

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Smoke Detector EASY PROTECT B.One
Zenner International GmbH & Co. KG



EPD HUB, HUB-7872
Published on 20.10.2026, last updated on 20.10.2026, valid until 19.10.2031
Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1.

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Zenner International GmbH & Co. KG
Address	Heinrich-Barth-Str. 29, 66115 Saarbrücken, Germany
Contact details	info@zenner.com
Website	https://zenner.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Lukas Lang, Zenner International Gmbh & Co. KG
EPD verification	Independent verification of this EPD and data, according to ISO 14025: o Internal verification þ External verification
EPD verifier	Elena Antuña-Bernardo as an authorized verifier for EPD Hub

This EPD is intended for business-to-business and/or business-to-consumer communication. The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	Smoke Detector EASY PROTECT B.One
Additional labels	-
Product reference	-
Place(s) of raw material origin	Global, Asia
Place of production	Shanghai, China
Place(s) of installation and use	Europe
Period for data	Calendar Year 2025
Averaging in EPD	No grouping
Variation in GWP-fossil for A1-A3 (%)	-
GTIN (Global Trade Item Number)	4001471662564 (EAN)
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	6,16

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit of Smoke Detector EASY PROTECT B.One
Declared unit mass	0,205 kg
Mass of packaging	0,043 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	5,97
GWP-total, A1-A3 ($kgCO_2e$)	5,98
Secondary material, inputs (%)	10,8
Total energy use, A1-A3 (kWh)	23,9
Net freshwater use, A1-A3 (m^3)	0,05

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

ZENNER International GmbH & Co. KG, headquartered in Saarbrücken, develops, produces and distributes measurement technology for global markets. ZENNER operates production facilities in Europe, Asia and the USA and maintains a worldwide presence with 60 locations.
Today, ZENNER focuses entirely on the digitalization of the energy and utilities sector. The company offers a broad and diversified portfolio of products, solutions and services worldwide, enabling its customers to meet the challenges of digital transformation and seize the opportunities of digitalization. Together with the energy and utilities industry, the company works on future-oriented topics such as Smart Metering, Smart Utility and Smart City, developing new concepts, solutions and business models for the digital future through a continuous transfer of knowledge.

PRODUCT DESCRIPTION

The Smoke Detector EASY PROTECT B.One is an optical smoke alarm device for residential applications, approved in accordance with DIN EN 14604. It detects smoke in the early stages of fire development and issues an acoustic and visual alarm signal to warn occupants. The device is intended for use in dwellings and residential buildings. The smoke alarm includes remote inspection and monitoring functionality via wireless M-Bus or LoRaWAN radio communication. It is equipped with a permanently integrated, non-replaceable battery with a service life of 10 years, which is automatically activated during installation.

Further information can be found at:
https://zenner.com

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	12,98	Asia
Minerals	16,2	Asia
Fossil materials	70,82	Asia
Bio-based materials	0	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0,0061

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 unit of Smoke Detector EASY PROTECT B.One
Mass per declared unit	0,205 kg
Functional unit	-
Reference service life	10 years

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Not declared = ND.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

A market-based approach is used in modelling the electricity mix utilized in the factory.
The Smoke Detector EASY PROTECT B.One is mainly made of plastics and electronic components. The materials are transported to the ZENNER Meters (Shanghai) Ltd. production facility (A2 between 5km and 3950km) , where the main manufacturing process is injection molding before being assembled together. Production losses for plastic are between 14.41% and 87%. The materials gathered through production losses are collected by a qualified partner and transported to a waste treatment facility for landfilling (transport assumed 50 km). The finished product is packaged in shielding bags and cardboard before being sent to the installation site in cardboard packaging.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

