Beijing XCHARGE Technology Co., Ltd

ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT:

Smart DC Charger C7

PLANTS:

Shuangyang Road No.12, Yizhuang, Daxing District, Beijing, P.R. China

in compliance with ISO 14025 and EN15804 +A2

Program Operator	The Norwegian EPD Foundation
Publisher	EPDItaly

Declaration Number	NEPD-5577-4876-EN
Registration Number	MR-EPDITALY0079

Issue Date	13 / 12/ 2023
Valid to	13 / 12 / 2028

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epd-norway
Global Program Operator

Environmental Product Declaration

In accordance with 14025 and EN15804 +A2

Smart DC Charger C7

XCHARGE

Owner of the declaration:
Beijing XCHARGE Technology Co., Ltd

Product name:
Smart DC Charger C7

Declared unit:
1 pcs

Product category /PCR:
PCR EPDItaly017 – Charging Stations

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-5577-4876-EN

Registration number:
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Issue date: 13.12.2023

Valid to: 13.12.2028

The Norwegian
EPD Foundation

General information

Product:
Smart DC Charger C7

Program operator:
The Norwegian EPD Foundation
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Declaration number:
NEPD-5577-4876-EN

This declaration is based on Product Category Rules:
PCR EPDItaly017 – Charging Stations

Statements:
The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

Declared unit:
1 pcs Smart DC Charger C7

Declared unit with option:
Manufacturing, distribution, installation, use & maintenance and end-of-life stage

Functional unit:
Production of 1 pcs Smart DC Charger C7 and maintained for a period of 20 years

Verification:
Independent verification of the declaration and data, according to ISO14025:2010

internal ☐ external ☑

Sign

Vito D'Incognito
Independent verifier approved by EPD Norway

Owner of the declaration:
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Manufacturer:
Beijing XCHARGE Technology Co., Ltd

Place of production:
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Management system:
ISO 9001, ISO 14001, ISO 45001, ISO/IEC 20000-1, ISO/IEC 27001, IATF 16949

Organisation no:
911101083397675346

Issue date: 13.12.2023

Valid to: 13.12.2028

Year of study:
2022

Comparability:
EPDs from other programmes may not be comparable

The EPD has been worked out by:
Daqi Wang & Jiliu WU

Approved

Manager of EPD Norway

Product

Product description:

Smart DC Charger C7 is a barrier free, configurable, double outlet DC charger which is suitable for easy-access public parking environment. It consists of HMl Touch screen, power module, charger control unit, HPC DC charging cable. With compliance of Open Charge Point Protocol (OCPP) 1.6J & 2.0.1, C7 is able to be configured/diagnosed remotely through internet connection via 4G/Ethernet.

C7 Ultra-Fast Charger is an integrated and compact DC charger with high-output power. Designed around the needs of all EV drivers, it features barrier-free design, small footprint and flexible installation.

XCharge C7 Ultra-Fast Charger offers high power output with sleek and barrier-free design. Equipped with integrated cable management system and multiple types of connectors free to choose, it is compatible with every electric vehicle. Click the video to explore more about our products.

Table 1 Product information

Parameters	
Weights	750 kg
Weights of packaging	79.88 kg
Dimensions (L*W*H)	800*900*1992 mm
Connector	CCS2 (Liquid cooled cable) or CCS2 (Air cooled cable)

Product specification:

All raw material components of 1 pcs Smart DC Charger C7 were divided into several categories, which shows in following table.

Table 2 Raw Materials of C7

Materials	KG	%
Metal, aluminium	45.77	6.53%
Metal, copper	4.44	0.63%
Metal, ferrous	53.74	7.67%
Metal, other	6.14	0.88%
Metal, steel	349.93	49.92%
Other	206.07	29.40%
Plastic, other	79.68	11.37%

All packaging components of 1 pcs Smart DC Charger C7 were divided into several categories as well.

