Shanghai CHINT Power Systems Co., Ltd.

ENVIRONMENTAL PRODUCT DECLARATION

Product Name: Three-Phase String Inverter
SCH320K-T-EU, SCH333K-T-EU, SCH350K-T-EU

Site Plant: Plant 209, Plant 215 Northside, No. 3555, Si Xian Road,
Songjiang District, Shanghai, P.R. China

in accordance with ISO 14025:2006 and EN 50693:2019

Program Operator	EPDItaly
Publisher	EPDItaly
Declaration Number	EPDCHINTinverter_2024 _rev 1.1
Registration Number	EPDITALY1304
Issue Date	28/04/2026
Validity Date	28/04/2031

GENERAL INFORMATION

EPD OWNER	
Company name	Shanghai CHINT Power Systems Co., Ltd.
Registered office	No. 5999, Guangfulin Road, Songjiang District, 201616 Shanghai, P. R. China
Contacts for information on the EPD	CAI, Huan caihuan@chint.com

PROGRAMME OPERATOR	
EPDItaly	Via Gaetano De Castillia no. 10 - 20124 Milan, Italy

EPD INFORMATION	
Product name(s)	SCH320K-T-EU, SCH333K-T-EU, SCH350K-T-EU
Production Site(s)	Plant 209, Plant 215 Northside, No. 3555 Sixian Road, Songjiang District, Shanghai, P.R.CHINA
Summary description and technical information of product(s)	The SCH320K-T-EU, SCH333K-T-EU and SCH350K-T-EU are three-phase inverters, which are suitable for various commercial and large-scale PV grid-connected systems. These products exhibit superior efficiency, safety and Intelligent characteristics.
Scope of product(s)	Cradle to grave
Type of EPD	Product specific
CPC Code (number)	CPC 4612: "Electrical transformers, static converters and inductors"

VERIFICATION/VALIDATION INFORMATION	
PCR	Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, REV. 3.2 Issue date 2025/12/10 Sub-category PCR: EPDItaly032 “Power Inverter”, (Rev. 0), 22/12/2022
EPDItaly Regulations	Regulations of the EPDItaly Programme rev. 7.1 published on 05/09/2025
LCA Project Report	Life Cycle Assessment (LCA) Report of CHINT’s PV Inverter for Environmental Product Declaration (EPD), rev. 03, 2026/04/15
Independent Statement Verification / Validation	Independent verification of the declaration and of data performed according to ISO 14025:2010. Internal ☑ External Third-party verification/validation performed by: ICMQ S.p.A., via Gaetano De Castillia no. 10 - 20124 Milan, Italy. Accredited by Accredia.

VERIFICATION/VALIDATION INFORMATION	
Comparability Statement	Environmental statements published within the same product category, but from different programmes, may not be comparable.
Responsibility Statement	The EPD Owner releases EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence. EPDItaly accepts no responsibility for the information, data and results provided by the EPD Owner for the life cycle assessment.
Statement Validation	the production data used is considered representative on the basis of the representativeness analysis carried out with respect to the data of a reference product of the EPD Owner

1 COMPANY INTRODUCTION

Founded in 2009, Shanghai CHINT Power Systems Co., Ltd. (hereinafter referred to as CHINT) is a high-tech enterprise focusing on the new energy and power industry. It is mainly engaged in research and development, manufacturing and sales of photovoltaic inverters and energy storage system products and solutions. The company is in Songjiang District, Shanghai, with two R&D centers and five production bases. Its products have obtained IEC, GB and other developed countries' power grid certification and are sold to 30 countries and regions around the world.

CHINT has been accredited by international certification authorities, including ISO9001, ISO14001, ISO45001 and ISO50001.

2 SCOPE AND TYPE OF EPD

2.1 Scope of EPD

The system boundary of this report on CHINT's PV inverters encompasses the entire life cycle of the product, from cradle to grave, including the manufacturing, distribution, installation, use & maintenance, and end-of-life stage, as defined in the EPDItaly007-PCR.

PHASES	Manufacturing stage	Distribution stage	Installation stage	Use & Maintenance stage	End of life stage De-installation	Benefits & Loads
	EN 50693					
Phases declared	X	X	X	X	X	-

2.2 Type of EPD

This EPD is a product specific EPD. The declaration covers in total 3 models of inverters, including SCH320K-T-EU, SCH333K-T-EU, SCH350K-T-EU.