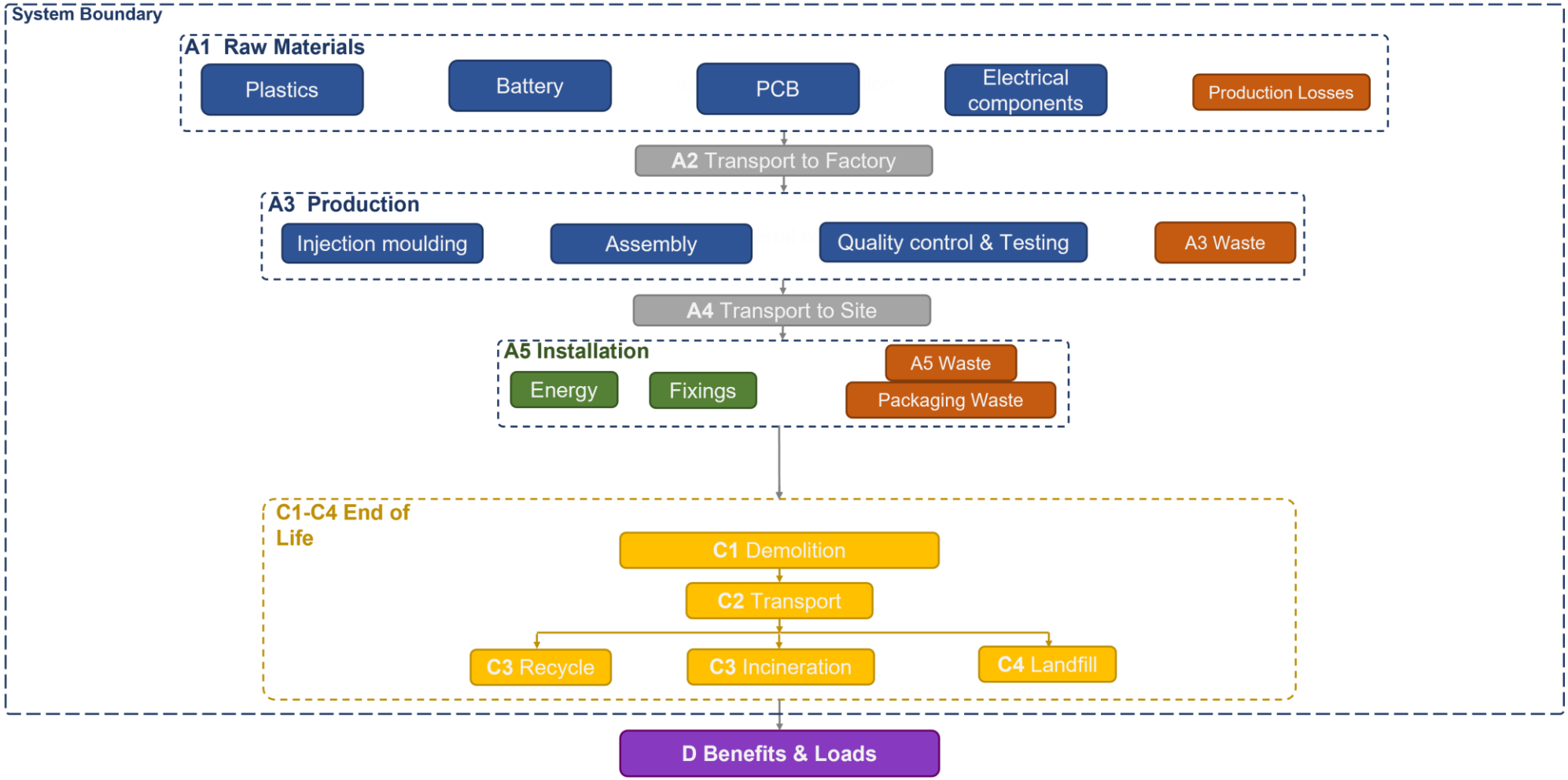
The transportation distance determined using real sales data. It was calculated by averaging the weighted distance for each installation site. For transport, two scenar ios were considered. In scenario 1, the goods are shipped from Shanghai to a logistics facility in Germany and then distributed to customers in the EU. In scenario 2, the transport to the installation site is handled directly by Zenner Meters in Shanghai. The average distance of transportation for both scenarios combined from production plant to installation site is assumed as 22.828,95 km by container ship and 624,34 km by lorry. Vehicle capacity utilization volume factor is assumed to be 50 % which means full load. In reality, it may vary but as role of transportation emissions in total results is small, the variety in load is assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by the transportation company to serve the needs of other clients. Transportation does not cause losses as products are packaged

properly. Also, volume capacity utilisation factor is assumed to be 100 % for the nested packaged products. Transportation impacts that occur from delivery of the product cover direct exhaust emissions of fuel, environmental impacts of fuel production, as well as related infrastructure emissions. Environmental impacts from installation into the building include waste packaging materials (A5) and release of biogenic carbon dioxide from wood pallets. The impacts of the used ancillary materials during installation are considered negligible.

