



ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME: Power supply and battery charger PSBCLite V2 **PRODUCTION SITE:** Via Pindaro, 19, 20128 Milano (MI)

in compliance with ISO 14025 and EN 50693

Program operator	EPDItaly
Publisher	EPDItaly
Declaration number	COL-TW-PSBCV2
Registration number	EPDITALY0577
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1. GENERAL INFORMATION

EPD owner	Col Giovanni Paolo S.p.A. (www.colgp.it) Via Antonio Chiribiri, 1, 10028 Trofarello (TO)
Reference production site	TW-TeamWare SRL (www.teamware.it) Via Pindaro, 19, 20128 Milano (MI)
Scope of application	This is a product-specific EPD referring to the Power supply and battery charger PSBCLite V2 manufactured in 2021 by TW-TeamWare SRL according to Enel specification GSTR001/1 Rev.01 of 08.08.2017 and sold as spare parts for charging the batteries which supply power to the components installed in the secondary substations or in the pole mounted installation i.e., switchgears: motor driven switch disconnectors (SD), secondary substation/pole mounted circuit breakers, LV circuit breakers, reclosers, directional fault passage indicators (RGDM or RGDAT), UE, and DCE., within the geographical scope of Italy.
Programme operator	EPDIItaly – info@epditaly.it Via Gaetano De Castillia, 10, 20124 Milano (MI)
Independent verification	This declaration has been developed in accordance with the regulations of EPDIItaly; further information and the same regulations are available at: www.epditaly.it Independent verification of the declaration and data carried out in accordance with ISO 14025: 2010 <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External Third party verification done by: ICMQ S.p.A. (www.icmq.it), Via Gaetano De Castillia, 10, 20124 Milano (MI) – Italia. Accredited by ACCREDIA, Accreditation number 0011PRD REV. 000
CPC code	4621 “Electricity distribution or control apparatus”
Company contact	Massimo BURATTO, Remote control B.U manager e-mail: massimo.buratto@teamware.it
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PCR – Product Category Rules	Core PCR: EPDIItaly007 – PCR for Electronic and Electrical Products and Systems, REV. 3.0 Issue date 13.01.2023
Reference documents	EN ISO 14025:2010, Environmental labels and declarations – Type III environmental declarations – Principles and procedures EN 50693:2019 - Product category rules for life cycle assessments of electronic and electrical products and systems. Regulations of the EPDIItaly Programme. Revision 5.2. Issue date 16.02.2022

Comparability	EPDs published within the same product category though originating from different programs may not be comparable. 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.
Liability	The EPD owner relieves EPDItaly from any non-compliance with the environmental legislations. The holder of the declaration will be liable for the supporting information and evidence. EPDItaly disclaims any liability regarding the manufacturer's information, data, and results of the life cycle assessment.

2. THE COMPANY

Col Giovanni Paolo S.p.A. (COL GROUP) is a leading Italian company owned by Oaktree Capital Management, L.P. in the fast-growing global energy transmission and distribution market. It specializes in the development and production of critical components and advanced solutions for smart grid applications in medium and high voltage electrical infrastructure with sustainability at the heart of all its activities. COL GROUP has been working to support the sustainable future of our planet and the long-term success of its customers as well as the company’s own business. Testament to that are the ambitions embodied in two of COL GROUP’s Strategy 2030 goals i.e., to lead with low-carbon circular economy solutions, and to enhance sustainability across the value chain. The company possesses numerous certifications according to international standards, among which are UNI EN ISO 9001:2015, UNI EN ISO 14001:2015, UNI ISO 45001:2018, UNI EN ISO 50001:2018, and ISO 27001: 2013. Established in 1920, COL GROUP has amassed over 100 years of valuable experience in the electro-technical and plant engineering fields, and it is one of the few authorized suppliers for major utility companies in Europe, Middle East, South America, and Southeast Asia. The company has developed a highly innovative technology portfolio in medium voltage switchgear, substation automation, battery control systems and several other smart grid and high-voltage applications in collaboration with other dominant global utilities and industrial players. Two years back, COL GROUP acquired TW-TeamWare SRL to accelerate its progress towards power quality, cyber security, and electric distribution remote control. The company now has production sites in Torino, Catania, Milano, and Cremona, with over 150 highly skilled, specialized, and efficient employees led by an adept management team.