2.3 Geographical scope

The geographical boundary for this report is defined with manufacturing of power inverters taking place in mainland China, while use phase and end-of-life treatment stage will be modelled with a case study taken place in Italy. It is noted that the inverter products can be installed and operated worldwide. Therefore, when interpreting the LCA results, the location where the products are installed and operated should be considered.

2.4 Time representativeness

All manufacturing data has been collected by CHINT based on their production inventory in the reference period from Jan 2024 to Dec 2024. Datasets have been selected according to the actual processes used by the manufacturer. For generic products where no upstream data was available, such as packaging and manufacturing has been modelled according to current industry practices.

2.5 Database and LCA software used

In this report, generic data for materials, energy as well as waste disposal and transportation were taken from the database Ecoinvent 3.11. LCA-software SimaPro 10.3.0.1 was used for modeling and calculation.

3 DETAILED PRODUCT DESCRIPTION

3.1 Description of the Product

The SCH320K-T-EU, SCH333K-T-EU and SCH350K-T-EU are three-phase inverters, which are suitable for various commercial and large-scale PV grid-connected systems. The sales destinations of the products are regions that recognize IEC certification. These products exhibit superior efficiency, safety and Intelligent characteristics:

- the max efficiency is 99%
- support various components 182, 210R, and 210
- integrate anti PID and night repair functions.
- 45℃ rated power output, 1.1 rated power output at 40℃
- IP66 protection level and C5-M anticorrosion level
- intelligent DC release switch
- support maximum 400mm^2 wire connection, saving cable costs.
- support PLC / RS485, saving communication cable
- active & Reactive power control

3.2 Technical parameters

Table 3-1 technical parameters of different power inverters

Model Name	SCH320K-T-EU	SCH333K-T-EU	SCH350K-T-EU
DC Input			
Max. DC Voltage	1500Vdc		
MPPT Operating Voltage Range	500 - 1500Vdc		
Start Voltage	550Vdc		
Rated DC Voltage	1190Vdc		
Number of MPPT	12/15		
Number of DC Connection Sets per MPPT	2		
Max. input current per MPPT	40A		
Max. DC short-circuit current per MPPT	60A		
String Fuse	/		

Model Name	SCH320K-T-EU	SCH333K-T-EU	SCH350K-T-EU
DC Disconnection Type	Integrated Switch		
AC Output			
Rated AC Power	320kW	333kW	350kW
Max. AC Power	352kVA	333kVA	350kVA
Rated AC Voltage	800V		
AC Voltage Range*	680 - 880V		
Grid Connection Type	3Φ / PE		
Max. AC Current	254A	241A	253A
Grid Frequency	50 / 60Hz		
Grid Frequency Range	45-55 / 55-65Hz		
Power Factor (cosφ)	>0.99(±0.8 adjustable)		
Current THD	<3%		
AC Disconnection Type	/		
System Data			
Topology	Three-phase, Transformerless		
Max. Efficiency	99.00%		
Euro Efficiency	98.50%		
Consumption at Night	<5W		
Protection			
DC reverse connection protection	Yes		
AC short circuit protection	Yes		
Leakage current protection	Yes		
Grid monitoring	Yes		
Ground fault monitoring	Yes		
Surge Protection	DC Type II / AC Type II		
Q at night function	Yes		
PID Prevent&Recovery	Yes		
Environment Data			
Ingress Protection	IP66		
Cooling Method	Cooling Fans		
Operating Temperature	-30° C to +60° C		
Ambient Humidity	0 - 100%		
Altitude	4000 m		
Display and Communication			
Display	LED + APP(Bluetooth)		
Communication	RS485/Ethernet/PLC/CAN		
Mechanical Data			
Dimensions (W*H*D)	1057W* 810H * 400Dmm		
Weight	143kg		
DC Connection Type	MC4 (Max. 6mm^2)		
AC Connection Type	OT/DT Terminal(Max.400 mm^2)		

3.3 Materials compositions

Table 3-2 Materials compositions (Mass ratio)

