

EPD



Environmental Product Declaration

Medium-voltage Air-insulated switchgear UniGear ZS1 500mm Feeder-12.12.32

Production site: Xiamen, China



DOCUMENT KIND Environmental Product Declaration	IN COMPLIANCE WITH ISO 14025 and EN 50693			
PROGRAM OPERATOR The Norwegian EPD Foundation	PUBLISHER The Norwegian EPD Foundation			
REGISTRATION NUMBER OF THE PROGRAM OPERATOR NEPD-11893-11842	ISSUE DATE 2025-07-28			
VALID TO 2030-07-28	STATUS Approved	SECURITY LEVEL Public		
OWNING ORGANIZATION ABB Switzerland Ltd, Group Technology Management	ABB DOCUMENT ID 3XAA078611	REV. A	LANG. EN	PAGE 1/15

EPD Owner	ABB Switzerland Ltd, Group Technology Management				
Organization No.	CHE-101.538.426				
Manufacturer name and address	ABB Xiamen Switchgear Co., Ltd. FangShanXiEr Road, Xiang'an District, Xiamen, Fujian, 361101, P. R. China				
Company contact	wei.wu@cn.abb.com Product Manager				
Program operator	The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo, Norway phone: +47 23 08 80 00, email: post@epd-norge.no				
Declared product	Medium-voltage air-insulated switchgear UniGear ZS1 500mm Feeder-12.12.32				
Product description	UniGear ZS1 is three-phase, metal-enclosed, air-insulated, LSC2B, PM switchgear and all the panels are factory-assembled, type-tested and suitable for indoor applications up to 12 kV. The panels are designed as withdrawable modules and are fitted with a single busbar system. The withdrawable parts are equipped with circuit breakers or contactors.				
Functional unit	The functional unit of this study is power distribution switchgear with main function of protecting and metering, during a service life of 20 years in China with a use rate of 100% and 64% load factor of the rated current.				
Reference flow	A single UniGear ZS1 500mm Feeder-12.12.32 switchgear, including packaging.				
Independent verification	Independent verification of the declaration and data, according to ISO 14025:2010 <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL Independent verifier approved by EPD-Norge: Elisabet Amat Signature: 				
Approved by	Håkon Hauan, CEO EPD-Norge Signature: 				
Reference PCR	EN 50693:2019 – Product Category Rules for Life Cycle Assessments of Electronic and Electrical Products and Systems. EPDIItaly007 – Electronic and Electrical Products and Systems, Rev. 3.1, 2024/11/12. EPDIItaly015 – Electronic and Electrical Products and Systems – Switchboards, Rev. 2.0, 2024/07/01.				
Program instructions	The Norwegian EPD Foundation/EPD-Norge, General Programme Instructions 2024. Version 4.0 dated 2024.09.18.				
LCA study	This EPD is based on the LCA study described in the LCA report 3XAA078610.				
EPD type	Specific product				
EPD scope	Cradle-to-grave				
Product RSL	20 years				
Geographical representativeness	Manufacturing (suppliers):	Manufacturing (ABB):	Downstream:		
	Global	China	China		
Reference year	2024				
LCA software	SimaPro 9.5 (2023)				
LCI database	Ecoinvent v3.9.1 (2022)				
Comparability	EPDs published within the same product category, though originating from different programs, may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible.				
Liability	The owner of the declaration shall be liable for the underlying information and evidence. EPD-Norge shall not be liable with respect to manufacturer, life cycle assessment data, and evidence.				

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	2/15

Contents

Sustainability at ABB 4

General Information 5

Constituent Materials..... 6

LCA Background Information 7

Inventory Analysis 9

Environmental Indicators..... 11

Sensitivity analysis 13

Additional Environmental Information..... 13

References..... 15

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	3/15



Sustainability at ABB

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.

At ABB, we actively contribute to a more sustainable world, leading by example in our own operations and partnering with customers and suppliers to enable a low-carbon society, preserve resources, and promote social progress.

