

# ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 50693 for:

Single Phase meter (Globy-DM)

From

Gridspertise Srl



Declared product:



Programme operator:	EPD China
Registration number:	EPD-CN-00052
Issued date:	2026-02-02
Valid until:	2031-02-01

# Programme Information

EPD Owner	Gridspertise Srl Contact: Danilo Ferrazza Manufacturing Quality Assurance danilo.ferrazza@gridspertise.com
Product Name	Single Phase meter (Globy-DM)
Production Site	No.99 Tianquan Rd., Hi-Tech Development Zone 611730, Chengdu, P.R.C.
Identification of product	UNCPC code: 4621 electricity distributor or control apparatus
Field of Application	Measure of electric energy consumption
Programme Operator	EPD China Address of Headquarter: Tianping Road, Xuhui District, Shanghai Website: www.epdchina.cn Email: info@epdchina.cn   secretary@epdchina.cn
LCA Practitioner	Leon Li, Yifei Wang
Responsibility	The EPD owner has the sole ownership, liability, and responsibility for the EPD
Comparability	EPDs within same category of product in different programme operator are not suggested to be compared. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible even applying the same PCR.
Liability	The EPD owner has the sole ownership, liability, and responsibility for the EPD.
Validity	The EPD is published on 2026-02-02 and valid to 2031-02-01
LCA Software (version)	Simapro 10.2; Ecovane Platform 8.2
LCI Dataset (version)	Ecoinvent 3.11
Year(s) of Primary Data	01/2024-12/2024
PCR	PCR EPD Italy 007: Electronic and electrical products and systems, REV.3.2 PCR EPD Italy 011: Electronic and electrical products and systems – meters, REV.1
Other Reference Document	EN 50693 (2019): Product category rules for life cycle assessments of electronic and electrical products and systems
Verification statement according EN 50693	
Independent verification of the declaration and data according to EN ISO 14025:2010 <input type="checkbox"/> internal <input checked="" type="checkbox"/> external Third-party institution verification: <Michael ZHU Jiang  , DQS AP LTD.> is an approved certification body accountable for third-party verification Approved by: EPD China	
Procedure for follow-up of data during EPD validity involves a third-party certification body: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

# General Information

## 1.1 Company information

Gridspertise Group is the technological partner that delivers intelligence for grid modernization in a flexible and reliable way, developing integrated devices, cloud-edge-based solutions, and services that enable, manage, and optimize smart grids. Set up in 2021 as a carve-out of Enel’s 20+ year experience in developing and scaling up digital grid technologies, Gridspertise became an independent company in 2022 and, in 2023, acquired Aidon a smart metering leader in the Nordics, which was founded in 2004.

Gridspertise Group, operates globally with headquarters in Italy and subsidiaries in Spain, Finland, Norway, Sweden, Denmark, Germany, Romania, and Brazil. Thanks to its glocal organization approach and its highly skilled and dynamic team, Gridspertise is perfectly positioned to work with utilities everywhere in the world, understanding their needs and offering tailored solutions.

As pioneers in smart energy, Gridspertise drive a powerful convergence of digital systems and operational assets, combining unparalleled cutting-edge technology and operational know-how and expertise.

As of June 2025, Gridspertise have served over 200 clients worldwide, delivered over 114 million smart meters and connected over one million energy metering points with our metering service.

## 1.2 Scope and type of EPD

System boundary: Cradle-to-grave

System Diagram :

Table 1: Process stage and EPD modules

PHASE	Manufacturing Stage	Distribution Stage	Installation Stage	Use & Maintenance Stage	End-of-life Stage	Benefits & Loads beyond the System Boundary*
	IN ACCORDANCE TO EN 50693					
Phases declared	X	X	X	X	X	MND
Data Quality Indicator	%	-				

X = included in LCA; MND = Module not declared

## 2 Detailed Product Description

### Description of the Product:

GLOBY-DM is a single-phase bidirectional electronic electric meter. Specifically designed for energy metering scenarios in low-voltage power grids, it features accurate metering capabilities, rich functional configurations, and reliable protection performance. Widely applicable to energy management in households and small commercial premises, it fully complies with relevant EU metrological and safety standards, combining practicality and compliance.

