ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

IRT in-roof solar PLM-125MB-24

PERLIGHT SOLAR CO., LTD

EPD HUB, HUB-0765

Publishing date 19 October 2023, last updated on 19 October 2023, valid until 19 October 2028.

GENERAL INFORMATION

MANUFACTURER

Manufacturer	PERLIGHT SOLAR CO., LTD
Address	Oufeng Road, Muyu Administration Area, Zeguo Town, Wenling City
Contact details	ENQUIRY@PERLIGHT.COM
Website	WWW.PERLIGHT.COM

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Glenn Guo,Sun Wei
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	Magaly González Vázquez, as an authorized verifier acting for EPD Hub Limited

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	IRT in-roof solar PLM-125MB-24
Additional labels	Perlight
Product reference	85414300
Place of production	China
Period for data	2022
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	-

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 Wp
Declared unit mass	0.072 kg（8.97kg/125Wp）
GWP-fossil, A1-A3 (kgCO2e)	5,98E-1
GWP-total, A1-A3 (kgCO2e)	5,92E-1
Secondary material, inputs (%)	2.22
Secondary material, outputs (%)	61.3
Total energy use, A1-A3 (kWh)	2.19
Total water use, A1-A3 (m3e)	4,18E-3

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Perlight Solar, founded in Zhejiang in 2006, focuses on manufacturing, research and development (R&D), providing technical services, and handling engineering, procurement, and construction (EPC) for photovoltaic (PV) solar modules and other new energy products.

With a manufacturing background spanning over 40 years and nearly 20 years of expertise in solar power, Perlight excels in manufacturing photovoltaic cells and solar panels.

The Perlight brand has gained international acclaim for its cutting-edge, visually appealing, intelligent, and high-performance PV modules, providing exceptional value and top-notch quality to customers worldwide.

Quality & Innovation

Perlight Solar prioritizes meticulous attention to detail in the production of solar modules to ensure customer satisfaction, leveraging a mature ERP and MES management system, advanced production equipment, and rigorous quality control measures.

R&D and technological innovation hold significant value at Perlight Solar, evident by Perlight's possession of over 100 patents and being recognized as a patent demonstration enterprise in Taizhou City.

The company upholds standardized management practices and takes responsibility seriously, evident in Perlight's compliance with various industry standards and certifications. These include ISO9001:2015 for quality management system, ISO14001:2015 for environmental management system, GB/T45001-2020 for occupational health and safety management system, and SA8000:2014 for social responsibility management system.

Global Distribution

Perlight serves customers worldwide, exporting its products to over 100 countries and regions across Europe, America, Africa, and Asia. Shining in the upscale residential solar market, embodying outstanding quality and service.

PERLIGHT brand modules enjoy a strong reputation globally, earning the trust of users and obtaining registered trademarks in over 80 countries and regions within the photovoltaic market.

In the UK & Europe, Perlight Solar is represented by Westech Solar, a trusted partner in the distribution and customer service of Perlight products.

Vision

With a forward-looking approach, the company remains committed to a distinctive competitive strategy, persistently innovating its offerings and services, diversifying its market presence, and upholding its unwavering quality standards. Perlight is dedicated to becoming the premier brand in renewable energy solutions, reaching customers across the globe, and delivering exceptional tailored solar energy products and services worldwide.

Certifications

The product line has successfully obtained professional certifications from esteemed organizations such as TUV, UL, CEC, MCS, CE, CSA, CQC, Golden Sun, and other global and regional certifying bodies. In 2018, Perlight also secured the Made in Zhejiang product certification.

In a notable achievement for the solar manufacturing industry, Perlight attained the SA8000 Standard certification in 2020, signifying adherence to internationally recognized standards for fair and decent work practices, a rarity in this field.

PRODUCT DESCRIPTION

Perlight IRT modules consist of a series of electrically interconnected crystalline silicon solar cells, which are permanently encapsulated between a tempered glass superstrate and substrate. The entire laminate is secured within an anodized aluminium frame for structural strength, ease of installation and to protect the cells from the most severe environmental conditions. Flashings are added to complete the IRT system. The IRT modules are a highly reliable, virtually maintenance-free direct current (DC) power source, designed to operate efficiently in sunlight.

