FOXESS Co., Ltd.

ENVIRONMENTAL PRODUCT DECLARATION

Product Name: Three-Phase Hybrid Inverters
H3-5.0-E, H3-6.0-E, H3-8.0-E, H3-10.0-E, H3-12.0-E

Site Plant: Wenzhou, Zhejiang Province, China

in accordance with ISO 14025:2006 and EN 15804: 2012+A2:2019/AC:2021

Program Operator	EPDItaly
Publisher	EPDItaly
Declaration Number	*FOXESS-EPD02*
Registration Number	EPDITALY0594
Issue Date	11 / 04 / 2024
Valid to	11 / 04 / 2029

1. GENERAL INFORMATION

EPD Owner:	FOXESS Co., Ltd. Address: No.939, Jinhai Third Road, New Airport Industry Area, Longwan District, Wenzhou, Zhejiang, P.R. China
Product Name:	Three-Phase Hybrid Inverters H3-5.0-E, H3-6.0-E, H3-8.0-E, H3-10.0-E, H3-12.0-E
Production site:	No.939, Jinhai Third Road, New Airport Industry Area, Longwan District, Wenzhou, Zhejiang Province, P.R.China
Field of application:	DC/AC power conversion, , B2B or B2C application
Program Operator:	EPDITALY (www.epditaly.it) Add: via Gaetano De Castillia n° 10 - 20124 Milano, Italy
CPC Code:	4612 “Electrical transformers, static converters and inductors”
Company Contact:	Zhou Yong Email: zhou-yong@fox-ess.com
External Audit:	This declaration has been developed referring to EPDItaly, following the General Program Instruction; further information and the document itself are available at: www.epditaly.it. Independent verification of the declaration and data, according to EN ISO 14025:2006 and EN 15804: 2012+A2:2019/AC:2021. ☐ INTERNAL ☒ EXTERNAL Third party verifier: ICMQ SpA - Via Gaetano De Castillia, 10 - 20124 – Milano/Italy
LCA Consultant:	This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
Reference PCR and version number:	Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, Rev. 3, 2023/01/13.
Other reference documents:	Regulations of the EPDItaly Program rev. 6.0. EN 15804: 2012+A2:2019/AC:2021, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
Comparability:	EPDs relating to the same category of products but belonging to different programmes 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. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.
Liability:	The owner of the declaration will be responsible for the information and supporting evidence. EPDItaly disclaims any liability regarding the manufacturer's information data.
Reference document:	This declaration is based on the EPDItaly regulation, available on the website www.epditaly.com

2. COMPANY INTRODUCTION

FOXESS is a leading enterprise providing research and development, manufacturing, sales and service of inverter and energy storage solutions, which established in September 2019 and located in Wenzhou, China. Product range includes photovoltaic inverters, hybrid inverters, micro inverters, lithium batteries, and electric vehicle chargers.

FOXESS has been accredited by international certification authorities, including ISO9001, ISO14001, ISO45001, ISO50001, and SA8000.

3. SCOPE AND TYPE OF EPD

3.1. Scope of EPD

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

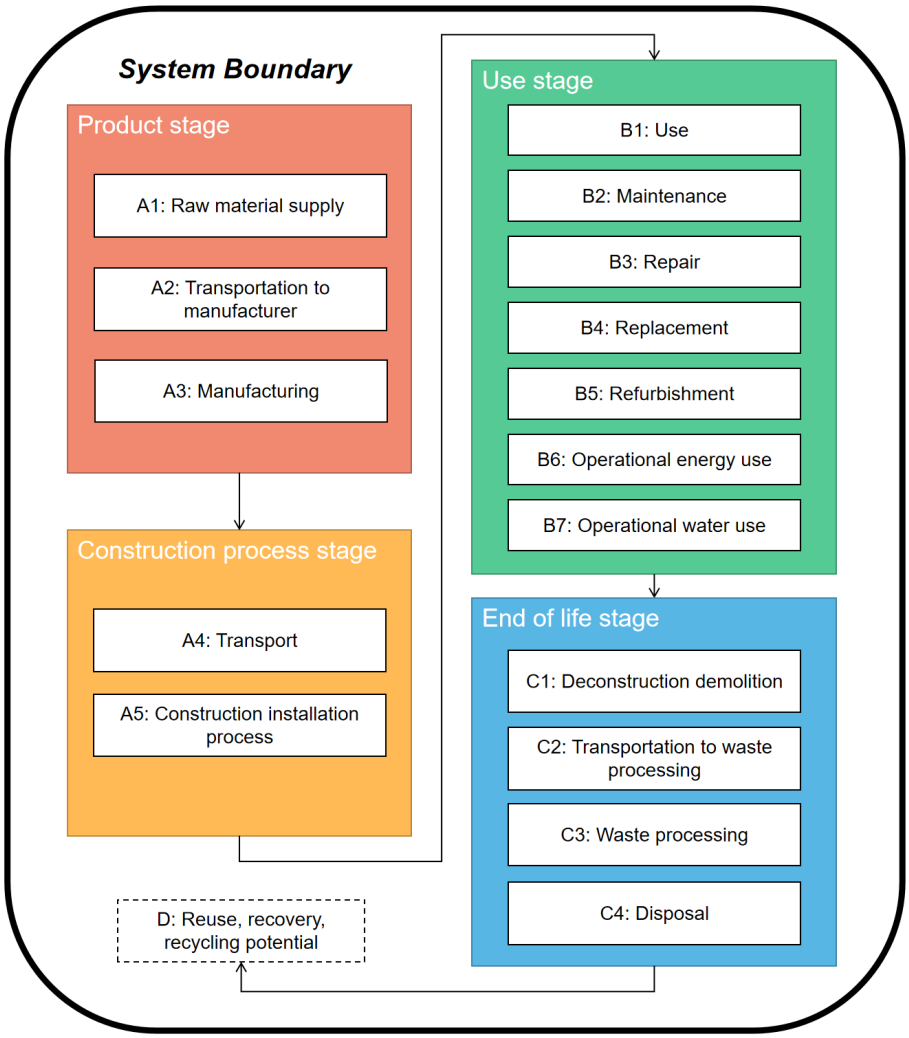

Figure 3-1 System boundary

3.2. Type of EPD

This EPD is a product specific EPD. The declaration covers in total 5 models of inverters, including H3-5.0-E, H3-6.0-E, H3-8.0-E, H3-10.0-E, H3-12.0-E.

