ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Insulation Piercing Connector (Covers All Range)
Melbye As

EPD HUB, HUB-5420
Published on 01.03.2026, last updated on 01.03.2031

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	Melbye As
Address	Prost Stabels Vei 22, 2019 Skedsmokorset, Norway
Contact details	kontakt@melbye.no
Website	https://melbye.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	Manufactured product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A5, and modules C1-C4, D
EPD author	Aditya Dharmendra Nishad
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Magaly Gonzalez Vazquez 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	Insulation Piercing Connector (Covers All Range)
Additional labels	-
Product reference	-
Place(s) of raw material origin	Austria
Place of production	Mosdorfergasse 1, 8160 Weiz, Austria
Place(s) of installation and use	Norway and Sweden
Period for data	1st January 2023 - 31st December 2023
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3 (%)	25%, 10%
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	9.92

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
Mass of packaging	0.3328 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	9.06
GWP-total, A1-A3 ($kgCO_2e$)	8.07
Secondary material, inputs (%)	13.7
Secondary material, outputs (%)	59.9
Total energy use, A1-A3 (kWh)	40.2
Net freshwater use, A1-A3 (m^3)	0.09

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Melbye As is one of Norway's oldest family-owned companies, with a history dating all the way back to 1907. We have a proud tradition of technical innovation and trade, and today, we are a leading provider of forward-thinking products and system solutions for critical infrastructure. We have expertise in transmission and utilities, fiber, ducts and chambers and safety.

We serve customers throughout the Nordic region and the United Kingdom, engage with stakeholders across Europe, and collaborate with around 200 partners and suppliers.

While our headquarters are located just outside Oslo, Norway, we also have offices at multiple locations in Norway, Sweden, and the United Kingdom, as well as representatives in Finland, India and China. Together, we are more than 120 co-workers who share the company's core values: Innovation, teamwork, and professionalism.

With advanced expertise spread across our core areas and a dedication to long-term operation and future-oriented development, we stand at the forefront of addressing future challenges. We take pride in contributing to the development of critical infrastructure that will shape tomorrow's society.

PRODUCT DESCRIPTION

This Environmental Product Declaration (EPD) covers a group of insulation piercing connectors (IPCs) used for branching insulated aluminum conductors in low- and medium-voltage electrical distribution networks. The declared product group includes IPCs with comparable design, material composition, manufacturing processes, standards compliance, and intended applications. All products are designed to create electrical connections without stripping conductor insulation, using insulation-piercing elements to ensure a gas-tight, maintenance-free contact. The clamps are suitable for Al/Al conductor combinations and consist of a glass fiber reinforced nylon clamp body, hot-dip galvanized steel pressure plates, and a grease-filled contact area for protection against water ingress and corrosion. All products comply with VDE 02020 and are intended for use in overhead lines, underground distribution networks, and external electrical infrastructure. The connectors included in this EPD cover a range of conductor cross-sections, with variations limited to conductor size and mechanical configuration, while providing the same core electrical and mechanical function. The environmental impacts reported in this EPD represent an average insulation piercing connector, calculated using weighted average data for materials, manufacturing, transport, and end-of-life treatment across all products included in the group, which are manufactured using the same production technologies and quality standards.
This EPD covers the whole range of Insulation Piercing connectors.

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

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	62.9	Austria
Minerals	-	-
Fossil materials	37.06	Austria
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	0.152727

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg
Mass per declared unit	1 kg
Functional unit	-
Reference service life	-

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	ND	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 manufacturing stage includes raw material processing, injection moulding of glass-fiber reinforced plastic components, and in-house mechanical assembly and quality control of insulation piercing connectors. All non-moulded components are supplied ready-to-use and assembled without further material processing. Electricity consumption represents a mix of renewable and conventional energy sources.
Manufacturing waste is assumed to be 3% for glass-fiber reinforced plastic, based on manufacturer primary data. Generated waste is treated according to standard European practice: recyclable fractions are transported 250 km to recycling, while non-recyclable fractions are transported 50 km to landfill. Waste treatment and transport modelling are based on Ecoinvent datasets and Eurostat waste statistics, in accordance with EN 15804+A2 and EPD Hub PCR.
The use of green energy in manufacturing is demonstrated through contractual instruments (GOs, RECs, etc.), and its use is ensured throughout the validity period of this EPD.