PRODUCT END OF LIFE (C1-C4, D)

Consumption of energy and natural resources in demolition process is assumed to be negligible. It is assumed that the waste is collected separately and transported to the waste treatment center. Transportation distance to treatment is assumed as 50 km to 250 km and the transportation method is assumed to be lorry (C2). According to EN 50693:2019, the sequence of treatment operations occurring to the product shall include de-pollution, fractions separation and preparation (dismantling, crushing, shredding, sorting), recycling, other material recovery, energy recovery and disposal. In this study, the default values from table G.4 of EN 50693 is used for treating materials in different waste treatment methods. Battery End-of-Life follows the guidelines according to Regulation (EU) 2023/1542.
Due to the material and energy recovery potential of parts in the smoke detector, the end-of-life product is converted into recycled raw materials, while the energy recovered from incineration displaces electricity and heat production (D). The packaging used during transportation is also incinerated for energy recovery and/or recycled. The benefits and loads of incineration and recycling are included in Module D.

LIFE CYCLE FLOW DIAGRAM



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

All industrial processes from raw material acquisition and pre-processing, production, product distribution, installation, use/application of product and end-of-life management are included. For easier modelling and because of lack of accuracy in available modelling resources many constituents under 0,1% of product mass are excluded. These include some additives and fasteners which are present in the product only in very small amounts and have no serious impact on the emissions. Further, water used for cleaning and maintenance of the equipment, transportation and waste streams of the packaging materials used for delivering the raw materials to the factory are omitted since the quantified mass contribution is less than 0.1%. The production of capital equipment, construction activities, and infrastructure, personnel-related activities, energy and water use related to company management and sales activities are excluded.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging material	No allocation
Ancillary materials	Physical Properties
Manufacturing energy and waste	Physical Properties

This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs. Allocation used in Ecoinvent 3.6 environmental data sources follow the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the EN 15804-standard.
All estimations and assumptions regarding the cut off criteria and the allocation are declared in the part "Cut-off Criteria except the estimations/assumptions below:

- **Module A2, A4 & C2:** Vehicle capacity utilization volume factor is assumed to be 1 which means full load. It may vary but as the role of transportation emission in total results is small, the variety in load is assumed to be negligible. Empty returns are not considered as it is assumed that return trip is used by transportation companies to serve the needs of other clients.
- **Module A4:** Transportation does not cause losses as products are packaged properly. Also, volume capacity utilisation factor is assumed to be 1 for the nested packaged products. Additionally, transportation distances are based on a sales volume-based weighted average and a lorry is the assumed vehicle type used.
- **Module C2:** Transportation distance to e-waste handling facility is estimated as 50 km to 250 km and the transportation method is assumed as lorry.
- **Module C3, C4, D:** The product undergoes dismantling, and the parts are sorted into metals, plastics and electronics. The waste treatment percentages based on EN 50693 are assumed to be applicable. Module C3 accounts for energy and resource inputs for sorting and treating these waste streams for recycling and incineration with energy recovery. Ash from recycling processes is negligible. The recycled end-of-life materials are assumed to serve as secondary raw materials in manufacturing, while incinerated materials displace the need for electricity and heat production.

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	No grouping
Grouping method	Not applicable
Variation in GWP-fossil for A1-A3, %	-

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.5. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11/3.12 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11/3.12 environmental data sources follow the methodology ‘allocation, Cut-off, EN 15804+A2‘.

- EPD Hub Core Product Category Rules version 1.2.1, April 2026
- EPD Hub General Program Instructions version 1.3.1, April 2026
- EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- EN 50693:2020 Product category rules for life cycle assessments of electronic and electrical products and systems
- EN 15941:2024 Sustainability of construction works - Data quality for environmental assessment of products and construction work - Selection and use of data
- EN 15942:2011 Sustainability of construction works - Environmental product declarations - Communication format business-to-business
- ISO 14025:2006 Environmental statements and programmes for products - Principles and general requirements
- ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
- ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
- Paper and cardboard packaging waste treatment: EUROSTAT, https://ec.europa.eu/eurostat/databrowser/view/env_waspac__custom_8519259/default/table?lang=en
- Plastic packaging waste treatment: EUROSTAT, https://ec.europa.eu/eurostat/databrowser/view/env_waspac__custom_8519242/default/table?lang=en
-Plastics Europe. 2020. Plastics – the Facts 2020. European plastics industry association.
-Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC

ENVIRONMENTAL IMPACT DATA

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	5,56E+00	3,19E-04	4,15E-01	5,98E+00	6,99E-02	3,01E-02	ND	ND	ND	ND	ND	ND	ND	1,21E-03	4,75E-03	1,50E-01	6,54E-02	-3,22E-01
GWP – fossil	kg CO_2e	5,53E+00	3,18E-04	4,35E-01	5,97E+00	6,98E-02	9,62E-03	ND	ND	ND	ND	ND	ND	ND	1,17E-03	4,75E-03	1,48E-01	6,54E-02	-3,20E-01
GWP – biogenic	kg CO_2e	1,76E-02	6,49E-08	-2,17E-02	-4,14E-03	-1,20E-06	2,05E-02	ND	ND	ND	ND	ND	ND	ND	3,98E-05	1,88E-06	1,37E-03	5,36E-06	-1,78E-03
GWP – LULUC	kg CO_2e	9,36E-03	1,42E-07	1,12E-03	1,05E-02	3,98E-05	3,04E-06	ND	ND	ND	ND	ND	ND	ND	3,49E-06	1,95E-06	3,52E-05	7,69E-07	-3,42E-04
Ozone depletion pot.	kg CFC_{-11}e	2,11E-07	4,63E-12	1,54E-08	2,26E-07	1,13E-09	2,51E-11	ND	ND	ND	ND	ND	ND	ND	1,95E-11	7,38E-11	5,69E-10	3,21E-11	-2,43E-09
Acidification potential	mol H^+e	3,79E-02	1,11E-06	2,64E-03	4,06E-02	1,02E-03	1,07E-05	ND	ND	ND	ND	ND	ND	ND	5,81E-06	1,59E-05	1,80E-04	1,79E-05	-5,13E-03
EP-freshwater[2)]	kg Pe	4,99E-03	3,45E-08	1,10E-04	5,10E-03	3,41E-06	9,67E-07	ND	ND	ND	ND	ND	ND	ND	1,08E-06	4,58E-07	9,82E-06	2,53E-07	-3,22E-03
EP-marine	kg Ne	7,20E-03	3,66E-07	4,18E-04	7,62E-03	4,15E-04	7,52E-06	ND	ND	ND	ND	ND	ND	ND	1,03E-06	5,13E-06	4,59E-05	6,27E-05	-1,40E-03
EP-terrestrial	mol Ne	7,20E-02	3,96E-06	3,58E-03	7,56E-02	4,60E-03	3,05E-05	ND	ND	ND	ND	ND	ND	ND	8,80E-06	5,58E-05	3,90E-04	8,46E-05	-1,98E-02
POCP ("smog")[3)]	kg NMVOCe	2,67E-02	1,62E-06	1,08E-03	2,78E-02	1,25E-03	1,07E-05	ND	ND	ND	ND	ND	ND	ND	2,82E-06	2,23E-05	1,12E-04	2,31E-05	-4,10E-03
ADP-minerals & metals[4]	kg Sbe	1,11E-03	9,11E-10	6,05E-07	1,11E-03	1,35E-07	1,12E-08	ND	ND	ND	ND	ND	ND	ND	2,59E-09	1,61E-08	3,37E-07	5,20E-09	-5,81E-05
ADP-fossil resources	MJ	7,76E+01	4,54E-03	5,23E+00	8,29E+01	8,91E-01	2,94E-02	ND	ND	ND	ND	ND	ND	ND	2,74E-02	6,62E-02	2,64E-01	2,26E-02	-4,85E+00
Water use[5)]	m^3e depr.	1,98E+00	2,65E-05	3,33E+00	5,31E+00	3,35E-03	9,51E-04	ND	ND	ND	ND	ND	ND	ND	7,25E-04	3,51E-04	1,68E-02	4,64E-03	-1,45E-01

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	3,33E-07	3,12E-11	8,46E-09	3,41E-07	3,01E-09	3,33E-10	ND	ND	ND	ND	ND	ND	ND	2,00E-11	3,71E-10	2,93E-09	1,50E-10	-4,54E-08
Ionizing radiation[6)]	kBq U235e	5,11E-01	3,81E-06	8,86E-03	5,20E-01	5,68E-04	4,85E-04	ND	ND	ND	ND	ND	ND	ND	7,76E-04	6,16E-05	2,13E-03	2,81E-05	-2,83E-02
Ecotoxicity (freshwater)	CTUe	9,71E+01	9,43E-04	1,40E+00	9,85E+01	2,85E-01	4,67E-01	ND	ND	ND	ND	ND	ND	ND	2,87E-02	6,99E-02	3,96E+00	2,52E-01	-2,88E+02
Human toxicity, cancer	CTUh	3,38E-09	5,00E-14	5,71E-11	3,43E-09	1,47E-11	2,58E-12	ND	ND	ND	ND	ND	ND	ND	1,95E-13	8,03E-13	2,55E-10	5,55E-12	-1,10E-10
Human tox. non-cancer	CTUh	1,81E-07	2,82E-12	3,15E-09	1,84E-07	3,32E-10	9,52E-11	ND	ND	ND	ND	ND	ND	ND	8,84E-12	4,12E-11	7,50E-10	2,17E-10	-7,37E-09
SQP[7)]	-	2,36E+01	4,53E-03	2,81E+00	2,64E+01	2,89E-01	1,45E-02	ND	ND	ND	ND	ND	ND	ND	3,90E-03	3,89E-02	1,04E-01	2,67E-02	-3,64E+00