3.3. Geographical scope

The geographical boundary for this LCA study 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 is installed and operated shall be considered.

3.4. Time representativeness

All manufacturing data has been collected by FOXESS based on their production inventory in the reference period from June, 2022 to May, 2023. 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, manufacturing has been modelled according to current industry practices.

3.5. Database and LCA software used

In this study, generic data for materials, energy as well as waste disposal and transportation were taken from the database Ecoinvent 3.9. LCA-software SimaPro 9.5 was used for the modeling and calculation.

4. DETAILED PRODUCT DESCRIPTION

4.1. Description of the Product

An inverter converts current from direct current (DC) to alternating current (AC), it is sometimes referred to as a DC/AC converter. FOXESS offers a wide range of products for residential, commercial, and utility-scale applications. The products that are under study are three-phase hybrid inverters, H3 for 5-12kW, applied as part of the building technical system for indoor and outdoor use.

These products have following features:

- Max battery charge and discharge efficiencies reach 98.5% and 97%.
- Compatible with the latest high-voltage lithium-ion batteries.
- IP65 rated and suitable for outdoor installation.
- Monitor remotely via smartphone or web portal.
- Natural cooling, wide temperature tolerance and no noisy internal fans.
- Add additional batteries easily, scaling to 28.49kWh.

4.2. Technical parameters

Table 4-1 technical parameters of different power inverters

Series	**H3**				
Model	**H3-5.0-E**	**H3-6.0-E**	**H3-8.0-E**	**H3-10.0-E**	**H3-12.0-E**
AC Output					
Norminal AC power[W]	5000	6000	8000	10000	12000
Max. apparent AC power[VA]	5500	6600	8800	11000	13200
Max. AC current[A](Per phase)	8.0	9.6	12.8	16.0	19.2
AC Input					
Max. AC power[VA]	10000	12000	16000	16000	16000
General information					
Operating temperature range[℃]	-25 to +60℃ (derating at 45℃)				
Storage temperature	-40 to +70°C				
Cooling	Natural			Fan cooling	
noise grade[dB]	<35			<45	
Inverter topology	Three phase				
Ingress protection	IP65 (for outdoor use)				
Altitude[m]	<2000				
Dimension (mm)	449*519*198				
Net weight (kg)	28				
Max. efficiency	97.80%	97.80%	98.00%	98.00%	98.00%
Euro-efficiency	97.20%	97.20%	97.30%	97.30%	97.30%
Standby consumption[W]	200W for hot standby,15W for cold standby				

4.3. Materials compositions

Table 4-2 Materials compositions (Mass ratio)

IEC62474 Classname	**IEC62474 ID**	**H3-5.0-E, H3-6.0-E, H3-8.0-E**	**H3-10.0-E, H3-12.0-E**
Stainless steel	M-100	0.499%	1.147%
Other ferrous alloys, non-stainless steels	M-119	1.357%	1.347%
Aluminium and its alloys	M-120	62.171%	61.733%
Copper and its alloys	M-121	5.805%	5.768%
Magnesium and its alloys	M-122	0.001%	0.001%
Nickel and its alloys	M-123	0.039%	0.039%
Zinc and its alloys	M-124	0.046%	0.045%
Lead and its alloys (including Pb solders)	M-125	0.598%	0.594%
Tin and its alloys (including Pb-free solders)	M-126	0.665%	0.660%
Other non-ferrous metals and alloys	M-149	0.061%	0.061%
Gold	M-150	0.008%	0.008%
Palladium	M-152	0.000%	0.000%
Other precious metals	M-159	0.039%	0.038%
Glass	M-161	5.507%	5.469%
Other inorganic materials	M-199	2.669%	2.650%
PolyVinylChloride (PVC)	M-200	0.238%	0.236%
PolyCarbonate (PC)	M-204	11.838%	11.755%

PolyEthylene (PE)	M-204	1.752%	1.779%
PolyAmide (PA)	M-208	0.638%	0.633%
PolyEthyleneTerephthalate (PET)	M-209	0.211%	0.209%
Polyphenylenesulfide (PPS)	M-213	0.027%	0.027%
Polymethylmethacrylate (PMMA)	M-220	0.000%	0.000%
Other unfilled thermoplastics	M-249	0.035%	0.035%
PolyAmide (PA) filled	M-258	0.948%	0.941%
Epoxy resin (EP)	M-302	1.177%	1.169%
Silicone	M-321	0.263%	0.262%
Ethylene-Propylene-Diene-Rubber (EPDM)	M-324	1.773%	1.761%
Paper	M-341	0.362%	0.360%
Other organic materials	M-399	1.153%	1.145%

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.

4.4. Description of the production process

All the inverter products share similar manufacturing processes and life cycle stages. Figure 4-1 is the flowchart illustrating the production process stages of FOXESS inverter products. For simplification purposes, only main stages of manufacturing are presented. Generally, production of inverter includes assembly of inductor box, terminals, transfer and power amplifier and control boards, wires, top cover, inspection, several tests, packaging and warehousing.

After the preparation works, the production process starts from assembly of inductor box. Terminals are installed afterwards. And then, transfer, power amplifier, and control board are assembled successively with silicone grease printing and wires installing.

Subsequently, inspection process examines the inverter, which can quickly and accurately detect various quality issues on the PCB, such as missing components, position deviation, and soldering defects. A safety test follows behind, that can check for safety-related issues.

With the finishing of top cover assembling, the inverter goes into an Automatic Test Equipment (ATE) test. The inverter goes off the assembly line afterwards. A set of test including aging test, ATE2 test and air-tight test are conducted to ensure the product quality, safety, and durability. Aging test applies continuous environmental stress to components at a certain temperature for a long time, including high temperature stress and other types of stress like temperature cycling and random vibration. The goal is to accelerate physical and chemical reactions and expose potential defects early, eliminating early failures of products. Air-tight test is to inflate or exhaust the air in a sealed space to detect the air tightness of the product. Finally, the inverter is packaged and sent to a warehouse.