3. THE PRODUCT

The Power supply and battery charger PSBCLite V2 product is manufactured in accordance with the Enel group technical specifications as stipulated under GSTR001/1 Rev.01 of 08.08.2017. The power supply and battery charger (PSBC) charges the batteries which supply power to the components installed in the secondary substations or in the pole mounted installation i.e., switchgears: motor driven switch disconnectors (SD), secondary substation(SS), pole mounted circuit breakers, LV circuit breakers,

reclosers, directional fault passage indicators (RGDM or RGDAT), UE, and DCE. The PSBCLite V2 is based on a solution with an isolated switching regulator with a reduction transformer from the power grid, consisting of the following sections: isolation transformer, EMI filtering and rectifier bridge, PWM regulator, logical regulation section, management section for calibrations, signals, and alarms. In the input section there are all the electronic filters and protections designed to neutralize conducted EMC disturbances and emissions. The PSBCLite V2 has a max depth of 25cm and is made of 19” by 3U galvanized steel panels and two front handles, and the hardware resources present include: a USB 2.0 device communication port (type B connector), 1 primary power input 100 / 230Vac, a 100 / 230Vac power selector switch, 2 250V / 3.15AT fuses (5x20mm) to protect the primary power supply, 1 turn on IO switch, 1 RESET button of the device, 1 Battery Test start button, signalling LEDs, 1 42-I sectioning switch loads, a circuit breaker protection and isolation circuit for motor power supply with auxiliary contact, a 20A blade fuse for protection of automotive batteries towards, 1 24Vdc battery recharge output, a 12V power output apparatus of an external modem, 2 24Vdc outputs of power loads, 1 24Vdc output for motor power supply, and 5 remote signal outputs. The photograph on the cover of this EPD document shows a fully assembled PSBCLite V2 device with all outputs distributed on two connectors respectively 9 and 12 female poles. **Table 1** summarizes the product identification details and main technical characteristics of the PSBCLite V2 and its packaging.

Table 1. Technical specifications for the fully assembled PSBCLite V2 as per GSTR001/1, and its packaging material

TEAMWARE Product code	TW143-SLEL-0107-00
Client product code	519541
Product model	PSBCLite V2
Product weight	8,247 kg
Product packaging	Cardboard box weighing 0,398 kg
Input characteristics	
Primary power source:	100 or 230Vac single phase with selector
Variation of the rated voltage:	-10% +20%
Nominal frequency:	50/60 Hz
Output characteristics	
Nominal voltage:	24Vdc adjustable in the range 23÷28Vdc
Maintenance load voltage:	27,24 to 25° C
Maximum current that can be supplied:	5A throughout the voltage range expected
Efficiency:	≥75% a 5A / 24Vdc

Material composition

The declaration on the content of materials for the product was done by the manufacturer in accordance with EN IEC 62474. The unique ID and percentage mass share of all the materials and declarable substances contained in the fully assembled product plus its packaging are reported in **table 2**.

Table 2. Material composition for the fully assembled PSBCLite V2 device plus its packaging

Material class name	ID	Mass share
Other ferrous alloys, non-stainless steels	M-119	34,9906%
Aluminium and its alloys	M-120	0,4812%
Copper and its alloys	M-121	44,3994%
Other unfilled thermoplastics	M-249	0,9832%
Unsaturated polyester (UP)	M-301	0,2795%
Paper	M-341	4,6081%
Other	OTHER	14,2581%

Reference service life

The reference service life (RSL) of the product was assumed to be 10 years.

4. SCOPE AND TYPE OF EPD

This is a product-specific EPD in compliance with ISO 14025 and EN 50693 under the EPDIItaly program regulations, for PSBCLite V2 produced by TW-TeamWare SRL, a COL GROUP company, and sold as spare parts replacing other faulty PSBCs for charging the batteries which supply power to the components installed in the secondary substations or in the pole mounted installation i.e., switchgears: motor driven switch disconnectors (SD), secondary substation/ pole mounted circuit breakers, LV circuit breakers, reclosers, directional fault passage indicators (RGDM or RGDAT), UE, and DCE. It is based on a cradle to grave life cycle assessment (LCA) methodology in accordance with the ISO 14040 and 14044 standards. The spatio-temporal scope for the data used in this study are summarized in **table 3** basing on the current global level of technology. The results were automatically generated using the excel-based LCA tool “LCA-COL GROUP Tool 2.1” of 01.09.2023., and they were intended for internal R&D, as well as external B2B and B2C communication. In effect, these results supported sustainable business decisions through comparison of the environmental attributes of products that have similar functional requirements.