Table 3 Packaging materials of C7

Materials	KG	%
Plywood	79.64	99.67%
Steel304	0.155	0.19%
PVC	0.105	0.13%

Technical data:

A brief C7 technical data is showed in table below.

Table 4 Technical data

Parameters	
Configuration	CCS2
Output performance referred to CCS2	240 kW, 300 kW, 420 kW
Output voltage	200 -1000 VDC
Output current	300 A Rated (400A boost within 20min)
Power Intensity Transfer	6.67 kWh/min
Maximum Charging Time	14.5 min (Audi E-Tron, 800V from 0%-100%)
Total Charging Efficiency	max 94.89%
Input voltage	3-phase 400 Vac +/- 10%, 50/60 Hz
RSL	20 Years
Standby Power	97 W diurnal , 150 W at night
Charging Sockets	Double Sockets

Market:

Mainly Europe

Reference service life, product:

20 years

Reference service life, building:

N/A

LCA: Calculation rules

Declared unit:

1 pcs Smart DC Charger C7

Data quality:

In this study, all primary activity data mainly refer to year 2022, and the production volume and electricity consumption refer to July 2022- June 2023.

Data about the weight and material compositions of each of the charging station components are provided by suppliers. The questionnaire and primary data sheet are referred in the Annex document. Material losses happened during the components manufacturing is considered. Data about materials quantities and components weight have been checked by verifying the mass balance of the charging station.

Activity data on transportation of components from suppliers to XCharge have been calculated based on the distance on e-map, starting from the address of the production site of each supplier.

Therefore, all the activity data mentioned before have to be considered of very good quality with reference to precision, completeness, and consistency, and very representative of the system under study.

XCharge does only have electricity consumption from test during the production stages. This data is from allocation for all factory electricity consumption of good quality regarding precision and consistency and completeness.

The data of distribution distance is based on the default scenario of PEFCR Guidance.

The electricity consumption figure during the use stages is from a report of good quality regarding precision and consistency and completeness.

Ordinary maintenance consists only filter replacement, the filter material is from the BOM provided by supplier and the distance is based on the default scenario of PEFCR Guidance.

At the end of life stage, percentage of different material treatment method (recovery and disposal) is from chapter 4.2.3.3 of EN 50693. And the distance is also from PEFCR Guidance.

Background data about materials, production processes, transport activities and EoL treatments are retrieved from the ecoinvent v3.9.1 LCI library. The ecoinvent library is the most comprehensive LCI library available, with information about data quality and representativeness.

The electricity mix of the networks providing electricity for the test in manufacturing is modelled with ecoinvent v3.9.1. datasets representing low-voltage electricity in State Grid North China Branch.

Allocation:

There is no allocation used in this study.

System boundary:

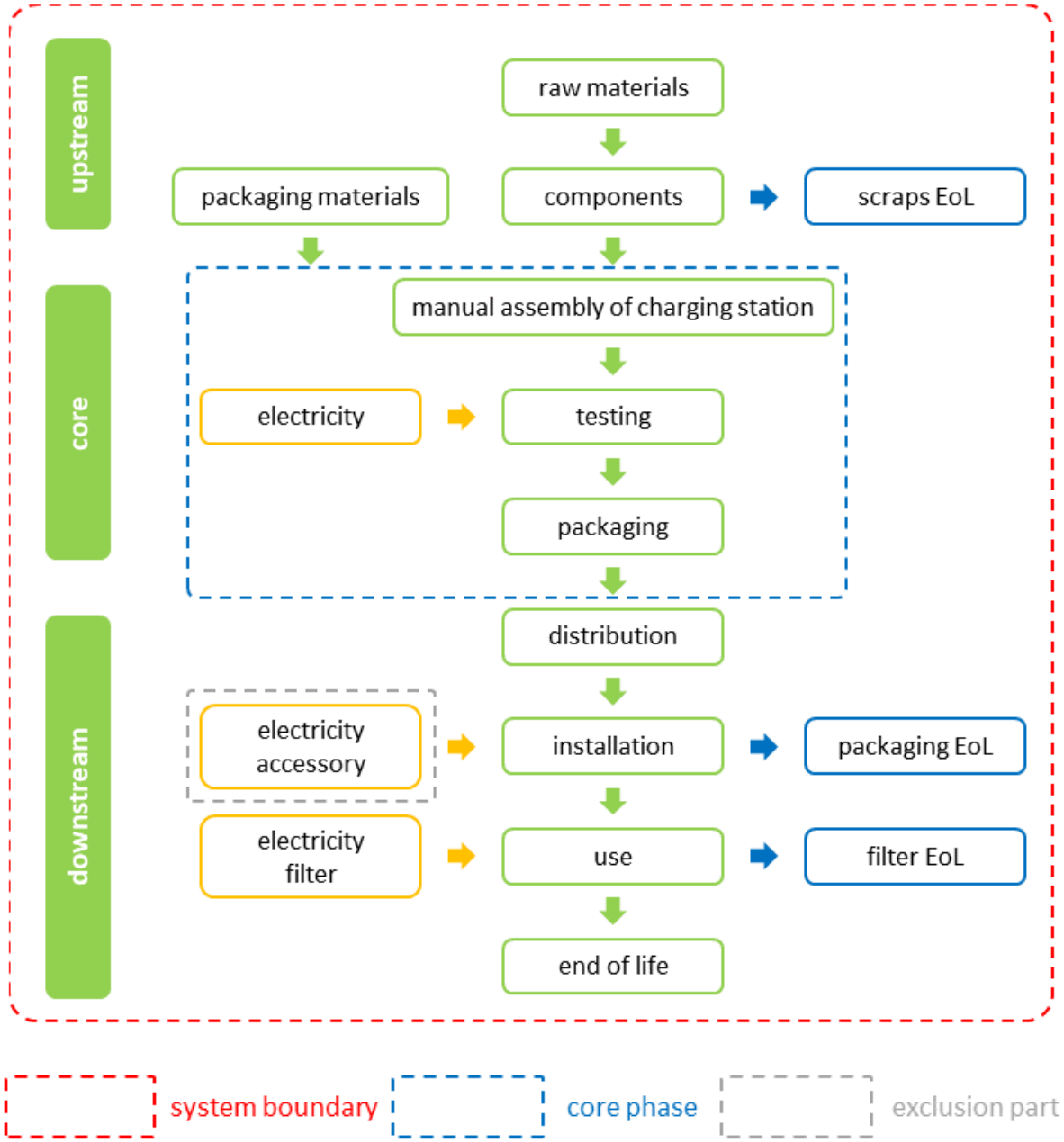

Figure 1 System boundary

Figure above shows the flowchart on the life cycle of the charging stations. The flowchart shows which processor are included. This study only takes in to account the charging stations and no capital goods/infrastructure that may be needed during production and use.

1) Upstream module, which includes all relevant supply chain processes;

- Raw materials acquisition;

- Components manufacturing;

- Waste disposal;

- Raw materials transportation.

2) Core module, which includes all the relevant processes managed by the organisation proposing the EPD;

- Charging station manual assembly;

- Charging station test;

- Packaging to area for shipment.

3) Downstream module, which includes all the relevant processes that take place outside of the organisation proposing the EPD:

- Product transportation/distribution;

- Installation;

- Use & maintenance;

- Disassembly;

- End of life.

Cut-off criteria:

Flows must not be omitted to avoid hiding significant impacts. The EPD Italy Regulations and PCR EPDItaly007 apply; specifically, the following flows and operations may be cut-off:

Production, use and disposal of the packaging components and semi-finished intermediates.

Materials making up the charging station itself whose total mass does not exceed 2% of the total weight of the device.

Water consumption.

Materials and energy flows related to the installation stage.

Materials and energy flows related to dismantling phase.

Devices external to the product itself required for installation.

In this study, diesel used in forklift is considered in installation, other installation accessories have been excluded as they could be reused.