Learn more on our website global.abb/group/en/sustainability or scan the QR code.



STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	4/15



General Information

This Environmental Product Declaration is a “specific product EPD”, and the declared product is the UniGear ZS1, including related accessories and packaging.

UniGear ZS1 is three-phase, metal-enclosed, air-insulated, LSC2B, PM switchgear and all the panels are factory-assembled, type-tested and suitable for indoor applications up to 12 kV. The panels are designed as withdrawable modules and are fitted with a single busbar system. The withdrawable parts are equipped with circuit breakers or contactors.

General technical information of the UniGear ZS1 500mm Feeder-12.12.32 is presented below.

Description		
Config.	Circuit breaker	VD4/P 12.12.32 P135
	Current sensor	LZZBJ9- 12/133b/2
Size	Width	500 mm
	Height	2200 mm
	Depth	1310 mm
Ratings	Rated voltage [kV]	12
	Rated power frequency withstand voltage (Ud) [kV]	42
	Rated lightning impulse withstand voltage (Up) [kV]	75
	Rated current [A]	1250
	Rated short-time withstand current (Ik) [kA]	31.5
	Rated peak withstand current (Ip) [kA]	80
	Rated duration of short-circuit (tk) [s]	4
	Rated frequency (fr) [Hz]	50/60

The product is manufactured by ABB Xiamen Switchgear Co., Ltd. located in Xiamen. The manufacturing site is certified according to the following standards:

- ISO 9001:2015 – Quality Management Systems
- ISO 14001:2015 – Environmental Management Systems
- ISO 45001:2018 – Occupational Health and Safety Management Systems
- ISO 50001:2018 – Energy management systems

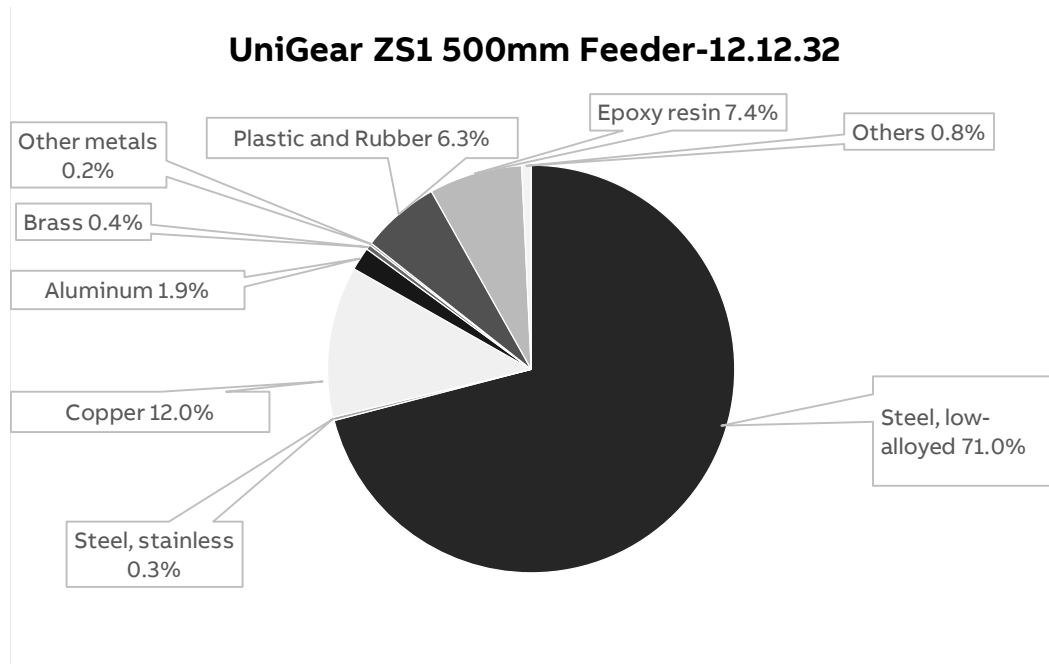
STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	5/15



Constituent Materials

The constituent materials of UniGear ZS1 are presented below.