IEC62474 Classname	IEC62474 ID	SCH320/333/350K-T-EU
Stainless steel	M-100	0.62%
Other ferrou alloy	M-119	6.18%
Aluminum and its alloy	M-120	33.90%
Copper and its alloy	M-121	10.32%
Nickel and its alloy	M-123	0.0047%
Zinc and its alloy	M-124	0.53%
Lead and its alloy	M-125	0.80%
Tin and its alloy	M-126	0.81%
Other non-ferrous metalds and alloy	M-149	0.14%
Gold	M-150	0.0006%
Glass	M-161	8.29%
Other inorganic	M-199	2.67%
PolyCarbonate (PC)	M-204	18.97%
PolyEthylene (PE)	M-204	1.57%
PolyEthylene Terephthalate (PET)	M-209	1.65%
Other unfilled thermoplastics	M-249	0.14%
Polyamide (PA) filled	M-258	0.60%
Epoxy resin	M-302	1.90%
Silicon	M-321	0.01%
EPDM	M-324	0.02%
Other organic material	M-399	10.87%
No substance in the product greater than 0.10% by weight is present on the "List of Potentially Hazardous Substances" candidates for authorization under the REACH legislation. Printed circuit boards used in this product are modelled through the Ecoinvent 3.11 process THT - “Printed wiring board, through-hole mounted, unspecified, Pb free {GLO}| printed wiring board production, through-hole mounted, unspecified, Pb free | Cut-off, U” and SMT - “Printed wiring board, surface mounted, unspecified, Pb free {GLO}| printed wiring board production, surface mounted, unspecified, Pb free | Cut-off, U”.		

3.4 Description of the production process

The production process is shown in Table 3-3. The inverter production process commences with Warehouse Material Issuance, after which PCBA FCT Testing is conducted, followed by Conformal Coating (3-proof Coating) application. Next up is Power Board Crimping, paired with Dispensing & Board Matching, and an initial Quality Inspection to ensure early-stage quality.

Subsequently, inductor components, brazed heat exchanger, and heat sink are installed onto the cabinet, along with the junction box and String Board 1 & 2, prior to an Air Tightness Test. Moving forward, the external fan assembly and AC terminal block are fitted, the power board is mounted, and wiring between the power board and string boards is completed. The capacitor board is then installed with corresponding wiring, followed by an Intermediate Quality Inspection.

Further along, the output board, capacitor board, power supply board, and control board are attached, together with the internal fan assembly, communication board, and PLC components. A Final Assembly Inspection is carried out, followed by key tests: Withstand Voltage Test, Functional Test, Aging Test, and Factory Acceptance Test.

Afterwards, the LED board and main unit top cover are installed, leading to a thorough Finished Product Inspection. Finally, the inverter undergoes Packaging & Warehousing, a rigorous Product Outgoing Inspection, and is then ready for Shipping & Transportation.

Table 3-3 Manufacturing process

Process number	Process name
1	Warehouse Material Issuance
2	PCBA FCT Testing
3	Conformal Coating (3-proof Coating)
4	Power Board Crimping
5	Dispensing & Board Matching
6	Quality Inspection
7	Install Inductor Components, Brazed Heat Exchanger, Heat Sink to Cabinet
8	Install Junction Box to Cabinet
9	Install String Board 1 & String Board 2 to Cabinet
10	Air Tightness Test
11	Install External Fan Assembly, AC Terminal Block
12	Install Power Board
13	Wiring for Power Board & String Board
14	Install Capacitor Board & Wiring
15	Intermediate Quality Inspection / In-line Intermediate Inspection
16	Install Output Board, Capacitor Board, Power Supply Board, Control Board
17	Install Internal Fan Assembly
18	Install Communication Board, PLC Components
19	Final Assembly Inspection
20	Withstand Voltage Test
21	Functional Test
22	Aging Test
23	Factory Acceptance Test
24	Install LED Board, Main Unit Top Cover
25	Finished Product Inspection
26	Packaging & Warehousing
27	Product Outgoing Inspection
28	Shipping & Transportation

4 LCA RESULTS

The LCA results show the environmental impacts and resource input and output flows calculated based on EF3.1. The LCA results have been calculated using the LCA software SimaPro 10.3.0.1 and the data from ecoinvent v3.11.

