COL GROUP **COL GIOVANNI PAOLO S.p.A.**

EPD ITALY

ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME:
TPT2020Lite CSV2

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-510022
Registration number	EPDITALY0413

Issue date	16/06/2023
Valid to	16/06/2028

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 S.r.l. (www.teamware.it) Via Pindaro, 19, 20128 Milano (MI)
Scope of application	This is a product-specific EPD referring to the TPT2020Lite model CSV2 devices produced by TW-TeamWare SRL in 2021, and used as technology for remote monitoring and supervision of digital substations within the geographical scope of Italy
Programme operator	EPDItaly – info@epditaly.it Via Gaetano De Castillia, 10, 20124 Milano (MI)
Independent verification	This declaration has been developed in accordance with the regulations of EPDItaly; 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 ☐ Internal ☑ 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 002H REV. 19
CPC code	4621 “Electricity distribution or control apparatus”
Company contact	Ivana RIZZI, Marketing & Tender Manager, COL GROUP e-mail: ivana.rizzi@colgp.it
Technical support	Emmanuel NYERO, Environmental Specialist, COL GROUP e-mail: emmanuel.nyero@teamware.it
PCR – Product Category Rules	Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, REV.2-21/10/2020, Issue date 20/01/2020
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 EPDItaly 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. Furthermore, COL GROUP acquired TW-TeamWare S.r.l. in 2021 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 accomplished management team.

3. THE PRODUCT

TPT2020Lite is a complex Remote Terminal Unit (RTU) expressly designed to be used in new generation HV/MV substations, based on IEC61850 protocol networks. It performs control and supervision operations, sampling information from field equipment like breakers, transformers, protection devices, auxiliary services, etc. It can also carry out commands instructed by the central system. TPT2020Lite is housed in a 19" by 1 Unit standard metallic rack. It includes processing unit, 12 digital inputs and 4 digital output module and the power supply. TPT2020Lite manages all the substation apparatus using communication based on IEC61850 protocol, over the primary LAN. The TPT2020Lite device is completely programmable and configurable, and it comes with a dedicated application software TMF, executable in Windows© OS. The main functionalities of TPT2020Lite are; managing observability data received by MT users CCI RTUs and to be sent to TSO, digital signals and analogue measures acquisition, execution of local

correlation processing to produce synthetic virtual events to be sent to the central system, stand-alone performing of local automation sequences, execution of commands, data storage and events chronological recording management, electrical loads management, different communication carriers over LAN and/or WAN, and self-diagnostic available through a resident web server. The image on the cover page of this EPD document displays the back and front panels of a TPT2020Lite device.

Technical specifications

The product identification details and technical specifications from the product datasheet are presented in **table 1.**

Table 1. Technical specifications for TPT2020Lite device

TEAMWARE Product code	TW139-PFEL-0080-00	
Matricola ENEL	510022	
Product model	TPT2020Lite CSV2	
Product weight	2,3614 kg	
Optical ethernet port	100BaseFx (1310nm), SC connector, multimode fiber	
Wired ethernet port	100BaseT	
2 serial ports	V.24	
1 serial port	RS485 serial port	
Digital input	12 digital galvanically insulated inputs (24Vcc)	
Digital output	4 digital outputs	
1 supply output	12V/8W for external DCE	
Power supply	24Vdc±20% 10W	
Packaging materials	**Polyethylene (PE) film**	0,0108 kg
	Cardboard box	0,0834 kg

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 of the fully assembled TPT2020Lite device plus its packaging

Material class name	ID	Mass share (%)
Other ferrous alloys, non-stainless steels	M-119	76,8077
Polyethylene (PE)	M-201	0,4398
Other unfilled thermoplastics	M-249	0,4154
Paper	M-341	3,3963
Other	OTHER	18,9407

Reference service life

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

4. SCOPE AND TYPE OF EPD

This is a product-specific EPD for the TPT2020Lite device produced at the COL GROUP production site in Milan (TEAMWARE) in compliance with ISO 14025 and EN 50693 under the EPDItaly program regulations. It is based on a cradle to grave life cycle assessment (LCA) methodology in accordance with the ISO 14040 and 14044 standards, considering the current level of technology worldwide. The geographical and temporal scope considered in this study are summarized in **table 3.** The results were automatically generated using the excel-based LCA tool "LCA-COL GROUP Tool 2.0 Version 2.0" of 31/05/2023., and they were intended for internal R&D, as well as external B2B and B2C communication. Correspondingly, these results facilitated judicious business decisions through comparison of the environmental performance of products that have similar functional requirements.