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.

A5 – Installation Phase

Material Loss: There is no material loss during installation, as insulation piercing connectors are compact and robust components designed for long-term reliability.

Additional Materials: Insulation piercing connectors are installed directly onto the conductors without the need for adhesives or consumables.

Installation Method: Installation is performed manually using standard hand tools (e.g., torque wrench) to ensure correct tightening of the shear-head bolts. An energy consumption of 0.01 kWh/kg is considered a standard assumption for manual installation activities.

A5 – End-of-Life Waste Management

Transport to Waste Facility: The average distance to the recycling or disposal facility is assumed to be 50 km, carried out by a lorry (>32 metric tons, EURO 5 standard).

Packaging Waste: Insulation piercing connectors are typically packaged in cardboard cartons (and occasionally wooden pallets for bulk shipments). Cardboard waste is assumed to be recycled, while untreated wood waste is assumed to be incinerated with energy and heat recovery, in line with EU waste packaging scenarios.

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 – Deconstruction / Demolition

At the end of their service life, insulation piercing connectors are manually removed from the electrical installation during dismantling or renewal of overhead or underground distribution lines (C1).
A standard energy consumption of 0.01 kWh/kg is assumed for manual removal, consistent with typical assumptions for small electrical connectors.

C2 – Transport to Waste Processing

After dismantling, insulation piercing connectors are transported to waste treatment facilities (C2).
Average assumed transport distances are 250 km to recycling facilities and 50 km to landfill, using 16–32 t EURO 6 lorries, representative of standard European waste logistics.

C3 – Waste Processing

In the waste processing stage (C3), end-of-life treatment depends on material type:

Plastic components (polymeric housing and insulation materials) are assumed to be 23% recycled, 50% incinerated with energy recovery, and 27% landfilled.

Steel components are assumed to be 85% recycled and 15% landfilled.

Aluminum components are assumed to be 70% recycled and 30% landfilled.

Recycling and incineration processes are assumed to take place within Europe, using established infrastructure for end-of-life treatment of electrical components.

C4 – Disposal

Non-recycled material fractions are disposed of in landfill (C4) and are modelled using standard European landfill datasets appropriate for plastics and metals.

D – Benefits and Loads Beyond the System Boundary

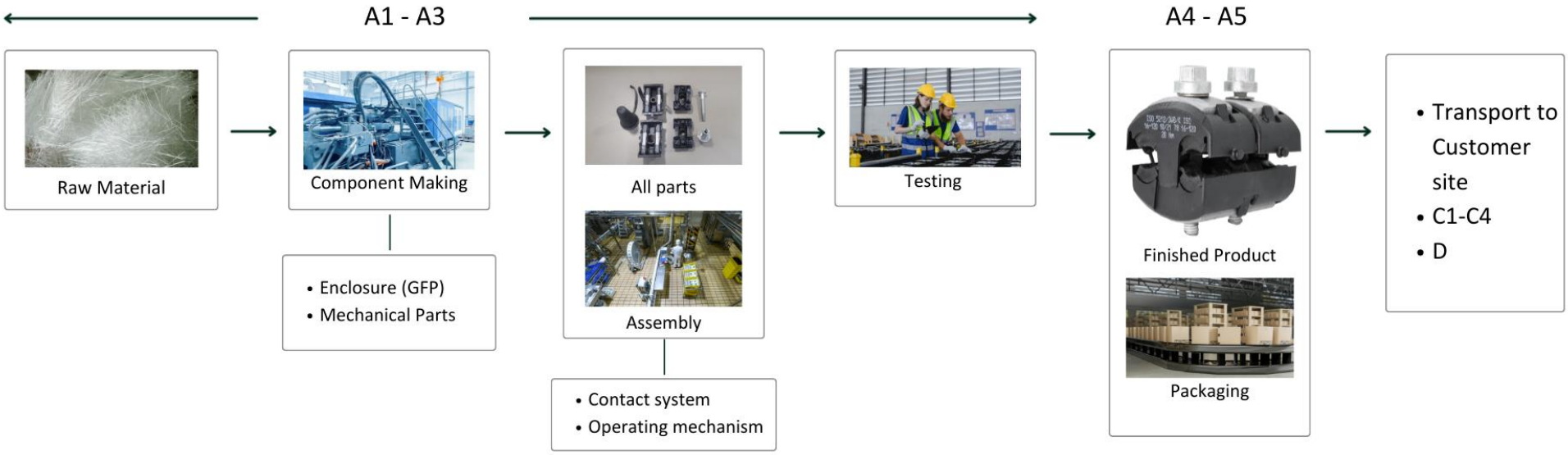
Module D includes loads and benefits beyond the system boundary arising from:

Recycling metals (aluminum and steel), providing avoided burdens through substitution of average European primary metal production.

Energy recovery from incineration of plastic components, generating avoided burdens through substitution of average European energy production.

All treatment-related loads are fully accounted for to avoid double counting. Substituted processes are modelled using European average datasets representative of current conditions, aligned with the background database applied in One Click LCA, in accordance with EN 15804 and EPD Hub PCR requirements.

MANUFACTURING PROCESS



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.

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

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	Multiple products
Grouping method	Based on average results of product group - by total volume
Variation in GWP-fossil for A1-A3, %	18%, 4.2%

This EPD is an averaged product group EPD covering insulation piercing connectors. The declared environmental results are based on weighted averaging of representative products produced at the included manufacturing site during the reference period.

The grouping is based on products with similar function, design, material composition, and manufacturing processes. Weighting is performed according to total production volume, ensuring that higher-volume products have a proportionally greater influence on the declared results.

The product group is manufactured at the following factory location(s):

Mosdorfergasse 1, 8160 Weiz, Austria

The variation in GWP fossil (A1–A3) within the product group ranges from 4.2% to 18% relative to the declared average value. This variation is calculated by comparing the minimum and maximum GWP fossil results of the representative product variants to the weighted average GWP fossil value reported in this EPD.

This EPD covers a range of insulation piercing connectors intended for branching insulated aluminum conductors in low- and medium-voltage distribution networks. Variations within the group relate to conductor cross-section range and mechanical configuration, while maintaining the same core electrical function and manufacturing technology.

Due to the use of averaging, this EPD shall only be used for products falling within the defined product group and manufacturing scope.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.3. 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 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11 environmental data sources follow the methodology ‘allocation, Cut-off, EN 15804+A2‘.

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

EPD Hub General Programme Instructions (GPI), (2023)

EPD Hub Product Category Rules (PCR): Electrification Components and Systems, Version 1.0 (2023)

Ecoinvent v3.9 (2023) – Life Cycle Inventory database used for background data.

ISO 14040:2006 – Environmental management – Life cycle assessment – Principles and framework.

ISO 14044:2006 – Environmental management – Life cycle assessment – Requirements and guidelines.

Manufacturer primary data (2023) – Material composition, energy consumption, packaging, transport distances, and waste treatment provided by the manufacturer.

Eurostat (2023) – Recycling and waste management statistics for Norway and Sweden used for end-of-life assumptions.

European Commission JRC (2021) – Electricity and heat mix data for substitution modelling.