4.1 Environmental impacts

Table 4-1 Environmental impact

Indicator	Unit	Manufacturing	Distribution	Installation	Use & Maintenance	End of Life
SCH320K-T-EU						
GWP-total	kg CO_2 eq.	5.21E+03	4.68E+01	6.20E+00	2.25E+04	7.24E+01
GWP-fossil	kg CO_2 eq.	5.19E+03	4.68E+01	4.23E+00	2.24E+04	5.16E+01
GWP-biogenic	kg CO_2 eq.	1.20E+01	7.85E-03	1.97E+00	6.65E+01	2.08E+01
GWP-LULUC	kg CO_2 eq.	9.09E+00	2.26E-02	3.18E-04	4.36E+01	1.63E-02
ODP	kg CFC11 eq.	1.13E-04	7.45E-07	1.65E-08	2.12E-03	1.16E-07
AP	mol H^+ eq.	4.10E+01	1.00E+00	5.48E-03	1.44E+02	6.74E-02
EP-freshwater	kg P eq.	4.94E-01	2.49E-04	9.19E-06	1.44E+00	5.65E-04
EP-marine	kg N eq.	5.92E+00	2.55E-01	2.90E-03	2.29E+01	1.06E-01
EP-terrestrial	mol N eq.	6.78E+01	2.83E+00	2.45E-02	2.66E+02	1.88E-01
POCP	kg NMVOC eq.	3.08E+01	7.90E-01	8.22E-03	9.43E+01	6.03E-02
ADP-M&M	kg Sb eq.	7.92E-01	8.12E-05	2.11E-06	9.21E-01	7.99E-05
ADP-fossil	MJ	6.85E+04	6.01E+02	1.21E+01	2.81E+05	1.41E+02
WDP	m^3	1.29E+03	1.73E+00	-2.79E+00	2.10E+04	-8.08E-01
SCH333K-T-EU						
GWP-total	kg CO_2 eq.	5.21E+03	4.68E+01	6.20E+00	2.34E+04	7.24E+01
GWP-fossil	kg CO_2 eq.	5.19E+03	4.68E+01	4.23E+00	2.33E+04	5.16E+01
GWP-biogenic	kg CO_2 eq.	1.20E+01	7.85E-03	1.97E+00	6.92E+01	2.08E+01
GWP-LULUC	kg CO_2 eq.	9.09E+00	2.26E-02	3.18E-04	4.53E+01	1.63E-02
ODP	kg CFC11 eq.	1.13E-04	7.45E-07	1.65E-08	2.20E-03	1.16E-07
AP	mol H^+ eq.	4.10E+01	1.00E+00	5.48E-03	1.49E+02	6.74E-02
EP-freshwater	kg P eq.	4.94E-01	2.49E-04	9.19E-06	1.50E+00	5.65E-04
EP-marine	kg N eq.	5.92E+00	2.55E-01	2.90E-03	2.38E+01	1.06E-01
EP-terrestrial	mol N eq.	6.78E+01	2.83E+00	2.45E-02	2.77E+02	1.88E-01
POCP	kg NMVOC eq.	3.08E+01	7.90E-01	8.22E-03	9.81E+01	6.03E-02
ADP-M&M	kg Sb eq.	7.92E-01	8.12E-05	2.11E-06	9.58E-01	7.99E-05
ADP-fossil	MJ	6.85E+04	6.01E+02	1.21E+01	2.92E+05	1.41E+02
WDP	m^3	1.29E+03	1.73E+00	-2.79E+00	2.19E+04	-8.08E-01
SCH350K-T-EU						
GWP-total	kg CO_2 eq.	5.21E+03	4.68E+01	6.20E+00	2.46E+04	7.24E+01
GWP-fossil	kg CO_2 eq.	5.19E+03	4.68E+01	4.23E+00	2.44E+04	5.16E+01

