



Bitron Electronic China Company LTD
A Bitron Group Company



ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME

GEMIS 2

SITEs

102, HuangheWest Road Huangdao - PRC

In accordance with ISO 14025 and EN 50693

Program Operator	EPDIItaly
Publisher	EPDIItaly

Declaration Number	GEMIS 2
Registration Number	EPDITALY0541

Issue date	18 / 12 / 2024
Update date	18 / 12 / 2024
Valid to	18 / 12 / 2029



www.epditaly.it

GENERAL INFORMATION

EPD OWNER

Name of the company	Bitron Electronic China Company LTD
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PROGRAM OPERATOR

EPDItaly	Via Gaetano De Castillia n° 10 - 20124 Milano, Italy
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INFORMATION ON THE EPD

Product name	GEMIS 2
Site (s)	102, HuangheWest Road Huangdao - PRC
Short description and technical information of the product (s)	Mono-phase meter Gemis 2 is a device for supply control of electrical energy, produced by Bitron Electronics S.p.A exclusively for Gridspertise S.r.l. and following Gridspertise technical specifications.
Field of application of the product	Measure of electric energy consumption.
CPC Code (number) https://unstats.un.org/unsd/classifications/Econ	4621 « electricity distributor or control apparatus »

VERIFICATION INFORMATION

PCR (title, version, date of publication or update)	Core-PCR: EPDITALY007 " Electronic and electrical product and systems" Rev. 3.1 del 12/11/2024 Sub-PCR: EPDITALY011 Sub-PCR: EPDITALY011 "Electronic and electrical product and systems -Meters" Rev. 0 del 16/03/2020 UNI EN 15804:2012+A1:2013+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
EPDItaly Regulation (version, date of publication or update)	Regolamento EPDITALY, Rev 6, del 31/10/2023
Project Report LCA	LCA Report GEMIS 2
Independent Verification Statement	The PCR review was performed by - info@epditaly.it. Independent verification of the declaration and data, carried out according to ISO 14025: 2010. <input type="checkbox"/> Internal <input checked="" type="checkbox"/> 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.

Introduction

This document represents EPD report of product GEMIS 2 produced by Bitron Electronics S.p.A in compliance with EPDItaly program and related regulation. This report is developed in compliance to ISO 14025 aimed to provide rules for development, verification, and publication of Environmental Product declarations.

This study is compliant with “PCR EPDItaly011 – Meters”, which identifies the goal, scope, application field of information rules for production of environmental information, life cycle phases to be included in the study, parameters considered, how to collect those parameters and how to perform communication on the report.

Organization

Bitron Group is an Italian international corporation that helps companies to design and realize innovative solutions by guiding them in research, development and production of mechatronic components and systems for automotive, home appliance, heating & ventilation, eV-charging, energy measurement and management.

Bitron Group's global presence extends with several plants located in Italy, China, Poland, Mexico, Turkey, and Spain, as well as commercial offices situated in France, Spain, Brazil, Germany, the United States, China, Turkey, and Mexico.

The company also has multiple technical research sites, located in Italy, Germany, and Romania, in addition to one after-market site in Italy.

Scope and goal of EPD

This is a specific product EPD of meter GEMIS 2: a device for supply control of electrical energy, produced by Bitron Electronics S.p.a exclusively for Gridspertise S.r.l. and following Gridspertise technical specifications.

The study includes all phases of life cycle from extraction of raw material to the disposal including recycling processes, reuse and/or recovery of materials at the end-of-life as secondary raw materials.

It was adopted a “cradle to grave” approach and calculation was performed with software OpenLCA v2.2 with database Ecoinvent 3.10. To enhance the accuracy of the model, the Ecoinvent database has been enriched with new datasets/processes related to purchasing components/goods that are part of the beat_database (bitron eco assessment tool) supplementary to Ecoinvent v.3.10.



The modules included into evaluation are defined in accordance with PCR011 and are shown in Table 1.

