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

ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME:

1. CCI_Wally A+
2. DSO Gate

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-CCIDSOG
Registration number	EPDITALY0828

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Valid to	13.12.2029

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 CCI_Wally A+ which consists of an extension of the resources of the apparatus Power Quality Analyzer Wally A+ and provides a solution to observability of distribution networks, and the DSO Gate which is an interface device between CCI, DSO and TSO remote control systems created in accordance with the ARERA Resolution 540/2021/R/EEL of 30 November 2021, both manufactured by TW-TeamWare SRL for use, within the geographical scope of Italy in 2021.
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 0004VV REV. 000
CPC code	4621 “Electricity distribution or control apparatus”
Company contact	Massimo ARIOLDI, Servizi Commerciali, TW-TeamWare SRL e-mail: massimo.arioldi@teamware.it
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PCR – Product Category Rules	Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, REV.3-13/01/2023 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 EPDItaly Programme. Revision 6.0. Issue date 30/10/2023

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 a century worth 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. A few 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 a capable management team.

3. THE PRODUCTS

CCI_Wally A+

The CCI_Wally A+ **(top photograph)** consists of an extension of the resources of the apparatus Power Quality Analyzer Wally A+, with a different port layout rear panel communication and the addition of a new network interface, and in a specific firmware module, and it provides a solution to observability of distribution networks. The CCI function is an extension that can only be installed at the factory and cannot

be added to an already existing equipment. The Complete set of integrated resources for the CCI function are; 4 voltage channels 0÷600Vac/dc, 3 channels for 0÷10Aac currents, 3 channels for 0÷3Vac/dc transducers, Internal data memory 32GB, 1 USB 2.0 port (host), 1 micro USB 2.0 port (device), 3 x 100baseT Ethernet ports, 1 GPS receiver port, 12 digital input channels, 4 analog channels 0/4÷20mA output, Auxiliary power supply in the range 80÷260Vac/dc, Integrated UPS with high autonomy (>30'), Operator interface with LCD display, keyboard and LED indicators, and Integrated GSM/GPRS/UMTS/LTE modem (option). The CCI_Wally A+ was developed to function as a central plant controller "*Controllore Centrale di Impianto*" and power quality instrument (optional) in compliance with CEI Standard 0-16 "Technical reference rule for the connection of active and passive users to the HV and MV networks of electricity distribution companies" in Annexes 0 and T "Central Plant Controller", ARERA resolution 540/2021/R/eel "Regulation of data exchange between Terna spa (TSO), Distribution Companies (DSO) and Significant Grid Users (SGU) for the purposes of the safe operation of the National Electricity System", RSE specification 12004159, Technical-functional specifications of voltage quality monitoring equipment for MV networks" and CEI EN61000-4-30 ed. 3 for Class A instrumentation. The CCI_Wally A+ is available in the following mounting options; DIN rail mounting, BT aux door assembly, and 19" rack mounting. **Table 1** highlights the identification details and some important technical specifications of the CCI_Wally A+ from the product datasheet.

Table 1. Some of the technical specifications of the CCI_Wally A+

Product identification	**Product model**	**CCI_Wally A+**
	TEAMWARE product code	**TW151-PFEL-0002-00**
	Product net weight	**4,094 kg (including battery)**
Technical specifications	Power consumption	30 VA (Watts)
	Frequency	50/60 Hz
	Battery	12 V 0.8Ah Pb sealed
	Voltage	0-600 Vac/dc
	Direct current	0-10 Aac
	Transducers	0-3 Vac/dc
Packaging materials	Carboard box	0,465
	PE-Film	0,012
	Wooden pallet	1,413

DSO Gate

The DSO Gate **(bottom photograph)** is an interface device between CCI, DSO and TSO remote control systems created in accordance with the ARERA Resolution 540/2021/R/EEL of 30 November 2021. The functions of the device are Management of communications with CCI devices on Ethernet network and "secured" IEC61850 protocol with certificate authentication, «Bridge» with DSO remote control Scada systems, in Ethernet connection, with IEC60870-5-104 protocol, Client for NTP (Network Time Protocol) synchronization, and Communication with GPS Device. The DSO gate communicates with the CCI via IEC61850 MMS protocol as per Annex O of CEI-016, compliant with the requirements. The TEAMWARE

product code is **TW153-PFEL-0001-00** and it has a net weight of about **2,473 kgs**. The technical features of the DSO Gate are; Available in DIN rail or 19'' rack version, Power supply 24 Vdc +/- 20%, Ethernet 100BaseT, 100BaseFx Optical Ethernet, Interface to GPS device (signals + power), and Operation indicator LED: ON – Power supply present, ETH 100 – Connection Status, ETH ACT – Connection Status, Link 104 – Connection Status with Control System, Link 61850 – Connection Status with CCI, Connection status with NTP/GPS Server, Alarm – Device anomaly, Fault – Device failure.

