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

EPD ITALY

ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME:

DY803 – 24kV Internal arc proof modular switchboards for MV with IMS insulated in SF_6 gas, ENEL Types: DY803/1, DY803/2, DY803/3, DY803/4, DY803/9N, and DY803/10N

PRODUCTION SITE:

Via Antonio Chiribiri, 1, 10028 Trofarello (TO)

in compliance with ISO 14025 and EN 50693

Program operator	EPDItaly
Publisher	EPDItaly

Declaration number	COL-TO-DY803
Registration number	EPDITALY0833

Issue date	10.02.2025
Valid to	10.02.2030

1. GENERAL INFORMATION

EPD owner	Col Giovanni Paolo S.p.A. (www.colgp.it) Via Antonio Chiribiri, 1, 10028 Trofarello (TO)
Reference production site	Via Antonio Chiribiri, 1, 10028 Trofarello (TO)
Scope of application	This is an omnibus product-specific EPD for six DY803 products i.e., DY803/1, DY803/2, DY803/3, DY803/4, DY803/9N, and DY803/10N that are a series of internal arc proof modular switchboards for medium voltage (MV) with IMS insulated in SF_6 gas manufactured in 2021 at the COL GROUP site in Torino (COL-TORINO) for use in MV secondary distribution networks within the Italian territory.
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	46214 “Boards, consoles, cabinets and other bases, equipped with electrical switching etc. apparatus, for electric control or the distribution of electricity, for a voltage exceeding 1000 V”
Company contact	Davide DA CAS, SEB & ESG Manager, COL GROUP e-mail: davide.dacas@colgp.it
Technical support	Emmanuel NYERO, Environmental Specialist, TW-TeamWare SRL e-mail: emmanuel.nyero@teamware.it
PCR – Product Category Rules	Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, REV 3.1, Issue date 12/11/2024 Sub-category PCR: EPDItaly015, Electronic and electrical products and systems – Switchboards, REV 2, Issue date 01/07/2024
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

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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. This is underpinned by 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 SA8000:2014, ISO 37001:2016, 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 accumulated valuable experience in the electro-technical and plant engineering fields for over a century, and it is among 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. Over the years, COL GROUP has registered significant growth through the acquisition of several companies in the electronic, energy systems, railway, and electromechanical sectors. The ever-expanding company now has modern production sites in Torino, Catania, Milano, and Cremona, with over 150 highly specialized and efficient employees led by a talented management team.

3. THE PRODUCTS

The six products are a DY803 series (i.e., DY803/1, DY803/2, DY803/3, DY803/4, DY803/9N, and DY803/10N) of Internal arc proof modular switchboards for medium voltage (MV) with IMS insulated in SF_6 gas manufactured at COL-TORINO under the identification codes of the manufacturer and the client (ENEL) summarized in **Table 1** for each of the 6 products.

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Table 1. Product identification codes for each of the six DY803 switchboards considered in this EPD

DY803 Types	Matricola COL-TORINO	Matricola ENEL
DY803/1	RCE/16-630-TO	162324
DY803/2	RGE-LE/16-630-TO	162325
DY803/3	RGE-T/16-630-TO	162326
DY803/4	RGE-U/16-630-TO	162327
DY803/9N	NGE-LE/16-630/N-TO	140082
DY803/10N	NGE-T/16-630/N-TO	140083

The six products are a series of compartments compliant with the Enel DY803 ed. 6, responding to the most varied needs of users who work in MV secondary distribution networks. The series are equipped with a three-position gas disconnector and with electrical and mechanical characteristics (24kV-630A-16kA/1s) for use in the field of secondary cabins. The equipment of CTs, VTs, sensors, earth fault and line fault detectors, as well as the application, on board, of active and reactive energy meters, makes this type of compartments an excellent solution for various problems linked to ring, mixed and island distribution. The degrees of protection are IP3X (excluding operating seats), and IP2XC (even with operating lever inserted), respectively. **Table 2** summarizes some of the technical requirements for all the six products, and they are compliant with the normal service and special conditions defined in Enel DY803 ed. 6 and IEC 62271-1 standard, respectively, and considering as minimum value of ambient temperature -15°C.