Table 3. Geographical and temporal scope of the LCA considering the current global level of technology

Representativeness	Scope
Geographical	Italian territory
Temporal	January to December, 2021

Functional unit

The functional unit (FU) was a fully assembled, tested, and packaged TPT2020Lite device produced at TEAMWARE with the technical specifications stated in **table 1**, transported and installed in various sites throughout Italy for use as technology for remote monitoring and supervision of digital substations, constantly working during a RSL of 10 years.

System boundary

The system boundary considered in this study covered the entire lifecycle of the product i.e., from cradle to grave as shown in **table 4** with the life cycle stages 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 scenarios used in the LCA model has been comprehensively done under **section 5** of this document.

Table 4. Summary of the life cycle stages and modules considered in the system boundary

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

✓ = Lifecycle stages and modules considered 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 2.0 Version 2.0" of 31/05/2023. 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 TEAMWARE 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 TEAMWARE 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 in this study was guided by the PCR of the product being studied. 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 from January to December 2021 i.e., reference year, 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 provided by TEAMWARE to its external suppliers for each component 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 and surface area of the structural components were calculated using the Solid Edge software. 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 activities at TEAMWARE 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 external suppliers to TEAMWARE were evaluated with the aid of Google Maps. The same technique was applied to determine the distributing distance across the various reference installation sites 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 2.0 Version 2.0” of 31/05/2023 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 TPT2020Lite device and its packaging, weighing about **2,456 kg** altogether.

Manufacturing

This 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 intermediate products comprising of electronic and structural components which are constituents of the final product, and the packaging materials for the final product. The electronic components are mainly boards on which smaller components are mounted, whereas the structural component consists of galvanized metallic sheets, bolts, and screws. The production of these various components is done by external suppliers all domicile in Italy on their manufacturing sites, and it was assumed that these different components were each transported by road in a 16 - 32 tonne EURO5 lorry to TEAMWARE where the core activities of assembling, testing, and final packaging of the TPT2020Lite device are done. The fully assembled product is then packaged by the application of a double-layered technique, starting by wrapping the product in a film of polyethylene material, and thereafter placing it in a cardboard box to minimize any potential damage during distribution. All but packaging wastes generated from all on-site activities 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 periodically transported in a 16 - 32 tonne ACI mix lorry to a waste treatment plant located **50 km** away.

Distribution

From here on out till the product's end of life, all the activities constitute the downstream module. The fully assembled and packaged product is loaded onto a 16 - 32 tonne EURO5 lorry for last mile delivery to the various installation sites throughout the Italian territory. For purposes of simplification, the distribution process was assumed to be solely done by road despite the ferry routes connecting mainland Italy to the islands. All the sites where the product was distributed and installed during the reference year were used and their distances (in kilometres) from TEAMWARE considering the fastest route were obtained 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 **(385,264 km)** was taken as the distribution distance.

Installation

Upon arrival at each of the installation sites, the product is unloaded, carefully removed from its packaging, and mounted in a metallic rack which normally accommodates multiple devices by skilled technicians using spanners to fasten the nuts, bolts, and washers. The entire installation process is

overseen by representatives of the client. It is immediately after this process that the packaging materials are returned for reuse as per the reduction of packaging waste agreement signed between TEAMWARE and its external suppliers. Furthermore, 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 located **50 km** away.

Use

The perfectly installed product functions continuously and consumes **378,432 kWh** of electricity, $\mathbf{E_{use}}$ during its **RSL** of 10 years, 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 device (in Watts), $\mathbf{P_{use}}$ was obtained by multiplying current and voltage whose values were determined after connecting the device to a D.C. regulated bench power supply unit with three banana connectors (i.e., positive, ground, and negative) and a digital display showing current, and voltage measured in amps and volts respectively. The TPT2020Lite device does not use any batteries, instead, it functions on a power supply at the installation site. It was assumed that no periodic or extraordinary maintenance works were required throughout the use phase since the possibility of device failure is seldom, this is on account of the numerous quality control tests performed during and after assembling to ensure robustness. 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.

$$\boldsymbol{E_{use}[\mathrm{kWh}] = \frac{P_{use} * 8760 * \mathrm{RSL}}{1000}} \qquad (1)$$

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)**, descriptive parameters for resource use **(Table 6),** and waste production **(Table 7)** computed as per Core PCR: EPDItaly007 and EN 50693 were automatically generated using the LCA TOOL "LCA-COL GROUP Tool 2.0 Version 2.0" of 31/05/2023.

