

EPD

Environmental Product Declaration

UniSec DY800/116 (SF6/AirPlus)

UniSec DY800/216 (SF6/AirPlus)

UniSec DY800/316 (SF6/AirPlus)

Production site: Dalmine, Italy



DOCUMENT KIND Environmental Product Declaration	IN COMPLIANCE WITH ISO 14025 and EN50693			
PROGRAM OPERATOR EPDItaly	PUBLISHER EPDItaly			
EPDITALY REGISTRATION NUMBER EPDITALY0222	ISSUE DATE 2022-01-23			
VALID TO 2027-01-23	STATUS Approved	SECURITY LEVEL Public		
OWNING ORGANIZATION ABB S.p.A.	DECLARATION NUMBER 2RDA043712	REV. A	LANG. en	PAGE 1/30

EPD Owner	ABB S.p.A.
Manufacturer name and address	ABB S.p.A. Via Friuli, 4, 24044 Dalmine (Italy)
Company contact	Stefano Vitali - stefano.vitali@it.abb.com R&D Manager - Field Application Support
Program operator	EPDItaly – info@epditaly.it via Gaetano De Castillia n° 10 - 20124 Milano, Italia
Declared product & Functional unit or declared unit	UniSec DY800/116 UniSec DY800/216 UniSec DY800/316 FU: single UniSec DY800 cell that incorporates one HySec apparatus. The cell monitors the power supply and protects lines and power transformers, during a service life of 20 years. Packaging is included.
Product description	DY800 cells are used in secondary electrical distribution for monitoring the power supply and protecting lines and power transformers. They have multiple applications: transformer substations, power production installations, medium voltage industrial installations, in the shipbuilding sector.
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
Independent verification	<p>This declaration has been developed referring to EPDItaly, following the "Regolamento di EPDItaly"; further information and the document itself are available at: www.epditaly.it. EPD document valid within the following geographical area: Italy and other countries worldwide according to sales market conditions. Independent verification of the declaration and data carried out according to ISO 14025: 2010.</p> <p><input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL</p> <p>Third party verification carried out by: ICMQ spa Accredited by: ACCREDIA</p>
Reference PCR and version number	Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, Rev. 2, 2020/10/21 Sub PCR: EPDItaly015 - Electronic and electrical products and systems – Switchboards. Rev. 1.4, 2020/04/09
Other reference documents	EN 50693:2019 - Product category rules for life cycle assessments of electronic and electrical products and systems Regulations of the EPDItaly Programme rev. 5.0 (1st July 2020)
Product RSL description	20 years
Markets of applicability	World (raw materials), Italy (production, use and end-of-life)
LCA study	This EPD study is based on the LCA study described in the ABB document 2RDA043711
EPD type	Product specific
EPD scope	"Cradle to grave"
Year of reported primary data	2020
Technical support	2B Srl (Italy) Via della Chiesa Campocroce 4, Mogliano Veneto (TV)
LCA software	SimaPro 9.1.1 (2020)
LCI database	ecoinvent v3.6 (2019)

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	2/30

LCIA methodology	EN 50693:2019
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	EPDItaly declines any responsibility regarding the manufacturer's information, data and results of the life cycle assessment.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	3/30

Contents

ABB Purpose & Embedding Sustainability	5
General Information	6
Constituent materials	8
LCA background information	14
Inventory analysis	17
Environmental indicators	19
Additional environmental information	29
References	30

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	4/30



ABB Purpose & Embedding Sustainability

ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. By connecting software to its electrification, robotics, automation and motion portfolio, ABB pushes the boundaries of technology to drive performance to new levels. With a history of excellence stretching back more than 130 years, ABB's success is driven by about 110 thousand talented employees in over 100 countries.

ABB's Electrification business offers a wide-ranging portfolio of products, digital solutions and services, from substation to socket, enabling safe, smart and sustainable electrification. Offerings encompass digital and connected innovations for low and medium voltage, including EV infrastructure, solar inverters, modular substations, distribution automation, power protection, wiring accessories, switchgear, enclosures, cabling, sensing and control.

ABB is committed to continually promoting and embedding sustainability across its operations and value chain, aspiring to become a role model for others to follow. With its ABB Purpose, ABB is focusing on reducing harmful emissions, preserving natural resources and championing ethical and humane behavior.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	5/30



General Information

ABB S.p.A Electrification Distribution Solutions facility in Dalmine (ABB IT-ELDS) produces medium voltage switches, disconnectors, and contactors, medium voltage switchboards for primary and secondary distribution, low voltage switchboards, complete packages and services for substations. Smart systems and technologies for electrical distribution are supplied to utilities, industrial, and tertiary sector customers. Dalmine exports 85% of the volumes produced.

ABB IT-ELDS adopts and implements for its own activities an integrated Quality/Environmental/Health Management System in compliance with the following standards:

- UNI EN ISO 9001/2015 - Quality Management Systems- Requirements
- UNI EN ISO 14001/2015 - Sistemi di Gestione Ambientale Requisiti e Guida per l'Uso
- BS OHSAS 18001/2007 - Occupational Health and Safety Assessment Series

The manufacturing of the switchgear cells is located in ABB facility of Dalmine, Italy.

Product cluster UniSec DY800 declared in this EPD includes the following medium voltage switchgear cells with built-in HySec apparatus:

UniSec DY800 cell	Built-in apparatus
DY800/116	SF ₆ -insulated HySec
DY800/216	SF ₆ -insulated HySec
DY800/316	SF ₆ -insulated HySec
DY800/116	AirPlus-insulated HySec
DY800/216	AirPlus-insulated HySec
DY800/316	AirPlus-insulated HySec

Technical specifications are as follows:

	UniSec DY800	Multi-function apparatus type HySec
Rated voltage	24 kV	24 kV
Rated frequency	50 Hz	50 Hz
Rated thermal current	630 A	630 A
Admissible short time withstand current	16 kA	16 kA

The accessories associated with these products are also included in the study.

DY800 cells are used for monitoring the power supply and protecting lines and power transformers and they have multiple applications: transformer substations, power production installations (e.g., cogeneration and photovoltaic systems), medium voltage industrial installations (such as airports, shopping centers and hospitals), in the shipbuilding sector.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	6/30

The manufacturing of the medium voltage switchgear (DY800), as well as that of the HySec, take place in ABB facility in Dalmine, Italy. DY800 switchgears are produced in the Switchgears factory, while HySecs are produced in the Apparatus factory and are subsequently mounted inside the cells.