Type	Material	Weight [kg]	Weight %
Metals	Steel, low-alloyed	354.9	71.0
	Steel, stainless	1.3	0.3
	Copper	59.8	12.0
	Aluminum	9.3	1.9
	Brass	2.0	0.4
	Other metals	0.7	0.2
Plastics	Plastic and Rubber	31.2	6.3
Others	Epoxy resin	37.0	7.4
	Others	3.9	0.8
Total		500.2	100



STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	6/15

The constituent materials of the packaging is presented below. 1 pcs is assumed per pallet.

Description	Material	Weight [kg]	Weight %
Packaging box	Plywood	70.00	95.93
Fasteners	Steel	0.34	0.46
Plastic bag	PE	0.78	1.07
Packing strips	PET	0.27	0.36
Drying agent	Kaolinite	1.59	2.18
Total		72.97	100



LCA Background Information

Functional Unit

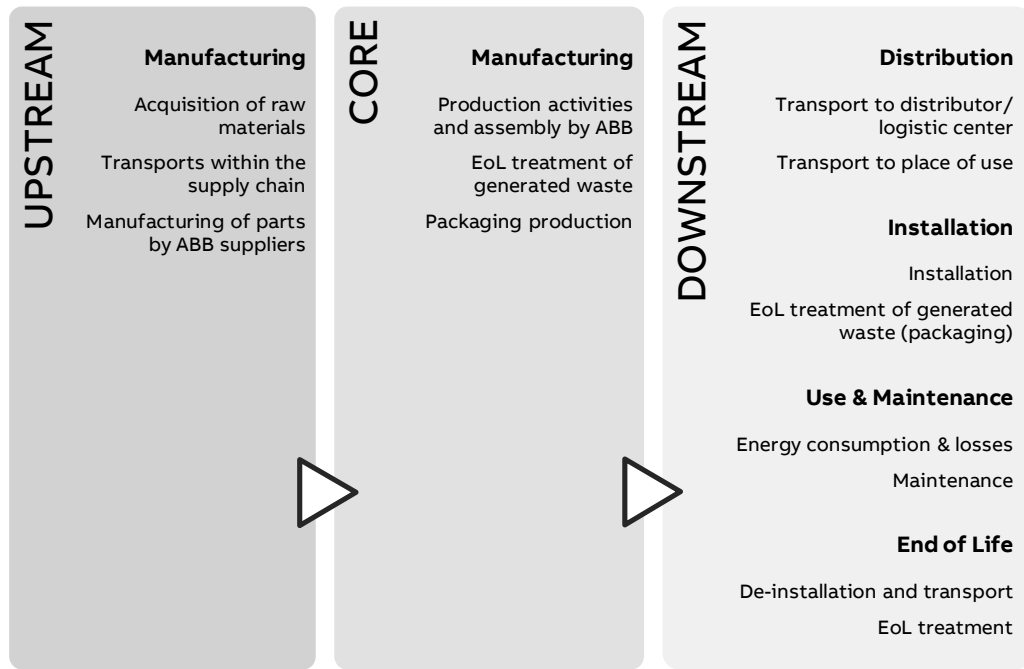
The functional unit of this study is power distribution switchgear with main function of protecting and metering, during a service life of 20 years in China with a use rate of 100% and 64% load factor of the rated current. The reference flow is a single UniGear ZS1 500mm Feeder-12.12.32 device, including packaging.

Note, the reference service life (RSL) of 20 years is a theoretical period selected for calculation purposes only – this is not representative for the minimum, average, nor actual service life of the product.

System Boundaries

The life cycle assessment is a “cradle-to-grave” analysis, and the system boundaries are defined according to EN 50693, as required by the PCR. For transparency reasons, the manufacturing stage is further divided into an upstream and core stage.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	7/15



Data quality

Both primary and secondary data are used. The main sources for primary data are the bill of materials (BOM), CAD-files, technical drawings, and site-specific foreground data provided by ABB.