Table 2. Some of the technical requirements of all the six DY803 Series products

Panels	Rated voltage	U_r [kV]	24
	Rated frequency	f_r [Hz]	50
	Power frequency withstand voltage	U_d [kV]	50/60
	Rated lightning impulse withstand voltage	U_w [kV]	125/145
	Rated current	I_r [A]	630 (*)
	Rated short time withstand current (tk = 1 s)	I_k [kA]	16
	Internal arc capacity	[kA]/[s]	16/0,5 A F
IMS	Rated short circuit making current	I_{ma} [kA]	40
	Rated mainly active load breaking current	I_1 [A]	630
	Rated closed loop breaking current	I_{2a} [A]	630
	Rated transformer breaking current	I_3 [A]	6,3
	Rated cable charging breaking current	I_{4a} [A]	31,5
	Rated line charging breaking current	I_{4b} [A]	10
ST/ST1	Rated short time withstand current (tk = 1 s)	I_k [kA]	16
	Rated peak withstand current	I_p [kA]	40
	Rated short circuit making current	I_{ma} [kA]	40
	Short circuit closing number		5
ST2	Rated short time withstand current (tk = 1 s)	I_k [kA]	1

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	Rated peak withstand current	I_p [kA]	2,5
	Rated short circuit making current	I_{ma} [kA]	2,5
	Short circuit closing number		5

(*) For the transformer protection compartment the rated current is 250A

Material composition

The declaration on the content of materials for each of the six fully assembled DY803 products was done by the manufacturer in accordance with EN IEC 62474. The material class name, unique ID, and percentage mass share of all the materials and declarable substances contained in each of the fully assembled DY803 products plus their packaging materials are shown in **Table 3.**

Table 3. Material composition for the each of the six fully assembled and packaged DY803 products

Material class name	ID	Mass share (Percentage, %)					
		DY803/1	DY803/2	DY803/3	DY803/4	DY803/9N	DY803/10N
Stainless steel	M-100	-	9,2972	9,6669	6,5321	7,8201	7,7078
Other ferrous alloys, non-stainless steels	M-119	86,4062	77,1216	75,9202	79,9664	82,3917	80,1683
Copper and its alloys	M-121	4,5313	5,8568	5,4058	6,2850	2,3573	3,2395
PolyEthylene (PE)	M-201	0,1562	0,2048	0,1590	0,1584	0,1871	0,1862
Other unfilled thermoplastics	M-249	0,1562	0,0819	0,0795	0,0634	0,0748	0,0745
Epoxy resin (EP)	M-302	3,3594	3,5632	5,1673	4,1182	3,2553	4,8406
Silicone	M-321	-	0,0410	-	-	0,0374	-
Wood	M-340	4,6875	2,8670	2,7824	2,2175	2,9933	2,9789
Paper	M-341	0,0781	0,1229	0,0795	0,0950	0,1123	0,1117
Refrigerant gases and cryogens and other greenhouse gases	M-400	-	0,2294	0,2226	0,1774	0,2095	0,2085
*Other	OTHER	0,6250	0,6144	0,5167	0,3865	0,5613	0,4841

*Miscellaneous electronic materials with no unique ID

Reference service life

The reference service life (RSL) of the product was set at 20 years in compliance with the requirements stated in PCR EPDItaly015 – Switchboards.

4. SCOPE AND TYPE OF EPD

This is an omnibus product-specific EPD in compliance with ISO 14025 and EN 50693 under the EPDItaly regulations for the six DY803 series products in **Table 1**, manufactured at COL-TORINO in 2021 for installation and use in MV secondary distribution networks of the Enel Group within the Italian territory. It is based on a cradle to grave life cycle assessment (LCA) methodology in accordance with the ISO 14040

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and 14044 standards considering the current technological level worldwide. The geographical and temporal scope for the data considered in this study are summarized in **Table 4.** The environmental performance results from the LCA 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. Furthermore, these results facilitated sustainable business choices in a compendious manner after the comparison and analysis of the environmental attributes of products that have similar functional requirements.

Table 4. The geographical and temporal scope considered at the current global level of technology

Representativeness	Scope
Geographical	Italy
Timeframe	2021

Functional unit

The functional unit (FU) for the LCA was a fully assembled, tested, and packaged unit of each of the six DY803 series of switchboards highlighted in **Table 1** with a rated voltage and current of 24kV and 630A, respectively, and the technical specifications stated in **Table 2**, manufactured at COL-TORINO in 2021, distributed and installed in MV secondary distribution networks of the Enel Group in various sites within the Italian territory, functioning nonstop during a RSL of 20 years.