An elegant solar tile that take integration to a new level without sacrificing performance or reliability. The IRT is designed to overcome common problems faced by residential solar installations. Not only to be a better-looking solution, more in-keeping with traditional building design but also a system that reduces the number of tiles and wooden battens required, which is especially important for new-build projects. With installers and suppliers also in mind, the IRT is made to be easier and faster to install, easier and safer to handle, reducing damages and difficulties of transportation and even storage, leaving a smaller footprint.

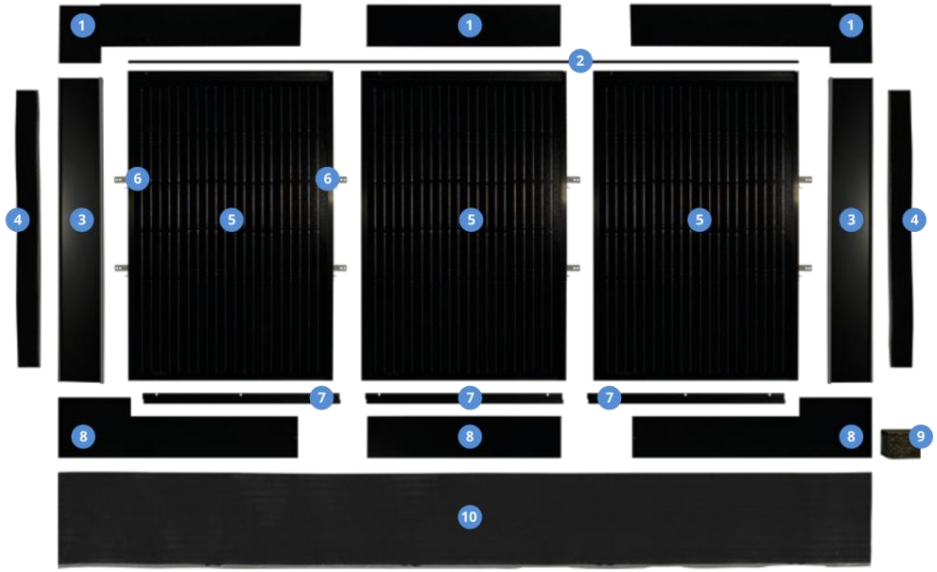
Advantages of the IRT module include:
1. Elimination of plastic components and adhesives, which tend to deteriorate over time.

2.Simplified design with fewer components compared to on-roof and in-roof systems, resulting in faster installation and reduced potential failure points.

3.Enhanced installation convenience surpassing both conventional on-roof and in-roof systems.

Further information can be found at WWW.PERLIGHT.COM.

System components



1. Aluminium flashing top (left, middle, right)
2. Seal strip 01
3. Aluminium flashing side (left & right)
4. Seal strip 02
5. IRT Panels (left, middle, right)
6. Mid-clamp (right & left)
7. Bottom edge
8. Aluminium flashing bottom (left, middle, right)
9. Self tapping screws
10. Lead replacement

Operating Conditions

Max. system voltage	1000VDC
Limiting reverse current	15A
Operating temperature range	-14°C to 85°C
Max. static load front (e.g., snow)	5400Pa
Max. static load back (e.g. wind)	3420Pa

Mechanical Characteristics

Front cover (material / thickness)	low-iron tempered glass/3.2mm
Backsheet (colour)	black
Cell (quantity/material/dimensions)	-14°C to 24/monocrystalline silicon/158.75x158.75mm
Frame (material/colour)	anodized aluminium alloy/black
Junction box (protection degree)	≥IP67
Cables & Plug connectors	900mm/4mm² & MC4 compatible/IP67
Module Dimensions (L/W/H)	1036mmx701mmx24.5mm
Module Weight	8.97kg

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	22.5%	Asia
Minerals	65.6%	Asia
Fossil materials	11.9%	Asia
Bio-based materials	-	-

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	0.003069

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 Wp
Mass per declared unit	0.072 kg（8.97kg/125Wp）
Functional unit	1 Wp of manufactured photovoltaic module.
Reference service life	From cradle-to-grave, with activities needed for a study period for a reference service of 25 years (≥80% of the labelled power output).