For all processes for which primary data are not available, generic background data originating from the ecoinvent v3.9.1 database, with system model “allocation, cut-off by classification”, are used. The database Industry Data 2.0 is also used for chemical substance which is not available by ecoinvent. The LCA software used for the calculations is SimaPro 9.5.

Allocation rules

The utility consumption and waste generation by ABB, in the core manufacturing stage, is allocated to the production of one reference product according to applicable rules. For the end-of-life allocation, the “Polluter Pays” principle is adopted according to what is defined in the CEN/TR 16970 standard. However, the potential benefits and avoided loads from recovery and recycling processes are not considered because it is not required by the PCR.

Cut-off criteria

According to EPDIItaly015, the cut-off criteria can be set to a maximum of 2 % of the overall environmental impacts. In this LCA, stickers have been excluded as their weights are negligible. The process of phosphating has also been excluded due to the unavailability of data and complexity of modelling.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	8/15



Inventory Analysis

Manufacturing Stage (upstream)

The life cycle inventory in the upstream manufacturing stage is based on the primary data available from ABB. Datasets are applied accordingly, to the best of our knowledge, to represent each material, manufacturing process, and surface treatment. Modelling decisions and assumptions that are highly relevant to the results are as following:

- Epoxy is modelled on a chemical level, i.e., each chemical used is considered and mapped with the most representative dataset available.

Additionally, supply chain transport is added as far as data is available between ABB, the suppliers, and sub-suppliers. Only primary suppliers are considered. The rest of the transports are assumed to already be included in ecoinvent's "market for"-processes.

Manufacturing Stage (core)

In the core manufacturing stage, utility consumption and waste generation at the ABB manufacturing site are accounted for. The packaging materials and accessories associated with the product are also considered. Modelling decisions and assumptions that are highly relevant to the results are as following:

- 64.39% Nuclear power is considered, which is procured by the ABB manufacturing site through a distribution agreement with the local utility. However, due to the lack of life cycle based residual mix data, other electricity mixes in the LCA are not calculated with residual mix.
- The remaining 35.61% is internally produced from solar panels installed on the roof of the Xiamen manufacturing site.

Distribution

The transport distance from the ABB manufacturing site to the site of installation is assumed to be 300 km by lorry, as suggested by the PCR EPDIItaly015, as the actual distance is unknown. The environmental impacts can be multiplied accordingly if the actual distance is known.

	Dataset	Amount	Unit	Represent.
Transport	<i>Transport, freight, lorry 16-32 metric ton, EURO4 {RoW} market for transport, freight, lorry 16-32 metric ton, EURO4 Cut-off, S</i>	300	km	EPDIItaly 015

Installation

The installation phase only implies manual activities, and no energy is consumed. Therefore, this phase only considers the end-of-life of the packaging materials used.

	Scenario	Transport	Representation
Packaging End-of-Life	<i>ABB_WS_Packaging Waste Scenario_China literature 2022 - Polluter pays</i>	100 km by lorry (assumption)	Global

* Due to lack of data, 100% energy recovery is assumed for wood, and 100% landfill is assumed for ceramics (e.g., kaolinte)

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	9/15

Use

The use stage considers the reference power losses over the reference service life as defined in the functional unit. This is calculated using the following formula, according to PCR EPDItaly015:

$$E_{use} [kWh] = \frac{P_{use} * 8760 * RSL * \alpha}{1000} = \frac{184.7 \text{ W} * 8760 \text{ hours} * 20 \text{ years} * 100 \%}{1000} = 32353.4 \text{ kWh}$$

Where:

- E_{use} = Total energy use over the reference service life
- P_{use} = Reference power consumption in watts
- RSL = Reference Service Life in years
- α = Use time rate
- 8760 is the number of hours in a year
- 1000 is the conversion factor from W to kW

Energy mix	Source	Amount	Unit
<i>Electricity, medium voltage {CN} / market group for electricity, medium voltage / Cut-off, S_Biogenic</i>	Ecoinvent v3.9.1	0.958	kg CO ₂ -eq/kWh

Maintenance is not considered because the product is designed as maintenance free product. Even if some maintenance happens during the use stage, from the environmental impacts point of view it can be omitted from the analysis due to negligible energy is consumed.