Apparatus
Factory

Switchgear
Factory

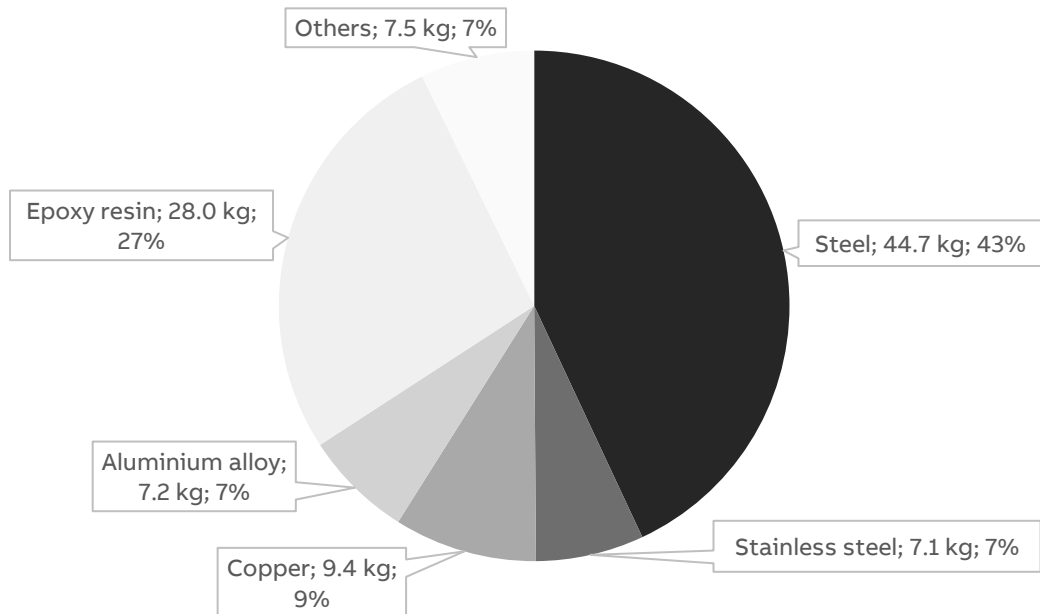
STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	7/30



Constituent materials

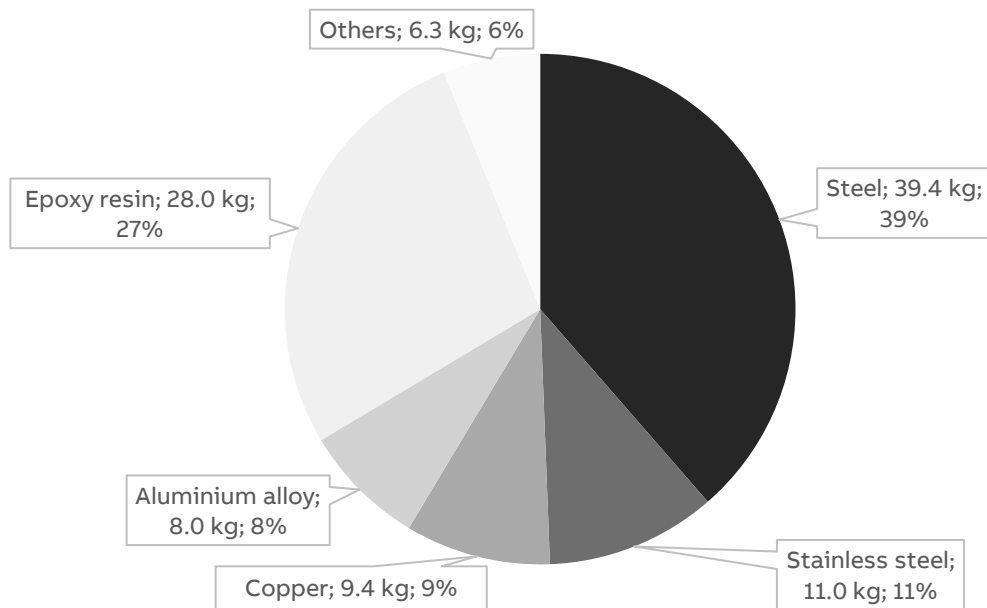
The **SF₆-insulated HySec** weighs about 104 kg. In this analysis, small parts not made of steel and other parts like labels or grease are not included as they are 0.6% of the total mass of the apparatus, according to 4.2.3.9 EPDIItaly012. So, the total mass considered for this study is 103.82 kg.

HySec, SF ₆ -insulated				
Materials	Name	CAS Number	Weight [kg]	%
Plastics	Epoxy resin	90598-46-2	27.97	26.9
	Other plastics and rubbers	-	3.58	3.4
Metals	Steel	68316-05-2	44.68	43.0
	Copper	7440-50-8	9.40	9.1
	Aluminum alloy	91728-14-2	7.15	6.9
	Stainless steel	65997-19-5	7.12	6.9
	Other metals	-	2.51	2.4
Others	Others	-	1.20	1.2
	Sulphur hexafluoride	2551-62-4	0.22	0.2
Total			103.8	100



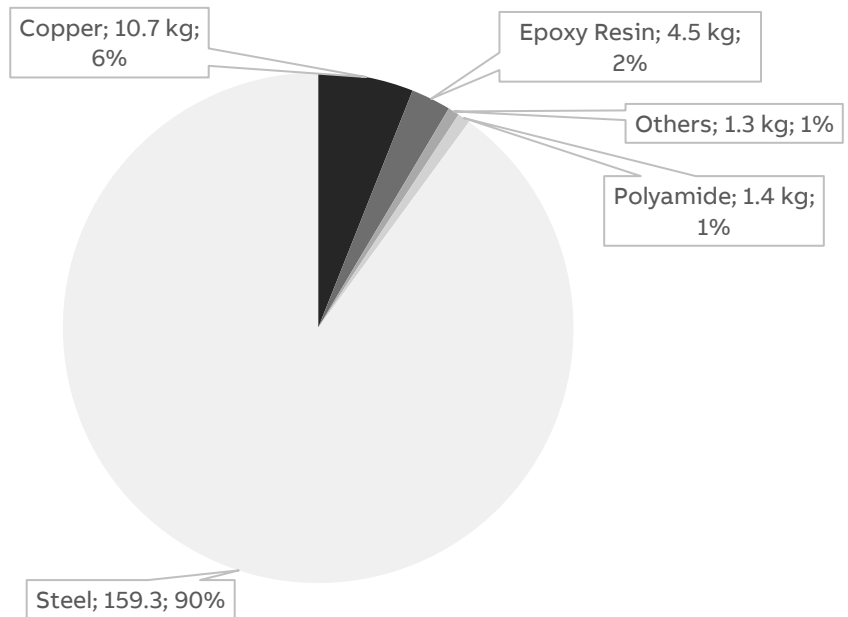
The **AirPlus-insulated HySec** weighs about 103 kg. In this analysis, small parts not made of steel and other parts like labels or grease are not included as they are 0.9% of the total mass of the apparatus, according to 4.2.3.9 EPDItaly012. So, the total mass considered for this study is 102 kg.