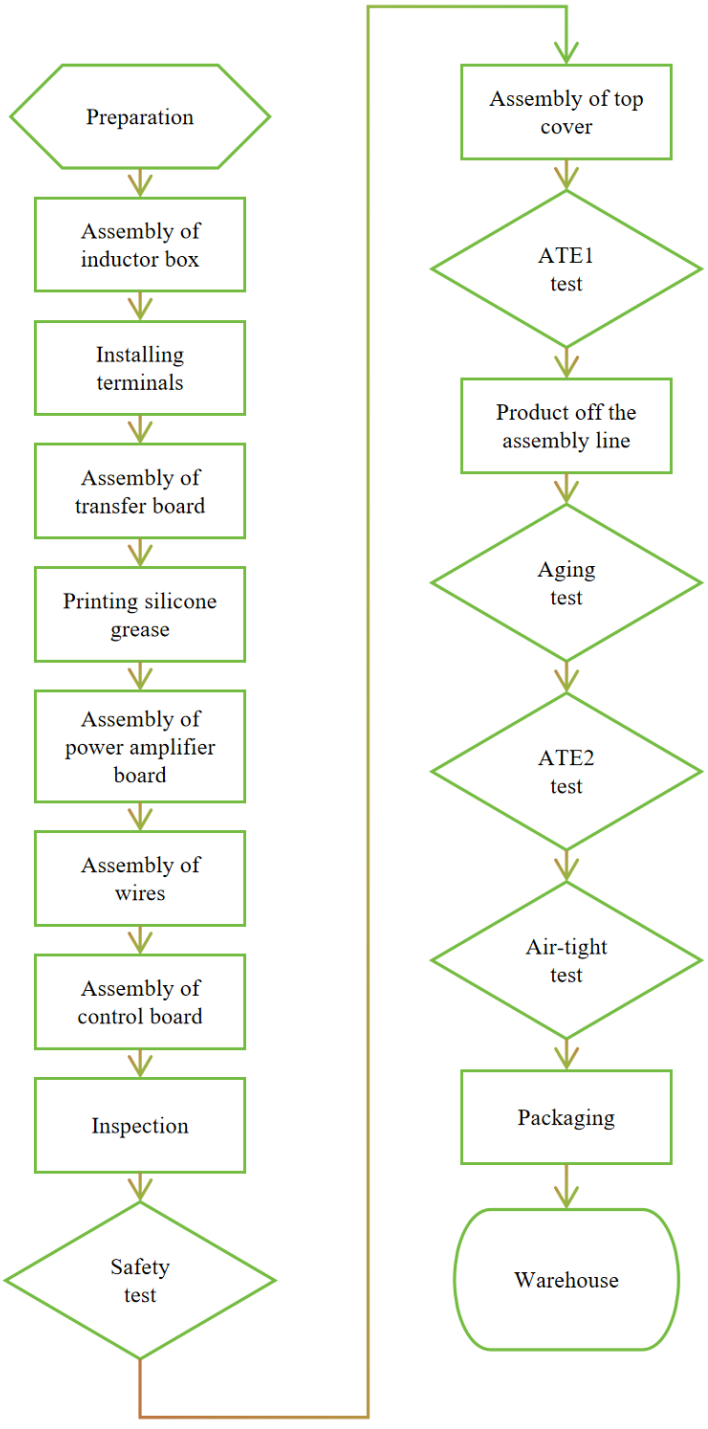

Figure 4-1 Manufacturing process flow diagram of inverter

5. LCA RESULTS

The LCA results show the environmental impacts and resource input and output flows calculated according to EN 15804 reference package based on EF3.1. The results are shown per functional unit (1 piece of inverter). The LCA results have been calculated using the LCA software SimaPro 9.5 and the data from ecoinvent v3.9.

Table 5-1 System boundaries and life cycle stages within this study

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE NOT DECLARED)																	
	Product Stage			**Construction process stage**		**Use Stage**							**End of life stage**				**Resource recovery stage**
	Raw Material	Transport	Manufacturing	Transport	Assembly / Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction and demolition	Transport	Waste processing	disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

5.1. Environmental impacts

Table 5-2 Environmental impacts - H3 Series

	Impact category	**Unit**	**Product stage**			**Construction stage**		**Use stage**							**End-of-life stage**				**3R potential**
			A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
H3-5.0-E	GWP-total	kg CO2 eq	1.08E+03	3.91E+00	6.71E+00	1.30E+01	3.11E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E+03	0.00E+00	0.00E+00	2.96E-01	1.59E+00	4.02E+00	-5.57E+02
	GWP-fossil	kg CO2 eq	1.08E+03	3.91E+00	6.75E+00	1.30E+01	1.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+03	0.00E+00	0.00E+00	2.96E-01	1.59E+00	1.29E+00	-5.56E+02
	GWP-biogenic	kg CO2 eq	3.51E+00	1.66E-03	-3.62E-02	3.43E-03	5.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.75E+01	0.00E+00	0.00E+00	2.91E-04	7.30E-04	2.83E+00	4.98E-01
	GWP-luluc	kg CO2 eq	2.20E+00	2.00E-03	2.67E-03	7.59E-03	5.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+00	0.00E+00	0.00E+00	1.42E-04	3.16E-03	1.51E-04	-8.14E-01
	ODP	kg CFC11 eq	3.25E-05	5.84E-08	1.50E-08	1.98E-07	2.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.78E-05	0.00E+00	0.00E+00	6.31E-09	1.08E-08	3.48E-09	-6.67E-06
	AP	mol H+ eq	7.82E+00	1.16E-02	3.45E-02	1.48E-01	6.88E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.17E+00	0.00E+00	0.00E+00	1.19E-03	8.55E-03	1.21E-03	-4.87E+00
	EP-Freshwater	kg P eq	1.23E-01	3.62E-05	1.41E-04	9.99E-05	1.25E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.42E-02	0.00E+00	0.00E+00	2.32E-06	7.95E-05	1.56E-05	-6.48E-02