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	7,81E+00	6,32E-05	3,47E-01	8,16E+00	9,39E-03	-5,15E-01	ND	ND	ND	ND	ND	ND	ND	6,19E-03	9,70E-04	5,27E-02	6,14E-04	-1,05E+00
Renew. PER as material	MJ	0,00E+00	0,00E+00	4,14E-01	4,14E-01	0,00E+00	-4,14E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,51E-03
Total use of renew. PER	MJ	7,81E+00	6,32E-05	7,61E-01	8,57E+00	9,39E-03	-9,29E-01	ND	ND	ND	ND	ND	ND	ND	6,19E-03	9,70E-04	5,27E-02	6,14E-04	-1,04E+00
Non-re. PER as energy	MJ	7,31E+01	4,54E-03	4,73E+00	7,78E+01	8,91E-01	-2,34E-01	ND	ND	ND	ND	ND	ND	ND	2,74E-02	6,62E-02	-2,49E+00	-1,89E+00	-5,02E+00
Non-re. PER as material	MJ	4,64E+00	0,00E+00	-2,14E-03	4,64E+00	0,00E+00	-2,63E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-2,53E+00	-1,84E+00	1,05E+00
Total use of non-re. PER	MJ	7,77E+01	4,54E-03	4,73E+00	8,25E+01	8,91E-01	-4,96E-01	ND	ND	ND	ND	ND	ND	ND	2,74E-02	6,62E-02	-5,02E+00	-3,74E+00	-3,97E+00
Secondary materials	kg	2,20E-02	1,90E-06	2,47E-02	4,68E-02	4,76E-04	2,88E-05	ND	ND	ND	ND	ND	ND	ND	2,82E-06	2,93E-05	1,68E-04	1,43E-05	5,48E-02
Renew. secondary fuels	MJ	1,08E-03	2,48E-08	3,74E-03	4,81E-03	2,11E-06	1,92E-07	ND	ND	ND	ND	ND	ND	ND	1,20E-08	3,80E-07	4,01E-06	4,25E-07	-8,99E-05
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	4,79E-02	6,52E-07	6,44E-03	5,44E-02	7,39E-05	-8,43E-08	ND	ND	ND	ND	ND	ND	ND	1,68E-05	8,59E-06	3,39E-04	-2,19E-05	-3,31E-03

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,46E+01	2,91E-05	1,90E-02	1,46E+01	4,11E-03	3,06E-04	ND	ND	ND	ND	ND	ND	ND	5,92E-05	1,33E-04	4,19E-03	9,87E-04	-3,88E-02
Non-hazardous waste	kg	2,16E+01	5,74E-04	2,21E+00	2,38E+01	2,19E-02	2,29E-02	ND	ND	ND	ND	ND	ND	ND	5,30E-03	2,63E-03	1,17E-01	9,86E-02	-8,09E-01
Radioactive waste	kg	1,34E-04	9,11E-10	1,62E-06	1,36E-04	1,36E-07	1,24E-07	ND	ND	ND	ND	ND	ND	ND	1,99E-07	1,51E-08	5,29E-07	7,05E-09	-7,13E-06