HySec, AirPlus-insulated				
Materials	Name	CAS Number	Weight [kg]	%
Plastics	Epoxy resin	90598-46-2	27.98	27.4
	Other plastics and rubbers	-	2.49	2.4
Metals	Steel	68316-05-2	39.38	38.6
	Copper	7440-50-8	9.39	9.2
	Stainless steel	65997-19-5	11.00	10.8
	Aluminum alloy	91728-14-2	7.97	7.8
	Other metals	-	2.74	2.7
Others	Others	-	1.05	1.0
Total			102.0	100



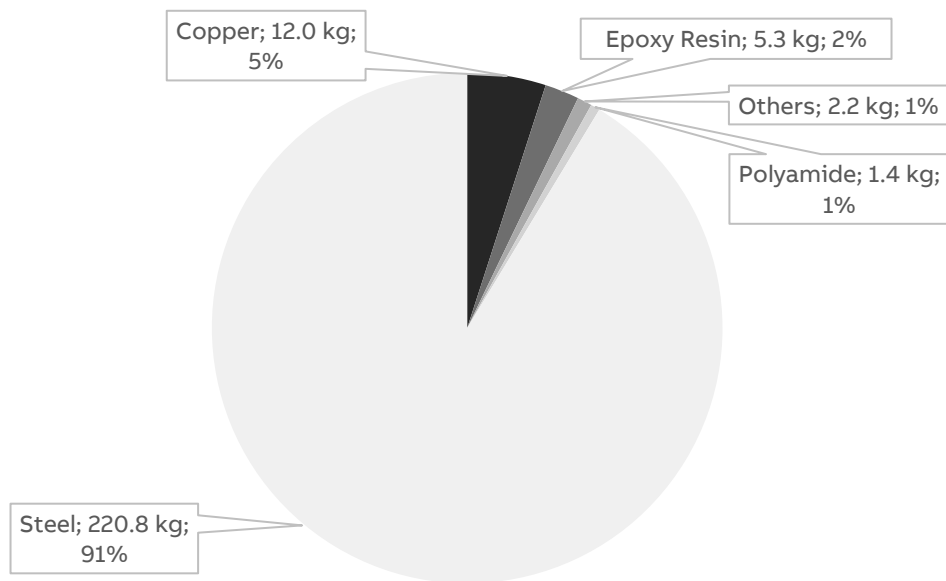
The cell **DY800/116**, with no apparatus inside, weighs about 178 kg. In this analysis, small parts not made of steel and other parts like labels or grease are not included as they are 0.6% of the total mass of the cell, according to 4.2.3.9 EPDItaly015. So, the total mass considered for this study is 177.2 kg.

DY800/116				
Materials	Name	CAS Number	Weight [kg]	%
Plastics	Epoxy resin	90598-46-2	4.47	2.5
	Polyamide	63428-83-1	1.41	0.8
	Other plastics and rubbers	-	0.81	0.5
Metals	Steel	68316-05-2	159.33	89.9
	Copper	7440-50-8	10.68	6.0
	Other metals	-	0.45	0.3
Others	Others	-	0.01	0.0
Total			177.15	100



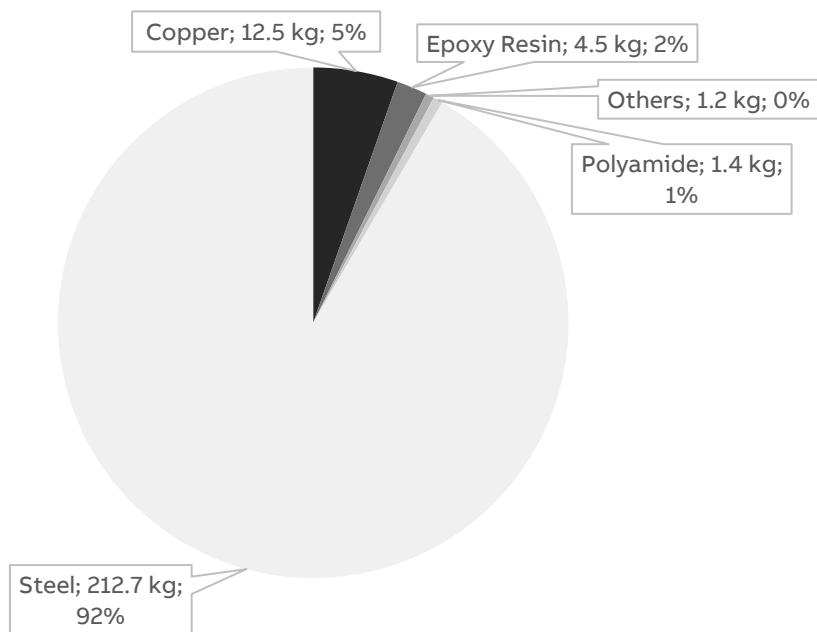
The cell **DY800/216**, with no apparatus inside, weighs about 243 kg. In this analysis, small parts not made of steel and other parts like labels or grease are not included as they are 0.5% of the total mass of the cell, according to 4.2.3.9 EPDItaly015. So, the total mass considered for this study is 241.7 kg.

DY800/216				
Materials	Name	CAS Number	Weight [kg]	%
Plastics	Epoxy resin	90598-46-2	5.25	2.2
	Polyamide	63428-83-1	1.41	0.6
	Other plastics and rubbers	-	0.58	0.2
Metals	Steel	68316-05-2	220.79	91.3
	Copper	7440-50-8	12.03	5.0
	Other metals	-	1.67	0.7
Total			241.7	100



The cell **DY800/316**, with no apparatus inside, weighs about 233 kg. In this analysis, small parts not made of steel and other parts like labels or grease are not included as they are 0.3% of the total mass of the cell, according to 4.2.3.9 EPDItaly015. So, the total mass considered for this study is 232.3 kg.

DY800/316				
Materials	Name	CAS Number	Weight [kg]	%
Plastics	Epoxy resin	90598-46-2	4.47	1.9
	Polyamide	63428-83-1	1.41	0.6
	Other plastics and rubbers	-	0.77	0.3
Metals	Steel	68316-05-2	212.70	91.6
	Copper	7440-50-8	12.47	5.4
	Other metals	-	0.46	0.2
Others	Others	-	0.01	0.0
Total			232.3	100



Cell	HySec	Assembly weight
DY800/116	SF ₆ -insulated	281.0 kg
DY800/216	SF ₆ -insulated	345.5 kg
DY800/316	SF ₆ -insulated	336.1 kg
DY800/116	AirPlus-insulated	279.2 kg
DY800/216	AirPlus-insulated	343.7 kg
DY800/316	AirPlus-insulated	334.3 kg

The single-use packaging was also included in the analysis, in the manufacturing stage core. This is composed of steel fixing brackets, a wooden pallet and plastic film.

Cells DY800/116 and DY800/216 have the same packaging of 16.6 kg. The packaging of DY800/316 weighs 21.6 kg.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	13/30