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	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

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.

A1: This stage considers the extraction and processing of raw materials, carried out to manufacture mono-crystalline photovoltaic modules. The primary components consist of monocrystalline silicon wafer, tempered glass, aluminium, Junction box, ethylene vinyl acetate copolymer, Polyethylene terephthalate, silica gel, as well as minor parts like plastics and copper.

A2: The components are manufactured in different regions and assembled at the manufacturing facility. Transportation is considered in the context of the transportation of raw materials to the production plant and the transportation within the plant. The primary mode of transportation of raw materials is by lorry.

A3: This module addresses the environmental impact associated with the production of the PLM-125MB-24 mono-crystalline photovoltaic module. The manufacturing process requires electricity for various equipment and heating purposes. The following processes are included: melting and ingot forming, wafer production, soldering, lamination, framing, sealing, and packing, which collectively complete the PLM-125MB-24 modules. Plastic waste generated at the facility is incinerated, while glass and metal waste streams are respectively sent for recycling and landfilling. Wastewater treatment is also taken into account. To transport the product from the factory gate, a wooden pallet, cardboard cartons, and packaging film are utilized as packaging materials.

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.

A4: The transportation distance is defined according to the PCR. This stage considers transportation of the solar modules to the intended market locations with the transportation route being from the factory to Ningbo port then from Ningbo port to European port by sea freight. The average distance of transportation from UK warehouse to installation site is assumed as 117 km and the transportation method is assumed to be by truck. A vehicle capacity utilization volume factor of 1 is assumed, which means full load. While in reality, this factor may vary, the impact of transportation emissions on overall results is considered minimal, thus the

variation in load is deemed negligible. Empty returns are not taken into account as it is assumed that the return trip is used by the transportation company to serve the needs of other clients. Additionally, transportation does not result in any losses as the product is appropriately packaged.

A5: The installation of the product into the building requires a stainless-steel strip, seal strip, EPDM foam, flashing and aluminium frame to correctly install the product onto a roof. Additionally, A5 also considers the burdens associated with the waste packaging materials and the release of biogenic carbon dioxide from wood pallets and cardboard boxes. the wood pallet is incinerated at it's end of life and the plastics and paper are recycled.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

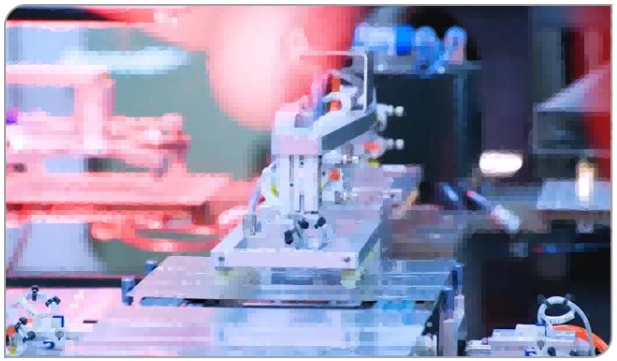
C1-C4: Consumption of energy in the de-construction process is considered. It is assumed that the waste is collected separately and subsequently transported to the waste treatment centre. Transportation distance to the treatment centre is assumed as 50 km and the transportation method is assumed to be by truck (C2). Due to the absence of specific data in this study, Table G.4 of EN 50693:2019 Product Category rules for life cycle assessments of electronic and electrical products and systems is used as default values for waste treatment percentages.