Table 1. System boundaries in accordance with PCR011

Manufacturing STAGE		DISTRIBUTION STAGE	INSTALLATION STAGE	USE & MAINTENANCE STAGE	END OF LIFE STAGE
UPSTREAM MODULE	CORE MODULE	DOWNSTREAM			
Extraction of raw materials, including waste recycling processes and the production of semi-finished and ancillary products	Manufacturing of the product constituents, including all the stages	IN ACCORDANCE WITH EN 50693			
Transportation of raw materials to the manufacturing company	Product assembly				
	Packaging ¹				
	Waste recycling processes				

Functional unit

The functional unit object of the study is 1 single device designed for the monitoring of electric energy consumption from first measure to 20 years of life.

Product and processes description

Meter Gemis 2 is a device for supply control of electrical energy. The meter allows detailed access to consumption information, in particular: it checks how much electricity has been consumed, divided into various time slots and it examines the trend of daily consumption in detail.

Production of meter consist of 3 main processes due to complexity of components that compose the meter itself:

1. The process involving the assembly of electronic parts on printed circuit board (PCB), called SMT phase, takes place at the plant in China (U75). In this plant components are assembled and soldered on the electronic boards. The line is completely automatic and provides full traceability and MLS automatic control (Moisture sensitivity level refers to packaging and handling precaution of some semiconductor), 3D inspection of soldering paste, test in-line ICT e AOI (2D/3D), X-ray test.
2. Plastic components are purchased already moulded.

¹ Only Boxing, while raw material is considered upstream.

3. Plastics and electronic components are assembled at Poland plant (U75). The assembly line is semi-automatic and the meter, that has a unique serial number, is tested according to customer specification in order to obtain MID certification as required by the legal requirements.

Finally, the meter is closed, packed in containers and sent to the customer sorting centre or customer warehouse.



Component and characteristics of product

The characteristic data of the meter are:

Technical specification	Value
Nominal voltage	230V
Frequency	50 Hz
Performance class according to reference standard	Class B, Class 2
Current intensity	$I(\min) = 0.1A$, $I_b (I_{ref}) = 5A$, $I(\max) = 60A$

Based on our current knowledge and verification:

- We have detected a presence greater than 0.1% wt/wt of substances included in “Candidate List of SVHC” (number of Substances on list: 241, last updated: June 27, 2024) (see Table 2).
- The listed groups of restricted substances in the current version of the European Directive 2011/65/UE (RoHS II) (and last updating 2015/863/UE) and 2011/37/UE (ELV) and their implementations, are not contained or are contained only in homogeneous proportions below the tolerance/exemption values.