Material composition

The declaration on the content of materials for the two products 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 products plus their packaging materials are reported in **table 2.**

Table 2. Material composition for the fully assembled and packaged CCI_Wally A+ and DSO Gate devices

Material class name	ID	Percentage mass share	
		CCI_Wally A+	DSO Gate
Other ferrous alloys, non-stainless steels	M-119	41,0533%	69,8023%
Polyethylene (PE)	M-201	0,2157%	0,7365%
Other unfilled thermoplastics	M-249	2,1601%	0,3627%
Wood	M-340	24,9687%	3,1680%
Paper	M-341	8,2269%	4,5891%
***Other**	OTHER	23,3753%	21,3415%

***Miscellaneous electronic materials with no unique ID

Reference service life

The reference service life (RSL) of each of the CCI_Wally A+ and DSO Gate devices was taken to be 10 years.

4. SCOPE AND TYPE OF EPD

This is a product-specific EPD for the CCI_Wally A+ which consists of an extension of the resources of the apparatus Power Quality Analyzer Wally A+ and provides a solution to observability of distribution networks, and the DSO Gate which is an interface device between CCI, DSO and TSO remote control systems, both produced by TW-TeamWare SRL, a COL GROUP company, 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. 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 2.2" of 07.11.2024., and they were intended for internal research and development (R&D), as well as external

B2B and B2C communication. In effect, these results facilitated judicious corporate decisions through comparison of the environmental attributes of products that have similar functional requirements.

Table 3. The spatio-temporal scope of the LCA study at the current global level of technology

Representativeness	Scope
Spatial	Italy
Temporal	January to December, 2021

Functional unit

The functional unit (FU) was a fully assembled, tested, and packaged CCI_Wally A+ and DSO Gate devices whose technical specifications are described in **section 3** of this document, distributed to sites within Italy, installed and used as technology for providing a solution to observability of distribution networks, during a RSL of 10 years, working continuously.

System boundary

The system boundary implemented in this LCA covered the entire lifecycle of the two products 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 thoroughly 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
CN	IT	IT	IT	IT	IT	IT
Upstream		Core	Downstream			
✓		✓	✓	✓	✓	✓

CN = China**, IT** = Italy**,** ✓ = 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 2.2" of 07.11.2024. 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 CCI_Wally A+ and DSO Gate final products as it was assumed that such impacts were negligible. Furthermore, a cut-off was similarly applied to the impacts associated with the skilled labour required during installation before use and dismantling of the CCI_Wally A+ and DSO Gate products at their end-of-life. Potential impacts that could have arisen from ordinary maintenance such as battery replacement for the CCI_Wally A+ were thought to be negligible. Furthermore, any extraordinary

maintenance was also ignored since the products were assumed to not require such maintenance 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 CCI_Wally A+ and DSO Gate products 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 each of the CCI_Wally A+ and DSO Gate products 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 products, 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 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 and Ports.com for transport by road and sea, respectively. 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 2.2" of 07.11.2024 were used to obtain generic data for some up- and down-stream processes in the life cycle of the products.

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 CCI_Wally A+ and DSO Gate devices, whose individual weights are as indicated in **table 5.**

Table 5. Weights of the fully assembled and packaged CCI_Wally A+ and DSO Gate devices

Product	CCI_Wally A+	DSO Gate
Total weight (kg)	5,984 (including batteries)	2,702

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 CCI_Wally A+ and DSO Gate devices, and the packaging materials for each of the final products. 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 panels, bolts, and screws. The production of these various components was done by external suppliers on their manufacturing sites whose distances from TW-TeamWare SRL were obtained using Google Maps. The electronic components were made in China and assumed to be shipped to the port of Genova, and then transported by road in a 16 - 32 tonne EURO5 lorry to TW-TeamWare SRL premises. Along similar lines, the structural components and packaging materials manufactured within Italy were transported in a 16 - 32 tonne EURO5 lorry to the reference production site where the core activities of assembling, testing, and final packaging of each of the CCI_Wally A+ and DSO Gate devices were done. Each of the fully assembled products was then packaged by the application of a double-layered technique, starting by covering the product in a PE-film, and thereafter placing it in a cardboard box to minimize any potential damage on the wooden pallet 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. Each of the fully assembled and packaged CCI_Wally A+ and DSO Gate products on the pallet is loaded onto a 16 - 32 tonne EURO5 lorry for final delivery to the various installation sites throughout Italy. All the sites where each of the CCI_Wally A+ and DSO Gate products was distributed and installed during the reference year were considered and their distances (in kilometres) from TEAMWARE considering the fastest route were obtained from Google Maps. However, since the distribution each of the products 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 **(table 6)** was taken as the distribution distance for each of the fully assembled and packaged products