	EP-Marine	kg N eq	1.22E+00	3.38E-03	7.08E-03	4.15E-02	8.99E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E+00	0.00E+00	0.00E+00	4.51E-04	1.43E-03	3.42E-03	-7.42E-01
	EP-Terrestrial	mol N eq	1.39E+01	3.60E-02	7.79E-02	4.56E-01	2.86E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E+01	0.00E+00	0.00E+00	4.86E-03	1.69E-02	4.15E-03	-8.78E+00
	POCP	kg NMVOC eq	5.56E+00	1.55E-02	2.26E-02	1.34E-01	1.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.21E+00	0.00E+00	0.00E+00	1.75E-03	4.78E-03	1.82E-03	-2.46E+00
	ADP- M&M	kg Sb eq	2.10E-01	1.23E-05	8.29E-06	3.26E-05	2.74E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-02	0.00E+00	0.00E+00	9.32E-07	1.43E-05	3.91E-07	-1.80E-01
	ADP-fossil	MJ	1.34E+04	5.37E+01	6.34E+01	1.73E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E+04	0.00E+00	0.00E+00	4.11E+00	1.98E+01	2.43E+00	-5.74E+03
	WDP	m3 depriv.	2.07E+02	2.42E-01	7.64E-01	6.76E-01	2.66E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E+03	0.00E+00	0.00E+00	1.70E-02	2.84E-01	8.97E-02	-1.02E+02
H3-6.0-E	GWP-total	kg CO2 eq	1.08E+03	3.91E+00	6.99E+00	1.30E+01	3.11E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E+03	0.00E+00	0.00E+00	2.96E-01	1.59E+00	4.02E+00	-5.57E+02
	GWP-fossil	kg CO2 eq	1.08E+03	3.91E+00	7.02E+00	1.30E+01	1.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+03	0.00E+00	0.00E+00	2.96E-01	1.59E+00	1.29E+00	-5.56E+02
	GWP-biogenic	kg CO2 eq	3.51E+00	1.66E-03	-3.77E-02	3.43E-03	5.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.81E+01	0.00E+00	0.00E+00	2.91E-04	7.30E-04	2.83E+00	4.98E-01
	GWP-luluc	kg CO2 eq	2.20E+00	2.00E-03	2.78E-03	7.59E-03	5.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E+00	0.00E+00	0.00E+00	1.42E-04	3.16E-03	1.51E-04	-8.14E-01
	ODP	kg CFC11 eq	3.25E-05	5.84E-08	1.56E-08	1.98E-07	2.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.49E-05	0.00E+00	0.00E+00	6.31E-09	1.08E-08	3.48E-09	-6.67E-06
	AP	mol H+ eq	7.82E+00	1.16E-02	3.60E-02	1.48E-01	6.88E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.88E+00	0.00E+00	0.00E+00	1.19E-03	8.55E-03	1.21E-03	-4.87E+00
	EP-Freshwater	kg P eq	1.23E-01	3.62E-05	1.47E-04	9.99E-05	1.25E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-02	0.00E+00	0.00E+00	2.32E-06	7.95E-05	1.56E-05	-6.48E-02
	EP-Marine	kg N eq	1.22E+00	3.38E-03	7.38E-03	4.15E-02	8.99E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E+00	0.00E+00	0.00E+00	4.51E-04	1.43E-03	3.42E-03	-7.42E-01
	EP-Terrestrial	mol N eq	1.39E+01	3.60E-02	8.11E-02	4.56E-01	2.86E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E+01	0.00E+00	0.00E+00	4.86E-03	1.69E-02	4.15E-03	-8.78E+00
	POCP	kg NMVOC eq	5.56E+00	1.55E-02	2.34E-02	1.34E-01	1.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.65E+00	0.00E+00	0.00E+00	1.75E-03	4.78E-03	1.82E-03	-2.46E+00
	ADP- M&M	kg Sb eq	2.10E-01	1.23E-05	8.63E-06	3.26E-05	2.74E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.93E-02	0.00E+00	0.00E+00	9.32E-07	1.43E-05	3.91E-07	-1.80E-01
	ADP-fossil	MJ	1.34E+04	5.37E+01	6.60E+01	1.73E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E+04	0.00E+00	0.00E+00	4.11E+00	1.98E+01	2.43E+00	-5.74E+03
	WDP	m3 depriv.	2.07E+02	2.42E-01	7.95E-01	6.76E-01	2.66E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E+03	0.00E+00	0.00E+00	1.70E-02	2.84E-01	8.97E-02	-1.02E+02
H3-8.0-E	GWP-total	kg CO2 eq	1.08E+03	3.91E+00	7.46E+00	1.30E+01	3.11E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E+03	0.00E+00	0.00E+00	2.96E-01	1.59E+00	4.02E+00	-5.57E+02
	GWP-fossil	kg CO2 eq	1.08E+03	3.91E+00	7.50E+00	1.30E+01	1.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E+03	0.00E+00	0.00E+00	2.96E-01	1.59E+00	1.29E+00	-5.56E+02
	GWP-biogenic	kg CO2 eq	3.51E+00	1.66E-03	-4.02E-02	3.43E-03	5.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.90E+01	0.00E+00	0.00E+00	2.91E-04	7.30E-04	2.83E+00	4.98E-01
	GWP-luluc	kg CO2 eq	2.20E+00	2.00E-03	2.97E-03	7.59E-03	5.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E+00	0.00E+00	0.00E+00	1.42E-04	3.16E-03	1.51E-04	-8.14E-01
	ODP	kg CFC11 eq	3.25E-05	5.84E-08	1.66E-08	1.98E-07	2.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-05	0.00E+00	0.00E+00	6.31E-09	1.08E-08	3.48E-09	-6.67E-06
	AP	mol H+ eq	7.82E+00	1.16E-02	3.84E-02	1.48E-01	6.88E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E+00	0.00E+00	0.00E+00	1.19E-03	8.55E-03	1.21E-03	-4.87E+00
	EP-Freshwater	kg P eq	1.23E-01	3.62E-05	1.57E-04	9.99E-05	1.25E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.34E-02	0.00E+00	0.00E+00	2.32E-06	7.95E-05	1.56E-05	-6.48E-02