System boundary

The system boundary applied in this LCA followed the cradle-to-grave perspective i.e., covering the entire lifecycle of each of the 6 final products as shown in **Table 5** with the life cycle stages for all the major activities involved, grouped into three distinct modules i.e., upstream, core, and downstream with reference to EN 50693. The life cycle and inventory analysis describing all the activities conducted at each of the lifecycle stages for all the six DY803 products, simplifying assumptions, and modelling scenarios used in the LCA have been thoroughly performed in **section 5** of this document.

Table 5. The life cycle stages 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

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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-offs 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, metal carpentry, etc.) transported to COL-TORINO for processing and later assembling of each of the six final DY803 products as it was assumed that such impacts were negligible. On top of that, a cut-off was similarly applied to the impacts associated with the skilled labour required during installation and dismantling of all the six products at their end-of-life. Potential impacts that could have arisen from ordinary or extraordinary maintenance were ignored since each of the six final products 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 reference PCR of the products being studied. Since many other products are produced at the reference site, the "multi-output" allocation rule was applied to distribute the environmental burden among these multiple products. 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 euro) to obtain the allocation factor for each of the products under study, this was computed using the total annual revenue generated at COL-TORINO, annual revenue from selling each of the six products being studied, and the number of each of the studied products sold in the reference year.

Data quality

The most recent and verifiable site-specific data collected in the reference year 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 for each of the DY803 products i.e., BOMs (having both net and gross weights), mechanical drawings, and technical standards from ENEL provided by COL-TORINO to its external suppliers for preparing the raw materials for the sub-assemblies of all the six final DY803 products, and these data was analyzed using Microsoft excel. The weight of the heavier structural components was calculated using the Solid Edge software. For the lighter components, they were manually weighed using a well calibrated weighing scale and recorded. Additional primary data used included the water and energy (petrol, electricity, and natural gas) consumption for the core activities at COL-TORINO 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 that use electronic fuel cards. In addition to that, the distances from external suppliers to COL-TORINO 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 2.2" of 07.11.2024 were used to obtain generic data for some up- and down-stream processes in the life cycle of each of the products.

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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 each of the six DY803 series of switchboards, fully assembled and packaged with the total weights in kilograms (kg) as presented in **Table 6.**

Table 6. Total weight of each of the six fully assembled and packaged DY803 switchboards in this LCA

DY803 Types	DY803/1	DY803/2	DY803/3	DY803/4	DY803/9N	DY803/10N
Total weight (kg)	128,00	244,16	251,58	315,67	267,26	268,56

Manufacturing

This first life cycle stage covers all the activities categorized under 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 DY803 switchboards, and the packaging materials for each of the final DY803 products. The electronic components are cables, and smaller electronic components, whereas the structural component consists of metallic sheets (which produce some scrap after processing), bolts, and screws. The raw materials for making these components was provided by external suppliers based in Italy except for the SF_6 gas which was procured from Germany. All these components were produced in accordance with Enel Technical Specification code: DY803 ed. 6, and they were assumed to be transported by road in a 16 - 32 tonne EURO5 lorry to COL-TORINO where the core activities of assembling, testing, and final packaging of the DY803 switchboards were done. Each of the fully assembled products was then packaged by mounting it on a wooden pallet and then covering it with a transparent plastic casing to provide protection. All but packaging wastes generated from all activities on-site (including scrap) 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 in a 16 - 32 tonne ACI mix lorry to a waste treatment plant **50 km** away.

Distribution

From this point forth, all the activities are classified under the downstream module. All the fully assembled and packaged DY803 products were loaded onto a 16 - 32 tonne EURO5 lorry for final delivery to the various installation sites throughout Italy. 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 each of the DY803 products was distributed and installed during the reference year were considered and their distances (in kilometres) from COL-TORINO 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 7)** was taken as the distribution distance for each of the fully assembled and packaged DY803 switchboards.

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Table 7. The distribution distance of each of the six fully assembled and packaged DY803 switchboards

DY803 Types	DY803/1	DY803/2	DY803/3	DY803/4	DY803/9N	DY803/10N
Distribution distance (km)	535,000	779,202	210,630	156,884	169,500	784,861

Installation

Upon arrival at any of the installation sites for the clients, each of the DY803 switchboards was unloaded, carefully removed from its packaging, and installed by skilled technicians for use in MV secondary distribution substations of the Enel Group within the Italian territory. It is exactly after installation of each DY803 product that the wooden pallets previously used for packaging were returned for reuse i.e., subsequent deliveries. At the end of life of the packaging materials, they were assumed to be transported in a 7 - 16 tonne EURO5 lorry to a waste treatment plant **50 km** away.