Table 6. Weighted distribution distance for the CCI_Wally A+ and DSO Gate products

Product	CCI_Wally A+	DSO Gate
Distribution distance (km)	514,5	245,375

Installation

Upon arrival at the client's location, the CCI_Wally A+ and DSO Gate products are unloaded, carefully removed from the packaging, and installed by skilled technicians. 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

Each of the perfectly installed CCI_Wally A+ and DSO Gate products consume **2628** and **394,2 kWh** of electricity, $\mathbf{E_{use}}$, respectively, during a **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 device (in Watts), $\mathbf{P_{use}}$ was obtained from the product datasheets of the CCI_Wally A+ and DSO Gate devices.

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

The CCI_Wally A+ device has two batteries weighing **0,0039 kg** and **0,3234 kg**, respectively, which were both assumed to be replaced every 2,5 years i.e., 3 times during the RSL of the product, whereas the DSO Gate has no batteries. An additional environmental information is that during the installation and use stages, both the CCI_Wally A+ and DSO Gate devices do 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 products, 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 CCI_Wally A+ and DSO Gate products for the different lifecycle stages per FU accounting for all the mandatory environmental impact indicators **(Tables 7 and 10)** and descriptive parameters for resource use **(Tables 8 and 11)** and waste production **(Tables 9 and 12)** calculated as per Core PCR: EPDItaly007 and EN 50693 were automatically generated using the LCA TOOL "LCA-COL GROUP Tool 2.2" of 07.11.2024.

Environmental impacts for CCI_Wally A+

Table 7. LCA results for the environmental impact indicators

Impact indicators	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
GWP-total	kg CO_2 eq.	3,45E+02	4,52E-01	3,72E+00	9,44E+02	4,28E+00	1,30E+03
GWP-fossil	kg CO_2 eq.	3,45E+02	4,52E-01	3,60E+00	9,40E+02	4,26E+00	1,29E+03
GWP-biogenic	kg CO_2 eq.	3,30E-01	1,54E-05	1,17E-01	4,03E+00	4,48E-04	4,48E+00
GWP-luluc	kg CO_2 eq.	4,25E-01	1,11E-05	3,83E-03	6,34E-02	8,64E-04	4,94E-01
ODP	kg CFC-11 eq.	1,83E-05	9,22E-09	5,77E-08	1,97E-05	2,03E-08	3,80E-05
AP	mol H^+ eq.	2,16E+00	1,13E-03	4,52E-02	3,09E+00	4,06E-03	5,30E+00
EP-freshwater	kg P eq.	5,96E-02	3,79E-07	2,22E-04	1,62E-02	2,97E-05	7,60E-02
EP-marine	kg N eq.	4,30E-01	4,31E-04	4,24E-03	4,75E-01	1,12E-03	9,11E-01
EP-terrestrial	mol N eq.	5,02E+00	4,72E-03	4,77E-02	5,43E+00	1,18E-02	1,05E+01
POCP	kg NMVOC eq.	1,66E+00	1,96E-03	1,62E-02	2,50E+00	3,32E-03	4,18E+00
ADP-min & met	kg Sb eq.	1,02E-01	1,49E-08	1,53E-03	1,16E-03	1,26E-07	1,05E-01
ADP-fossil	MJ	4,46E+03	5,97E+00	4,99E+01	1,55E+04	9,03E+00	2,00E+04
WDP	m^3 eq. deprived	9,43E+01	2,53E-03	9,71E-01	6,91E+02	2,02E-01	7,87E+02

Caption: GWP-total = Global Warming Potential – total; **GWP-fossil** = Global Warming Potential – fossil; **GWP-biogenic** = Global Warming Potential – biogenic; **GWP-luluc** = Global Warming Potential – land use and land use change; **ODP** = Ozone Depletion Potential; **AP** = Acidification Potential; **EP-freshwater** = Eutrophication potential, aquatic freshwater; **EP-marine** = Eutrophication potential, marine; **EP-terrestrial** = Eutrophication potential, 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 deprivation potential

Resource use for CCI_Wally A+

Table 8. LCA results for the environmental parameters describing resource use

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PERE	MJ	5,99E+02	2,07E-02	4,21E+00	5,35E+03	8,53E-01	5,96E+03
PERM	MJ	2,62E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,62E+01
PERT	MJ	6,25E+02	2,07E-02	4,21E+00	5,35E+03	8,53E-01	5,98E+03
PENRE	MJ	4,43E+03	5,97E+00	4,99E+01	1,55E+04	9,03E+00	2,00E+04
PENRM	MJ	2,84E+01	0,00E+00	7,58E-04	5,69E-04	0,00E+00	2,84E+01
PENRT	MJ	4,46E+03	5,97E+00	4,99E+01	1,55E+04	9,03E+00	2,00E+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
FW	m^3	3,20E+00	1,53E-04	3,78E-02	1,82E+01	6,66E-03	2,15E+01