LCA background information

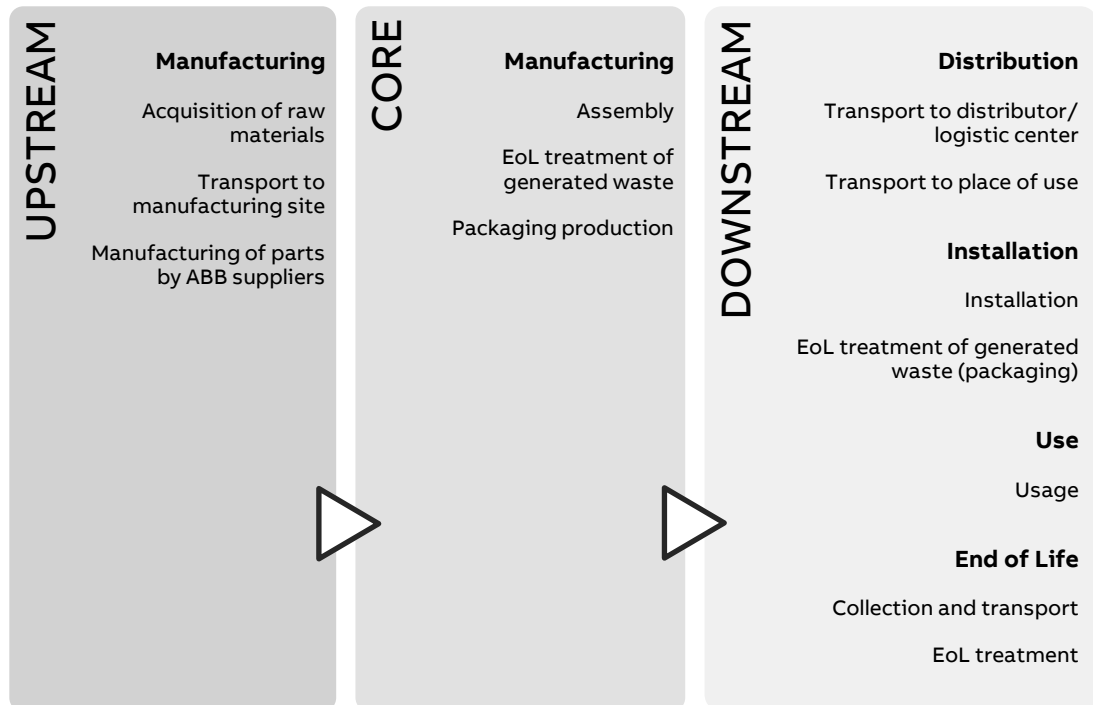
Functional Unit

The functional unit of this study is a single UniSec DY800 cell that incorporates one HySec apparatus. The cell monitors the power supply and protects lines and power transformers, during a service life of 20 years. The packaging is also included in the functional unit.

System Boundaries

The life cycle of the UniSec DY800 cell, an EEPS (Electronic and Electrical Products and Systems), is a “from cradle to grave” analysis and covers the following main life cycle stages: manufacturing, including the relevant upstream processes (e.g. acquisition of raw material, preparation of semi-finished goods, etc.) and the main manufacturing and processing steps; distribution; installation, including the relevant steps for the preparation of the product for use; use including the required maintenance steps within the RSL (reference service life of the product) associated to the reference product; end-of-life stage, including the necessary steps until final disposal or recovery of the product system.

The following table shows the stages of the product life cycle and the information stages according to EN 50693 for the evaluation of electronic and electrical products and systems.



STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	14/30

The stages of the product life cycle and the information considered for the evaluation of the UniSec DY800 cells are:

- Manufacturing upstream includes raw materials, and production activities of ABB suppliers, including transport of semifinished items and subassemblies to ABB Dalmine.
- The core part of the manufacturing stage includes local consumptions (ABB Dalmine), the relevant assembling and waste due to manufacturing. This includes also the packaging production.
- The distribution stage includes the impacts related to the distribution of the product at the installation site.
- The installation stage includes the end of life of the packaging.
- The use and maintenance stages include the impact related to energy consumption during the service life of the product.
- End of life includes the operations for the disposal of the product at the end of its service life.

Temporal and geographical boundaries

The ABB component suppliers are sourced all over the world: Africa, Asia and Europe. All primary data collected from ABB are from 2020, which is a representative production year. Secondary data are provided by ecoinvent v3.6.

The selected ecoinvent processes in the LCA model have a global representativeness, due to the unclear origin of each component. In this way, a conservative approach has been adopted.

The results of this study are only applicable to DY800 cells produced in Dalmine in 2020.

Boundaries in the life cycle

As indicated in the PCR EPDItaly015, capital goods, such as buildings, machinery, tools and infrastructure, the packaging for internal transport which cannot be allocated directly to the production of the reference product, may be excluded from the system boundary.

Infrastructures, when present, such as processes deriving from the ecoinvent database have not been excluded.

Data quality

In this EPD, both primary and secondary data are used. Site specific foreground data have been provided by ABB. Main data sources are the bill of materials available on the enterprise resource planning. For all processes for which primary are not available, generic data originating from the ecoinvent v3.6 database, allocation cut-off by classification, are used. The ecoinvent database is available in the SimaPro 9.1.1 software used for the calculations.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	15/30

Environmental impact indicators

The information obtained from the inventory analysis is aggregated according to the effects related to the various environmental issues. According to PCR EPDItaly015 and EN 50693 the environmental impact indicators must be determined using the characterization factors and impact assessment methods specified in EN 15804:2012+A2:2019.

PCR EPDItaly015 and the EN 50693 standard establish four indicators for climate impact (GWP-GHG): GWP (total) which includes all greenhouse gases; GWP (fossil fuels); GWP (biogenic carbon) which includes the emissions and absorption of biogenic carbon dioxide and biogenic carbon stored in the product; GWP (land use).

Allocation rules

An allocation key is used for consumptions related to the manufacturing process in the production site, as well for company waste. Since the factory produces several products (apparatus and switchgears), only a part of the environmental impact has been allocated to the production line.

Allocation coefficients are based on installed power for electricity and on the line's surface area for methane and water consumption.

Concerning end-of-life allocation, the "cut-off" approach has been applied. As a result, the ecoinvent database "allocation, cut-off by classification" has been applied. With this approach, outputs subject to recycling are considered as inputs to the next life cycle, and neither environmental burdens nor environmental gains deriving from the recycling process are allocated to the waste stream.

Limitations and simplifications

The raw material life cycle stage includes the extraction of raw materials but neglects the production of various components at ABB's suppliers (fastener, other parts with very low weight), as their mass represent less than 2% of that of the whole switchgear cell, as stated in the paragraph of cut-off criteria of EPDItaly015: "Materials making up the switch itself whose total mass does not exceed 2% of the total weight of the device".

This same applies for packaging, where small parts such as screws and fasteners are even a smaller fraction of the total mass. Also sticking labels and grease have been excluded since they are negligible.

Surface treatments like galvanizing, tin plating, silver plating and painting have been considered in the LCA model. Specific epoxy resin heating treatment and phosphated surface treatments have been excluded by operational choice.

Scraps for metal working and plastic processes are included when already defined in ecoinvent.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	16/30



Inventory analysis

The ecoinvent v3.6 cut-off by classification system processes are used to model the background system of the processes. In addition, polyoxymethylene was taken from the database Industry Data 2.0, as it is not present in ecoinvent database.

Due to the large amounts of components in the UniSec DY800 cells, raw material inputs are modelled with data from ecoinvent representing a global market coverage. These datasets are assumed to be representative.

Manufacturing stage

Steel is the most frequently used material, followed by epoxy resin and copper. For the cells, all steel components (hot rolled, cold rolled, galvanized, low-alloyed steel) are modelled with the same kind of steel: *Steel, low-alloyed {GLO} market for | Cut-off, S*, as it representative for the large majority of the steel parts. For the HySec apparatuses, the quantity of chromium steel (stainless steel) is relevant, so it was modelled with *Steel, chromium steel 18/8 {GLO} market for | Cut-off, S*.

The single-use packaging is also included in the analysis in the manufacturing stage-core. ABB receives packaging components from outside suppliers and packages the cells before shipping them.