Environmental impacts

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.	1,34E+02	1,48E-01	2,43E-02	1,50E+02	2,29E+00	2,86E+02
GWP-fossil	kg CO_2 eq.	1,33E+02	1,48E-01	1,77E-02	1,47E+02	2,28E+00	2,83E+02
GWP-biogenic	kg CO_2 eq.	2,54E-01	1,08E-05	6,59E-03	2,24E+00	3,19E-04	2,50E+00
GWP-luluc	kg CO_2 eq.	1,95E-01	2,83E-06	2,35E-07	1,00E-02	2,65E-04	2,05E-01
ODP	kg CFC-11 eq.	6,30E-06	3,12E-09	4,86E-11	3,06E-06	2,28E-09	9,37E-06
AP	mol H^+ eq.	8,01E-01	3,76E-04	1,07E-05	4,88E-01	1,14E-03	1,29E+00
EP-freshwater	kg P eq.	1,90E-02	1,13E-07	7,50E-09	2,44E-03	5,84E-06	2,14E-02
POCP	kg NMVOC eq.	7,54E-01	6,07E-04	1,61E-05	4,09E-01	1,14E-03	1,16E+00
ADP-min & met	kg Sb eq.	3,45E-02	4,97E-09	3,70E-10	2,20E-06	2,70E-08	3,45E-02
ADP-fossil	MJ	2,00E+03	1,89E+00	2,02E-02	2,63E+03	2,62E+00	4,63E+03
WDP	m^3 eq. deprived	4,18E+01	1,77E-03	9,72E-04	9,24E+01	5,25E-02	1,34E+02

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; **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

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

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PENRE	MJ	2,01E+03	1,94E+00	2,07E-02	2,63E+03	2,66E+00	4,65E+03
PERE	MJ	3,04E+02	5,05E-03	2,39E-04	5,88E+02	1,72E-01	8,92E+02
PENRM	MJ	7,29E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,29E+00

PERM	MJ	6,67E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,67E-01
PENRT	MJ	2,02E+03	1,94E+00	2,07E-02	2,63E+03	2,66E+00	4,66E+03
PERT	MJ	3,04E+02	5,05E-03	2,39E-04	5,88E+02	1,72E-01	8,92E+02
FW	m^3	1,05E+04	3,00E-01	7,58E-02	5,31E+04	8,79E+00	6,36E+04
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

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

Waste production

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	2,11E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,11E-01
NHWD	kg	0,00E+00	0,00E+00	5,44E-03	0,00E+00	7,31E-01	7,37E-01
RWD	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	1,28E-02	0,00E+00	5,10E-03	1,79E-02
MFR	kg	6,14E-01	0,00E+00	7,57E-02	0,00E+00	1,63E+00	2,31E+00
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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; **MER** = Materials for energy recovery; **MFR** = Material for recycling; **CRU** = Components for reuse; **ETE** = Exported thermal energy; **EEE** = Exported electricity energy

7. REFERENCES

1. Col Giovanni Paolo S.p.A. website, accessed 12 May 2023, <https://colgp.it/en/>
2. Core-PCR: PCR EPDItaly007 "Electronic and electrical product and systems" Revision REV.2– 21/10/2020, Issue date 20/01/2020
3. EN 50693:2019-08 Product category rules for life cycle assessments of electronic and electrical products and systems
4. EN IEC 62474:2019 Material declaration for products of and for the electrotechnical industry
5. Regulations of the EPDItaly Programme. Revision 5.2. Issue date 16/02/2022
6. ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
7. ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
8. ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
9. TW-TeamWare S.r.l. website, accessed 19 May 2023, < https://www.teamware.it/en/>