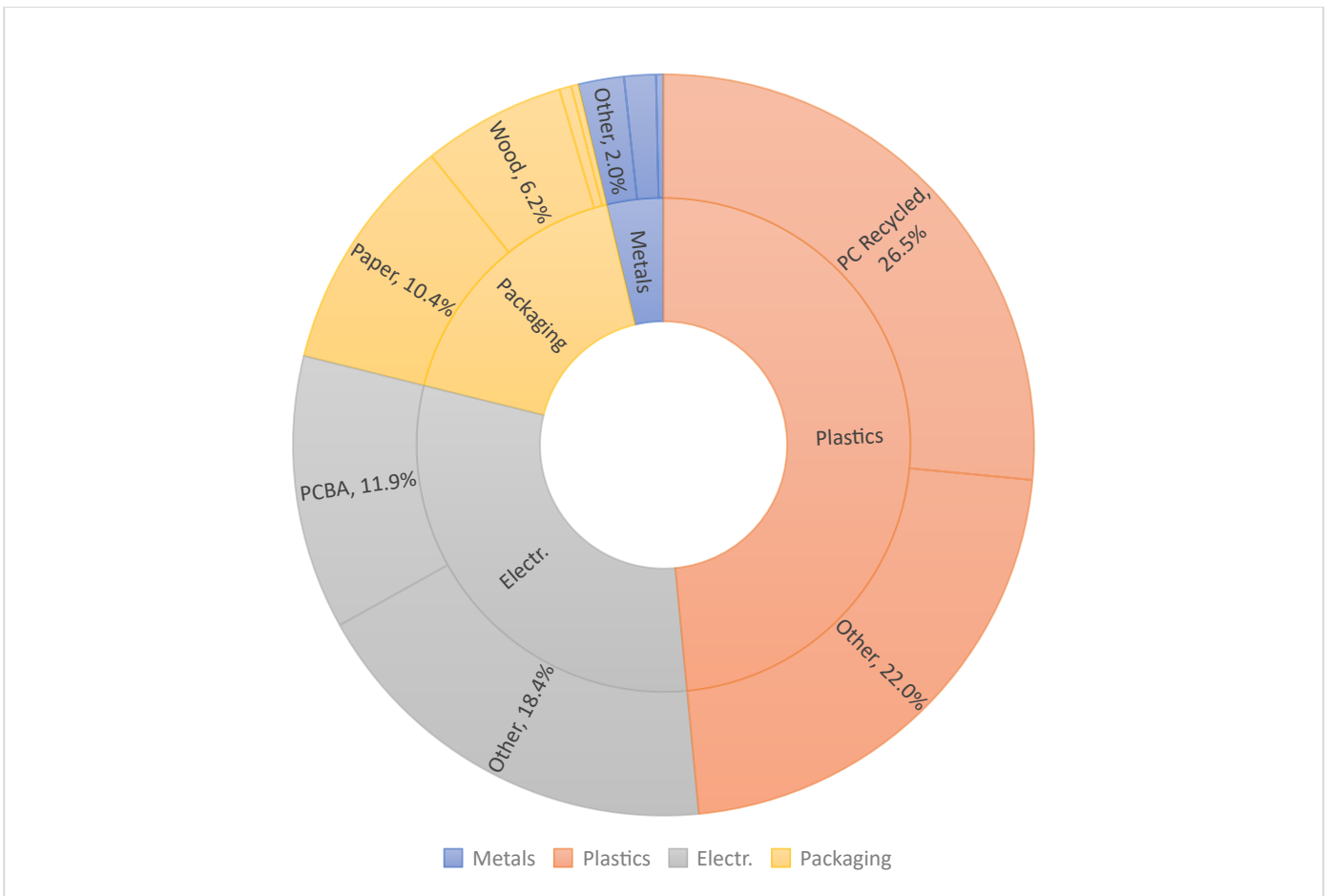
Table 2. Presence of SVHCs and RoHS exemptions

SVHCs	RoHS exemptions
7439-92-1 LEAD	7A
110-71-4 EGDME	7C1

Materials contents by weight are listed in Table 3.

Table 3. Materials contents by weight

Total weight [kg]	Material cluster	Materials	Quantity
1.604	Metals	Stainless steel	0.3%
		Steel	1.4%
		Other	2.0%
	Plastics	PC Recycled	26.5%
		Other	22.0%
	Electr.	PCBA	11.9%
		Other	18.4%
	Packaging	Paper	10.4%
		Wood	6.2%
		Plastic	0.5%
Other		0.3%	



Reference service life (RSL)

According to PCR EPDItaly, the reference life service (RLS) 20 years. The following formula show the calculation for electric energy consumption of the device during use phase according to PCR EPDItaly 011.

$$E_{use} = \frac{P(\text{use}) * 8760 * RLS}{1000}$$

LCA results

This section shows the LCA results calculated according to EN15804 methodologies.

Table 4. Results of LCA study for impact EPD impact categories.

