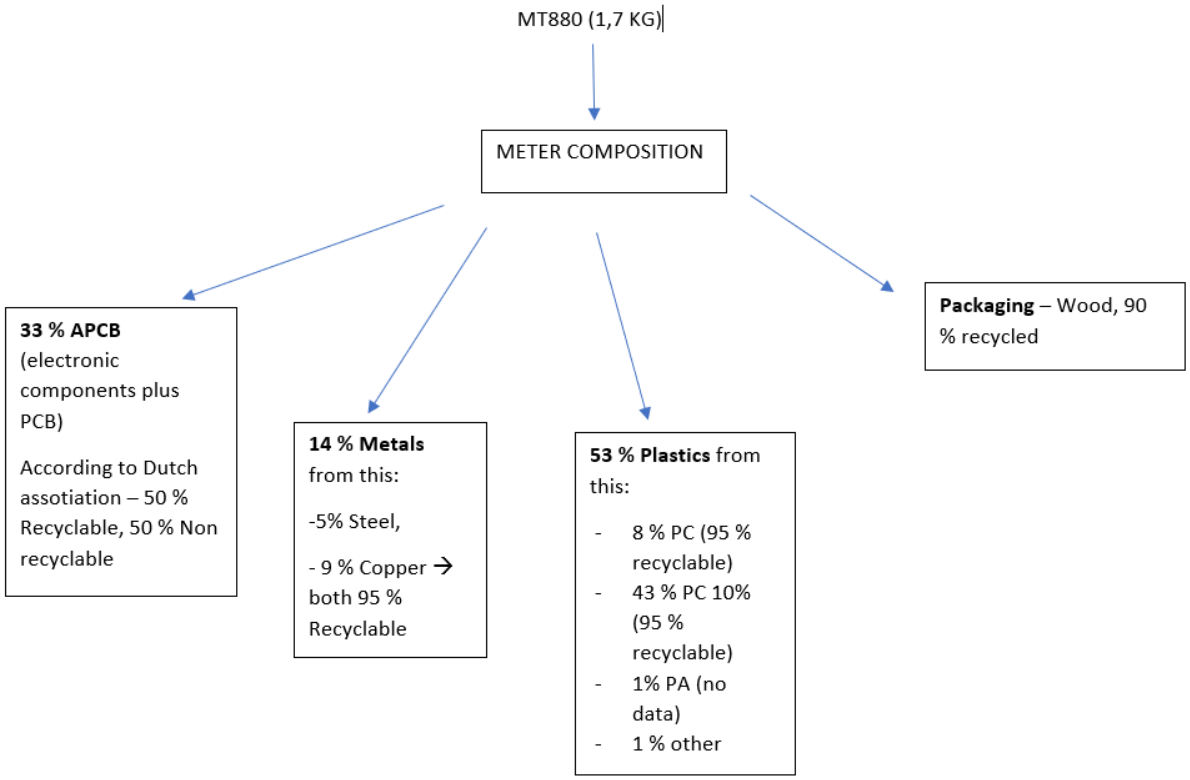


Figure 3 – End of waste scenario

Data related to transport distances (by land and by sea) were estimated using the online calculators Google Maps (https://maps.google.com) and ShipTraffic (www.ShipTraffic.net). **SimaPro 9 version 9.1.0.11** released by PRé Consultants, is the software used to develop the model for the calculation of environmental impacts of different indicators.

Cut-off rules

According to PCR EPDItaly 011, we cut-off the following flows and operations:

- Impacts related to the production, transportation and installation of capital goods (buildings, infrastructure, machinery, internal transport packaging), general operations (staff travel, marketing and communication actions) that cannot be directly allocated to products are excluded from the LCA study and maintenance of production line machinery.

- Production, use and disposal of the packaging of components and semi-finished intermediates.

We included packaging treatment in waste management.

- Materials making up the meter itself whose total mass does not exceed 2% of the total

weight of the device (for instance, the production of the glues and the ink used in the packaging). For copper, we do not consider the manufacturing process for specific production of single components because data are not available in SimaPro (copper cut-off for manufacturing process of components less than 1%).

- Any extraordinary maintenance done on the meter. The working assumption is that the meter is designed not to be tampered with or modified in any way during its service life.
- Material and energy flows related to the dismantling phase, whenever it is reasonable to assume that dismantling is performed by adopting manual tools (e.g. screwdrivers, hammers, etc.).
- Devices external to the meter itself (e.g. switchboards) required for installation.

Allocation rules

The allocation rule used for calculating the specific data inputs and outputs is based on the mass and number of meters produced. Specifically, the electricity and heat consumption has been allocated to the specific production of MT880-T1 meter for Chile. For the generic data selected, the allocations reported in the database were used.