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	8.04E+00	3.10E-02	-3.62E-01	7.70E+00	ND	5.41E-01	ND	ND	ND	ND	ND	ND	ND	3.61E-03	3.20E-02	5.85E-01	2.23E-02	-7.03E-03
GWP – fossil	kg CO_2e	8.01E+00	3.10E-02	6.50E-01	8.69E+00	ND	1.51E-02	ND	ND	ND	ND	ND	ND	ND	3.60E-03	3.20E-02	5.85E-01	2.23E-02	-3.93E-02
GWP – biogenic	kg CO_2e	2.52E-02	5.95E-06	-1.02E+00	-9.90E-01	ND	5.26E-01	ND	ND	ND	ND	ND	ND	ND	3.68E-07	7.03E-06	-3.93E-05	-1.17E-05	3.24E-02
GWP – LULUC	kg CO_2e	5.68E-03	1.39E-05	2.98E-03	8.67E-03	ND	1.60E-05	ND	ND	ND	ND	ND	ND	ND	3.69E-07	1.42E-05	2.45E-05	3.94E-06	-6.43E-05
Ozone depletion pot.	kg $CFC\text{-}_{11}e$	1.49E-07	4.57E-10	1.67E-08	1.66E-07	ND	2.32E-10	ND	ND	ND	ND	ND	ND	ND	5.52E-11	4.52E-10	2.68E-10	2.12E-10	-4.87E-10
Acidification potential	mol H^+e	5.46E-02	1.06E-04	2.88E-03	5.75E-02	ND	9.34E-05	ND	ND	ND	ND	ND	ND	ND	3.25E-05	1.07E-04	2.35E-04	3.39E-05	-2.48E-04
EP-freshwater[2)]	kg Pe	2.12E-01	2.41E-06	5.91E-04	2.13E-01	ND	3.11E-06	ND	ND	ND	ND	ND	ND	ND	1.04E-07	2.49E-06	9.68E-06	5.86E-07	-2.44E-05
EP-marine	kg Ne	8.45E-03	3.47E-05	7.39E-04	9.22E-03	ND	8.50E-05	ND	ND	ND	ND	ND	ND	ND	1.51E-05	3.48E-05	8.04E-05	3.38E-05	-3.77E-05
EP-terrestrial	mol Ne	1.38E-01	3.78E-04	6.30E-03	1.44E-01	ND	4.07E-04	ND	ND	ND	ND	ND	ND	ND	1.65E-04	3.78E-04	7.89E-04	1.04E-04	-3.72E-04
POCP ("smog")[3)]	kg NMVOCe	2.06E-02	1.56E-04	1.92E-03	2.26E-02	ND	1.30E-04	ND	ND	ND	ND	ND	ND	ND	4.93E-05	1.51E-04	2.16E-04	4.76E-05	-1.21E-04
ADP-minerals & metals[4)]	kg Sbe	2.82E-03	8.64E-08	9.44E-06	2.83E-03	ND	3.92E-08	ND	ND	ND	ND	ND	ND	ND	1.29E-09	1.02E-07	8.84E-07	1.34E-08	-5.05E-08
ADP-fossil resources	MJ	1.11E+02	4.49E-01	9.42E+00	1.21E+02	ND	2.02E-01	ND	ND	ND	ND	ND	ND	ND	4.72E-02	4.51E-01	2.56E-01	1.55E-01	-6.48E-01
Water use[5)]	m^3e depr.	4.32E+00	2.22E-03	5.64E-01	4.89E+00	ND	4.27E-03	ND	ND	ND	ND	ND	ND	ND	1.18E-04	2.12E-03	1.77E-02	1.23E-03	-1.25E-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, 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	5.08E-07	3.10E-09	2.27E-08	5.33E-07	ND	1.98E-09	ND	ND	ND	ND	ND	ND	ND	9.25E-10	2.66E-09	2.61E-09	5.53E-10	-2.11E-09
Ionizing radiation[6)]	kBq U235e	2.39E-01	3.91E-04	1.28E-01	3.67E-01	ND	4.86E-04	ND	ND	ND	ND	ND	ND	ND	2.09E-05	3.70E-04	1.54E-03	1.66E-04	-1.24E-02
Ecotoxicity (freshwater)	CTUe	6.57E+01	6.36E-02	4.07E+01	1.06E+02	ND	1.32E-01	ND	ND	ND	ND	ND	ND	ND	2.60E-03	7.00E-02	2.46E-01	1.11E+01	-7.75E-02
Human toxicity, cancer	CTUh	1.93E-08	5.11E-12	6.15E-10	1.99E-08	ND	6.39E-12	ND	ND	ND	ND	ND	ND	ND	3.71E-13	5.41E-12	3.37E-11	2.84E-12	-8.21E-12
Human tox. non-cancer	CTUh	9.81E-08	2.91E-10	1.14E-08	1.10E-07	ND	3.34E-10	ND	ND	ND	ND	ND	ND	ND	5.87E-12	2.84E-10	1.61E-09	3.89E-10	-3.32E-10
SQP[7)]	-	1.06E+01	4.53E-01	2.38E+01	3.48E+01	ND	1.45E-01	ND	ND	ND	ND	ND	ND	ND	3.30E-03	3.04E-01	4.03E-01	1.25E-01	-2.47E-01