Use

Each of the six installed DY803 products operate continuously during their RSL with the same consumption of electricity **(34212,145 kWh)** on account of having the same resistance and nominal current, and all of them were assumed to be maintenance free for the entire expected service life. The electricity consumed by each DY803 product during its RSL, $\mathbf{E_{use}}$ was computed using the parameters as in LCA-TOOL "LCA-COL GROUP Tool 2.2" of 07.11.2024, and the formula shown below in **Equation 1**, where; $\mathbf{P_{use}}$ is the power consumed by the switchboard; **RSL** is the service life of the product, assumed to be 20 years; **8760** is 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. $\mathbf{P_{use}}$ (in Watts) considering a three **(3)** phase system was computed using formula in **Equation 2**, where **R** is the electrical resistance (ohms) and **i** is the nominal current (amps). An additional environmental information is that during the use phase, all the switchboards but the DY803/1 type emit SF_6 gas to the environment, and the SF_6 gas leakage rate for each of the five DY803 products insulated in SF6 gas (i.e., DY803/2, DY803/3, DY803/4, DY803/9N, and DY803/10N) was computed to be **0,23** grams per year from the gas tightness test results.

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

$$\boldsymbol{P_{use}}[\mathbf{W}] = \mathbf{3} * \mathbf{R} * \boldsymbol{i^2} \qquad (\mathbf{2})$$

End of life

At the end of the RSL of each of the six DY803 products, the dismantling process and separation of the switchboard components was 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.

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6. LCA RESULTS

The environmental performance results of all the six DY803 products (i.e., DY803/1, DY803/2, DY803/3, DY803/4, DY803/9N, and DY803/10N) for the different lifecycle stages per FU accounting for all the mandatory environmental impact indicators **(Tables 8, 11, 14, 17, 20, and 23)**, descriptive parameters for resource use **(Tables 9, 12, 15, 18, 21, and 24),** and waste production **(Tables 10, 13, 16, 19, 22, and 25)** 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

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Environmental impacts for DY803/1

Table 8. 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.	4,45E+02	1,06E+01	3,98E-01	1,22E+04	1,24E+02	1,28E+04
GWP-fossil	kg CO_2 eq.	4,44E+02	1,06E+01	2,55E-01	1,22E+04	1,24E+02	1,28E+04
GWP-biogenic	kg CO_2 eq.	3,96E-01	3,63E-04	1,43E-01	5,24E+01	5,87E-03	5,30E+01
GWP-luluc	kg CO_2 eq.	3,61E-01	2,61E-04	1,56E-05	7,67E-01	1,11E-02	1,14E+00
ODP	kg CFC-11 eq.	4,72E-06	2,17E-07	1,96E-09	2,55E-04	1,01E-07	2,60E-04
AP	mol H^+ eq.	6,30E+00	2,65E-02	6,98E-04	3,97E+01	6,21E-02	4,61E+01
EP-freshwater	kg P eq.	4,08E-02	8,91E-06	6,33E-07	2,07E-01	2,97E-04	2,48E-01
EP-marine	kg N eq.	5,51E-01	1,01E-02	3,87E-04	6,13E+00	2,27E-02	6,71E+00
EP-terrestrial	mol N eq.	9,36E+00	1,11E-01	3,43E-03	7,00E+01	2,34E-01	7,97E+01
POCP	kg NMVOC eq.	2,21E+00	4,62E-02	1,06E-03	3,24E+01	6,35E-02	3,47E+01
ADP-min & met	kg Sb eq.	6,99E-02	3,51E-07	2,06E-08	1,77E-04	1,43E-06	7,01E-02
ADP-fossil	MJ	5,28E+03	1,40E+02	1,39E+00	2,01E+05	1,19E+02	2,07E+05
WDP	m^3 eq. deprived	1,82E+02	5,96E-02	-3,62E-01	8,99E+03	2,63E+00	9,17E+03