The transport distances from raw materials suppliers to the manufacturing are assumed to be 300 km. The distance from subassembly manufacturing factory to ABB facility is calculated.

The manufacturing of the cells is located in ABB facility of Dalmine, Italy. In the factory, the different components and subassemblies are assembled into the switchgear cell.

The energy mix used for the production phase is representative for Dalmine production site and includes green energy only (hydroelectric 79%, wind power 8% and photovoltaic 13%).

The waste generated by the production and assembly processes is included in the calculation.

Distribution

The transport distances from ABB plant to the place of use are assumed to be 300 km.

Installation

The installation phase only implies manual activities and no energy is consumed. This phase also includes the disposal of the packaging of the cells.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	17/30

Use

Use and maintenance are modelled according to the PCR EPDItaly015 - Switchboards.

For the use phase, the general Italian medium voltage electricity mix from ecoinvent v3.6 is used.

During the use phase, the cells dissipate some electricity due to ohmic losses. They are calculated according to the own internal resistance of the HySec apparatus and the PCR rules. The internal resistance values of the switchgear can be considered unchanged with both types of HySec.

The formula for the calculation of the electricity consumed is shown in sub-PCR EPDItaly015 and it is described as follows, where P_{use} is the power consumed by the switchgear cell at a given value of current:

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

UniSec DY800 cell	Nominal current [A]	P_{use} [W]	E_{use} [kWh]
DY800/116	630	26.8	4693.7
DY800/216	630	41.7	7301.4
DY800/316	630	26.8	4693.7

Since no maintenance happens during the use phase, the environmental impacts linked this procedure have been omitted from the analysis.

End of life

The transport distances from the place of use to the place of disposal are assumed to be 100 km.

The end of life stage is modelled according to PCR EPDItaly015 and IEC/TR 62635. The percentages for end of life treatments of cells are taken from IEC/TR 62635, while the data for packaging waste scenarios are provided by ISPRA.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	18/30



Environmental indicators

The following tables show the environmental impact indicators of the life cycle of a single switchgear cell, as indicated by PCR EPDItaly007, sub-PCR EPDItaly015 and EN 50693:2019.

The indicators are divided into the contribution of the processes to the different modules (upstream, core and downstream) and stages (manufacturing, distribution, installation, use and end-of-life).

DY800/116 SF₆

Impact category	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
GWP - fossil	kg CO ₂ eq.	7.75E+03	1.41E+03	7.37E+01	6.63E+00	1.58E+00	6.25E+03	8.59E+00
GWP - biogenic	kg CO ₂ eq.	5.50E+02	2.01E+01	-1.41E+01	3.73E-03	3.80E+00	5.41E+02	6.24E-03
GWP - luluc	kg CO ₂ eq.	3.10E+00	2.11E+00	3.66E-02	2.00E-03	1.27E-04	9.45E-01	1.86E-03
GWP - total	kg CO ₂ eq.	8.30E+03	1.43E+03	5.97E+01	6.63E+00	5.38E+00	6.79E+03	8.59E+00
ODP	kg CFC-11 eq.	9.74E-04	1.05E-04	8.96E-06	1.51E-06	7.95E-08	8.57E-04	1.20E-06
AP	mol H ⁺ eq.	5.38E+01	2.13E+01	1.53E-01	3.40E-02	2.38E-03	3.23E+01	2.75E-02
EP - freshwater	kg P eq.	4.00E+00	2.43E+00	8.68E-03	5.41E-04	4.85E-05	1.56E+00	4.18E-04
POCP	kg NMVOC eq.	2.19E+01	7.78E+00	1.48E-01	3.74E-02	2.71E-03	1.39E+01	3.02E-02
ADP – minerals and metals	kg Sb eq.	5.55E-01	5.43E-01	5.98E-04	1.12E-04	8.71E-06	1.17E-02	1.31E-04
ADP – fossil	MJ, net calorific value	1.11E+05	1.74E+04	1.18E+03	1.02E+02	5.54E+00	9.19E+04	8.11E+01
WDP	m ³ eq.	4.10E+03	4.81E+02	1.51E+02	3.78E-01	7.54E-02	3.47E+03	6.34E-01

GWP-fossil: Global Warming Potential fossil; GWP-biogenic: Global Warming Potential biogenic; GWP-luluc: Global Warming Potential land use and land use change; ODP: Depletion potential of the stratospheric ozone layer; AP: Acidification potential; EP-freshwater: Eutrophication potential-freshwater compartment; POCP: Formation potential of tropospheric ozone; ADP-minerals & metals: Abiotic Depletion for non-fossil resources potential; ADP-fossil: Abiotic Depletion for non-fossil resources potential; WDP: Water deprivation potential.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	19/30

Resource use parameters	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
PENRE	MJ, low cal. value	1.09E+05	1.62E+04	1.18E+03	1.02E+02	5.54E+00	9.19E+04	8.11E+01
PERE	MJ, low cal. value	3.06E+03	1.64E+03	7.61E+00	5.34E-02	7.35E-04	1.41E+03	3.27E-01
PENRM	MJ, low cal. value	1.27E+03	1.27E+03	0	0	0	0	0
PERM	MJ, low cal. value	2.22E+02	2.22E+02	0	0	0	0	0
PENRT	MJ, low cal. value	1.11E+05	1.74E+04	1.18E+03	1.02E+02	5.54E+00	9.19E+04	8.11E+01
PERT	MJ, low cal. value	2.52E+04	1.86E+03	1.24E+03	1.10E+00	8.93E-02	2.21E+04	1.20E+00
FW	m ³	1.14E+02	1.50E+01	3.56E+00	1.24E-02	2.53E-03	9.58E+01	1.84E-02
MS	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0

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; RFS: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels.

Waste production indicators	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
HWD	kg	1.64E+01	1.04E+01	2.01E+00	7.79E-03	5.21E-02	3.85E+00	2.06E-02
NHWD	kg	7.96E+02	3.93E+02	7.46E+01	8.78E+00	3.66E+00	2.67E+02	4.89E+01
RWD	kg	2.95E-01	4.25E-02	1.39E-03	6.78E-04	3.47E-05	2.50E-01	5.44E-04
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	2.74E+02	2.86E+01	1.09E-01	0.00E+00	1.02E+01	0.00E+00	2.36E+02
CRU	kg	0.00E+00	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	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	20/30

DY800/116 AirPlus

Impact category	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
GWP - fossil	kg CO ₂ eq.	7.66E+03	1.37E+03	7.37E+01	6.58E+00	1.58E+00	6.19E+03	8.54E+00
GWP - biogenic	kg CO ₂ eq.	5.52E+02	2.17E+01	-1.41E+01	3.71E-03	3.80E+00	5.41E+02	6.12E-03
GWP - luluc	kg CO ₂ eq.	2.99E+00	2.00E+00	3.66E-02	1.98E-03	1.27E-04	9.45E-01	1.85E-03
GWP - total	kg CO ₂ eq.	8.21E+03	1.40E+03	5.97E+01	6.58E+00	5.38E+00	6.73E+03	8.55E+00
ODP	kg CFC-11 eq.	9.73E-04	1.05E-04	8.96E-06	1.50E-06	7.95E-08	8.57E-04	1.19E-06
AP	mol H ⁺ eq.	5.37E+01	2.12E+01	1.53E-01	3.38E-02	2.38E-03	3.23E+01	2.74E-02
EP - freshwater	kg P eq.	3.99E+00	2.42E+00	8.68E-03	5.37E-04	4.85E-05	1.56E+00	4.15E-04
POCP	kg NMVOC eq.	2.18E+01	7.67E+00	1.48E-01	3.71E-02	2.71E-03	1.39E+01	3.00E-02
ADP – minerals and metals	kg Sb eq.	4.42E-01	4.30E-01	5.98E-04	1.11E-04	8.71E-06	1.17E-02	1.30E-04
ADP – fossil	MJ, net calorific value	1.11E+05	1.74E+04	1.18E+03	1.01E+02	5.54E+00	9.19E+04	8.06E+01
WDP	m ³ eq.	4.07E+03	4.46E+02	1.51E+02	3.75E-01	7.54E-02	3.47E+03	6.32E-01