Indicator	Unit	Manufacturing	Distribution	Installation	Use & Maintenance	End of Life
GWP-biogenic	kg CO_2 eq.	1.20E+01	7.85E-03	1.97E+00	7.27E+01	2.08E+01
GWP-LULUC	kg CO_2 eq.	9.09E+00	2.26E-02	3.18E-04	4.77E+01	1.63E-02
ODP	kg CFC11 eq.	1.13E-04	7.45E-07	1.65E-08	2.32E-03	1.16E-07
AP	mol H^+ eq.	4.10E+01	1.00E+00	5.48E-03	1.57E+02	6.74E-02
EP-freshwater	kg P eq.	4.94E-01	2.49E-04	9.19E-06	1.57E+00	5.65E-04
EP-marine	kg N eq.	5.92E+00	2.55E-01	2.90E-03	2.51E+01	1.06E-01
EP-terrestrial	mol N eq.	6.78E+01	2.83E+00	2.45E-02	2.91E+02	1.88E-01
POCP	kg NMVOC eq.	3.08E+01	7.90E-01	8.22E-03	1.03E+02	6.03E-02
ADP-M&M	kg Sb eq.	7.92E-01	8.12E-05	2.11E-06	1.01E+00	7.99E-05
ADP-fossil	MJ	6.85E+04	6.01E+02	1.21E+01	3.07E+05	1.41E+02
WDP	m^3	1.29E+03	1.73E+00	-2.79E+00	2.30E+04	-8.08E-01

Caption:

1E+01 is equal to 1 x 10^1

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 and compartment; See "additional Norwegian requirements" for indicator given as PO4 eq. **EP-Marine**: Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-Terrestrial**: 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 consumption

4.2 Resource use, end-of-life-waste, and output flows

Table 4-2 Resource use

Indicator	Unit	Manufacturing	Distribution	Installation	Use & Maintenance	End of Life
SCH320K-T-EU						
PERE	MJ	7.11E+03	6.25E+00	2.07E-01	1.20E+06	1.60E+01
PERM	MJ	3.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.48E+03	6.25E+00	2.07E-01	1.20E+06	1.60E+01
PENRE	MJ	3.92E+04	3.57E+01	1.22E+00	1.51E+05	6.99E+01
PENRM	MJ	1.78E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.93E+04	3.57E+01	1.22E+00	1.51E+05	6.99E+01
SM	kg	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
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.13E+01	5.46E-02	-6.36E-02	7.66E+02	9.89E-03
SCH333K-T-EU						

Indicator	Unit	Manufacturing	Distribution	Installation	Use & Maintenance	End of Life
PERE	MJ	7.11E+03	6.25E+00	2.07E-01	1.25E+06	1.60E+01
PERM	MJ	3.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.48E+03	6.25E+00	2.07E-01	1.25E+06	1.60E+01
PENRE	MJ	3.92E+04	3.57E+01	1.22E+00	1.57E+05	6.99E+01
PENRM	MJ	1.78E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.93E+04	3.57E+01	1.22E+00	1.57E+05	6.99E+01
SM	kg	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
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.13E+01	5.46E-02	-6.36E-02	7.97E+02	9.89E-03
SCH350K-T-EU						
PERE	MJ	7.11E+03	6.25E+00	2.07E-01	1.31E+06	1.60E+01
PERM	MJ	3.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.48E+03	6.25E+00	2.07E-01	1.31E+06	1.60E+01
PENRE	MJ	3.92E+04	3.57E+01	1.22E+00	1.65E+05	6.99E+01
PENRM	MJ	1.78E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.93E+04	3.57E+01	1.22E+00	1.65E+05	6.99E+01
SM	kg	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
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.13E+01	5.46E-02	-6.36E-02	8.37E+02	9.89E-03

Caption

1E+01 is equal to 1 x 10^1

PERE: Renewable primary energy resources used as energy carrier; **PERM:** Renewable primary energy resources used as raw materials; **PERT:** Total use of renewable primary energy resources; **PENRE:** Nonrenewable primary energy resources used as energy carrier; **PENRM:** Nonrenewable primary energy resources used as materials; **PENRT:** 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; **FW:** Use of net fresh water.