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

Manufacturing stage

Data with regard to which raw materials and quantities per manufactured charging station were collected by XCHARGE. In addition, the company asked their suppliers for data and information on which manufacturing processes are used for each component.

Manufacturing processes are presented for each type of material that is included in the study, which have been used to produce all components, but there are other manufacturing processes that are embedded in the upstream data that has used in the LCA. Figures for material loss were under assumption.

Table 5 Manufacturing processes and materials losses for each type of material

Type of material	Manufacturing process	Loss of material
Metal	Metal working	10%
Plastic	Injection moulding	5%
Other	N/A	0%

Distribution stage

This module includes the impact to the distribution of the product at the installation site. Because C7 model has been put into market, a scenario was assumed: one C7 charging station with package was transported from XCHARGE to Europe. In this scenario, three transportation phases are considered: plant gate to sea stations, sea transport to export countries, distribution locations to installation sites. Distances in the first two phases are default values in PEFCR Guidance, and the average distance in the third phase is assumed as 300 km is PCR EPDItaly017. In the absence of any primary data on the fleet of vehicles used, a EURO 4 category vehicle is considered in this study.

Table 6 Transportation Information of Distribute Stage

Type	Type of vehicle	Distance	Description	Source
Lorry	32+ metric ton, euro 4	1000 km	gate to transport stations	ecoinvent 3.9.1
Container Ship	-	18000 km	transport station to export areas	ecoinvent 3.9.1
Lorry	3.5-7.5 metric ton, euro 4	300 km	to installation	ecoinvent 3.9.1

Installation stage

This module includes impacts arising from the installation of the charging station in the operational site. According to the product instruction, forklift trucks is used in installation, a diesel of 0.85kg/L is assumed to be used in this forklift with a working time of 20 mins and fuel consumption of 2.25L/h. The accessories listed in the instruction could be reused without any environmental burden. There is little waste and scrap generated during the installation stage, so the only outflow is the end of life (Eol) for packaging, including transport, waste quantities and recovery rates. To identify the waste amount, default values for recovery rates were grabbed in BS EN 50693:2019..

In this study, we assumed all packaging material would be collected and transported to a disassembly site, then delivered to recycle/disposal sites. For these two transport phases, the distances of 100 km are assumed. The lorry is assumed to be a EURO 4 category vehicle with a load capacity of 32+ tons.

Table 7 Recovery and Waste Management Scenario in Packaging on each Type of Material per Functional Unit (fu)

Material	Weight (kg/fu)	Recovery rate	Waste management scenario
Plywood	7.96E+01	0%	no plywood components in packaging are assumed to recycling, the remaining will be landfilled
Steel304	1.55E-01	80%	80% Steel304 components in packaging are assumed to recycling, the remaining will be landfilled
PVC	1.05E-01	0%	no PVC components in packaging are assumed to recycling, the remaining will be landfilled

According to PCR EPDItaly017, use phase only considers the energy absorbed by the charging station to keep operating and ready to transfer electric power to the connected vehicles. Therefore, the environmental burden of using the charging stations is based on the standby consumption.

Ordinary scheduled maintenance is included in the system. Based on XCHARGE's recommendation, the air filter should be exchanged once per year.

RSL is the service life of the product, announced to be 20 years by XCHARGE.

Use & maintenance

According to PCR EPDItaly017, use phase only considers the energy absorbed by the charging station to keep operating and ready to transfer electric power to the connected vehicles. Therefore, the environmental burden of using the charging stations is based on the standby consumption.

Table 8 Waste Treatment Scenarios on Material for Air Filters

Material	Weight (kg/pcs)	Quantity in RSL	Recovery Rate
Metal (aluminium alloy)	2.07	20	70%
Polymer (PET)	0.17	20	0%

End of Life stage

When finishing the service life, the charging station would be delivered to a disassemble place, then all materials entering the final period of waste treatment: disposal and recycling. In absence of primary data, the default values for material recovery rates were used: all BOM components were divided into 3 main categories by homogeneous material - metal, plastic and other, 8 sub-categories to match specific material types in BS EN 50693: 2019. Moreover, the reference figures for recovery were grabbed there, except recovery proportion, other parts were assumed to disposal. Following table shows specific information about waste treatment. In addition, there are no recycled parts in used raw material, from XCHARGE engineers.