GWP-fossil: Global Warming Potential fossil; GWP-biogenic: Global Warming Potential biogenic; GWP-luluc: Global Warming Potential land use and land use change; ODP: Depletion potential of the stratospheric ozone layer; AP: Acidification potential; EP-freshwater: Eutrophication potential-freshwater compartment; POCP: Formation potential of tropospheric ozone; ADP-minerals & metals: Abiotic Depletion for non-fossil resources potential; ADP-fossil: Abiotic Depletion for non-fossil resources potential; WDP: Water deprivation potential.

Resource use parameters	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
PENRE	MJ, low cal. value	1.09E+05	1.61E+04	1.18E+03	1.01E+02	5.54E+00	9.19E+04	8.06E+01
PERE	MJ, low cal. value	3.09E+03	1.67E+03	7.61E+00	5.34E-02	7.35E-04	1.41E+03	3.27E-01
PENRM	MJ, low cal. value	1.24E+03	1.24E+03	0	0	0	0	0
PERM	MJ, low cal. value	2.22E+02	2.22E+02	0	0	0	0	0
PENRT	MJ, low cal. value	1.11E+05	1.74E+04	1.18E+03	1.01E+02	5.54E+00	9.19E+04	8.06E+01
PERT	MJ, low cal. value	2.53E+04	1.89E+03	1.24E+03	1.09E+00	8.93E-02	2.21E+04	1.20E+00
FW	m ³	1.14E+02	1.42E+01	3.56E+00	1.23E-02	2.53E-03	9.58E+01	1.83E-02
MS	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0

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; RFS: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	21/30

Waste production indicators	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing		Distribution	Installation	Use	End of life
HWD	kg	1.52E+01	9.22E+00	2.01E+00	7.73E-03	5.21E-02	3.85E+00	1.90E-02
NHWD	kg	8.12E+02	4.10E+02	7.46E+01	8.71E+00	3.66E+00	2.67E+02	4.87E+01
RWD	kg	2.95E-01	4.28E-02	1.39E-03	6.73E-04	3.47E-05	2.50E-01	5.41E-04
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	2.73E+02	2.88E+01	1.09E-01	0.00E+00	1.02E+01	0.00E+00	2.34E+02
CRU	kg	0.00E+00	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	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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.

DY800/216 SF₆

Impact category	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing		Distribution	Installation	Use	End of life
GWP - fossil	kg CO ₂ eq.	1.14E+04	1.66E+03	7.37E+01	1.01E+01	1.58E+00	9.69E+03	9.76E+00
GWP - biogenic	kg CO ₂ eq.	8.63E+02	3.21E+01	-1.41E+01	5.69E-03	3.80E+00	8.41E+02	6.99E-03
GWP - luluc	kg CO ₂ eq.	3.91E+00	2.39E+00	3.66E-02	3.05E-03	1.27E-04	1.47E+00	2.24E-03
GWP - total	kg CO ₂ eq.	1.23E+04	1.70E+03	5.97E+01	1.01E+01	5.38E+00	1.05E+04	9.77E+00
ODP	kg CFC-11 eq.	1.47E-03	1.23E-04	8.94E-06	2.31E-06	7.95E-08	1.33E-03	1.46E-06
AP	mol H ⁺ eq.	7.32E+01	2.28E+01	1.53E-01	5.19E-02	2.38E-03	5.02E+01	3.32E-02
EP - freshwater	kg P eq.	5.02E+00	2.58E+00	8.67E-03	8.25E-04	4.85E-05	2.43E+00	5.00E-04
POCP	kg NMVOC eq.	3.06E+01	8.76E+00	1.47E-01	5.70E-02	2.71E-03	2.16E+01	3.63E-02
ADP – minerals and metals	kg Sb eq.	6.48E-01	6.29E-01	5.97E-04	1.71E-04	8.71E-06	1.83E-02	1.61E-04
ADP – fossil	MJ, net calorific value	1.65E+05	2.04E+04	1.17E+03	1.56E+02	5.54E+00	1.43E+05	9.80E+01
WDP	m ³ eq.	6.08E+03	5.28E+02	1.51E+02	5.76E-01	7.54E-02	5.40E+03	7.09E-01

GWP-fossil: Global Warming Potential fossil; GWP-biogenic: Global Warming Potential biogenic; GWP-luluc: Global Warming Potential land use and land use change; ODP: Depletion potential of the stratospheric ozone layer; AP: Acidification potential; EP-freshwater: Eutrophication potential-freshwater compartment; POCP: Formation potential of tropospheric ozone; ADP-minerals & metals: Abiotic Depletion for non-fossil resources potential; ADP-fossil: Abiotic Depletion for non-fossil resources potential, WDP: Water deprivation potential.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	22/30

Resource use parameters	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
PENRE	MJ, low cal. value	1.63E+05	1.91E+04	1.17E+03	1.56E+02	5.54E+00	1.43E+05	9.80E+01
PERE	MJ, low cal. value	3.32E+03	1.90E+03	7.61E+00	5.34E-02	7.35E-04	1.41E+03	3.27E-01
PENRM	MJ, low cal. value	1.29E+03	1.29E+03	0	0	0	0	0
PERM	MJ, low cal. value	2.22E+02	2.22E+02	0	0	0	0	0
PENRT	MJ, low cal. value	1.65E+05	2.04E+04	1.17E+03	1.56E+02	5.54E+00	1.43E+05	9.80E+01
PERT	MJ, low cal. value	3.78E+04	2.13E+03	1.24E+03	1.67E+00	8.93E-02	3.44E+04	1.44E+00
FW	m ³	1.69E+02	1.68E+01	3.56E+00	1.89E-02	2.53E-03	1.49E+02	2.09E-02
MS	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0

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; RFS: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels.