Table 4-3 End of life – Waste

Indicator	Unit	Manufacturing	Distribution	Installation	Use & Maintenance	End of Life
SCH320K-T-EU						
HWD	kg	6.31E-01	3.45E-03	8.50E-05	1.62E+01	6.24E-04
NHWD	kg	2.21E+02	1.01E+01	1.88E+01	1.61E+03	4.35E+01
RWD	kg	1.21E-01	9.76E-05	3.20E-06	4.33E-01	2.59E-04

Indicator	Unit	Manufacturing	Distribution	Installation	Use & Maintenance	End of Life
SCH333K-T-EU						
HWD	kg	6.31E-01	3.45E-03	8.50E-05	1.68E+01	6.24E-04
NHWD	kg	2.21E+02	1.01E+01	1.88E+01	1.68E+03	4.35E+01
RWD	kg	1.21E-01	9.76E-05	3.20E-06	4.50E-01	2.59E-04
SCH350K-T-EU						
HWD	kg	6.31E-01	3.45E-03	8.50E-05	1.77E+01	6.24E-04
NHWD	kg	2.21E+02	1.01E+01	1.88E+01	1.76E+03	4.35E+01
RWD	kg	1.21E-01	9.76E-05	3.20E-06	4.72E-01	2.59E-04

Caption

1E+01 is equal to 1 x 10^1

HWD Hazardous waste disposed; **NHWD** Non-hazardous waste disposed; **RWD** Radioactive waste disposed.

Table 4-4 End of life – Output flow

Indicator	Unit	Manufacturing	Distribution	Installation	Use & Maintenance	End of Life
SCH320K-T-EU						
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.65E+00	0.00E+00	1.42E+01	0.00E+00	9.05E+01
MER	kg	3.58E-01	0.00E+00	9.88E+00	0.00E+00	1.33E+01
EEE	MJ	4.55E-01	0.00E+00	2.03E+01	0.00E+00	5.96E+01
ETE	MJ	6.13E+00	0.00E+00	4.05E+01	0.00E+00	1.09E+02
SCH333K-T-EU						
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.65E+00	0.00E+00	1.42E+01	0.00E+00	9.05E+01
MER	kg	3.58E-01	0.00E+00	9.88E+00	0.00E+00	1.33E+01
EEE	MJ	4.55E-01	0.00E+00	2.03E+01	0.00E+00	5.96E+01
ETE	MJ	6.13E+00	0.00E+00	4.05E+01	0.00E+00	1.09E+02
SCH350K-T-EU						
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.65E+00	0.00E+00	1.42E+01	0.00E+00	9.05E+01
MER	kg	3.58E-01	0.00E+00	9.88E+00	0.00E+00	1.33E+01
EEE	MJ	4.55E-01	0.00E+00	2.03E+01	0.00E+00	5.96E+01
ETE	MJ	6.13E+00	0.00E+00	4.05E+01	0.00E+00	1.09E+02

Caption

1E+01 is equal to 1 x 10^1

CRU = Components for re-use; **MFR** = Materials for recycling; **MER** = Materials for energy recovery; **EEE** = Exported electrical energy; **EET** = Exported energy Thermal.

5 Calculation rules

5.1 Functional unit

A single power inverter unit intended for DC/AC voltage transformation installed, with a reference service life (RSL) of 25 years. The geographical boundary for this report is defined with manufacturing of power inverters taking place in mainland China, while use phase and end-of-life treatment stage will be modelled with a case study taken place in Italy.

5.2 Reference Service Life

The reference service life of the studied product is 25 years.

5.3 Assumptions

Table 5-1 List of assumptions

Life cycle stages	Items	Assumptions
Manufacturing stage	Material of connector	Due to the small amount and difficulty of collecting relative data from upstream suppliers, it is assumed that copper alloy shares 95% of the total weight, nickel shares 5%.
	Material of wall bracket	Due to the small amount and difficulty of collecting relative data from upstream suppliers, it is assumed that low-carbon steel shares 95%, polyester resin shares 1% and other metal shares 4%.
	Transportation vehicle type	For the vehicle used for transportation of solid and hazardous wastes, EURO 6 lorry with 16 - 32 ton capacity is assumed for modelling
Distribution stage	Transportation vehicle type	For the vehicle used for product distribution, EURO 6 lorry with 16 - 32 ton capacity, and container ship are assumed for domestic land and sea transport. EURO 4 lorry with 16 - 32 ton capacity is assumed for oversea land. 300km was assumed for the transports from port to warehouse and from warehouse to customer.
Installation stage	Electricity and materials use	No electricity and materials used for installation as it can be done manually