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

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Resource use for DY803/1

Table 9. LCA results for the environmental parameters describing resource use

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PERE	MJ	5,48E+02	4,87E-01	1,04E-02	6,96E+04	8,90E+00	7,02E+04
PERM	MJ	1,02E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,02E+02
PERT	MJ	6,50E+02	4,87E-01	1,04E-02	6,96E+04	8,90E+00	7,03E+04
PENRE	MJ	5,06E+03	1,40E+02	1,39E+00	2,01E+05	1,19E+02	2,06E+05
PENRM	MJ	2,17E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,17E+02
PENRT	MJ	5,28E+03	1,40E+02	1,39E+00	2,01E+05	1,19E+02	2,07E+05
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	5,37E+00	3,60E-03	-8,25E-03	2,36E+02	9,48E-02	2,42E+02

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

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Waste production for DY803/1

Table 10. LCA results for the environmental parameters describing waste production

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
HWD	kg	3,93E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,93E-03
NHWD	kg	0,00E+00	0,00E+00	2,36E+00	0,00E+00	2,73E+01	2,96E+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	5,21E+00	0,00E+00	1,93E+00	0,00E+00	9,22E+01	9,93E+01
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,25E+00	2,25E+00
ETE	MJ	0,00E+00	0,00E+00	3,21E+01	0,00E+00	0,00E+00	3,21E+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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Environmental impacts for DY803/2

Table 11. 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.	9,62E+02	2,96E+01	7,17E-01	1,23E+04	2,37E+02	1,36E+04
GWP-fossil	kg CO_2 eq.	9,60E+02	2,96E+01	5,18E-01	1,23E+04	2,36E+02	1,35E+04
GWP-biogenic	kg CO_2 eq.	9,46E-01	1,01E-03	1,99E-01	5,24E+01	1,12E-02	5,36E+01
GWP-luluc	kg CO_2 eq.	7,23E-01	7,25E-04	2,03E-05	7,67E-01	2,11E-02	1,51E+00
ODP	kg CFC-11 eq.	9,24E-06	6,02E-07	2,47E-09	2,55E-04	1,92E-07	2,65E-04
AP	mol H^+ eq.	1,44E+01	7,35E-02	8,94E-04	3,97E+01	1,18E-01	5,43E+01
EP-freshwater	kg P eq.	8,26E-02	2,48E-05	8,06E-07	2,07E-01	5,65E-04	2,91E-01
EP-marine	kg N eq.	1,16E+00	2,82E-02	5,24E-04	6,13E+00	4,33E-02	7,36E+00
EP-terrestrial	mol N eq.	2,09E+01	3,09E-01	4,37E-03	7,00E+01	4,47E-01	9,17E+01
POCP	kg NMVOC eq.	4,58E+00	1,28E-01	1,35E-03	3,24E+01	1,21E-01	3,72E+01
ADP-min & met	kg Sb eq.	1,51E-01	9,76E-07	2,77E-08	1,77E-04	2,74E-06	1,51E-01
ADP-fossil	MJ	1,06E+04	3,90E+02	1,74E+00	2,01E+05	2,27E+02	2,12E+05
WDP	m^3 eq. deprived	3,82E+02	1,66E-01	-4,35E-01	8,99E+03	5,02E+00	9,37E+03

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

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Resource use for DY803/2

Table 12. LCA results for the environmental parameters describing resource use

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PERE	MJ	1,37E+03	1,35E+00	1,42E-02	6,96E+04	1,69E+01	7,10E+04
PERM	MJ	1,21E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,21E+02
PERT	MJ	1,49E+03	1,35E+00	1,42E-02	6,96E+04	1,69E+01	7,11E+04
PENRE	MJ	1,02E+04	3,90E+02	1,74E+00	2,01E+05	2,27E+02	2,12E+05
PENRM	MJ	4,34E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,34E+02
PENRT	MJ	1,06E+04	3,90E+02	1,74E+00	2,01E+05	2,27E+02	2,12E+05
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	1,12E+01	1,00E-02	-9,84E-03	2,36E+02	1,81E-01	2,48E+02

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

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Waste production for DY803/2

Table 13. LCA results for the environmental parameters describing waste production

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
HWD	kg	1,13E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,13E-02
NHWD	kg	0,00E+00	0,00E+00	2,88E+00	0,00E+00	5,35E+01	5,64E+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	1,50E+01	0,00E+00	2,47E+00	0,00E+00	1,74E+02	1,91E+02
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,50E+00	4,50E+00
ETE	MJ	0,00E+00	0,00E+00	4,08E+01	0,00E+00	0,00E+00	4,08E+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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Environmental impacts for DY803/3