Waste production indicators	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
HWD	kg	1.93E+01	1.17E+01	1.57E+00	1.19E-02	5.21E-02	5.99E+00	2.29E-02
NHWD	kg	1.01E+03	4.59E+02	7.02E+01	1.34E+01	3.66E+00	4.15E+02	5.36E+01
RWD	kg	4.42E-01	5.01E-02	1.38E-03	1.03E-03	3.47E-05	3.89E-01	6.59E-04
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	3.50E+02	4.36E+01	1.09E-01	0.00E+00	1.02E+01	0.00E+00	2.96E+02
CRU	kg	0.00E+00	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	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	23/30

DY800/216 AirPlus

Impact category	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
GWP - fossil	kg CO ₂ eq.	1.14E+04	1.63E+03	7.37E+01	1.01E+01	1.58E+00	9.63E+03	9.72E+00
GWP - biogenic	kg CO ₂ eq.	8.64E+02	3.37E+01	-1.41E+01	5.66E-03	3.80E+00	8.41E+02	6.87E-03
GWP - luluc	kg CO ₂ eq.	3.79E+00	2.28E+00	3.66E-02	3.03E-03	1.27E-04	1.47E+00	2.23E-03
GWP - total	kg CO ₂ eq.	1.22E+04	1.66E+03	5.97E+01	1.01E+01	5.38E+00	1.05E+04	9.72E+00
ODP	kg CFC-11 eq.	1.47E-03	1.22E-04	8.94E-06	2.30E-06	7.95E-08	1.33E-03	1.45E-06
AP	mol H ⁺ eq.	7.31E+01	2.26E+01	1.53E-01	5.16E-02	2.38E-03	5.02E+01	3.30E-02
EP - freshwater	kg P eq.	5.01E+00	2.57E+00	8.67E-03	8.21E-04	4.85E-05	2.43E+00	4.97E-04
POCP	kg NMVOC eq.	3.05E+01	8.65E+00	1.47E-01	5.67E-02	2.71E-03	2.16E+01	3.61E-02
ADP – minerals and metals	kg Sb eq.	5.35E-01	5.16E-01	5.97E-04	1.70E-04	8.71E-06	1.83E-02	1.60E-04
ADP – fossil	MJ, net calorific value	1.65E+05	2.03E+04	1.17E+03	1.55E+02	5.54E+00	1.43E+05	9.75E+01
WDP	m ³ eq.	6.04E+03	4.93E+02	1.51E+02	5.73E-01	7.54E-02	5.40E+03	7.07E-01

GWP-fossil: Global Warming Potential fossil; GWP-biogenic: Global Warming Potential biogenic; GWP-luluc: Global Warming Potential land use and land use change; ODP: Depletion potential of the stratospheric ozone layer; AP: Acidification potential; EP-freshwater: Eutrophication potential-freshwater compartment; POCP: Formation potential of tropospheric ozone; ADP-minerals & metals: Abiotic Depletion for non-fossil resources potential; ADP-fossil: Abiotic Depletion for non-fossil resources potential; WDP: Water deprivation potential.

Resource use parameters	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
PENRE	MJ, low cal. value	1.63E+05	1.90E+04	1.17E+03	1.55E+02	5.54E+00	1.43E+05	9.75E+01
PERE	MJ, low cal. value	3.35E+03	1.93E+03	7.61E+00	5.34E-02	7.35E-04	1.41E+03	3.27E-01
PENRM	MJ, low cal. value	1.28E+03	1.28E+03	0	0	0	0	0
PERM	MJ, low cal. value	2.22E+02	2.22E+02	0	0	0	0	0
PENRT	MJ, low cal. value	1.65E+05	2.03E+04	1.17E+03	1.55E+02	5.54E+00	1.43E+05	9.75E+01
PERT	MJ, low cal. value	3.78E+04	2.16E+03	1.24E+03	1.67E+00	8.93E-02	3.44E+04	1.43E+00
FW	m ³	1.68E+02	1.59E+01	3.56E+00	1.89E-02	2.53E-03	1.49E+02	2.08E-02
MS	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0

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; RFS: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	24/30

Waste production indicators	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing		Distribution	Installation	Use	End of life
HWD	kg	1.82E+01	1.05E+01	1.57E+00	1.18E-02	5.21E-02	5.99E+00	2.14E-02
NHWD	kg	1.03E+03	4.75E+02	7.02E+01	1.33E+01	3.66E+00	4.15E+02	5.34E+01
RWD	kg	4.42E-01	5.04E-02	1.38E-03	1.03E-03	3.47E-05	3.89E-01	6.56E-04
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	3.49E+02	4.38E+01	1.09E-01	0.00E+00	1.02E+01	0.00E+00	2.95E+02
CRU	kg	0.00E+00	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	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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.

DY800/316 SF₆

Impact category	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing		Distribution	Installation	Use	End of life
GWP - fossil	kg CO ₂ eq.	7.91E+03	1.56E+03	7.49E+01	9.98E+00	1.59E+00	6.25E+03	9.51E+00
GWP - biogenic	kg CO ₂ eq.	5.49E+02	2.37E+01	-2.09E+01	5.62E-03	5.30E+00	5.41E+02	6.76E-03
GWP - luluc	kg CO ₂ eq.	3.31E+00	2.28E+00	7.48E-02	3.01E-03	1.64E-04	9.45E-01	2.18E-03
GWP - total	kg CO ₂ eq.	8.46E+03	1.59E+03	5.40E+01	9.99E+00	6.89E+00	6.79E+03	9.52E+00
ODP	kg CFC-11 eq.	9.86E-04	1.16E-04	8.95E-06	2.28E-06	1.03E-07	8.57E-04	1.42E-06
AP	mol H ⁺ eq.	5.63E+01	2.38E+01	1.64E-01	5.13E-02	3.02E-03	3.23E+01	3.23E-02
EP - freshwater	kg P eq.	4.29E+00	2.72E+00	9.14E-03	8.15E-04	6.28E-05	1.56E+00	4.86E-04
POCP	kg NMVOC eq.	2.28E+01	8.66E+00	1.56E-01	5.63E-02	3.45E-03	1.39E+01	3.53E-02
ADP – minerals and metals	kg Sb eq.	5.77E-01	5.65E-01	5.80E-04	1.69E-04	1.12E-05	1.17E-02	1.56E-04
ADP – fossil	MJ, net calorific value	1.13E+05	1.92E+04	1.18E+03	1.54E+02	7.15E+00	9.19E+04	9.53E+01
WDP	m ³ eq.	4.15E+03	5.24E+02	1.50E+02	5.69E-01	7.52E-02	3.47E+03	6.91E-01

GWP-fossil: Global Warming Potential fossil; GWP-biogenic: Global Warming Potential biogenic; GWP-luluc: Global Warming Potential land use and land use change; ODP: Depletion potential of the stratospheric ozone layer; AP: Acidification potential; EP-freshwater: Eutrophication potential-freshwater compartment; POCP: Formation potential of tropospheric ozone; ADP-minerals & metals: Abiotic Depletion for non-fossil resources potential; ADP-fossil: Abiotic Depletion for non-fossil resources potential; WDP: Water deprivation potential.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	25/30

Resource use parameters	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
PENRE	MJ, low cal. value	1.11E+05	1.80E+04	1.18E+03	1.54E+02	7.15E+00	9.19E+04	9.53E+01
PERE	MJ, low cal. value	3.14E+03	1.73E+03	7.61E+00	5.34E-02	7.35E-04	1.41E+03	3.27E-01
PENRM	MJ, low cal. value	1.26E+03	1.26E+03	0	0	0	0	0
PERM	MJ, low cal. value	3.25E+02	3.25E+02	0	0	0	0	0
PENRT	MJ, low cal. value	1.13E+05	1.92E+04	1.18E+03	1.54E+02	7.15E+00	9.19E+04	9.53E+01
PERT	MJ, low cal. value	2.55E+04	2.05E+03	1.31E+03	1.65E+00	1.13E-01	2.21E+04	1.40E+00
FW	m ³	1.16E+02	1.64E+01	3.54E+00	1.87E-02	2.60E-03	9.58E+01	2.03E-02
MS	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0

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; RFS: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels.