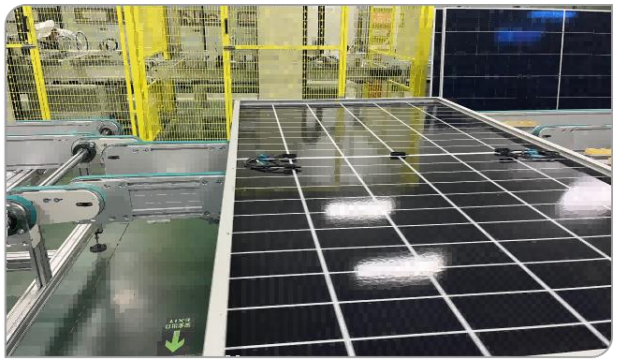
The products treatment process shall encompass de-pollution, fractional separation, preparation (involving dismantling, crushing, shredding, and sorting), recycling, material recovery, energy recovery, and disposal.

Module C3 accounts for energy and resource inputs required for sorting and treating these waste streams for recycling and incineration with energy recovery efficiency surpassing 60%. Furthermore, waste that undergoes incineration without energy recovery or is disposed in landfills is accounted for in Module C4, while any flow path not accounted for in Module D is considered for its potential benefits. In the case of silicon from PV cells, a conservative assumption is made that it will be disposed of in an underground deposit.

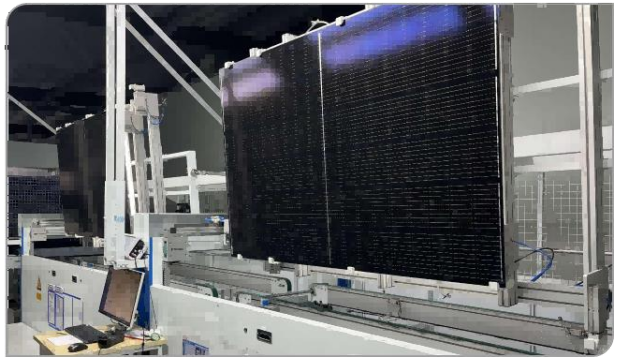
D: Considering the potential for material and energy recovery from components in the end-of-life product and packaging, the utilization of recycled raw materials helps to avoid the production of virgin materials. Additionally, the energy obtained through incineration replaces the need for electricity and heat production (D). Module D encompasses the assessment of both the benefits and impacts associated with incineration and recycling.

MANUFACTURING PROCESS





Solar cell sorting → Automatic Machine Laying & soldering → Laying → Semi-product EL testing → Lamination → Physical detection → EL Testing → Framing → Junction box installation → Cleaning → I/V curve testing → Insulation &Withstand voltage testing → EL Testing → Physical detection → Packing

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.

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 materials	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	-

There is no average result considered in this study since this EPD refers to one specific product produced in one production plant.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. Ecoinvent 3.8 and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