#### 1. Product Application Field

This meter focuses on measuring active and reactive energy in low-voltage power grids (below 10 kW), and is compatible with a reference voltage of 127 V to 230 V, meeting the usage requirements of different low-voltage grid environments and accurately matching the metering needs of various small-scale electricity consumption scenarios. Additionally, the meter supports both remote-control mode and standalone operation mode. It can be integrated into remote control systems for centralized management or used independently, adapting to the diverse usage scenarios of Distribution System Operators (DSO) and general users

#### 2. Core Technical Characteristics

**Metering Capabilities:** Active energy metering accuracy reaches Class 1 of IEC 62053-21 or Class B/A of EN 50470-3; reactive energy metering accuracy reaches Class 2 of IEC 62053-23, ensuring accurate and reliable metering data. It features bidirectional metering functionality, simultaneously recording energy consumption and generation feedback data.

**Multiple Communication Interfaces:** Equipped with a ZVEI optical interface conforming to EN IEC 62056-21, and a power line communication (PLC) modem, enabling remote communication with low-voltage concentrators. It also reserves communication interfaces for home devices, adapting to the linkage requirements of smart grids.

**Reliable Protection Design:** IP51 protection rating, employing a double insulation design, Class II protection, effectively resisting external environmental interference and electrical shocks; it features anti-tampering functions such as terminal cover opening detection, case opening detection, and magnetic field interference detection, ensuring the security of metering data.

Table 2: Technical data of GLOBY-DM meter

Technical specification	Value
Nominal voltage	127V/230V (-15% to +15%)
Frequency	50 Hz (± 2%)
Performance class according to reference standard	Active: Class B Reactive: Class 2
Current intensity	Minimum current:0.25A Base current:5A maximum current: 80A

### Product Identification

- IEC 62052-11
- IEC 62053-21
- EN 50470-3
- EN 62052-31



Figure 1: Picture of the declared product

### Description of the production processes

#### Pick and Place:

SMT (Surface Mount Technology) is a precision assembly technique that involves mounting electronic components directly onto the surface of a printed circuit board (PCB) for soldering. The process consists of three stages: solder paste printing, component placement, and reflow soldering. Solder paste is applied to the PCB pads through a stencil, components are accurately placed using a pick-and-place machine, and finally, soldering connections are achieved through reflow soldering.

#### AOI Test:

SMT AOI (Automated Optical Inspection) is a critical equipment in SMT (Surface Mount Technology) production, used to detect solder joint defects and component placement quality. Based on optical imaging and machine vision technology, it can inspect circuit board defects on the production line in real time and improve product yield.

#### Wave soldering:

The DIP (Dual In-line Package) component insertion process is primarily used for larger components that cannot be mounted via SMT. Components are inserted into PCB holes manually or with automated equipment, and then electrical connections between the components and the PCB are achieved through wave soldering, where molten solder forms a wave to complete the soldering process.

#### Selective wave soldering:

Selective wave soldering is a type of surface mount technology that achieves efficient and high-quality soldering through precise localization of the soldering area.

#### PCB functional test:

By simulating actual operating conditions, it validates the circuit board's electrical performance, component

functionality, and overall reliability.

Assembly phase:

The structural component assembly process utilizes automated equipment such as automatic welding machines and automatic screw fastening machines to achieve the assembly of structural parts and the welding of wires.

Meter Functional test:

A key verification step after ASSY assembly, primarily used to detect the meter's measurement performance and electrical parameters.

Meter calibration:

Detecting the accuracy error value of electric meters. The core principle of electrical energy accuracy testing is to quantify errors by comparing the output difference between the meter under test and a standard reference instrument, combined with high-precision time and power measurement technology.

Packaging of final product:

The final stage before product shipment involves writing corresponding parameters according to customer requirements and completing the meter locking operation, followed by final packaging and shipping.

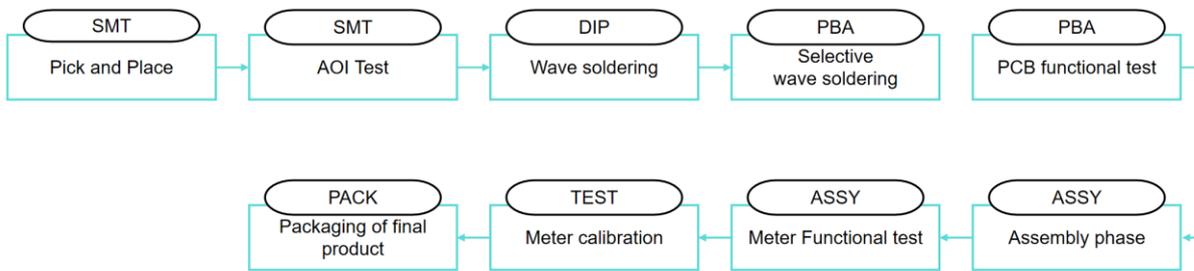


Figure 2: The production process in selected stages.