	EP-Marine	kg N eq	1.22E+00	3.38E-03	7.88E-03	4.15E-02	8.99E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+00	0.00E+00	0.00E+00	4.51E-04	1.43E-03	3.42E-03	-7.42E-01
	EP-Terrestrial	mol N eq	1.39E+01	3.60E-02	8.66E-02	4.56E-01	2.86E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E+01	0.00E+00	0.00E+00	4.86E-03	1.69E-02	4.15E-03	-8.78E+00
	POCP	kg NMVOC eq	5.56E+00	1.55E-02	2.49E-02	1.34E-01	1.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.40E+00	0.00E+00	0.00E+00	1.75E-03	4.78E-03	1.82E-03	-2.46E+00
	ADP- M&M	kg Sb eq	2.10E-01	1.23E-05	9.22E-06	3.26E-05	2.74E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.71E-02	0.00E+00	0.00E+00	9.32E-07	1.43E-05	3.91E-07	-1.80E-01
	ADP-fossil	MJ	1.34E+04	5.37E+01	7.05E+01	1.73E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E+04	0.00E+00	0.00E+00	4.11E+00	1.98E+01	2.43E+00	-5.74E+03
	WDP	m3 depriv.	2.07E+02	2.42E-01	8.49E-01	6.76E-01	2.66E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	0.00E+00	0.00E+00	1.70E-02	2.84E-01	8.97E-02	-1.02E+02
H3-10.0-E	GWP-total	kg CO2 eq	1.09E+03	3.93E+00	7.99E+00	1.31E+01	3.11E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E+03	0.00E+00	0.00E+00	2.98E-01	1.60E+00	4.04E+00	-5.57E+02
	GWP-fossil	kg CO2 eq	1.08E+03	3.92E+00	8.03E+00	1.30E+01	1.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E+03	0.00E+00	0.00E+00	2.98E-01	1.60E+00	1.30E+00	-5.57E+02
	GWP-biogenic	kg CO2 eq	3.56E+00	1.67E-03	-4.31E-02	3.45E-03	5.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+02	0.00E+00	0.00E+00	2.94E-04	7.35E-04	2.83E+00	4.99E-01
	GWP-luluc	kg CO2 eq	2.20E+00	2.01E-03	3.18E-03	7.63E-03	5.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E+00	0.00E+00	0.00E+00	1.43E-04	3.19E-03	1.52E-04	-8.14E-01
	ODP	kg CFC11 eq	3.26E-05	5.87E-08	1.78E-08	1.99E-07	2.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-05	0.00E+00	0.00E+00	6.35E-09	1.09E-08	3.49E-09	-6.68E-06
	AP	mol H+ eq	7.83E+00	1.17E-02	4.11E-02	1.49E-01	6.88E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E+01	0.00E+00	0.00E+00	1.20E-03	8.61E-03	1.22E-03	-4.87E+00
	EP-Freshwater	kg P eq	1.23E-01	3.64E-05	1.68E-04	1.01E-04	1.25E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.70E-02	0.00E+00	0.00E+00	2.34E-06	8.01E-05	1.57E-05	-6.48E-02
	EP-Marine	kg N eq	1.22E+00	3.39E-03	8.44E-03	4.18E-02	8.99E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E+00	0.00E+00	0.00E+00	4.55E-04	1.44E-03	3.44E-03	-7.43E-01
	EP-Terrestrial	mol N eq	1.40E+01	3.62E-02	9.28E-02	4.58E-01	2.86E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E+01	0.00E+00	0.00E+00	4.89E-03	1.71E-02	4.17E-03	-8.78E+00
	POCP	kg NMVOC eq	5.57E+00	1.56E-02	2.65E-02	1.35E-01	1.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.25E+00	0.00E+00	0.00E+00	1.76E-03	4.81E-03	1.83E-03	-2.47E+00
	ADP- M&M	kg Sb eq	2.10E-01	1.24E-05	9.87E-06	3.28E-05	2.74E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.60E-02	0.00E+00	0.00E+00	9.38E-07	1.44E-05	3.93E-07	-1.80E-01
	ADP-fossil	MJ	1.34E+04	5.40E+01	7.55E+01	1.74E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+04	0.00E+00	0.00E+00	4.14E+00	1.99E+01	2.43E+00	-5.74E+03
	WDP	m3 depriv.	2.07E+02	2.43E-01	9.10E-01	6.80E-01	2.66E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E+03	0.00E+00	0.00E+00	1.71E-02	2.86E-01	8.99E-02	-1.02E+02
H3-12.0-E	GWP-total	kg CO2 eq	1.09E+03	3.93E+00	8.53E+00	1.31E+01	3.11E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E+03	0.00E+00	0.00E+00	2.98E-01	1.60E+00	4.04E+00	-5.57E+02
	GWP-fossil	kg CO2 eq	1.08E+03	3.92E+00	8.57E+00	1.30E+01	1.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E+03	0.00E+00	0.00E+00	2.98E-01	1.60E+00	1.30E+00	-5.57E+02
	GWP-biogenic	kg CO2 eq	3.56E+00	1.67E-03	-4.59E-02	3.45E-03	5.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E+02	0.00E+00	0.00E+00	2.94E-04	7.35E-04	2.83E+00	4.99E-01
	GWP-luluc	kg CO2 eq	2.20E+00	2.01E-03	3.39E-03	7.63E-03	5.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E+00	0.00E+00	0.00E+00	1.43E-04	3.19E-03	1.52E-04	-8.14E-01
	ODP	kg CFC11 eq	3.26E-05	5.87E-08	1.89E-08	1.99E-07	2.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-04	0.00E+00	0.00E+00	6.35E-09	1.09E-08	3.49E-09	-6.68E-06
	AP	mol H+ eq	7.83E+00	1.17E-02	4.39E-02	1.49E-01	6.88E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E+01	0.00E+00	0.00E+00	1.20E-03	8.61E-03	1.22E-03	-4.87E+00
	EP-Freshwater	kg P eq	1.23E-01	3.64E-05	1.79E-04	1.01E-04	1.25E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-01	0.00E+00	0.00E+00	2.34E-06	8.01E-05	1.57E-05	-6.48E-02

	EP-Marine	kg N eq	1.22E+00	3.39E-03	9.00E-03	4.18E-02	8.99E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E+00	0.00E+00	0.00E+00	4.55E-04	1.44E-03	3.44E-03	-7.43E-01
	EP-Terrestrial	mol N eq	1.40E+01	3.62E-02	9.90E-02	4.58E-01	2.86E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E+01	0.00E+00	0.00E+00	4.89E-03	1.71E-02	4.17E-03	-8.78E+00
	POCP	kg NMVOC eq	5.57E+00	1.56E-02	2.82E-02	1.35E-01	1.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.10E+00	0.00E+00	0.00E+00	1.76E-03	4.81E-03	1.83E-03	-2.47E+00
	ADP- M&M	kg Sb eq	2.10E-01	1.24E-05	1.05E-05	3.28E-05	2.74E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-02	0.00E+00	0.00E+00	9.38E-07	1.44E-05	3.93E-07	-1.80E-01
	ADP-fossil	MJ	1.34E+04	5.40E+01	8.05E+01	1.74E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.14E+04	0.00E+00	0.00E+00	4.14E+00	1.99E+01	2.43E+00	-5.74E+03
	WDP	m3 depriv.	2.07E+02	2.43E-01	9.70E-01	6.80E-01	2.66E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+03	0.00E+00	0.00E+00	1.71E-02	2.86E-01	8.99E-02	-1.02E+02

The results of the environmental impact indicators of ADPminerals and metals, ADPfossil and WDP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator. The additional environmental impact indicators have been calculated for all the products, but not reported in the EPD.