Table 14. 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.	9,80E+02	8,23E+00	6,17E-01	1,23E+04	2,51E+02	1,36E+04
GWP-fossil	kg CO_2 eq.	9,78E+02	8,23E+00	4,35E-01	1,23E+04	2,50E+02	1,35E+04
GWP-biogenic	kg CO_2 eq.	8,58E-01	2,81E-04	1,82E-01	5,24E+01	1,17E-02	5,35E+01
GWP-luluc	kg CO_2 eq.	7,27E-01	2,02E-04	1,94E-05	7,67E-01	2,18E-02	1,52E+00
ODP	kg CFC-11 eq.	9,82E-06	1,68E-07	2,39E-09	2,55E-04	2,00E-07	2,65E-04
AP	mol H^+ eq.	1,41E+01	2,05E-02	8,61E-04	3,97E+01	1,24E-01	5,39E+01
EP-freshwater	kg P eq.	8,01E-02	6,90E-06	7,78E-07	2,07E-01	5,85E-04	2,88E-01
EP-marine	kg N eq.	1,15E+00	7,85E-03	4,90E-04	6,13E+00	4,55E-02	7,33E+00
EP-terrestrial	mol N eq.	2,14E+01	8,60E-02	4,22E-03	7,00E+01	4,70E-01	9,20E+01
POCP	kg NMVOC eq.	4,54E+00	3,57E-02	1,30E-03	3,24E+01	1,27E-01	3,71E+01
ADP-min & met	kg Sb eq.	1,42E-01	2,72E-07	2,63E-08	1,77E-04	2,89E-06	1,42E-01
ADP-fossil	MJ	1,10E+04	1,09E+02	1,69E+00	2,01E+05	2,35E+02	2,12E+05
WDP	m^3 eq. deprived	3,79E+02	4,61E-02	-4,30E-01	8,99E+03	5,26E+00	9,37E+03

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

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Resource use for DY803/3

Table 15. LCA results for the environmental parameters describing resource use

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PERE	MJ	1,37E+03	3,77E-01	1,33E-02	6,96E+04	1,75E+01	7,10E+04
PERM	MJ	1,20E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,20E+02
PERT	MJ	1,49E+03	3,77E-01	1,33E-02	6,96E+04	1,75E+01	7,12E+04
PENRE	MJ	1,04E+04	1,09E+02	1,69E+00	2,01E+05	2,35E+02	2,12E+05
PENRM	MJ	6,08E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,08E+02
PENRT	MJ	1,10E+04	1,09E+02	1,69E+00	2,01E+05	2,35E+02	2,12E+05
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	1,12E+01	2,78E-03	-9,75E-03	2,36E+02	1,90E-01	2,48E+02

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

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Waste production for DY803/3

Table 16. LCA results for the environmental parameters describing waste production

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
HWD	kg	9,82E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,82E-03
NHWD	kg	0,00E+00	0,00E+00	2,83E+00	0,00E+00	5,61E+01	5,89E+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	1,30E+01	0,00E+00	2,37E+00	0,00E+00	1,77E+02	1,92E+02
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,60E+00	6,60E+00
ETE	MJ	0,00E+00	0,00E+00	3,95E+01	0,00E+00	0,00E+00	3,95E+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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Environmental impacts for DY803/4

Table 17. 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.	1,20E+03	7,69E+00	7,17E-01	1,23E+04	3,12E+02	1,39E+04
GWP-fossil	kg CO_2 eq.	1,20E+03	7,69E+00	5,18E-01	1,23E+04	3,12E+02	1,38E+04
GWP-biogenic	kg CO_2 eq.	1,02E+00	2,62E-04	1,99E-01	5,24E+01	1,47E-02	5,37E+01
GWP-luluc	kg CO_2 eq.	9,18E-01	1,89E-04	2,03E-05	7,67E-01	2,76E-02	1,71E+00
ODP	kg CFC-11 eq.	1,16E-05	1,57E-07	2,47E-09	2,55E-04	2,52E-07	2,67E-04
AP	mol H^+ eq.	1,89E+01	1,91E-02	8,94E-04	3,97E+01	1,56E-01	5,87E+01
EP-freshwater	kg P eq.	1,07E-01	6,44E-06	8,06E-07	2,07E-01	7,40E-04	3,15E-01
EP-marine	kg N eq.	1,49E+00	7,34E-03	5,24E-04	6,13E+00	5,70E-02	7,68E+00
EP-terrestrial	mol N eq.	2,62E+01	8,03E-02	4,37E-03	7,00E+01	5,88E-01	9,69E+01
POCP	kg NMVOC eq.	5,90E+00	3,34E-02	1,35E-03	3,24E+01	1,59E-01	3,85E+01
ADP-min & met	kg Sb eq.	1,97E-01	2,54E-07	2,77E-08	1,77E-04	3,60E-06	1,97E-01
ADP-fossil	MJ	1,35E+04	1,02E+02	1,74E+00	2,01E+05	2,97E+02	2,15E+05
WDP	m^3 eq. deprived	4,92E+02	4,31E-02	-4,35E-01	8,99E+03	6,59E+00	9,48E+03