### Product component

Table 3: Main product components and packaging materials per unit.

Product components		Weight, g	Weight-% (versus the product)
Electronic component		102.196	23.9%
Structure & Mechanical	Plastic	178.05	41.6%
	Metal	2.73	0.6%
	Relay	145.154	33.9%
TOTAL		428.13	
Packaging materials		Weight, g	Weight-% (versus the product)
Corrugated board		69.34	33.5%
Plastic		89.44	43.2%
Wood pallet		40	19.3%
Others		8.35	4.0%
TOTAL		207.13	

## 3 LCA results according to EN 50693

### 3.1 Environmental Impacts

The results of the underlying LCA is provided in this section as environmental impacts, resource use, output flows and additional information on biogenic carbon. All pre-set parameters of EN 15804 are required.

Table 4: Environmental impacts according to EN 15804 (EF 3.1)

RESULT OF THE LCA – ENVIRONMENTAL IMPACT per functional unit							
Core indicators	Unit	Total	Manufacturing	Distribution	Installation	Use & Maintenance	EoL
Climate change – total	kg CO2 eq	1.37E+02	1.22E+01	4.38E-01	3.24E-01	1.23E+02	5.89E-01
Climate change - fossil	kg CO2 eq	1.34E+02	1.18E+01	4.36E-01	1.12E-01	1.21E+02	5.87E-01
Climate change - biogenic	kg CO2 eq	2.42E+00	3.77E-01	1.70E-03	2.13E-01	1.83E+00	1.42E-03
Climate change - land use and LU change	kg CO2 eq	4.40E-02	2.17E-02	2.04E-04	1.42E-06	2.20E-02	8.79E-05
Ozone Depletion	kg CFC11 eq	3.57E-06	7.11E-07	6.53E-09	7.99E-11	2.85E-06	6.93E-10
Acidification	mol H+ eq	5.96E-01	1.53E-01	5.85E-03	3.93E-05	4.37E-01	3.76E-04
Eutrophication aquatic freshwater	kg P eq	5.58E-02	1.51E-02	3.33E-05	3.82E-06	4.06E-02	2.18E-05
Eutrophication aquatic marine	kg N eq	1.03E-01	1.87E-02	1.59E-03	4.02E-05	8.20E-02	2.74E-04
Eutrophication terrestrial	mol N eq	1.08E+00	2.07E-01	1.75E-02	1.89E-04	8.55E-01	1.29E-03
Photochemical ozone formation	kg NMVOC eq	3.81E-01	6.68E-02	5.12E-03	5.39E-05	3.09E-01	3.61E-04
Depletion of abiotic resources - minerals and metals	kg Sb eq	6.12E-03	3.99E-03	1.08E-06	1.13E-08	2.13E-03	3.70E-07
Depletion of abiotic resources - fossil fuels	MJ	1.88E+03	1.64E+02	5.82E+00	5.31E-02	1.71E+03	7.34E-01
Water use	m3 depriv.	1.22E+01	3.17E+00	2.17E-02	1.51E-03	8.97E+00	2.18E-02
Additional indicators	Unit	Total	Manufacturing	Distribution	Installation	Use & Maintenance	EoL
Particulate matter emissions	disease inc.	2.70E-06	7.99E-07	2.69E-08	3.13E-10	1.87E-06	3.62E-09
Ionising radiation, human health	kBq U-235 eq	8.20E+00	1.10E+00	4.30E-03	7.75E-05	7.09E+00	4.66E-03
Ecotoxicity (freshwater)	CTUe	6.15E+02	3.07E+02	8.00E-01	1.12E+00	3.02E+02	4.56E+00
Human toxicity, cancer effects	CTUh	3.52E-08	1.15E-08	8.03E-11	1.37E-11	2.35E-08	7.46E-11
Human toxicity, non-cancer effects	CTUh	2.07E-06	8.36E-07	2.87E-09	2.53E-09	1.22E-06	1.08E-08
Land use related impacts / soil quality	Pt*	3.62E+02	7.59E+01	2.42E+00	2.95E-02	2.83E+02	3.19E-01

### 3.2 Resource use and waste categories

Table 5: Resource use and waste categories according to EN 15804.