Life cycle stages	Items	Assumptions
	Waste treatment	The disposal scenario follows PEF EoL default values in Italy and Europe values and Eurostat. The inert substances that cannot be recycled is all landfilled.
Use & Maintenance stage	Replacement	No replacement for inverters as the inverters have RSL>25 years.
End-of-life stage	De - construction	The de - construction of inverter is assumed to be done manually, no electricity and materials use in this stage
	Waste transportation	Waste transportation distance from the de - installation plant to the waste treatment facilities is assumed to be 50 km for simplification purposes. The vehicle used is assumed as EURO 4 lorry with 16 - 32 ton capacity.
	Waste processing	The Ecoinvent waste processing data "waste electric and electronic equipment; treatment of, shredding" is applied
	Disposal	The disposal scenario follows PEF EoL default values in Italy and Europe, WEEE and IEC/TR 62635 guidelines. The inert substances that cannot be recycled is all landfilled.

5.4 Cut-off Rules

For the processes within the system boundary, all available energy and material flow data have been included in the model. In cases where no matching life cycle inventories are available to represent a flow, proxy data have been applied based on conservative assumptions regarding environmental impacts.

5.5 Data Quality

Primary data system (such materials or energy flows that enter the production system) is from CHINT manufacturing facilities in a reference period from Jan 2024 to Dec 2024 (annual average). Generic data related to the life cycle impacts of the material or energy flows that enter the production system is sourced from Ecoinvent 3.11 "allocation, cut-off by classification - unit" database.

5.6 Exclude Process

The following steps/stages are not included in the system boundary due to the reason that the elements below are considered irrelevant or not within the boundary to the report:

- Production, transportation and installation of capital goods (buildings, infrastructure, machinery, internal transport packaging) and general operations (staff travel, marketing and communication actions).
- Emissions during the PV inverter installation due to no obvious emission observable.

- Storage phases and sales of products due to no observable impact. Product losses due to abnormal damage such as natural disasters or fire accidents would occur at a rather low frequency.
- Handling operations at the distribution center and retail outlet due to small contribution and negligible impact.
- Research and development activities.
- Long-term emissions are excluded due to high modelling uncertainty and limited data availability.

5.7 Allocation

When a factory produces different products, allocation of the inventory data to the different products is needed. The allocation is made in accordance with the provisions of EN 50693 and Core PCR, considered and the principles of "modularity" and "polluter pays" were followed. Allocation refers to the partitioning of input or output flows of a process or a product system between the product systems under study and one or more other product systems. In this study, there are three types of allocation procedures considered:

Multi-input allocation

For the manufacturing process, energy consumption and emission are allocated based on product production working hours, i.e., electricity consumption and the emissions are calculated based on the amount of time spent producing each type of inverter.

Multi-output allocation

No other by-products are produced from production, hence there is no production of by-products that need to be used to allocate the situation.

End-of-life allocation

For end-of-life allocation of background data (energy and materials), the model "allocation cut-off by classification (ISO standard) is used. The underlying philosophy of this approach is that primary (first) production of materials is always allocated to the primary user of a material. If material is recycled, the primary producer does not receive any credit for the provision of any recyclable materials. Consequently, recyclable materials are available burden- free for recycling processes, and secondary (recycled) materials bear only the impacts of the recycling processes.

5.8 Electricity mix

The life cycles of the products take place in different geographic locations, so the electricity mixes represented for these locations are used for modeling accordingly. The manufacturing processes takes place in the eastern of China, so the electricity of eastern China is used.

The sales locations are in Europe, with Italy as a representative, therefore, the electricity of Italy is used for modelling environmental impact led by electricity consumption at the usage stage.

Table 5-1 Electricity mix used in the report

Life stage	Electricity mix used		GWP Value	Source
A3	Shanghai (Eastern China)	Electricity, medium voltage {CN-ECGC}| market for electricity, medium voltage| Cut-off, U	0.764	Ecoinvent 3.11 database

Life stage	Electricity mix used		GWP Value	Source
B6	Italy	Electricity, medium voltage {IT}| market for electricity, medium voltage | Cut-off, U	0.371	Ecoinvent 3.11 database
		Electricity, low voltage {IT}| electricity production, photovoltaic, 570kWp slanted-roof installation, multi-Si, panel, mounted | Cut-off, U	0.0747	Ecoinvent 3.11 database

6 LCA calculation scenarios

6.1 Manufacturing

The manufacturing includes raw materials supply, transportation from upstream supply site to core factory and core production processes. All raw materials are produced in China, which are transported by lorry with 16-32 ton capacity. The core production plant is an assembly plant, which is located in Shanghai. The core manufacturing process only involves electricity consumption, without other energy consumption and water consumption. In addition, general waste and hazardous waste are generated during production. Activity data in manufacturing stage, like BOM, transportation information, energy consumption and other production information, are provided by CHINT.