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,98E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	7,13E-02	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	8,40E-04	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,27E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	6,88E-01	0,00E+00	0,00E+00
Exported energy – Electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,22E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	3,72E-01	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,04E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	3,16E-01	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	5,52E+00	3,17E-04	4,38E-01	5,96E+00	6,95E-02	1,34E-02	ND	ND	ND	ND	ND	ND	ND	1,17E-03	4,72E-03	1,49E-01	6,53E-02	-3,18E-01
Ozone depletion Pot.	kg $CFC_{-11}e$	2,25E-07	3,69E-12	1,16E-08	2,36E-07	8,97E-10	2,07E-11	ND	ND	ND	ND	ND	ND	ND	1,60E-11	5,92E-11	5,51E-10	2,79E-11	-2,10E-09
Acidification	kg SO_2e	3,13E-02	8,45E-07	2,25E-03	3,35E-02	7,37E-04	8,41E-06	ND	ND	ND	ND	ND	ND	ND	4,93E-06	1,22E-05	1,48E-04	1,28E-05	-3,60E-03
Eutrophication	kg PO_4^3e	1,50E-02	2,29E-07	1,10E-03	1,61E-02	1,52E-04	5,44E-06	ND	ND	ND	ND	ND	ND	ND	7,02E-07	3,09E-06	4,46E-05	6,32E-06	-1,18E-03
POCP (“smog”)	kg C_2H_4e	4,10E-03	7,35E-08	1,07E-04	4,21E-03	4,39E-05	1,68E-06	ND	ND	ND	ND	ND	ND	ND	2,74E-07	1,08E-06	9,33E-06	1,23E-06	-1,85E-04
ADP-elements	kg Sbe	1,11E-03	8,87E-10	5,97E-07	1,11E-03	1,33E-07	1,09E-08	ND	ND	ND	ND	ND	ND	ND	2,55E-09	1,57E-08	2,89E-07	3,82E-09	-5,79E-05
ADP-fossil	MJ	6,92E+01	4,48E-03	5,17E+00	7,44E+01	8,82E-01	2,09E-02	ND	ND	ND	ND	ND	ND	ND	1,37E-02	6,52E-02	2,30E-01	2,21E-02	-4,30E+00

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[9)]	kg CO_2e	5,54E+00	3,19E-04	4,36E-01	5,98E+00	6,99E-02	9,62E-03	ND	ND	ND	ND	ND	ND	ND	1,17E-03	4,75E-03	1,49E-01	6,54E-02	-3,20E-01

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH4 fossil, CH4 biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO2 is set to zero

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

1. Electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted, chongqing, Ecoinvent, 0.0895 kgCO2e/kWh
2. Electricity, consumption mix w/o renewables, China, 2023, China, One Click LCA, 1.15 kgCO2e/kWh

Transport scenario documentation - A4 (Transport resources)

1. Market for transport, freight, lorry, >32 metric ton, diesel, EURO 5, 624.34 km
2. Market for transport, freight, sea, container ship, heavy fuel oil, 22828.95 km

Transport to the building site (A4) - Scenario documentation

Scenario parameter	Value
Capacity utilization (including empty return) %	50
Bulk density of transported products	14,6
Volume capacity utilization factor	1

Installation at the building site (A5) - Scenario documentation

Scenario parameter	Value
Energy: type and consumption (MJ or kWh)	Market for electricity, medium voltage: 0.0020475 kWh
Water use (m^3)	No water is needed for the installation of the product.
Ancillary materials: type and mass (kg)	No ancillary materials are needed for the installation of the product.
Waste materials: type and mass (kg)	Plastic: 0,00662 kg Cardboard: 0,03234 kg Paper: 0,00018 kg Steel: 0,00012 kg Source: Eurostat 2020
Waste materials: output routes	Plastic: 42 % recycling 33 % incineration 25 % landfill Cardboard: 85% recycling 10% incineration 5% landfill Paper: 70% recycling 20% incineration 10% landfill Steel: 95% recycling 5% incineration 0% landfill

	Source: Eurostat 2020
Direct emissions (kg)	No direct emissions are expected to occur during the installation process. Emissions from energy use, ancillary materials and their processing are considered in the respective datasets used in the modelling.

End of life (C1-C4) - Scenario documentation

Scenario information	Value
Collection process: collected separately (kg)	Other Plastics: 0,0199 kg incinerated 0,0069 kg landfilled PCB: 0,026 kg recycled 0,026 kg landfilled PU: 0,00046 kg incinerated 0,00015 kg landfilled Steel & ferrous materials: 0,0035 kg recycled 0,00087 kg landfilled ABS: 0,057 kg incinerated 0,019 kg recycled 0,019 kg landfilled
Collection process: Mixed waste (kg)	-
Recovery: re-use (kg)	0
Recovery: recycling (kg)	0,07
Recovery: energy recovery (kg)	0
Disposal (kg)	0,08
Scenario assumptions e.g. transportation (mode, km) & other	Recycling: 250 km, Landfilling: 50 km, Incineration: 100–150 km

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools

Tool verifier: Magaly Gonzalez Vazquez
Tool verification validity: 27 March 2025 - 26 March 2028

Elena Antuña-Bernardo as an authorized verifier for EPD Hub Limited
20.10.2026