Table 3. The spatio-temporal scope of the LCA study

Representativeness	Scope
Spatial	Italy
Temporal	January to December, 2021

Functional unit

The functional unit (FU) was a fully assembled, tested, and packaged PSBCLite V2 device produced by TW-TeamWare SRL in 2021 with the technical specifications stated in **table 1**, distributed to sites of the client within the Italian territory, and installed as spare parts for charging the batteries which supply power to the components installed to replace faulty PSBCs in the secondary substations or in the pole mounted installations, during a RSL of 10 years, operating nonstop.

System boundary

The system boundary implemented in this LCA covered the entire lifecycle of the product i.e., from cradle to grave as shown in **table 4** with the life cycle stages and the geographical scopes for all the major activities involved, grouped into three distinct modules i.e., upstream, core, and downstream with reference to EN 50693. The product life cycle and inventory analysis describing all the activities, simplifying assumptions, and modelling scenarios used in the LCA has been exhaustively conducted under **section 5** of this document.

Table 4. The life cycle stages, geographical scope, and modules declared in the system boundary

Manufacturing		Distribution	Installation	Use	End of life
Upstream	Core	Downstream			
✓	✓	✓	✓	✓	✓

✓ = Lifecycle stages and modules declared in the LCA

Cut-off criteria

The mandatory cut-off for mass and energy flows in this LCA study was set at 1% as defined and modelled in the LCA TOOL "LCA-COL GROUP Tool 2.1" of 01.09.2023. All the material and energy flows within the system boundary known to have potential to cause significant impacts on the LCA results have been accounted for. However, cut-off was applied to the potential impacts that could have resulted from production and disposal of the packaging materials of all the semi-finished products included in the BOMs (e.g., sheets, electronics, screws, etc.) transported to TW-TeamWare SRL for processing and later assembling of the final product as it was assumed that such impacts were negligible owing to the reuse agreement for such materials existing between TW-TeamWare SRL and the external suppliers. Furthermore, a cut-off was similarly applied to the impacts associated with the skilled labour required during installation before use and dismantling of the product at its end-of-life. Potential impacts that could have arisen from ordinary or extraordinary maintenance were also ignored since the product was assumed to be maintenance free for the entire expected service life.

Allocation rules

The allocation criteria adopted for the LCA model was guided by the PCR of the reference product. Since many other products are produced at the reference site, the "multi-output" allocation rule was applied to calculate the environmental impact of the product being studied. The primary data relating to waste generation, water, and energy consumption (petrol, electricity, and natural gas) used was provided for the reference year, and these were allocated based on economic value (revenue generated in millions of euros) using the total annual revenue of the company, annual revenue from selling the product being studied, and the number of the studied product sold in the reference year, to get the allocation factor.

Data quality

The most recent and verifiable site-specific data collected in 2021 was used in this study, and the International System of Units (SI) was adopted while recording the data. The initial primary data forming the basis for the LCA were the production specifications i.e., BOMs, mechanical drawings, and technical

information from the client provided by TW-TeamWare SRL to its external suppliers for each sub-assembly of the final product, and these were analyzed using Microsoft excel. In instances where data was missing for some individual electronic components, approximations were made in the BOMs and proxy data with the nearest equivalence in terms of functionality and mass was used for modelling such components. The weight of the structural components was determined from a well calibrated weighing scale. For the electronic components, information from product datasheets obtained from the websites of Farnell Italia and Mouser Electronics were used, these were complimented with data from Altium and Microarea Mago4 software. Additional primary data used included the water and energy (petrol, electricity, and natural gas) consumption for the core activities at TW-TeamWare SRL premises during the reference year, and these were downloaded from the company's reference production site account on the website of the service providers. A similar approach was applied to download annual data for fuel consumption by company vehicles from the Q8 online portal which documents electronic fuel vouchers. In addition to that, the distances from the manufacturing sites of all the external suppliers to TW-TeamWare SRL were evaluated with the aid of Google Maps for transport by road. The same technique was applied to determine the distributing distance from TW-TeamWare SRL to the client's location within Italy, and justification was provided for all the simplifying assumptions stated. In terms of secondary data, databases from legitimate sources already embedded in the LCA TOOL "LCA-COL GROUP Tool 2.1" of 01.09.2023 were used to obtain generic data for some up- and down-stream processes in the life cycle of the product.