MT880-T1 meter life cycle environmental impact

The environmental impact indicators must be determined using the characterization factors and impact assessment methods specified in **EN 15804:2012+A2:2019** as per requirements of chapter 6.1 ENVIRONMENTAL IMPACT DESCRIPTIVE PARAMETERS of **PCR EPDItaly 011 – Meters.**

Impact category	Impact indicators	UNIT	Manufacturing		Distribution	Installation	Use Maintenance	End of life with waste	Total
			Upstream	Core	Downstream				
Climate change - total	GWP - total	kg CO_2 eq.	7,07E+01	1,63E+00	9,96E+00	5,74E-01	2,27E+02	7,04E-01	**3,11E+02**
Climate change - fossil	GWP - fossil	kg CO_2 eq.	7,07E+01	2,03E+00	9,96E+00	4,69E-03	2,27E+02	7,03E-01	**3,10E+02**
Climate change - biogenic	GWP - biogenic	kg CO_2 eq.	-4,43E-02	-4,00E-01	2,29E-03	5,70E-01	-1,45E-01	2,08E-04	**-1,70E-02**
Climate change - land use and change in land use	GWP - luluc	kg CO_2 eq.	9,21E-02	1,39E-03	6,02E-04	1,10E-06	2,08E-02	4,21E-04	**1,15E-01**
Ozone Depletion	ODP	kg CFC - 11 eq.	5,89E-06	2,14E-07	2,26E-06	5,49E-10	7,26E-06	9,56E-09	**1,56E-05**
Acidification	AP	moles H^+ eq.	5,80E-01	1,85E-02	5,25E-02	1,49E-04	1,91E+00	2,05E-03	**2,56E+00**
Eutrophication of water	EP - fresh water	kg P eq.	1,07E-01	1,58E-03	1,51E-04	3,35E-06	1,65E-01	2,88E-04	**2,74E-01**
Eutrophication aquatic marine	EP - marine	kg N eq.	9,27E-02	2,22E-03	1,93E-02	2,99E-04	4,39E-01	1,90E-03	**5,56E-01**
Eutrophication terrestrial	EP - terrestrial	mol N eq.	9,89E-01	1,82E-02	2,11E-01	7,56E-04	4,59E+00	6,50E-03	**5,81E+00**
Photochemical ozone formation	POCP	kg NMVOC eq.	2,79E-01	6,15E-03	5,43E-02	3,61E-04	1,15E+00	1,83E-03	**1,49E+00**
Consumption of abiotic resources - minerals and materials	ADP MINERALS & METALS	kg Sb eq.	3,06E-02	1,45E-05	1,10E-05	4,85E-08	3,68E-04	9,93E-06	**3,10E-02**
Consumption of abiotic resources - fossil resources	ADP - fossil	MJ, calculated using lower calorific values	9,77E+02	3,27E+01	1,40E+02	3,95E-02	2,63E+03	1,60E+00	**3,78E+03**
Water consumption	WDP	m^3 eq.	1,11E+02	9,49E+00	4,11E-03	5,62E-06	3,99E-01	1,62E-03	**1,21E+02**

Table 4 – Core environmental impact indicators

PARAMETERS	UNIT	Manufacturing		Distribution	Installation	Use Maintenance	End of life with waste	Total
		Upstream	Core	Downstream				
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material (PENRE)	MJ, net calorific value	1,21E+03	3,84E+01	1,38E+02	4,12E-02	3,67E+03	2,03E+00	**5,06E+03**
Use of renewable primary energy excluding renewable primary energy resources used as raw material (PERE)	MJ, net calorific value	8,56E+01	1,08E+01	4,49E-01	6,62E-04	5,78E+02	1,98E-01	**6,75E+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	**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	**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	1,21E+03	3,84E+01	1,38E+02	4,12E-02	3,67E+03	2,03E+00	**5,06E+03**
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value	8,56E+01	1,08E+01	4,49E-01	6,62E-04	5,78E+02	1,98E-01	**6,75E+02**
Net use of fresh water (FW)	m^3	1,79E+01	1,52E+00	3,05E-03	2,95E-06	9,52E-02	4,09E-04	**1,95E+01**
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	**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	**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	**0,00E+00**

Table 5 – Parameters describing resources use

Impact category	UNIT	Manufacturing		Distribution	Installation	Use Maintenance	End of life with waste	Total
		Upstream	Core	Downstream				
Hazardous landfill waste (HWD)	kg	3,57E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**3,57E-06**
Non-hazardous waste disposed (NHWD)	kg	4,75E-05	2,45E-02	0,00E+00	3,16E-01	0,00E+00	3,37E-01	**6,78E-01**
Radioactive waste disposed (RWD)	kg	3,39E-03	1,49E-04	1,00E-03	2,28E-07	1,90E-03	5,13E-06	**6,44E-03**
Materials for energy recovery (MER)	kg	0,00E+00	7,48E-02	0,00E+00	8,11E-02	0,00E+00	1,80E-01	**3,36E-01**
Material for recycling (MFR)	kg	0,00E+00	1,94E-01	0,00E+00	3,97E-01	0,00E+00	1,36E+00	**1,95E+00**
Components for reuse (CRU)	kg	0,00E+00	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	**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	**0,00E+00**

Table 6 – Waste production descriptive parameters

References

1. BS EN 50693:2019 – Product category rules for life cycle assessments of electronic andelectrical products and systems
2. ISO 14040:2006 Environmental management – Life cycle assessment – Principles andFramework
3. ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and Guidelines
4. IPCC (2013), Fifth Assessment Report of the Intergovernmental Panel on Climate Change
5. 2006 IPCC Guidelines for National Greenhouse Gas Inventories
6. PCR EPDItaly 007 - ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS rev. 3, 13/01/2023
7. PCR EPDItaly 011 - ELECTRONIC AND ELECTRICAL PRODUCTS AND SYSTEMS - METERS, rev. 0, 16/03/2020
8. Report of Dutch Association for the rate of recycling and disposal of packaging waste, updated 2019
9. Regolamento del programma EPD Italy, revisione 5.2 del 16/02/2022

10. UNI EN 15804:2012+A1:2013+A2:2019 Sustainability of construction works - Environmental product declarations – Core rules for the product category of construction products
11. MT880-T1 meter LCA document REV.4, 6/12/2023