Table 9 Recovery and Waste Management Scenario on each Type of Material per Functional Unit (fu)

Material	Weight (kg/fu)	Recovery rate	Weight to be landfilled (kg/fu)
Metal, aluminium	45.77	70%	13.73
Metal, copper	4.44	60%	1.78
Metal, ferrous	53.74	80%	10.75
Metal, other	6.14	60%	2.46
Metal, steel	349.93	80%	69.99
Other	206.07	0%	206.07
Plastic, ABS	0.96	20%	0.76
Plastic, other	79.68	0%	79.68

Table 10 Transportation Information of EoL Stage

Type	Type of vehicle	Distance	Description	Source
Lorry	32+ metric ton, euro 4	100 km	installation site to disassemble plant	ecoinvent 3.9.1
Lorry	32+ metric ton, euro 4	100 km	disassemble plant to final platform (recovery or disposal)	ecoinvent 3.9.1

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Core environmental impact indicators

Table 11 Core environmental impact indicators

Indicator	Unit	Manufacturing		Distribution	Installation	Use & maintenance	End-of-life
		Upstream	Core	Downstream			
GWP-total	kg CO2 eq.	2.20E+04	2.26E+02	3.76E+02	9.87E+00	8.70E+03	2.03E+02
GWP-fossil	kg CO2 eq.	2.19E+04	2.27E+02	3.76E+02	3.13E+00	8.41E+03	3.66E+01
GWP-biogenic	kg CO2 eq.	7.79E+01	-1.33E+00	1.22E-01	6.74E+00	2.67E+02	1.67E+02
GWP-LULUC	kg CO2 eq.	3.95E+01	3.49E-02	2.41E-01	1.68E-03	2.13E+01	1.38E-02
ODP	kg CFC11 eq.	4.35E-03	4.32E-07	6.73E-06	9.27E-08	2.03E-04	4.60E-07
AP	mol H^+ eq.	2.25E+02	1.29E+00	5.43E+00	1.66E-02	4.89E+01	1.16E-01
EP-freshwater	kg P eq.	2.73E+01	4.49E-02	2.38E-02	3.36E-04	7.51E+00	4.97E-03

EP-marine	kg N eq.	3.24E+01	2.58E-01	1.46E+00	3.33E-02	7.93E+00	5.94E-01
EP-terrestial	mol N eq.	3.47E+02	2.75E+00	1.60E+01	6.01E-02	7.28E+01	4.18E-01
POCP	kg NMVOC eq.	1.16E+02	7.28E-01	4.67E+00	2.61E-02	2.33E+01	1.98E-01
ADP-M&M	kg Sb eq.	7.26E+00	7.38E-04	9.85E-04	6.88E-06	1.33E-01	5.97E-05
ADP-fossil	MJ	2.80E+05	2.08E+03	5.07E+03	7.79E+01	1.82E+05	3.43E+02
WDP	m³	5.46E+03	2.45E+01	1.87E+01	1.02E+00	2.09E+03	5.28E+00

GWP-total: *Global Warming Potential;* ***GWP-fossil:*** *Global Warming Potential fossil fuels;* ***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, Accumulated Exceedance;* ***EP-freshwater:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See "additional requirements" for indicator given as PO4 eq.* ***EP-marine:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment;* ***EP-terrestial:*** *Eutrophication potential, Accumulated Exceedance;* ***POCP****: Formation potential of tropospheric ozone;* ***ADP-M&M****: Abiotic depletion potential for non-fossil resources (minerals and metals);* ***ADP-fossil:*** *Abiotic depletion potential for fossil resources;* ***WDP:*** *Water deprivation potential, deprivation weighted water counsumption*