5. PRODUCT LIFE CYCLE AND INVENTORY ANALYSIS

The life cycle inventory (LCI) lists and quantifies all the flows entering and leaving all the declared life cycle stages of the product within the system boundary considered in relation to the scope of the study. The reference flow for the LCI is 1 piece of a fully assembled and packaged PSBCLite V2 device, weighing **8,646 kg** altogether.

Manufacturing

This first life cycle stage covers all the activities spanning across the upstream and core modules. The supply chain processes commence with the extraction of raw materials to produce sub-assemblies comprising of electronic and structural components which are constituents of the final PSBCLite V2 device, and the packaging materials for the final product. The electronic components ordinarily are made of cables and printed circuit boards (PCB) on which smaller components are mounted, whereas the structural component consists of metallic and plastic materials. The production of these various components was done by external suppliers on their manufacturing sites all domicile in Italy, and whose distances from TW-TeamWare SRL were obtained using Google Maps. The different product components and packaging materials were assumed to be transported in a 16 - 32 tonne EURO5 lorry to the reference production site where the core activities of assembling, testing, and final packaging of the PSBCLite V2 devices were done. The fully assembled product was then packaged by placing it in a cardboard box to minimize any potential damage during distribution. All the wastes generated on-site from these activities (except packaging) are documented by category in the production site register and declared annually in the MUD "*Modello Unico di Dichiarazione ambientale*" following the applicable regulations and deadlines. Furthermore, these

wastes were assumed to be transported periodically in a 16 - 32 tonne ACI mix lorry to a waste treatment plant located **50 km** away.

Distribution

From this point forth, all the activities are classified under the downstream module. The fully assembled and packaged product in the cardboard box is loaded onto a 16 - 32 tonne EURO5 lorry for last mile delivery to the various sites of the client. For purposes of simplification, the distribution process was assumed to be solely done by road and the distribution distances from TW-TeamWare SRL to each site was determined from Google Maps. However, since the distribution of the product was not homogeneous across the entire Italian territory, these distances were weighted against the quantity of the product distributed in each of the installation sites, and the sum of the various weighted distances (**336,6 km**) was taken as the distribution distance.

Installation

Upon arrival at the client's location, the PSBCLite V2 is unloaded, carefully removed from its packaging, and installed as a spare part by skilled technicians for charging the batteries which supply power to the components installed in the secondary substations or in the pole mounted installations. It is immediately after this process that the packaging materials are returned for reuse as per the reduction of packaging waste agreement between TW-TeamWare SRL and its external suppliers. At the end of life of the packaging materials, they are assumed to be transported in a 7 - 16 tonne EURO5 lorry to a waste treatment plant **50 km** away.

Use

The perfectly installed PSBCLite V2 product consumes **131,4 kWh** of electricity, E_{use} during its **RSL** of 10 years, operating constantly, and this was computed using **Equation 1** with **8760** representing the number of hours in a year; and **1000** is the conversion factor that allows the energy consumed in kWh over the product's service life to be expressed. The nominal power of the PSBCLite V2, P_{use} was **1,5 Watts**.

$$E_{use}[\text{kWh}] = \frac{P_{use} * 8760 * \text{RSL}}{1000} \quad (1)$$

The PSBCLite V2 does not use any batteries, instead, it is electrically powered at 24Vdc directly from the MV/LV SS at the installation site to function as a power supply and battery charger device. In addition to that, it was assumed that no periodic or extraordinary maintenance works were required throughout the use phase. An additional environmental information is that during the installation and use stages, the device does not emit any pollutants or substances which are dangerous for the environment and health.

End of life

At the end of the RSL of the product, the dismantling process and separation of the device components is done following guidelines given by the manufacturer, and the resulting wastes were assumed to be transported using a 7,5 - 16 tonne EURO5 lorry to a waste treatment plant located **50 km** away from the installation site.

6. LCA RESULTS

The environmental performance results of the product for the different lifecycle stages per FU accounting for all the mandatory environmental impact indicators (**Table 5**) and descriptive parameters for resource use (**Table 6**) and waste production (**Table 7**) calculated as per Core PCR: EPDItaly007 and EN 50693 were automatically generated using the LCA TOOL "LCA-COL GROUP Tool 2.1" of 01.09.2023.