RESULT OF THE LCA - resource use and waste categories per functional unit							
Resource and waste indicators	Unit	Total	Manufacturing	Distribution	Installation	Use & Maintenance	EoL
PENRE	MJ	8.43E+02	8.55E+01	7.34E-01	8.45E-03	7.56E+02	3.56E-01
PERE	MJ	1.40E+02	2.02E+01	7.10E-02	1.21E-03	1.20E+02	6.79E-02
PENRM	MJ	1.28E+01	1.28E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ	1.57E+00	1.57E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	8.55E+02	9.83E+01	7.34E-01	8.45E-03	7.56E+02	3.56E-01
PERT	MJ	1.42E+02	2.18E+01	7.10E-02	1.21E-03	1.20E+02	6.79E-02
FW	m3	5.51E+01	1.94E+01	8.09E-02	1.56E-03	3.56E+01	6.11E-02
SM	MJ	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
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD	kg	1.11E-01	9.64E-03	1.24E-04	1.58E-03	6.28E-02	3.65E-02
NHWD	kg	5.83E+00	6.97E-01	1.83E-01	1.64E-02	4.85E+00	8.19E-02
RWD	kg	2.06E-03	2.71E-04	1.05E-06	1.94E-08	1.79E-03	1.14E-06
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MRF	kg	2.57E-01	0.00E+00	0.00E+00	1.11E-01	6.40E-02	8.20E-02
CRU	kg	4.80E-02	0.00E+00	0.00E+00	3.60E-02	1.20E-02	0.00E+00
ETE	MJ	1.23E+00	0.00E+00	0.00E+00	3.31E-01	3.04E-01	5.91E-01
EEE	MJ	6.28E-01	0.00E+00	0.00E+00	1.71E-01	1.56E-01	3.01E-01

### 3.3 Information on biogenic carbon content

Information on biogenic carbon content which shall be included in the EPD as follows:

Table 6: Information describing the biogenic carbon content

Biogenic carbon content	Unit (expressed per functional unit or per declared unit)
Biogenic carbon content in product	0 kg C
Biogenic carbon content in accompanying packaging	0.978 kg C
NOTE: 1 kg biogenic carbon is equivalent to 44/12 kg of CO <sub>2</sub> .	

## 4 Supplementary information

### 4.1 Calculation rules

#### **Functional unit:**

1 single GLOBY-DM meter designed for monitoring of electric energy consumption from first measure to 20 years of life.

#### **Mass reference**

428.13g

#### **Assumption**

To address data gaps and define the modeling boundaries, the following key assumptions and limitations are applied. Detailed inventory data and specific parameters have been provided in the respective LCI sections above.

- Manufacturing Stage:
  - Data Proxies: Due to the unavailability of specific datasets, Expanded Polystyrene (EPS) is modeled using Expanded Polyethylene (EPE) as a proxy.
  - Energy & Transport: Manufacturing electricity is modeled using the Southwest China Grid (CN-SWG) mix. Raw material transport is consistently modeled using EURO 4 lorries (16-32 t).
- Distribution Stage:
  - The logistics scenario assumes a specific intermodal route (Road-Sea-Road) from the manufacturing site in Chengdu, China to the final customer in Rome, Italy.
- Use & Maintenance Stage:
  - 1 single GLOBY-DM meter has a designed service life-time of 15 years, to cover the RSL (20 years) as requirement, a replacement of 0.33 units (representing the remaining 5 years) is required. The environmental impacts associated with the production, distribution, installation, and end-of-life of this replacement fraction are reported under Use & Maintenance Stage.
- End-of-Life Stage:
  - Waste Treatment Logic: Recycling rates are modeled according to the PEF methodology (R2 parameters).
  - Residuals: Unrecycled plastic and packaging residuals are assumed to be split between incineration and landfill based on regional waste management practices, rather than assuming 100% landfill.
  - Electronics: Electronic waste is differentiated into specific streams: Printed Circuit Boards (PCBs) are modeled for metal recovery, while remaining components undergo standard WEEE treatment.
  - Transport: An average distance of 50 km is assumed for transport to waste treatment facilities.

#### **Assumption about generic data for this study:**

- Transport model is based on the average regional data.
- Energy models are based on average national data, and in case possible, provincial or regional data is used to the best potential.
- Raw material uses generic data from database with adaptation of supplier data to the best possible potential.

#### **Cut-off rules:**

In case of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1% of renewable and non-renewable primary energy usage and 1% of the total mass input of that unit process.