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

5.2. Resource use, end-of-life-waste, and output flows

Table 5-3 Resource use, end-of-life-Waste, and output flows - H3 Series

Inverter	Impact category	Unit	Product stage			Construction stage		Use stage							End-of-life stage				3R potential
			A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
H3-5.0-E	PERE	MJ	1.48E+03	6.88E-01	9.64E+00	1.94E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E+04	0.00E+00	0.00E+00	6.38E-02	2.65E+00	1.08E-01	-4.44E+02
	PERM	MJ	5.58E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PERT	MJ	1.54E+03	6.88E-01	9.64E+00	1.94E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E+04	0.00E+00	0.00E+00	6.38E-02	2.65E+00	1.08E-01	-4.44E+02
	PENRE	MJ	1.32E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRM	MJ	2.04E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRT	MJ	1.34E+04	5.37E+01	6.34E+01	1.73E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E+04	0.00E+00	0.00E+00	4.11E+00	1.98E+01	2.43E+00	-5.74E+03
	SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	FW	m3	7.81E+00	7.60E-03	1.89E-02	2.18E-02	8.33E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.22E+01	0.00E+00	0.00E+00	5.86E-04	1.09E-02	2.44E-03	-2.99E+00
	HWD	kg	1.10E-01	3.46E-04	6.41E-05	1.05E-03	8.87E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.99E-01	0.00E+00	0.00E+00	2.62E-05	3.95E-05	1.28E-05	-2.06E-02
	NHWD	kg	1.17E+02	2.63E+00	4.86E-01	6.33E+00	1.87E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E+02	0.00E+00	0.00E+00	2.01E-01	2.42E+01	6.62E+00	-8.22E+01
	RWD	kg	2.63E-02	1.09E-05	6.77E-05	3.07E-05	5.78E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.61E-02	0.00E+00	0.00E+00	1.34E-06	5.12E-05	1.84E-06	-4.92E-03
	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	MFR	kg	0.00E+00	0.00E+00	2.26E-01	0.00E+00	2.72E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E+01	0.00E+00
	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	6.39E-02	0.00E+00	5.99E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.13E+00	0.00E+00
	EEE	MJ	0.00E+00	0.00E+00	4.74E-03	0.00E+00	3.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E+00	0.00E+00
H3-6.0-E	PERE	MJ	1.48E+03	6.88E-01	1.00E+01	1.94E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E+04	0.00E+00	0.00E+00	6.38E-02	2.65E+00	1.08E-01	-4.44E+02
	PERM	MJ	5.58E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PERT	MJ	1.54E+03	6.88E-01	1.00E+01	1.94E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E+04	0.00E+00	0.00E+00	6.38E-02	2.65E+00	1.08E-01	-4.44E+02
	PENRE	MJ	1.32E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRM	MJ	2.04E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRT	MJ	1.34E+04	5.37E+01	6.60E+01	1.73E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E+04	0.00E+00	0.00E+00	4.11E+00	1.98E+01	2.43E+00	-5.74E+03
	SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	FW	m3	7.81E+00	7.60E-03	1.97E-02	2.18E-02	8.33E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E+01	0.00E+00	0.00E+00	5.86E-04	1.09E-02	2.44E-03	-2.99E+00
	HWD	kg	1.10E-01	3.46E-04	6.67E-05	1.05E-03	8.87E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E-01	0.00E+00	0.00E+00	2.62E-05	3.95E-05	1.28E-05	-2.06E-02
	NHWD	kg	1.17E+02	2.63E+00	5.06E-01	6.33E+00	1.87E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+02	0.00E+00	0.00E+00	2.01E-01	2.42E+01	6.62E+00	-8.22E+01
	RWD	kg	2.63E-02	1.09E-05	7.05E-05	3.07E-05	5.78E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.85E-02	0.00E+00	0.00E+00	1.34E-06	5.12E-05	1.84E-06	-4.92E-03
	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	MFR	kg	0.00E+00	0.00E+00	2.26E-01	0.00E+00	2.72E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E+01	0.00E+00
	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	6.39E-02	0.00E+00	5.99E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.13E+00	0.00E+00
	EEE	MJ	0.00E+00	0.00E+00	4.74E-03	0.00E+00	3.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E+00	0.00E+00
H3-8.0-E	PERE	MJ	1.48E+03	6.88E-01	1.07E+01	1.94E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.74E+04	0.00E+00	0.00E+00	6.38E-02	2.65E+00	1.08E-01	-4.44E+02
	PERM	MJ	5.58E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

	PERT	MJ	1.54E+03	6.88E-01	1.07E+01	1.94E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.74E+04	0.00E+00	0.00E+00	6.38E-02	2.65E+00	1.08E-01	-4.44E+02
	PENRE	MJ	1.32E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRM	MJ	2.04E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRT	MJ	1.34E+04	5.37E+01	7.05E+01	1.73E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E+04	0.00E+00	0.00E+00	4.11E+00	1.98E+01	2.43E+00	-5.74E+03
	SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	FW	m3	7.81E+00	7.60E-03	2.10E-02	2.18E-02	8.33E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+01	0.00E+00	0.00E+00	5.86E-04	1.09E-02	2.44E-03	-2.99E+00
	HWD	kg	1.10E-01	3.46E-04	7.12E-05	1.05E-03	8.87E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.33E-01	0.00E+00	0.00E+00	2.62E-05	3.95E-05	1.28E-05	-2.06E-02
	NHWD	kg	1.17E+02	2.63E+00	5.40E-01	6.33E+00	1.87E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E+02	0.00E+00	0.00E+00	2.01E-01	2.42E+01	6.62E+00	-8.22E+01
	RWD	kg	2.63E-02	1.09E-05	7.53E-05	3.07E-05	5.78E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-02	0.00E+00	0.00E+00	1.34E-06	5.12E-05	1.84E-06	-4.92E-03
	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	MFR	kg	0.00E+00	0.00E+00	2.26E-01	0.00E+00	2.72E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E+01	0.00E+00
	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	6.39E-02	0.00E+00	5.99E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.13E+00	0.00E+00
	EEE	MJ	0.00E+00	0.00E+00	4.74E-03	0.00E+00	3.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E+00	0.00E+00
H3-10.0-E	PERE	MJ	1.48E+03	6.91E-01	1.15E+01	1.96E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E+04	0.00E+00	0.00E+00	6.43E-02	2.67E+00	1.08E-01	-4.44E+02
	PERM	MJ	5.58E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PERT	MJ	1.54E+03	6.91E-01	1.15E+01	1.96E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E+04	0.00E+00	0.00E+00	6.43E-02	2.67E+00	1.08E-01	-4.44E+02
	PENRE	MJ	1.32E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRM	MJ	2.05E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRT	MJ	1.34E+04	5.40E+01	7.55E+01	1.74E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+04	0.00E+00	0.00E+00	4.14E+00	1.99E+01	2.43E+00	-5.74E+03
	SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	FW	m3	7.83E+00	7.64E-03	2.25E-02	2.20E-02	8.33E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E+01	0.00E+00	0.00E+00	5.90E-04	1.10E-02	2.45E-03	-2.99E+00
	HWD	kg	1.10E-01	3.48E-04	7.62E-05	1.05E-03	8.87E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.28E-01	0.00E+00	0.00E+00	2.64E-05	3.98E-05	1.29E-05	-2.06E-02
	NHWD	kg	1.18E+02	2.64E+00	5.78E-01	6.37E+00	1.87E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E+02	0.00E+00	0.00E+00	2.02E-01	2.44E+01	6.66E+00	-8.22E+01
	RWD	kg	2.63E-02	1.10E-05	8.06E-05	3.09E-05	5.78E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.73E-02	0.00E+00	0.00E+00	1.35E-06	5.16E-05	1.85E-06	-4.93E-03
	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