Impact categories	Unit	Total	Manufacturing Stage	Distribution stage	Installation Stage	Use and Maintenance stage	End of Life
Climate Change - Total	kg CO ₂ eq	1.20E+02	2.06E+01	1.24E+00	3.95E-01	9.49E+01	3.00E+00
Climate change - fossil	kg CO ₂ eq	1.12E+02	2.05E+01	1.24E+00	3.75E-02	8.74E+01	2.97E+00
Climate change - biogenic	kgCO ₂ eq	8.02E+00	7.79E-02	4.69E-04	3.58E-01	7.55E+00	3.56E-02
Climate change - land use and change in land use	kgCO ₂ eq	4.68E-02	2.70E-02	4.99E-04	2.87E-06	1.66E-02	2.67E-03
Ozone Depletion	kgCFC-11eq	2.67E-06	6.01E-07	2.26E-08	4.31E-10	2.02E-06	3.13E-08
Acidification	mol H+eq	5.83E-01	1.89E-01	1.33E-02	1.49E-04	3.68E-01	1.26E-02
Eutrophication aquatic freshwater	kgP eq	4.13E-02	2.09E-02	7.39E-05	7.69E-07	1.95E-02	8.73E-04
Eutrophication aquatic marine	kg N eq	8.94E-02	2.82E-02	3.41E-03	6.54E-05	5.50E-02	2.76E-03
Eutrophication terrestrial	molc N eq	9.62E-01	2.94E-01	3.77E-02	7.41E-04	5.99E-01	3.09E-02
Photochemical ozone formation	kg NMVOCeq	3.80E-01	1.01E-01	1.18E-02	2.80E-04	2.57E-01	1.08E-02
Depletion of abiotic resources – minerals and metals ²	kg Sb eq	5.50E-03	4.39E-03	3.56E-06	1.93E-08	1.10E-03	4.54E-06
Depletion of abiotic resources – fossil fuels ²	MJ	1.74E+03	2.83E+02	1.67E+01	3.62E-01	1.40E+03	3.25E+01
Water use ²	m ³ eq	6.17E+01	7.06E+00	7.48E-02	1.47E-03	5.37E+01	8.86E-01

² The results of this environmental impact indicator should be used with caution as uncertainties about these results are high or due to limited experience with this indicator.

Table 5. Results of use of resource.

Impact categories	Unit	Total	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	EoL
PENRE	MJ	1.65E+03	2.72E+02	1.52E+01	3.26E-01	1.33E+03	3.09E+01
PERE	MJ	6.47E+02	3.27E+01	2.68E-01	1.67E-03	6.09E+02	4.98E+00
PENRM	MJ	8.60E+01	1.09E+01	1.57E+00	3.63E-02	7.19E+01	1.60E+00
PERM	MJ	2.13E+00	2.13E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.74E+03	2.83E+02	1.67E+01	3.62E-01	1.40E+03	3.25E+01
PERT	MJ	6.50E+02	3.48E+01	2.68E-01	1.67E-03	6.09E+02	4.98E+00
FW	m ³	1.91E+00	1.91E-01	2.02E-03	3.30E-05	1.69E+00	2.64E-02
SM	kg	7.29E+01	1.53E+00	1.86E-02	1.00E-04	7.10E+01	3.38E-01
RSF	MJ	4.22E+01	3.24E-01	5.00E-03	1.53E-05	4.17E+01	1.94E-01
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Legenda:

- PENRE = Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as raw materials.
- PERE = Use of renewable primary energy resources excluding renewable primary energy resources used as raw materials.
- PENRM = Use of non-renewable primary energy resources used as raw materials.
- PERM = Use of renewable primary energy resources used as raw materials.
- PENRT = Total use of non-renewable primary energy resources.
- PERT = Total use of renewable primary energy resources.
- FW = Use of fresh water.
- SM = Use of secondary materials.
- RSF = Use of secondary renewable fuels.
- NRSF = Use of secondary non-renewable fuels.

**Considering impact category SM, RSF, NRSF for the use of secondary materials, we have specific secondary raw material usage in the BoM for recycled polycarbonate. All the value calculated are totally reasonable but are related to specific Ecoinvent datasets used for the model.*

Table 6. Results for waste production and output flux.