Waste production indicators	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
HWD	kg	1.80E+01	1.14E+01	2.70E+00	1.17E-02	3.44E-02	3.85E+00	2.13E-02
NHWD	kg	8.41E+02	4.40E+02	6.32E+01	1.32E+01	4.73E+00	2.67E+02	5.22E+01
RWD	kg	3.00E-01	4.70E-02	1.36E-03	1.02E-03	4.50E-05	2.50E-01	6.41E-04
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	3.35E+02	3.34E+01	1.36E-02	0.00E+00	1.34E+01	0.00E+00	2.88E+02
CRU	kg	0.00E+00	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	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	26/30

DY800/316 AirPlus

Impact category	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
GWP - fossil	kg CO ₂ eq.	7.81E+03	1.53E+03	7.49E+01	9.93E+00	1.59E+00	6.19E+03	9.47E+00
GWP - biogenic	kg CO ₂ eq.	5.50E+02	2.53E+01	-2.09E+01	5.59E-03	5.30E+00	5.41E+02	6.64E-03
GWP - luluc	kg CO ₂ eq.	3.19E+00	2.17E+00	7.48E-02	2.99E-03	1.64E-04	9.45E-01	2.17E-03
GWP - total	kg CO ₂ eq.	8.37E+03	1.56E+03	5.40E+01	9.94E+00	6.89E+00	6.73E+03	9.48E+00
ODP	kg CFC-11 eq.	9.85E-04	1.15E-04	8.95E-06	2.27E-06	1.03E-07	8.57E-04	1.41E-06
AP	mol H ⁺ eq.	5.62E+01	2.36E+01	1.64E-01	5.10E-02	3.02E-03	3.23E+01	3.21E-02
EP - freshwater	kg P eq.	4.28E+00	2.70E+00	9.14E-03	8.11E-04	6.28E-05	1.56E+00	4.84E-04
POCP	kg NMVOC eq.	2.27E+01	8.55E+00	1.56E-01	5.60E-02	3.45E-03	1.39E+01	3.51E-02
ADP – minerals and metals	kg Sb eq.	4.64E-01	4.52E-01	5.80E-04	1.68E-04	1.12E-05	1.17E-02	1.55E-04
ADP – fossil	MJ, net calorific value	1.12E+05	1.92E+04	1.18E+03	1.53E+02	7.15E+00	9.19E+04	9.48E+01
WDP	m ³ eq.	4.11E+03	4.89E+02	1.50E+02	5.66E-01	7.52E-02	3.47E+03	6.89E-01

GWP-fossil: Global Warming Potential fossil; GWP-biogenic: Global Warming Potential biogenic; GWP-luluc: Global Warming Potential land use and land use change; ODP: Depletion potential of the stratospheric ozone layer; AP: Acidification potential; EP-freshwater: Eutrophication potential-freshwater compartment; POCP: Formation potential of tropospheric ozone; ADP-minerals & metals: Abiotic Depletion for non-fossil resources potential; ADP-fossil: Abiotic Depletion for non-fossil resources potential; WDP: Water deprivation potential.

Resource use parameters	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use	End of life	
PENRE	MJ, low cal. value	1.11E+05	1.79E+04	1.18E+03	1.53E+02	7.15E+00	9.19E+04	9.48E+01
PERE	MJ, low cal. value	3.17E+03	1.76E+03	7.61E+00	5.34E-02	7.35E-04	1.41E+03	3.27E-01
PENRM	MJ, low cal. value	1.25E+03	1.25E+03	0	0	0	0	0
PERM	MJ, low cal. value	3.25E+02	3.25E+02	0	0	0	0	0
PENRT	MJ, low cal. value	1.12E+05	1.92E+04	1.18E+03	1.53E+02	7.15E+00	9.19E+04	9.48E+01
PERT	MJ, low cal. value	2.55E+04	2.08E+03	1.31E+03	1.64E+00	1.13E-01	2.21E+04	1.39E+00
FW	m ³	1.15E+02	1.55E+01	3.54E+00	1.86E-02	2.60E-03	9.58E+01	2.02E-02
MS	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0

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; RFS: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	27/30

Waste production indicators	Unit	Total	UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing		Distribution	Installation	Use	End of life
HWD	kg	1.68E+01	1.02E+01	2.70E+00	1.17E-02	3.44E-02	3.85E+00	1.98E-02
NHWD	kg	8.57E+02	4.57E+02	6.32E+01	1.32E+01	4.73E+00	2.67E+02	5.21E+01
RWD	kg	3.00E-01	4.73E-02	1.36E-03	1.02E-03	4.50E-05	2.50E-01	6.38E-04
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	3.33E+02	3.36E+01	1.36E-02	0.00E+00	1.34E+01	0.00E+00	2.86E+02
CRU	kg	0.00E+00	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	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	28/30



Additional environmental information

Recyclability potential

According to the waste treatment scenario calculation in SimaPro, based on the recycling rate in the technical report IEC/TR 62635 Edition 1.0 - Table D2, the following recyclability potentials were calculated.

DY800/116 AirPlus	DY800/116 SF ₆	DY800/216 AirPlus	DY800/216 SF ₆	DY800/316 AirPlus	DY800/316 SF ₆
83.8%	83.8%	85.7%	85.7%	85.7%	85.6%

Other certifications

In 2021, the UniSec DY800 switchboard cells have been ISO 14067:2018 certified by a third party, with ID number 2RDA043329.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	29/30



References

- LCA report 2RDA043711 – UniSec DY800 cluster, ABB 2021
- Report Carbon Footprint 2RDA043329, UniSec DY800 cluster, ABB, 2021
- EN 50693:2019 - Product category rules for life cycle assessments of electronic and electrical products and systems
- PCR EPDIItaly007 - Electronic and electrical products and systems (rev.2), October 2020 (rev.2 published: 21stOctober 2020)
- PCR EPDIItaly012 - Electronic and electrical products and systems - Switches, March 2020 (published: 16th March 2020)
- PCR EPDIItaly015 - Electronic and electrical products and systems – Switchboards (published: 24th September 2020)
- IEC/TR 62635 - Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment - Edition 1.0 2012-10
- UNI EN ISO 14040:2021 - Environmental management -Life cycle assessment - Principles and framework
- UNI EN ISO 14044:2021 - Environmental management - Life cycle assessment - Requirements and guidelines
- ecoinvent, 2019. Swiss Centre for Life Cycle Assessment, v3.6 (www.ecoinvent.ch).
- PRé Consultants, 2020. Software SimaPro versione 9.1.1 (www.pre.nl).
- <https://www.isprambiente.gov.it/it>
- <https://www.mise.gov.it/index.php/it/>
- EPDIItaly regulations rev. 5.0 (1st July 2020)

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	2RDA043712	A	en	30/30