Environmental impacts for PSBCLite V2

Table 5. LCA results for the environmental impact indicators

Impact categories	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
GWP-total	kg CO ₂ eq.	1,02E+02	4,55E-01	3,79E-02	5,20E+01	8,10E+00	1,62E+02
GWP-fossil	kg CO ₂ eq.	1,01E+02	4,55E-01	6,40E-03	5,12E+01	8,08E+00	1,61E+02
GWP-biogenic	kg CO ₂ eq.	2,99E-01	3,31E-05	3,15E-02	7,76E-01	1,12E-03	1,11E+00
GWP-luluc	kg CO ₂ eq.	1,98E-01	8,71E-06	6,88E-07	3,49E-03	9,24E-04	2,02E-01
ODP	kg CFC-11 eq.	2,03E-06	9,60E-09	1,45E-10	1,06E-06	8,02E-09	3,11E-06
AP	mol H ⁺ eq.	2,92E+00	1,16E-03	3,28E-05	1,69E-01	4,00E-03	3,09E+00
EP-freshwater	kg P eq.	1,95E-02	3,49E-07	2,02E-08	8,49E-04	2,04E-05	2,04E-02
EP-marine	kg N eq.	1,98E-01	4,53E-04	4,13E-05	2,67E-02	1,45E-03	2,27E-01
EP-terrestrial	mol N eq.	2,84E+00	4,79E-03	1,43E-04	3,23E-01	1,49E-02	3,18E+00
POCP	kg NMVOC eq.	8,31E-01	1,87E-03	5,36E-05	1,42E-01	4,01E-03	9,79E-01
ADP-min & met	kg Sb eq.	4,91E-02	1,53E-08	6,74E-10	7,63E-07	9,54E-08	4,91E-02
ADP-fossil	MJ	1,61E+03	5,80E+00	7,56E-02	9,12E+02	9,18E+00	2,54E+03
WDP	m ³ eq. deprived	4,97E+01	5,43E-03	1,20E-03	3,21E+01	1,85E-01	8,20E+01

Caption: **GWP-total** = Climate change – total; **GWP-fossil** = Climate change – fossil; **GWP-biogenic** = Climate change – biogenic; **GWP-luluc** = Climate change – land use and land use change; **ODP** = Ozone Depletion; **AP** = Acidification; **EP-freshwater** = Eutrophication aquatic freshwater; **EP-marine** = Eutrophication, marine; **EP-terrestrial** = Eutrophication, terrestrial; **POCP** = Photochemical ozone formation; **ADP-min & met** = Depletion of abiotic resources – minerals and metals; **ADP-fossil** = Depletion of abiotic resources – fossil fuels; **WDP** = Water use.

Resource use for PSBCLite V2

Table 6. LCA results for the environmental parameters describing resource use

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PERE	MJ	1,91E+02	1,55E-02	6,70E-04	2,04E+02	6,03E-01	3,96E+02
PERM	MJ	3,19E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,19E+00
PERT	MJ	1,95E+02	1,55E-02	6,70E-04	2,04E+02	6,03E-01	3,99E+02
PENRE	MJ	1,61E+03	5,97E+00	7,76E-02	9,15E+02	9,29E+00	2,54E+03
PENRM	MJ	2,40E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,40E+01
PENRT	MJ	1,63E+03	5,97E+00	7,76E-02	9,15E+02	9,29E+00	2,56E+03
MS	kg	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
FW	m ³	5,49E+03	9,23E-01	1,22E-01	1,84E+04	3,10E+01	2,40E+04

Caption: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw material; PERM = Use of renewable primary energy resources used as raw material; PERT = Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials); PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material; PENRM = Use of non-renewable primary energy resources used as raw material; PENRT = Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials); MS = Use of secondary materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

Waste production for PSBCLite V2

Table 7. LCA results for the environmental parameters describing waste production

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
HWD	kg	9,29E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,29E-03
NHWD	kg	0,00E+00	0,00E+00	2,03E-02	0,00E+00	3,13E+00	3,15E+00
RWD	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	2,71E-02	0,00E+00	3,47E-01	0,00E+00	5,06E+00	5,43E+00
MER	kg	0,00E+00	0,00E+00	2,99E-02	0,00E+00	5,46E-02	8,45E-02
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for reuse; MFR = Material for recycling; MER = Materials for energy recovery; ETE = Exported thermal energy; EEE = Exported electricity energy

7. BIBLIOGRAPHY

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