End of life

Decommissioning of the product only implies manual activities, and no energy is consumed. Therefore, this phase only considers the end-of-life of the product.

Product	Scenario	Transport	Representation
End-of-Life	IEC/TR 62635 (Annex D.3)*	100 km by lorry (assumption)	China

*A conservative approach is adopted by considering all parts as either: requiring selective treatment, difficult to process, or going through a separation process; no individual part is considered as a single recyclable material. Also, due to the transformer containing parts difficult to process through separation, these are all modelled as 100 % waste to landfill to represent the typical waste streams within China.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	10/15



Environmental Indicators

In accordance with the PCR EPDItaly007, the environmental impact indicators are determined by using the characterization factors and impact assessment methods specified in EN 15804:2012+A2:2019.

UniGear ZS1 500mm Feeder-12.12.32

Impact category	Unit	Total	Cradle-to-gate					
			UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing	Distribution	Installation	Use and maintenance	End-of-life	
GWP – total	kg CO ₂ eq.	3.42E+04	3.08E+03	-4.45E+01	3.28E+01	1.06E+02	3.10E+04	7.11E+01
GWP – fossil	kg CO ₂ eq.	3.40E+04	3.00E+03	4.74E+01	3.28E+01	3.60E+00	3.08E+04	5.62E+01
GWP – biogenic	kg CO ₂ eq.	2.46E+02	7.26E+01	-9.20E+01	1.15E-02	1.02E+02	1.48E+02	1.49E+01
GWP – luluc	kg CO ₂ eq.	2.00E+01	7.49E+00	2.09E-01	1.71E-02	1.11E-03	1.22E+01	6.63E-02
ODP	kg CFC-11 eq.	1.90E-04	1.28E-04	5.51E-06	5.19E-07	4.23E-08	5.56E-05	5.95E-07
AP	mol H+ eq.	2.28E+02	6.45E+01	3.99E-01	1.44E-01	1.80E-02	1.63E+02	2.47E-01
EP – freshwater	kg P eq.	1.01E+01	4.53E+00	2.50E-02	2.67E-03	6.09E-04	5.58E+00	1.68E-02
EP – marine	kg N eq.	4.02E+01	5.13E+00	1.39E-01	5.29E-02	9.29E-03	3.47E+01	1.23E-01
EP – terrestrial	mol N eq.	4.68E+02	9.61E+01	1.46E+00	5.65E-01	8.39E-02	3.69E+02	6.57E-01
POCP	kg NMVOC eq.	1.17E+02	1.90E+01	4.55E-01	1.94E-01	2.36E-02	9.76E+01	2.07E-01
ADP – minerals and metals	kg Sb eq.	7.07E-01	6.87E-01	5.58E-04	1.06E-04	6.92E-06	1.97E-02	4.37E-04
ADP – fossil	MJ, net calorific value	3.41E+05	3.83E+04	2.10E+03	4.64E+02	3.03E+01	3.00E+05	6.07E+02
WDP	m ³ eq.	4.24E+03	8.48E+02	6.84E+01	2.05E+00	-7.11E-01	3.32E+03	7.62E+00

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; EP-marine: Eutrophication potential-marine compartment; EP-terrestrial: Eutrophication potential-accumulated exceedance; POCP: Formation potential of tropospheric ozone; ADP-minerals & metals: Abiotic Depletion for non-fossil resources potential; ADP-fossil: Abiotic Depletion for fossil resources potential; WDP: Water deprivation potential.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	11/15