6.2 Distribution

The products are firstly transported from the manufacturing site, Shanghai plant, to Shanghai harbor, with a 87km distance by a 16-32 metric ton EURO 6 lorry. Then, it is transported through container ship from Shanghai harbor to Gevona harbor, Italy. And products will be transported 300km from Gevona harbor to warehouse by lorry. According to the PCR, a 16-32 metric ton EURO 4 lorry is selected to be the transportation vehicle for EU land transportation.

Table 6-1 Product distribution

Sales market	Transportation vehicle	Distance (km)	Start location	End location
Italy	Lorry 16 - 32 metric ton, EURO6	87	Plant	Shanghai harbor
	Container ship	16146	Shanghai harbor	Genova harbor
	Lorry 16 - 32 metric ton, EURO4	300	Gevona harbor	Warehouse

6.3 Installation

In the installation stage, the energy use is negligible since the installation process is mainly done manually.

The waste generated from the product packaging mainly consists of paper, wood and plastics. The treatments of them according to PEF EoL default values in Italy and Europe. Transportation distance of the waste is assumed to be 50km.

6.4 Use & maintenance Stage

This stage is used to analyze energy consumption during the product's usage process, with the calculation based on PCR032. In addition, the product lacks information on maintenance during the usage stage. Therefore, it is assumed that there will be no replacement or repair of the product throughout its life cycle.

The electricity consumption during the use stage of the inverters involves two different scenarios. Load consumption takes place when the inverter is operating during daytime hours while the connected solar panels are generating electricity, while non-load or standby consumption takes place when the inverter is connected to the grid but not actively generating electricity due to a lack of sunlight (e.g. at night). In this study, both load consumption using solar powered electricity and non-load consumption using grid-supplied electricity is modelled.

The following formula should be used to calculate the load of electricity used during the product's service life:

$$E_{use} = P_{AC} \times I_r \times (1 - eff) \times RSL$$

where:

Euse (kWh) is the power losses during the operation of power inverter;

PAc (kW) is the output rated AC active power;

Ir (h) is average local annual sunshine in country where the inverter is installed. In this report, Italy is taken as a target country, Roma is as a representative city, the annual sunshine hour is 2473h.

eff (%) is average Energy Efficiency measured or from data sheet;

RSL is the service life of the product, 25 years, while non-load electricity consumption can be calculated using the standby power.

While non-load electricity consumption can be calculated using the standby power:

$$E_{\text{standby}} = P_{\text{standby}} \times (8760 - I_r) \times RSL$$

where E_{standby} is the standby electricity consumption of the inverter, P_{standby} (W) is the standby power of the inverter.

6.4 End-of-life

For end-of-life (EoL) stage, assumptions are made due to a lack of data. De-installation stage of power inverters is assumed to be manually done with no energy use. Transportation distance from the plant site to the waste treatment site is assumed to be 50km according to PCR. For waste processing, power inverter is shredded and post-processed.

In this stage, both PEF EoL default values in Italy and Europe, WEEE and IEC/TR 62635 guidelines are referred. It is assumed that inert substances that cannot be recycled is all landfilled.

7 Reference

[1] ISO 14040:2006 Environmental management – Life cycle assessment – Principles and framework

[2] ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines

[3] EN 50693:2019 "Product category rules for life cycle assessments of electronic and electrical products and systems"

[4] ISO 14025: 2006: Environmental labels and declarations - Type III environmental declarations - principles and procedures.

[5] PCR EPDItaly 007: Electronic and Electric Products and Systems (rev.3), 2023/01/13.

[6] PCR EPDItaly032: Power Inverter, 2022/12/22

[7] Ecoinvent database 3.11, http://www.Ecoinvent.org.

[8] Life Cycle Assessment (LCA) Report of CHINT's PV Inverter for Environmental Product Declaration (EPD), rev. 03, 2026/04/15