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	5,83E-01	1,01E-02	-1,31E-03	5,92E-01	1,62E-02	8,17E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	3,49E-04	3,20E-02	-1,20E-03	-1,77E-01
GWP – fossil	kg CO_2e	5,78E-01	1,01E-02	9,95E-03	5,98E-01	1,62E-02	7,03E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	3,48E-04	3,36E-02	3,86E-04	-1,68E-01
GWP – biogenic	kg CO_2e	3,26E-03	0,00E+00	-1,13E-02	-8,04E-03	4,70E-06	1,13E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,43E-08	-1,64E-03	-1,59E-03	-6,55E-03
GWP – LULUC	kg CO_2e	1,09E-03	5,67E-06	4,55E-05	1,14E-03	1,04E-05	1,51E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,29E-07	9,14E-07	6,97E-07	-2,46E-03
Ozone depletion pot.	kg $CFC_{-11}e$	1,47E-06	2,09E-09	2,00E-09	1,48E-06	3,31E-09	3,55E-09	MND	MND	MND	MND	MND	MND	MND	0,00E+00	8,02E-11	6,15E-11	7,63E-11	-1,40E-08
Acidification potential	mol H^+e	3,73E-03	4,50E-05	5,62E-05	3,83E-03	4,04E-04	4,38E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,48E-06	7,21E-06	2,82E-06	-1,46E-03
EP-freshwater[2)]	kg Pe	2,33E-05	1,11E-07	4,95E-07	2,39E-05	7,89E-08	2,50E-06	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,85E-09	2,42E-08	9,34E-09	-4,28E-06
EP-marine	kg Ne	6,05E-04	1,27E-05	1,33E-05	6,31E-04	1,00E-04	6,92E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	4,39E-07	2,81E-06	8,19E-07	-1,76E-04
EP-terrestrial	mol Ne	6,87E-03	1,41E-04	1,31E-04	7,15E-03	1,11E-03	7,67E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	4,84E-06	2,99E-05	9,04E-06	-2,08E-03
POCP ("smog")[3)]	kg NMVOCe	1,94E-03	4,40E-05	3,68E-05	2,02E-03	2,91E-04	5,62E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,55E-06	7,59E-06	2,65E-06	-6,19E-04
ADP-minerals & metals[4)]	kg Sbe	2,40E-05	7,45E-08	5,11E-08	2,41E-05	3,15E-08	3,96E-06	MND	MND	MND	MND	MND	MND	MND	0,00E+00	8,17E-10	1,21E-08	9,88E-10	-5,57E-07
ADP-fossil resources	MJ	6,59E+00	1,44E-01	1,30E-01	6,87E+00	2,12E-01	7,95E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	5,23E-03	8,24E-03	6,80E-03	-1,62E+00
Water use[5)]	m^3e depr.	1,65E-01	8,00E-04	5,31E-03	1,71E-01	7,17E-04	1,93E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,34E-05	1,06E-03	5,63E-05	-9,45E-02

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, PEF

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	4,18E-08	8,16E-10	1,21E-09	4,39E-08	7,39E-10	5,57E-09	MND	MND	MND	MND	MND	MND	MND	0,00E+00	4,02E-11	1,41E-10	4,84E-11	-1,29E-08
Ionizing radiation[6)]	kBq U235e	3,61E-02	6,95E-04	7,77E-04	3,75E-02	9,77E-04	3,73E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,49E-05	4,28E-05	3,56E-05	-1,35E-02
Ecotoxicity (freshwater)	CTUe	2,43E+01	1,49E-01	3,17E-01	2,48E+01	1,52E-01	1,79E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	4,71E-03	2,08E-01	3,59E+00	-4,30E+00
Human toxicity, cancer	CTUh	5,26E-10	7,51E-12	1,53E-11	5,49E-10	8,75E-12	7,62E-11	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,16E-13	3,01E-12	2,94E-13	-1,01E-10
Human tox. non-cancer	CTUh	1,18E-08	1,44E-10	1,68E-10	1,21E-08	1,14E-10	1,50E-09	MND	MND	MND	MND	MND	MND	MND	0,00E+00	4,66E-12	6,28E-11	7,60E-12	-4,44E-09
SQP[7)]	-	1,81E+00	7,90E-02	1,18E+00	3,07E+00	6,39E-02	1,65E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	6,03E-03	1,57E-02	1,11E-02	-1,04E+00

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator; 7) SQP = Land use related impacts/soil quality.