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

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Resource use for DY803/4

Table 18. LCA results for the environmental parameters describing resource use

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PERE	MJ	1,66E+03	3,52E-01	1,42E-02	6,96E+04	2,22E+01	7,13E+04
PERM	MJ	1,21E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,21E+02
PERT	MJ	1,78E+03	3,52E-01	1,42E-02	6,96E+04	2,22E+01	7,14E+04
PENRE	MJ	1,29E+04	1,02E+02	1,74E+00	2,01E+05	2,97E+02	2,14E+05
PENRM	MJ	6,13E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,13E+02
PENRT	MJ	1,35E+04	1,02E+02	1,74E+00	2,01E+05	2,97E+02	2,15E+05
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	1,44E+01	2,60E-03	-9,84E-03	2,36E+02	2,38E-01	2,51E+02

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

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Waste production for DY803/4

Table 19. LCA results for the environmental parameters describing waste production

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
HWD	kg	1,16E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,16E-02
NHWD	kg	0,00E+00	0,00E+00	2,88E+00	0,00E+00	7,01E+01	7,29E+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	1,53E+01	0,00E+00	2,47E+00	0,00E+00	2,27E+02	2,44E+02
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,60E+00	6,60E+00
ETE	MJ	0,00E+00	0,00E+00	4,08E+01	0,00E+00	0,00E+00	4,08E+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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Environmental impacts for DY803/9N

Table 20. 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.	9,99E+02	7,04E+00	7,53E-01	1,23E+04	2,58E+02	1,36E+04
GWP-fossil	kg CO_2 eq.	9,97E+02	7,04E+00	5,33E-01	1,23E+04	2,58E+02	1,36E+04
GWP-biogenic	kg CO_2 eq.	7,48E-01	2,40E-04	2,20E-01	5,24E+01	1,22E-02	5,34E+01
GWP-luluc	kg CO_2 eq.	7,00E-01	1,73E-04	2,27E-05	7,67E-01	2,31E-02	1,49E+00
ODP	kg CFC-11 eq.	9,42E-06	1,43E-07	2,78E-09	2,55E-04	2,10E-07	2,65E-04
AP	mol H^+ eq.	1,02E+01	1,75E-02	1,00E-03	3,97E+01	1,29E-01	5,00E+01
EP-freshwater	kg P eq.	6,58E-02	5,90E-06	9,04E-07	2,07E-01	6,19E-04	2,74E-01
EP-marine	kg N eq.	1,03E+00	6,71E-03	5,80E-04	6,13E+00	4,73E-02	7,21E+00
EP-terrestrial	mol N eq.	2,06E+01	7,35E-02	4,90E-03	7,00E+01	4,88E-01	9,12E+01
POCP	kg NMVOC eq.	3,93E+00	3,05E-02	1,51E-03	3,24E+01	1,32E-01	3,65E+01
ADP-min & met	kg Sb eq.	8,60E-02	2,32E-07	3,07E-08	1,77E-04	2,99E-06	8,62E-02
ADP-fossil	MJ	1,10E+04	9,29E+01	1,96E+00	2,01E+05	2,48E+02	2,12E+05
WDP	m^3 eq. deprived	3,39E+02	3,94E-02	-4,94E-01	8,99E+03	5,48E+00	9,33E+03