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 CCI_Wally A+

Table 9. LCA results for the environmental parameters describing waste production

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
HWD	kg	2,06E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,06E-01
NHWD	kg	0,00E+00	0,00E+00	6,01E-01	5,11E-06	1,52E+00	2,12E+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	5,99E-01	0,00E+00	7,76E-01	9,82E-01	2,52E+00	4,87E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,11E-02	6,11E-02
ETE	MJ	0,00E+00	0,00E+00	8,08E+00	7,80E-05	0,00E+00	8,08E+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							

Environmental impacts for DSO Gate

Table 10. LCA results for the environmental impact indicators

Impact indicators	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
GWP-total	kg CO_2 eq.	1,31E+02	1,03E-01	4,27E-02	1,41E+02	2,40E+00	2,75E+02
GWP-fossil	kg CO_2 eq.	1,31E+02	1,03E-01	1,93E-02	1,40E+02	2,39E+00	2,74E+02
GWP-biogenic	kg CO_2 eq.	1,01E-01	3,51E-06	2,34E-02	6,04E-01	1,17E-04	7,29E-01
GWP-luluc	kg CO_2 eq.	1,46E-01	2,53E-06	7,19E-07	8,84E-03	2,25E-04	1,55E-01
ODP	kg CFC-11 eq.	6,01E-06	2,10E-09	6,78E-11	2,94E-06	2,02E-09	8,95E-06
AP	mol H^+ eq.	8,94E-01	2,56E-04	2,57E-05	4,58E-01	1,23E-03	1,35E+00
EP-freshwater	kg P eq.	1,89E-02	8,63E-08	2,30E-08	2,39E-03	6,01E-06	2,13E-02
EP-marine	kg N eq.	1,70E-01	9,83E-05	3,13E-05	7,06E-02	4,45E-04	2,41E-01
EP-terrestrial	mol N eq.	2,09E+00	1,08E-03	1,15E-04	8,07E-01	4,60E-03	2,90E+00
POCP	kg NMVOC eq.	7,53E-01	4,47E-04	4,17E-05	3,73E-01	1,25E-03	1,13E+00
ADP-min & met	kg Sb eq.	3,38E-02	3,40E-09	8,07E-10	2,04E-06	2,79E-08	3,38E-02
ADP-fossil	MJ	1,71E+03	1,36E+00	4,62E-02	2,32E+03	2,40E+00	4,03E+03
WDP	m^3 eq. deprived	4,54E+01	5,77E-04	-8,03E-03	1,04E+02	5,17E-02	1,49E+02

Caption: GWP-total = Global Warming Potential – total; **GWP-fossil** = Global Warming Potential – fossil; **GWP-biogenic** = Global Warming Potential – biogenic; **GWP-luluc** = Global Warming Potential – land use and land use change; **ODP** = Ozone Depletion Potential; **AP** = Acidification Potential; **EP-freshwater** = Eutrophication potential, aquatic freshwater; **EP-marine** = Eutrophication potential, marine; **EP-terrestrial** = Eutrophication potential, 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 deprivation potential

Resource use for DSO Gate

Table 11. LCA results for the environmental parameters describing resource use

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PERE	MJ	2,95E+02	4,72E-03	5,74E-04	8,02E+02	1,80E-01	1,10E+03
PERM	MJ	2,07E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,07E+00
PERT	MJ	2,97E+02	4,72E-03	5,74E-04	8,02E+02	1,80E-01	1,10E+03
PENRE	MJ	1,70E+03	1,36E+00	4,62E-02	2,32E+03	2,40E+00	4,02E+03
PENRM	MJ	8,04E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,04E+00
PENRT	MJ	1,71E+03	1,36E+00	4,62E-02	2,32E+03	2,40E+00	4,03E+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	1,38E+00	3,48E-05	-1,74E-04	2,72E+00	1,87E-03	4,10E+00

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 DSO Gate

Table 12. LCA results for the environmental parameters describing waste production

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
HWD	kg	1,84E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,84E-01
NHWD	kg	0,00E+00	0,00E+00	5,67E-02	0,00E+00	8,15E-01	8,71E-01
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	5,37E-01	0,00E+00	1,24E-01	0,00E+00	1,65E+00	2,31E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,90E-03	4,90E-03
ETE	MJ	0,00E+00	0,00E+00	9,00E-01	0,00E+00	0,00E+00	9,00E-01
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

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