The total of neglected input flows per stage, i.e., Manufacturing (Upstream and Core), Distribution, Installation, Use, and End-of-Life stage, shall be a maximum of 5% of energy usage and mass. Conservative assumptions in combination with plausibility considerations and expert judgement can be used to demonstrate compliance with these criteria.

The study does not exclude any modules or processes which are stated mandatory in EN 50693 and the applied PCR. The study does not exclude any hazardous materials or substances. In the study, the consumption of a smaller amount of label-like materials and workshop consumables (e.g., internal handling pallets) was disregarded. The weight of the disregarded items accounts for 0.004% of the total weight of raw material input.

At the same time, flows less than 1% of the total inventory were excluded, i.e.:

- Construction of company plants and processing machinery (Capital goods with a life of more than three years);
- Staff travel and home-work transfers (Personnel activities);
- Storage phases and sales activities;
- The materials necessary for cleaning the machinery.

**Data quality:**

Table 7 The declaration of data sources, reference years, data categories, and share of primary data

Process	Source type	Source	Reference year	Data category
Generation of electricity used in manufacturing of product	Database	Ecoinvent v3.11	2024	Primary data
Transport of sources to manufacturing site	Collected data	EPD owner	2024	Primary data

The data quality was assessed against the UN Environment Global Guidance criteria. The following evaluations were determined:

Geographical Representativeness: Primary data for the manufacturing stage were obtained directly from Chengdu facility. This aligns with the specific geographical scope of the study, qualifying for a "Very Good" rating.

Technical Representativeness: LCI data reflect actual operational parameters from production lines, including SMT, DIP, and final assembly. The technical coverage accurately corresponds to the technology defined in the goal and scope, qualifying for a "Very Good" rating.

Time-related Representativeness: The data collection period spanned from January 1 to December 31, 2024. This twelve-month cycle mitigates the influence of seasonal yield fluctuations and ensures the use of contemporary data, qualifying for a "Very Good" rating.

The data quality requirements for this study were as follows:

- Precision
- Completeness
- Representativeness
  - Time - related coverage
  - Geographic coverage
  - Technology coverage
- Consistency
- All the above data quality requirements are met.

**Allocation**

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. According to PCR EPDIItaly007, the following stepwise procedure shall be applied for allocation of co-products:

- Allocation shall be avoided, if possible, by dividing the unit process into two or more sub-processes and collecting the environmental data related to these sub-processes.
- Allocation shall be based on physical properties (e.g. mass, volume) when the difference in revenue from the co-products is low.
- In all other cases, including joint co-production processes, where no relevant underlying physical relationships between the products and co-products can be identified, the inputs and outputs of the remaining parts of process should be allocated between the products and co-products in a way that reflects the economic value of the co-products when they leave the unit process.

In this study, when acquiring the factory's energy consumption data, because there are numerous production models on the production lines, the capacity ratio is used to allocate the energy consumption data. According to PCR EPDIItaly007, the allocation of waste shall follow the polluter-pays principle that is made operational.