	MFR	kg	0.00E+00	0.00E+00	2.26E-01	0.00E+00	2.72E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E+01	0.00E+00
	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	6.39E-02	0.00E+00	5.99E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E+00	0.00E+00
	EEE	MJ	0.00E+00	0.00E+00	4.74E-03	0.00E+00	3.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E+00	0.00E+00
H3-12.0-E	PERE	MJ	1.48E+03	6.91E-01	1.22E+01	1.96E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.91E+04	0.00E+00	0.00E+00	6.43E-02	2.67E+00	1.08E-01	-4.44E+02
	PERM	MJ	5.58E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PERT	MJ	1.54E+03	6.91E-01	1.22E+01	1.96E+00	3.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.91E+04	0.00E+00	0.00E+00	6.43E-02	2.67E+00	1.08E-01	-4.44E+02
	PENRE	MJ	1.32E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRM	MJ	2.05E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRT	MJ	1.34E+04	5.40E+01	8.05E+01	1.74E+02	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.14E+04	0.00E+00	0.00E+00	4.14E+00	1.99E+01	2.43E+00	-5.74E+03
	SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	FW	m3	7.83E+00	7.64E-03	2.40E-02	2.20E-02	8.33E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.22E+01	0.00E+00	0.00E+00	5.90E-04	1.10E-02	2.45E-03	-2.99E+00
	HWD	kg	1.10E-01	3.48E-04	8.13E-05	1.05E-03	8.87E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-01	0.00E+00	0.00E+00	2.64E-05	3.98E-05	1.29E-05	-2.06E-02
	NHWD	kg	1.18E+02	2.64E+00	6.17E-01	6.37E+00	1.87E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E+02	0.00E+00	0.00E+00	2.02E-01	2.44E+01	6.66E+00	-8.22E+01
	RWD	kg	2.63E-02	1.10E-05	8.60E-05	3.09E-05	5.78E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.19E-02	0.00E+00	0.00E+00	1.35E-06	5.16E-05	1.85E-06	-4.93E-03
	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	MFR	kg	0.00E+00	0.00E+00	2.26E-01	0.00E+00	2.72E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E+01	0.00E+00
	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	6.39E-02	0.00E+00	5.99E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E+00	0.00E+00
	EEE	MJ	0.00E+00	0.00E+00	4.74E-03	0.00E+00	3.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E+00	0.00E+00

Caption:

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

PENRE: Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PERE**: Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PENRM**: Use of non-renewable primary energy resources used as raw materials; **PERM**: Use of renewable primary energy resources used as raw materials; **PERT**: Total use of renewable primary energy resources; **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; **HWD** = Hazardous waste disposed; **NHWD** = Non-hazardous waste disposed; **RWD** = Radioactive waste disposed; **CRU** = Components for re-use; **MFR** = Materials for recycling; **MER** = Materials for energy recovery; **EEE** = Exported electrical energy; **EET** = Exported energy Thermal

6. Calculation rules

6.1. Declared or 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 LCA study 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.

6.2. Reference Service Life

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

6.3. Assumptions

Table 6-1 List of assumptions

Life cycle stages	Items	Assumptions
A1 - A3	Material of the electromagnetic relay	Ferrite and copper share 50% of the total weight respectively.
A1 - A3	Transportation vehicle type	For the vehicle used for transportation of solid and hazardous wastes, EURO 5 lorry with 16-32 ton capacity is assumed for modelling
A4 Distribution stage	Transportation vehicle type	For the vehicle used for product distribution, EURO 4 lorry with 16-32 ton capacity, and container ship are assumed for land and sea transport. 300km was assumed for the transport from storage center to customer.
A5 Installation stage	Electricity and materials use	No electricity and materials used for installation as it can be done manually
B Use & Maintenance	Replacement	No replacement for the module as the module has RSL>25 years
C1-C4 End-of-life	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
	Disposal	The disposal scenario follows PEF EoL default values in Italy and Europe and IEC/TR 62635 guidelines

6.4. Cut-off rules

For the processes within the system boundary, all available energy and material flow data have been included in the model. The cut-off criteria were set to 2% in this study according to PCR.

Table 6-2 Cut-off flows

Flow name	Process stage	Mass %	Criteria to cut-off
Spacer, tape, buzzer etc.	A1 Raw material	0.29	<2%
Devices external to the inverter itself required for installation	A5 Installation stage	N/A	Cut-off due to small impact according to PCR
Any extraordinary maintenance done on the switch	B Use & Maintenance	N/A	Specified in PCR
Total cut-off mass % estimated			<2%

6.5. Data quality

Primary data system (such materials or energy flows that enter the production system) is from FOXESS manufacturing facilities in a reference period from June, 2022 to May, 2023 (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 3.9 "allocation, cut-off by classification - unit" database.

6.6. Excluded processes

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 LCA study:

- Impacts related to the production, transportation and installation of capital goods (buildings, infrastructure, machinery, internal transport packaging) and general operations (staff travel, marketing and communication actions) that cannot be directly allocated to products are excluded from the LCA study.
- Emissions during the inverter installation and operation 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. These losses would mostly be accidental.
- Handling operations at the distribution center and retail outlet due to small contribution and negligible impact.
- Research and development activities.
- Long-term emissions.
- The recycling process of defective products is reused internally for the manufacturing process.