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

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Resource use for DY803/9N

Table 21. LCA results for the environmental parameters describing resource use

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PERE	MJ	1,23E+03	3,22E-01	1,57E-02	6,96E+04	1,86E+01	7,09E+04
PERM	MJ	1,38E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,38E+02
PERT	MJ	1,37E+03	3,22E-01	1,57E-02	6,96E+04	1,86E+01	7,10E+04
PENRE	MJ	1,05E+04	9,29E+01	1,96E+00	2,01E+05	2,48E+02	2,12E+05
PENRM	MJ	4,34E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,34E+02
PENRT	MJ	1,10E+04	9,29E+01	1,96E+00	2,01E+05	2,48E+02	2,12E+05
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	1,04E+01	2,38E-03	-1,12E-02	2,36E+02	1,98E-01	2,47E+02

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

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Waste production for DY803/9N

Table 22. LCA results for the environmental parameters describing waste production

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
HWD	kg	9,31E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,31E-03
NHWD	kg	0,00E+00	0,00E+00	3,26E+00	0,00E+00	5,64E+01	5,96E+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	1,23E+01	0,00E+00	2,77E+00	0,00E+00	1,93E+02	2,08E+02
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,50E+00	4,50E+00
ETE	MJ	0,00E+00	0,00E+00	4,57E+01	0,00E+00	0,00E+00	4,57E+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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Environmental impacts for DY803/10N

Table 23. 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.	1,04E+03	3,27E+01	7,53E-01	1,23E+04	2,66E+02	1,37E+04
GWP-fossil	kg CO_2 eq.	1,04E+03	3,27E+01	5,33E-01	1,23E+04	2,65E+02	1,36E+04
GWP-biogenic	kg CO_2 eq.	8,93E-01	1,12E-03	2,20E-01	5,24E+01	1,24E-02	5,36E+01
GWP-luluc	kg CO_2 eq.	7,43E-01	8,04E-04	2,27E-05	7,67E-01	2,33E-02	1,53E+00
ODP	kg CFC-11 eq.	1,04E-05	6,68E-07	2,78E-09	2,55E-04	2,13E-07	2,66E-04
AP	mol H^+ eq.	1,19E+01	8,15E-02	1,00E-03	3,97E+01	1,32E-01	5,18E+01
EP-freshwater	kg P eq.	7,33E-02	2,74E-05	9,04E-07	2,07E-01	6,23E-04	2,81E-01
EP-marine	kg N eq.	1,11E+00	3,12E-02	5,80E-04	6,13E+00	4,84E-02	7,32E+00
EP-terrestrial	mol N eq.	2,19E+01	3,42E-01	4,90E-03	7,00E+01	4,99E-01	9,27E+01
POCP	kg NMVOC eq.	4,33E+00	1,42E-01	1,51E-03	3,24E+01	1,35E-01	3,70E+01
ADP-min & met	kg Sb eq.	1,08E-01	1,08E-06	3,07E-08	1,77E-04	3,06E-06	1,08E-01
ADP-fossil	MJ	1,17E+04	4,32E+02	1,96E+00	2,01E+05	2,50E+02	2,13E+05
WDP	m^3 eq. deprived	3,68E+02	1,84E-01	-4,94E-01	8,99E+03	5,59E+00	9,36E+03

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

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Resource use for DY803/10N

Table 24. LCA results for the environmental parameters describing resource use

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
PERE	MJ	1,33E+03	1,50E+00	1,57E-02	6,96E+04	1,87E+01	7,10E+04
PERM	MJ	1,38E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,38E+02
PERT	MJ	1,47E+03	1,50E+00	1,57E-02	6,96E+04	1,87E+01	7,11E+04
PENRE	MJ	1,11E+04	4,32E+02	1,96E+00	2,01E+05	2,50E+02	2,13E+05
PENRM	MJ	6,14E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,14E+02
PENRT	MJ	1,17E+04	4,32E+02	1,96E+00	2,01E+05	2,50E+02	2,13E+05
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	1,11E+01	1,11E-02	-1,12E-02	2,36E+02	2,02E-01	2,48E+02

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

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Waste production for DY803/10N

Table 25. LCA results for the environmental parameters describing waste production

Parameters	Unit of measurement	Manufacturing	Distribution	Installation	Use	End of life	TOTAL
HWD	kg	1,19E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,19E-02
NHWD	kg	0,00E+00	0,00E+00	3,26E+00	0,00E+00	5,83E+01	6,15E+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	1,58E+01	0,00E+00	2,77E+00	0,00E+00	1,90E+02	2,09E+02
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,60E+00	6,60E+00
ETE	MJ	0,00E+00	0,00E+00	4,57E+01	0,00E+00	0,00E+00	4,57E+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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