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	1,14E+00	2,43E-03	1,28E-01	1,27E+00	1,76E-03	6,59E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	5,90E-05	5,90E-04	2,53E-04	-9,53E-01
Renew. PER as material	MJ	0,00E+00	0,00E+00	9,69E-02	9,69E-02	0,00E+00	-9,69E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,86E-02
Total use of renew. PER	MJ	1,14E+00	2,43E-03	2,25E-01	1,36E+00	1,76E-03	-3,10E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	5,90E-05	5,90E-04	2,53E-04	-8,94E-01
Non-re. PER as energy	MJ	6,33E+00	1,44E-01	1,22E-01	6,60E+00	2,12E-01	7,84E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	5,23E-03	8,24E-03	6,80E-03	-1,62E+00
Non-re. PER as material	MJ	2,61E-01	0,00E+00	3,24E-03	2,64E-01	0,00E+00	-8,11E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	-2,56E-01	0,00E+00	3,09E-03
Total use of non-re. PER	MJ	6,59E+00	1,44E-01	1,25E-01	6,86E+00	2,12E-01	7,76E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	5,23E-03	-2,48E-01	6,80E-03	-1,62E+00
Secondary materials	kg	1,60E-03	6,56E-05	3,97E-04	2,06E-03	8,89E-05	3,47E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,45E-06	9,84E-06	1,83E-06	1,10E-02
Renew. secondary fuels	MJ	1,46E-04	8,25E-07	2,21E-03	2,36E-03	4,50E-07	9,34E-06	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,47E-08	4,02E-07	7,31E-08	-2,17E-05
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	4,03E-03	2,07E-05	1,25E-04	4,18E-03	1,69E-05	4,49E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	6,78E-07	6,02E-06	5,71E-06	-2,86E-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	8,80E-02	2,78E-04	7,61E-04	8,90E-02	2,94E-04	1,15E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	6,94E-06	3,58E-05	4,11E-06	-4,02E-02
Non-hazardous waste	kg	8,58E-01	4,57E-03	1,62E-02	8,79E-01	3,10E-03	1,11E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,14E-04	1,51E-02	7,93E-03	-2,24E-01
Radioactive waste	kg	1,47E-05	9,23E-07	3,04E-07	1,59E-05	1,47E-06	1,76E-06	MND	MND	MND	MND	MND	MND	MND	0,00E+00	3,50E-08	1,93E-08	2,08E-08	-6,85E-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	MND	MND	MND	MND	MND	MND	MND	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	3,82E-03	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	3,87E-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	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,63E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	3,40E-01	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

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	5,64E-01	1,00E-02	9,88E-03	5,83E-01	1,61E-02	6,81E-02	MND	MND	MND	MND	MND	MND	MND	0,00E+00	3,45E-04	3,38E-02	3,77E-04	-1,65E-01
Ozone depletion Pot.	kg CFC-$_{11}$e	1,92E-06	1,66E-09	1,44E-09	1,93E-06	2,62E-09	3,01E-09	MND	MND	MND	MND	MND	MND	MND	0,00E+00	6,35E-11	5,15E-11	6,07E-11	-1,13E-08
Acidification	kg SO_2e	3,11E-03	3,52E-05	4,54E-05	3,19E-03	3,23E-04	3,68E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	1,15E-06	5,31E-06	2,20E-06	-1,25E-03
Eutrophication	kg PO_4^3e	1,18E-03	8,58E-06	2,48E-05	1,21E-03	3,76E-05	1,26E-04	MND	MND	MND	MND	MND	MND	MND	0,00E+00	2,61E-07	6,07E-06	5,91E-07	-2,46E-04
POCP (“smog”)	kg C_2H_4e	1,68E-04	1,96E-06	3,04E-06	1,73E-04	8,51E-06	2,19E-05	MND	MND	MND	MND	MND	MND	MND	0,00E+00	4,48E-08	2,80E-07	1,23E-07	-7,74E-05
ADP-elements	kg Sbe	6,77E-06	7,35E-08	4,98E-08	6,90E-06	3,09E-08	4,43E-07	MND	MND	MND	MND	MND	MND	MND	0,00E+00	7,91E-10	1,19E-08	9,47E-10	-4,79E-07
ADP-fossil	MJ	6,59E+00	1,44E-01	1,28E-01	6,86E+00	2,12E-01	7,95E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	5,23E-03	8,24E-03	6,80E-03	-1,62E+00

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013). In addition, the characterisation factors for the flows - CH4 fossil, CH4 biogenic and Dinitrogen monoxide - were updated in line with the guidance of IES PCR 1.2.5 Annex 1. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO2 is set to zero.

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY VERIFICATION STATEMENT

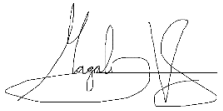
I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Magaly González Vázquez, as an authorized verifier acting for EPD Hub Limited
19.10.2023



VERIFIED ISO 14025