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	8.83E+00	6.16E-03	4.85E+00	1.37E+01	ND	-5.00E+00	ND	ND	ND	ND	ND	ND	ND	2.99E-04	6.19E-03	3.51E-02	2.15E-03	7.62E-01
Renew. PER as material	MJ	0.00E+00	0.00E+00	3.47E+00	3.47E+00	ND	-3.47E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-01
Total use of renew. PER	MJ	8.83E+00	6.16E-03	8.32E+00	1.72E+01	ND	-8.47E+00	ND	ND	ND	ND	ND	ND	ND	2.99E-04	6.19E-03	3.51E-02	2.15E-03	1.01E+00
Non-re. PER as energy	MJ	1.11E+02	4.49E-01	9.03E+00	1.20E+02	ND	2.02E-01	ND	ND	ND	ND	ND	ND	ND	4.72E-02	4.51E-01	-1.06E+01	-3.77E+00	-6.48E-01
Non-re. PER as material	MJ	0.00E+00	0.00E+00	2.09E-03	2.09E-03	ND	-2.09E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.60E-02
Total use of non-re. PER	MJ	1.11E+02	4.49E-01	9.04E+00	1.20E+02	ND	2.00E-01	ND	ND	ND	ND	ND	ND	ND	4.72E-02	4.51E-01	-1.06E+01	-3.77E+00	-5.72E-01
Secondary materials	kg	1.37E-01	1.91E-04	5.20E-02	1.89E-01	ND	1.38E-04	ND	ND	ND	ND	ND	ND	ND	1.96E-05	2.01E-04	5.68E-04	3.66E-05	-6.02E-05
Renew. secondary fuels	MJ	5.17E-03	2.43E-06	4.68E-03	9.85E-03	ND	1.13E-06	ND	ND	ND	ND	ND	ND	ND	5.12E-08	2.56E-06	1.15E-05	4.23E-07	4.00E-06
Non-ren. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	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	7.66E-02	6.64E-05	1.30E-02	8.97E-02	ND	-3.74E-04	ND	ND	ND	ND	ND	ND	ND	3.12E-06	6.11E-05	2.11E-04	-5.93E-04	-4.88E-04

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	1.20E+00	7.61E-04	3.02E-02	1.23E+00	ND	1.20E-03	ND	ND	ND	ND	ND	ND	ND	5.25E-05	7.83E-04	6.59E-03	3.19E-04	-2.81E-03
Non-hazardous waste	kg	1.27E+01	1.41E-02	4.62E+00	1.73E+01	ND	6.74E-01	ND	ND	ND	ND	ND	ND	ND	7.15E-04	1.46E-02	2.56E-01	8.43E-01	-1.23E-01
Radioactive waste	kg	2.05E-04	9.58E-08	3.25E-05	2.37E-04	ND	1.22E-07	ND	ND	ND	ND	ND	ND	ND	5.12E-09	9.08E-08	3.93E-07	4.12E-08	-3.19E-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	ND	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	1.74E+00	1.74E+00	ND	1.32E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	5.99E-01	0.00E+00	0.00E+00
Materials for energy rec	kg	0.00E+00	0.00E+00	1.15E-02	1.15E-02	ND	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	4.70E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	2.93E+00	0.00E+00	0.00E+00
Exported energy – Electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	1.98E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	1.23E+00	0.00E+00	0.00E+00
Exported energy –	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	2.72E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	1.70E+00	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	7.95E+00	3.08E-02	6.52E-01	8.63E+00	ND	2.64E-02	ND	ND	ND	ND	ND	ND	ND	3.59E-03	3.18E-02	5.85E-01	2.17E-02	-3.93E-02
Ozone depletion Pot.	kg CFC_{-11}e	1.40E-07	3.65E-10	1.45E-08	1.55E-07	ND	1.87E-10	ND	ND	ND	ND	ND	ND	ND	4.37E-11	3.61E-10	2.23E-10	1.69E-10	-4.05E-10
Acidification	kg SO_2e	4.15E-02	8.06E-05	2.34E-03	4.39E-02	ND	6.82E-05	ND	ND	ND	ND	ND	ND	ND	2.29E-05	8.19E-05	1.80E-04	2.65E-05	-2.10E-04
Eutrophication	kg PO_4^3e	7.89E-03	1.96E-05	3.27E-03	1.12E-02	ND	2.82E-05	ND	ND	ND	ND	ND	ND	ND	5.34E-06	1.99E-05	3.72E-05	1.03E-05	-2.22E-05
POCP (“smog”)	kg C_2H_4e	1.95E-03	7.19E-06	1.76E-04	2.13E-03	ND	7.93E-06	ND	ND	ND	ND	ND	ND	ND	1.71E-06	7.33E-06	1.16E-05	3.91E-06	-1.18E-05
ADP-elements	kg Sbe	2.82E-03	8.43E-08	9.39E-06	2.83E-03	ND	3.79E-08	ND	ND	ND	ND	ND	ND	ND	1.26E-09	9.97E-08	8.78E-07	1.26E-08	-4.99E-08
ADP-fossil	MJ	9.92E+01	4.43E-01	7.08E+00	1.07E+02	ND	1.94E-01	ND	ND	ND	ND	ND	ND	ND	4.68E-02	4.46E-01	2.29E-01	1.53E-01	-4.29E-01