Impact categories	Unit	Total	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	End of Life
HWD	kgHW	3.09E+00	1.57E+00	1.71E-02	5.03E-04	1.41E+00	9.18E-02
NHWD	kgW	3.99E+01	2.39E+01	1.80E-01	1.04E-02	1.48E+01	8.80E-01
RWD	kgRW	3.43E-03	5.20E-04	4.98E-06	2.85E-08	2.76E-03	1.43E-04
MER	kg MER	1.89E-02	1.47E-04	2.24E-06	6.86E-09	1.87E-02	8.70E-05
MFR	kg MFR	7.10E+01	1.65E+00	1.71E-02	8.18E-05	6.90E+01	3.24E-01
CRU	kg CRU	1.76E-05	1.76E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ ET	3.65E-01	1.01E-01	8.57E-03	1.16E-05	2.50E-01	5.59E-03
EEE	MJ EE	1.50E+01	2.00E-01	2.65E-03	1.05E-05	1.48E+01	1.19E-02

Legenda:

- HWD = Hazardous waste disposal
- NHWD = Non-hazardous waste disposal
- RWD = Radioactive waste disposal
- MER = Materials for energy recovering
- MFR = Materials for recycling
- CRU = Components for reuse
- ETE = Thermal energy exported
- EEE = Electric energy exported

Calculation rules

The evaluation was carried out in accordance with the reference standard for life cycle analysis (UNI EN ISO 14040:2021 e UNI EN ISO 14044:2021) and others reference documents previously mentioned (PCR EPDItaly011 – Meters).

Data quality

In this study, almost all data related to core activities are primary data and documented through appropriate reference documentation (e.g., energy consumption records, bill of materials, etc).

Secondary data are referred to specific datasets or technical documentation, to ensure a good level of reliability.

Cut-off

In this study impact related to production of buildings, machineries, and equipment (except for dataset already available on Ecoinvent 3.10), packaging wastes of purchased electronic components, device for installation, extraordinary maintenance of product, energy and materials used for disposal of meter are not considered. There are no specific cut-off criteria applied for inventory data.

Allocation

Main primary data are Bitron data and directly referred to U.F.. Some production data were allocated to the U.F. based on volumes. Allocation methods are applied to following processes related to production phase of meter: Energy consumption for the production, Primary packaging of product, Waste/scraps, Auxiliaries materials.

Development of scenarios

All life cycle stages are considered, as shown in Table 1, according to EN 50693. Specifically, the activities included in production stage (Upstream and core modules) are:

- Extraction of raw materials and production of materials/semi-finished/ancillary products (UPSTREAM)
- Transport of materials/semi-finished/ancillary products to manufacturing company (UPSTREAM)

- Manufacturing of the product constituents, including all stages (CORE)
- Production and assembly of product (CORE)
- Packaging³(CORE)
- Waste recycling and disposal (CORE)

In downstream are considered:

- Transport of complete product in its packaging from manufacturer to final customer and from manufacturer to installation site
- Disposal of packaging and scraps due to installation stage
- Energy consumption of the product during its use and over the RLS
- De-installation and final disposal of product

Reference period

The reference period for LCA study is from May 2024 to October 2024. It should be noted that the activity data collected can be considered representative thanks to the absence of consistent variability.

Reference documents

- » UNI EN ISO 14040:2021 Environmental management - Life cycle assessment - Principles and framework
- » UNI EN ISO 14044:2021 Environmental management - Life cycle assessment - Requirements and guidelines
- » ISO 14020:2000 Environmental labels and declarations -- General principles
- » UNI EN ISO 14025:2010, Etichette e dichiarazioni ambientali - Dichiarazioni ambientali di Tipo III - Principi e procedure
- » EN 50693:2019 Product category rules for life cycle assessments of electronic and electrical products and systems
- » Regolamento EPDItaly rev. 6 del 30/10/2023
- » Core-PCR: EPDITALY007 " Electronic and electrical product and systems" Rev. 3.1 del 12/11/2024
- » Sub-PCR: EPDITALY011 "Electronic and electrical product and systems -Meters" Rev. 0 del 16/03/2020
- » Ecoinvent, 2018. The Swiss Centre for Life Cycle Inventories. Ecoinvent v3.10
- » Report LCA: 2024_12_11 LCA REPORT GEMIS 2

³ Only Boxing, while raw material is considered upstream.