**4.2 Scenarios and additional technical information**

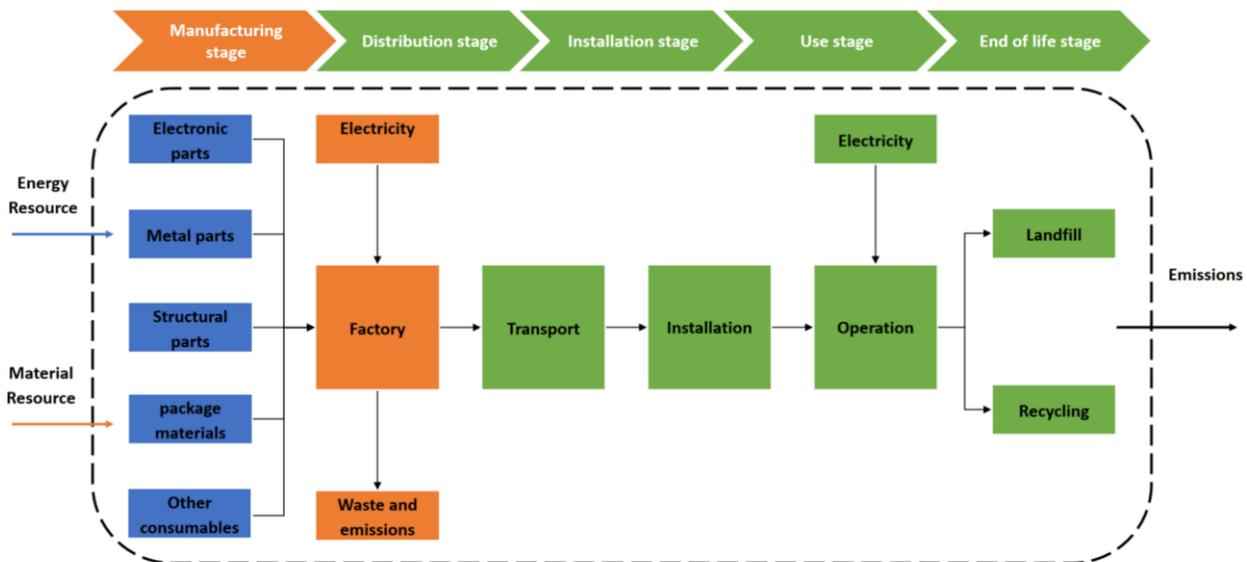


Figure 3: Life cycle stages flow chart of GLOBY-DM meter

**Upstream stage**

The LCI data from upstream stage includes extraction and processing of raw materials of PCB, PC, metal and electronic components, and the transportation of the raw material to the factory. Most of data regarding the raw materials, energy and transportation is adopted and adapted from background database, by adjusting input and output data from manufacturers directly from upstream.

**Core stage**

For product assembly, GLOBY-DM meter product included in this LCA report are assembled in Chengdu city, Sichuan province in China.

**Downstream stage**

The product transport follows a simplified weight-distance aggregated average approach, by aggregating the market into different regions and using estimation, scenario for product transportation is developed. see section 5.3 for more detail.

The GLOBY-DM meter's operation stage includes installation, use, maintenance, repair, replacement, refurbishment and the operational energy use and water use during the RSL (20 years) period of the GLOBY-DM meter's operation. Installation is assumed to be manual with no energy or material consumption. LCI data regarding the electricity consumption during use is collected from historical experience and expert calculation with test results by Gridspertise and extrapolated to represent GLOBY-DM meter. 1 single GLOBY-DM meter has a designed service life-time of 15 years, to cover the RSL (20 years) as requirement, another meter's environmental impact is allocated into the Use & maintenance stage.

The End-of-Life stage accounts for the collection, transportation, and specialized treatment of the GLOBY-DM meter at the end of its 20-year reference service life. The modeling is based on the following key parameters and assumptions to ensure representative results for the disposal region:

**Logistics and Transportation:** It is assumed that the decommissioned units are collected and transported to a disassembly facility via a >16t EURO 4 truck with an average distance of 50 km. An additional 50 km transport distance is applied for sorted materials to final treatment sites.

**Mechanical Processing:** The modeling includes energy consumption and environmental burdens associated with manual dismantling and mechanical shredding.

**Waste Treatment Scenarios:** Treatment pathways are defined by material composition and regional recycling capabilities, utilizing the PEF R2 recycling factors:

**Metals:** A 90% recovery rate is applied for steel and iron, with the remainder sent to sanitary landfills.

**Plastics:** A recycling rate of 29% is assumed. The non-recycled fraction is split equally (35.5% each) between municipal incineration and sanitary landfill based on European regional practices.

**Electronics:** Differentiated streams are established; Printed Circuit Boards (PCBs) are processed through dedicated metal recovery markets, while other electronic components undergo standard WEEE treatment.

### 4.3 Dangerous substances

There are no dangerous substances into indoor air, oil and water during the use stage.

## References

1. ISO 14044:2006: Environmental management — Life cycle assessment — Requirements and guidelines
2. ISO 14040:2006: Environmental management — Life cycle assessment — Principles and framework
3. ISO 14025:2006: Environmental labels and declarations — Type III environmental declarations — Principles and procedures
4. EN 15804:2012+A2:2019/AC:2021 (Date 18-Aug-2021) :2012+A2:2019/AC:2021 (Date 18-Aug-2021) : Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
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6. Regolamento EPDIItaly rev. 7.1 del 30/10/2023
7. EPDChina General Programme Instructions, Version 3.1
8. Core-PCR: EPDITALY007 " Electronic and electrical product and systems" Rev. 3.2
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13. Recommendation on the use of the Environmental Footprint methods 2021.
14. CFF\_Default\_Parameters\_March2018\_EFPilotPhase



EPD 中国项目 值得信赖

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