ENVIRONMENTAL PRODUCT DECLARATION

Resource use parameters	Unit	Total	Cradle-to-grave					
			UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing		Distribution	Installation	Use and maintenance	End-of-life
PENRE	MJ, low cal. value	3.40E+05	3.75E+04	2.06E+03	4.64E+02	3.03E+01	3.00E+05	6.07E+02
PERE	MJ, low cal. value	3.82E+04	4.72E+03	1.53E+03	5.91E+00	5.54E-01	3.19E+04	5.82E+01
PENRM	MJ, low cal. value	7.92E+02	7.53E+02	3.93E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ, low cal. value	1.02E+03	2.82E+01	9.94E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, low cal. value	3.41E+05	3.83E+04	2.10E+03	4.64E+02	3.03E+01	3.00E+05	6.07E+02
PERT	MJ, low cal. value	3.93E+04	4.75E+03	2.52E+03	5.91E+00	5.54E-01	3.19E+04	5.82E+01
FW	m ³	1.10E+02	2.61E+01	1.96E+00	6.62E-02	-1.20E-02	8.15E+01	2.89E-01
MS	kg	1.52E+02	1.52E+02	1.07E-01	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	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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.

System output indicators	Unit	Total	Cradle-to-grave					
			UPSTREAM	CORE	DOWNSTREAM			
			Manufacturing		Distribution	Installation	Use and maintenance	End-of-life
HWD	kg	6.97E-01	5.32E-01	4.82E-03	3.00E-03	1.80E-04	1.55E-01	2.28E-03
NHWD	kg	3.29E+03	8.69E+02	1.03E+01	2.25E+01	2.24E+00	2.27E+03	1.19E+02
RWD	kg	4.03E-01	6.62E-02	1.83E-02	9.38E-05	8.13E-06	3.17E-01	1.17E-03
MER	kg	7.61E+01	1.25E+00	1.23E+00	0.00E+00	7.03E+01	0.00E+00	3.30E+00
MFR	kg	5.68E+02	1.10E+02	5.81E+01	0.00E+00	5.77E-01	0.00E+00	3.99E+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	3.11E+02	4.59E+00	5.36E+00	0.00E+00	2.83E+02	0.00E+00	1.87E+01
EEE	MJ	1.73E+02	2.45E+00	2.95E+00	0.00E+00	1.57E+02	0.00E+00	1.04E+01

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	3XAA078611	A	EN	12/15



Sensitivity analysis

This chapter presents the results of a sensitivity analysis, to understand how the impact category “GWP – total” varies for UniGear ZS1 with the emission factor from latest IEA energy mix for China in use stage.

Emission factor for the IEA energy mix used in the use stage

Energy mix	Source	Amount	Unit
Electricity, medium voltage {CN} market group for Cut-off, S	IEA 2021	0.743	kg CO ₂ -eq/kWh

Sensitivity analysis for impact category “GWP – total” [kg CO₂-eq]

Scenario	Total	UPSTREAM	CORE	DOWNSTREAM			
		Manufacturing	Distribution	Installation	Use and maintenance	End-of-life	
Declared scenario							
Use stage: Energy mix source from Ecoinvent v3.9.1	3.42E+04	3.08E+03	-4.53E+01	2.97E+01	1.06E+02	3.10E+04	7.11E+01
IEA 2021							
Use stage: Energy mix source from IEA 2021	3.42E+04	3.08E+03	-4.53E+01	2.97E+01	1.06E+02	2.53E+04	7.11E+01



Additional Environmental Information

Circularity Values

The recyclability potential of the product (excluding packaging) is calculated by dividing “MFR: material for recycling” in the end-of-life stage by the total weight of the product. As a result, the recyclability potential of the product is 79.7 % presented below.

Recyclability potential	
UniGear ZS1 500mm 12.12.32	79.7 %

Greenhouse gas emissions from the use of electricity in the manufacturing phase

Production mix from import, medium voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process.

Energy mix	Source	Amount	Unit
ABB_Electricity mix Xiamen Factory {CN}_ Nuclear 64.39%-Solar 35.61%_2024 / Pseudos System	Ecoinvent v3.9.1	0.044	kg CO ₂ -eq/kWh

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	13/15

Dangerous substances

The product complies with REACH and RoHS directive requirements and does not contain any of the listed materials in excess of the authorized proportions. For further information about REACH and RoHS, please visit the ABB webpage:

<https://new.abb.com/contact/form>.

Indoor environment

The product meets the requirements for low emissions.

Carbon footprint

Carbon footprint has not been worked out for the product.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	14/15



References

- ecoinvent. ecoinvent v3.9.1 (2022). <https://ecoinvent.org/the-ecoinvent-database/data-releases/ecoinvent-3-9-1/>
- European Committee for Standardization. (2019). *Product category rules for life cycle assessments of electronic and electrical products and systems* (EN 50693:2019).
- European Committee for Standardization. (2019). *Sustainability of constructions - Environmental product declarations* (EN 15804:2012+A2:2019).
- ICMQ S.p.A. (2024). *PCR EPDItaly007 - Electronic and electrical products and systems*, rev. 3.1 (2024-11-12). EPDItaly. https://www.epditaly.it/en/pcr_/epditaly007pcr-for-electronic-and-electrical-products-and-systems-rev-3-1/
- ICMQ S.p.A. (2024). *PCR EPDItaly015 - Electronic and electrical products and systems - switchboards*, rev. 2.0 (2024-07-01). EPDItaly. <https://www.epditaly.it/en/view-pcr/>
- ICMQ S.p.A (2020b). *Regulations of the EPDItaly Programme Regulations*, rev. 5.2 (2020-02-16). EPDItaly. https://www.epditaly.it/en/wp-content/uploads/2016/12/EPDITALY-Regulament_rev-5.2_EN.pdf
- International Electrotechnical Commission. (2012). *Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment*, Edition 1.0 (2012-10-1) (IEC/TR 62635).
- International Organization for Standardisation. (2006). *Environmental management - Life cycle assessment - Principles and framework* (ISO Standard No. 14040:2006). <https://www.iso.org/standard/37456.html>
- International Organization for Standardisation. (2006). *Environmental management - Life cycle assessment - Requirements and guidelines* (ISO Standard No. 14044:2006). <https://www.iso.org/standard/38498.html>
- PRé Sustainability. (2023). SimaPro (version 9.5) [computer software]. <https://pre-sustainability.com/solutions/tools/simapro/>
- SeaRates. (2022). *Shipping Distances & Time Calculator*. <https://www.searates.com/services/distances-time>
- The Norwegian EPD Foundation/EPD-Norge, General Programme Instructions 2024. Version 4.0 dated 2024.09.18. [GPI Det norske EPD programmet ver4 18-09-2024 final 1.pdf](#)
- Wade. H (2025). *Life Cycle Assessment Report: Medium-voltage Ais-insulated Switchgear UniGear Z51 500mm Feeder-12.12.32* (LCA No. 3XAA078610, rev.A). ABB Switzerland Ltd, Group Technology Management.
- Blade.Weng (2025). *Life Cycle Assessment Report: VD4/P 12.12.32 P135* (Report No. 3XAA080639, rev. A). ABB Switzerland Ltd, Group Technology Management.
- Frank.Fu (2025). *Life Cycle Assessment Report: LZBJ9-12/133b/2* (LCA No. 3XAA081129, rev. A). ABB Switzerland Ltd, Group Technology Management.



Program Operator and publisher

The Norwegian EPD Foundation	Ph.	+47 23 08 80 00
Post Box 5250 Majorstuen,	email	post@epd-norge.no
0303 Oslo, Norway	web	www.epd-norge.no



Owner of the declaration

ABB Switzerland Ltd, Group Technology Management	
Brown Boveri Straße 6, 5400 Baden, Switzerland	web www.abb.com



Author

Wade Huang	Ph.	+86 592 6026033
ABB (China) Ltd.	email	Wadexiaobo. huang@cn.abb.com
No.885, FangShanXiEr Road, Xiang'an District, Xiamen, Fujian, 361001, P.R.China	web	www.abb.com

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	3XAA078611	A	EN	15/15