Additional environmental impact indicators

Table 12 Additional environmental impact indicators

Indicator	Unit	Manufacturing		Distribution	Installation	Use & maintenance	End-of-life
		Upstream	Core	Downstream			
PM	Disease incidence	1.46E-03	1.72E-05	2.17E-05	3.38E-07	2.19E-04	2.36E-06
IRP	kBq U235 eq.	2.36E+03	2.59E+00	5.93E+00	6.70E-02	4.94E+03	6.41E-01
ETP-fw	CTUe	5.74E+05	6.67E+02	2.62E+03	4.18E+01	3.19E+04	8.33E+02
HTP-c	CTUh	3.82E-05	5.46E-08	1.74E-07	1.47E-09	4.42E-06	1.51E-08
HTP-nc	CTUh	1.14E-03	2.73E-06	2.82E-06	3.76E-08	1.57E-04	5.18E-07
SQP	Dimensionless	1.42E+05	4.87E+02	2.23E+03	7.30E+01	3.55E+04	4.41E+02

PM: *Particulate matter emissions;* ***IRP:*** *Ionising radiation, human health;* ***ETP-fw:*** *Ecotoxicity (freshwater);* ***HTP-c:*** *Human toxicity, cancer effects;* ***HTP-nc:*** *Human toxicity, non-cancer effects;* ***SQP:*** *Land use related*

Resource use

Table 13 Resource use

Parameter	Unit	Manufacturing		Distribution	Installation	Use & maintenance	End-of-life
		Upstream	Core	Downstream			
RPEE	MJ	2.09E+02	9.54E+01	3.34E+01	3.21E-01	2.32E+04	3.63E+00
RPEM	MJ	1.54E+04	0.00E+00	0.00E+00	3.30E-02	2.02E+02	0.00E+00

TPE	MJ	1.57E+04	9.54E+01	3.34E+01	3.54E-01	2.34E+04	3.63E+00
NRPE	MJ	4.55E+03	2.08E+03	5.07E+03	4.47E+01	1.74E+05	3.43E+02
NRPM	MJ	2.75E+05	0.00E+00	0.00E+00	3.32E+01	7.87E+03	0.00E+00
TRPE	MJ	2.80E+05	2.08E+03	5.07E+03	7.79E+01	1.82E+05	3.43E+02
SM	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
W	m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

End of life – Waste

Table 14 End of life – Waste

Parameter	Unit	Manufacturing		Distribution	Installation	Use & maintenance	End-of-life
		Upstream	Core	Downstream			
HW	KG	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHW	KG	5.87E+01	0.00E+00	0.00E+00	7.98E+01	1.49E+01	3.85E+02
RW	KG	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

End of life – output flow

Table 15 End of life – output flow

Parameter	Unit	Manufacturing		Distribution	Installation	Use & maintenance	End-of-life
		Upstream	Core	Downstream			
CR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00	1.24E-01	2.75E+01	3.64E+02
MER	kg	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
ETE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Information describing the biogenic carbon content at the factory gate

Table 16 Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in the accompanying packaging	kg C	3.98E+01

Additional requirements

Greenhous gas emission from the use of electricity in the manufacturing phase

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

Table 17 Greenhous gas emission from the use of electricity in the manufacturing phase

National electricity grid	Unit	Value
market for electricity, low voltage, State Grid North China Branch (ecoinvent 3.9.1)	kg CO2 -eq/kWh	1.22

Bibliography

EPDItaly007 - CORE PCR EN 50693_BASE_rev.2_EN

EPDItaly017 - SUB PCR EN 50693_charging_stations_1

BS EN 50693:2019 Product category rules for life cycle assessments of electronic products and systems

ISO 14044:2006 + A1:2018 + A2:2020 (2020) Environmental management — Life cycle assessment — Requirements and guidelines

ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures

EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

Ecoinvent Database, Version 3.9.1

SimaPro Software, Version 9.5.0

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