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	8.01E+00	3.10E-02	6.53E-01	8.69E+00	ND	1.51E-02	ND	ND	ND	ND	ND	ND	ND	3.61E-03	3.20E-02	5.85E-01	2.23E-02	-3.94E-02

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 voltage transformation, residual mix, from high to medium voltage, slovakia, Ecoinvent, 0.45 kgCO2e/kWh
2. Electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted, Austria, Ecoinvent, 0.0968 kgCO2e/kWh

Transport scenario documentation A4

Scenario parameter	Value
Capacity utilization (including empty return) %	50
Bulk density of transported products	1.33E+01
Volume capacity utilization factor	1

Installation scenario documentation - A5 (Installation resources)

1. Diesel, burned in building machine, Ecoinvent, 0.01 kWh

Installation scenario documentation - A5 (Installation waste)

1. Treatment of waste wood, post-consumer, sorting and shredding, Ecoinvent, Materials for recycling, 0.09 kg
2. Treatment of waste wood, untreated, municipal incineration, Ecoinvent, 0.085 kg
3. Exported Energy: Electricity, Ecoinvent, 0.19 MJ
4. Exported Energy: Electricity, Ecoinvent, 0.008 MJ
5. Exported Energy: Thermal, Ecoinvent, 0.26 MJ
6. Exported Energy: Thermal, Ecoinvent, 0.012 MJ
7. Treatment of waste wood, untreated, sanitary landfill, Ecoinvent, 0.11 kg
8. Treatment of waste paperboard, unsorted, sorting, Ecoinvent, Materials for recycling, 0.042 kg
9. Treatment of waste packaging paper, municipal incineration, Ecoinvent, 0.004 kg
10. Treatment of waste packaging paper, sanitary landfill, Ecoinvent, 0.0045 kg

End-of-life scenario documentation - C1-C4 (Data source)

1. Treatment of waste polyethylene, for recycling, unsorted, sorting, Ecoinvent, Materials for recycling, 0.089 kg
2. Treatment of waste polyethylene, municipal incineration, Ecoinvent, 0.18 kg
3. Exported Energy: Electricity, Ecoinvent, 1.23 MJ
4. Exported Energy: Thermal, Ecoinvent, 1.6973 MJ
5. Treatment of waste polyethylene, sanitary landfill, Ecoinvent, 0.1 kg
6. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.13 kg
7. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.23 kg
8. Treatment of scrap steel, inert material landfill, Ecoinvent, 0.023 kg
9. Treatment of scrap steel, inert material landfill, Ecoinvent, 0.04 kg
10. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.15 kg
11. Treatment of waste aluminium, sanitary landfill, Ecoinvent, 0.063 kg
12. Diesel, burned in building machine, Ecoinvent, 0.01 kWh
13. Treatment of bilge oil, hazardous waste incineration, Ecoinvent, 0.00351 kg

Scenario information	Value
Scenario assumptions e.g. transportation	Transported 250 km (recycling) and 50 km (landfill) by lorry

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

Magaly Gonzalez Vazquez as an authorized verifier for EPD Hub Limited
01.03.2026

VERIFIED ISO 14025