6.7. Allocations

The allocation is made in accordance with the provisions of EN 15804 and Core PCR. 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 data sets in this study, raw materials as well as packaging materials of different inverters are based on the BOM from FOXESS, no allocation is used at the stage. As for the manufacturing process, the energy consumption and emission are allocated based on working hours of different inverter, i.e., the 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 the 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.

For end-of-life stage of the inverter products, the polluter pays principle (PPP) is followed in this report. This means

that the waste transportation to the treatment site and the waste processing (mainly shredding) is considered in this report, while the benefit, the load from waste treatment for recycling purposes such as de-pollution and crushing, etc., is allocated to the next life cycle of substituted products, but not the primary producers, hence no burden or benefit will be allocated to the primary producer of the electric products (cut-off approach).

6.8. Electricity mix

The manufacturing stage of inverters takes place in Zhejiang, China. Therefore, the Chinese grid market average electricity mix, and electricity production by PV in Zhejiang are used in this study. The installation and operation of inverters, as well as the end-of-life stage, are assumed taken place in Italy as a case study. Load consumption during the use stage is modelled with DC electricity generated from photovoltaic in Italy, while non-load consumption is modelled using average electricity market mix in Italy.

Table 6-3 Electricity mix used for modelling

Consumption type	Electricity process type
Electricity use in manufacturing stage (from grid)	Grid electricity mix in China (market for electricity, medium voltage, Ecoinvent 3.9)
Electricity use in manufacturing stage (from PV)	Electricity generated by photovoltaic in Zhejiang, China (low voltage, Ecoinvent 3.9)
Electricity use in use stage (load consumption)	Electricity generated by photovoltaic in Italy (DC output with inverter excluded, Ecoinvent 3.9)
Electricity use in use stage (non-load consumption)	Grid electricity mix in Italy (market for electricity, medium voltage, Ecoinvent 3.9)

6.9. Biogenic carbon in product and packaging

Table 6-4 Biogenic carbon in product and packaging

Biogenic Carbon	Product (kg C)	Packaging (kg C)
H3 Series	2.73E-02	9.55E-01

Note: This table applies to all products listed in this EPD.

7. LCA calculation scenarios

7.1. Distribution

For the distribution stage, this study takes Italy as the target market. The transportation information is provided by FOXESS. The products are firstly transported from the manufacturing site, Wenzhou plant, to Ningbo Port, with a 500km distance by lorry. Then, it is transported through container ship from Ningbo Port to Genova, Italy. Lastly, the product will be transported 505km from Genova to Rome, and 300km from Rome to customer by lorry. According to the PCR, a 16-32 metric ton EURO 4 lorry is selected to be the transportation vehicle for three sections of land transportation, in the absence of primary data on the category of lorry.

Table 7-1 Product distribution

Sales market	Transportation vehicle	Distance (km)	Start location	End location
Italy	Lorry 16-32 metric ton, EURO4	500km	Wenzhou plant	Ningbo
	Container ship	9859km	Ningbo	Genova.IT
	Lorry 16-32 metric ton, EURO4	505km	Genova.IT	Rome
	Lorry 16-32 metric ton, EURO4	300km	Rome	Customer

7.2. Installation

In the installation stage, the energy use is negligible since the installation process is mainly done manually. According to the product category rules (PCR), end of life of the packaging materials, scrap and general waste generated are considered in this stage.

The waste generated from the product packaging, mainly consist of wood pallets and plywood, papers, and plastics. The treatments of the waste are modelled according to the PEF EoL default values in Italy and Europe. Transportation distance of the waste is assumed to be 50km.

7.3. Use & Maintenance

The electricity consumption during the use stage of the inverters involves two different scenarios. Load consumption takes place when the inverter is operational 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.

According to PCR, the following formula shall be used to calculate the load electricity used during the product's service life:

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

where:

E_{use} (kWh) is the power losses during the operation of power inverter;

P_{AC} (kW) is the output rated AC active power;

I_r (h) is average local annual sunshine in country where the inverter is installed, in this study Italy is taken as the target country, with annual sunshine hours of 2000 h.

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

RSL is the service life of the product, 25 years;

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.

Table 7-2 Electricity consumption of inverter during use stage

Series	Model	Standby power (kW)	AC-power (kW)	Sunshine (h)	Efficiency	RSL (years)	Euse (kWh)	Estandby (kWh)
H3	H3-5.0-E	0.015	5	2000	97.20%	25	7000	2535
	H3-6.0-E	0.015	6	2000	97.20%	25	8400	2535
	H3-8.0-E	0.015	8	2000	97.30%	25	10800	2535
	H3-10.0-E	0.015	10	2000	97.30%	25	13500	2535
	H3-12.0-E	0.015	12	2000	97.30%	25	16200	2535

For the maintenance of the inverter products, the FOXESS inverters are designed to be free of maintenance during its service life. Therefore, no inputs and outputs are taken place in the maintenance stage in this study.

7.4. 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.

The power inverters disposal and recycling stage involves removing hazardous valuable materials, metal scraps. The most recyclable materials constitute the metal components, printed circuit board (PCBs), and cables. In this study, both PEF EoL default values in Italy and Europe and IEC/TR 62635 guidelines are referred.

8. REFERENCES

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

[2] Ecoinvent, 2021. Swiss Centre for Life Cycle Assessment, v3.9 (www.ecoinvent.ch).

[3] EPD Italy Regulation (rev. 6.0).

[4] IEC/TR 62635: Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electric and electronic equipment.

[5] ISO 14025:2006, Environmental labels and declarations-Type III environmental declarations-Principles and procedures.

[6] ISO 14040: 2006/Amd 1:2020 Environmental management - Life cycle assessment - Principles and framework Amendment 1 (ISO 2020).

[7] ISO 14044: 2006/Amd 2:2020 Environmental management - Life cycle assessment - Requirements and guidelines Amendment 2 (ISO 2020).

[8] LCA Report of FOXESS Hybrid Inverters for Environmental Product Declaration (EPD), rev. 01, March 2024.

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

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

[11] PRé Consultants, 2021. Software SimaPro version 9.5.0.0 (www.pre.nl).

[12] Product Environmental Footprint (PEF) 3.1, Annex C (https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml).