



ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Fuse switch Disconnecter
Melbye As



EPD HUB, HUB-5419

Published on 01.03.2026, last updated on 01.03.2026, valid until 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

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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: <input type="checkbox"/> Internal verification <input checked="" type="checkbox"/> 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 | Fuse switch Disconnecter |
| 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 (%) | -2.3, -2.8, -16% |
| GTIN (Global Trade Item Number) | - |
| NOBB (Norwegian Building Product Database) | - |
| A1-A3 Specific data (%) | 11 |

ENVIRONMENTAL DATA SUMMARY

| | |
|--|-----------|
| Declared unit | 1 kg |
| Declared unit mass | 1 kg |
| Mass of packaging | 0.3328 kg |
| GWP-fossil, A1-A3 (kgCO₂e) | 8.25 |
| GWP-total, A1-A3 (kgCO₂e) | 7.83 |
| Secondary material, inputs (%) | 26.9 |
| Secondary material, outputs (%) | 58.4 |
| Total energy use, A1-A3 (kWh) | 36.4 |
| Net freshwater use, A1-A3 (m³) | 0.6 |

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 160 A modular fuse switch disconnecter (ISO-Switch) with spike terminals, designed for low-voltage electrical distribution systems.

The product is a 3-pole modular load break switch, expandable with an additional pole for neutral protection. It is designed for use with NH00 fuse links and provides manual switching, isolation, and overcurrent protection of electrical circuits. The breaking capacity is 160 A when used with NH00

fuses. The product does not provide earth-leakage protection.

The switch features a modular design with spike terminals equipped with grease-filled rubber seals, protecting cable ends from external influences. Terminal end stops ensure correct cable insertion length, and torque screws provide reliable electrical connections. The insulation level is 1000 V, with a rated operating voltage of 660 V.

The product complies with IEC 947.

The fuse switch disconnecter is intended for installation in low-voltage distribution boards and control panels within buildings.

This EPD covers Fuse switch connector of all range.

All products within the group have a rated operating voltage of 660 V and an insulation level of 1000 V. Overcurrent and short-circuit protection are provided by the installed fuse links. The products do not provide earth-leakage protection.

Product Variants Included

160 A variants

Fuse size: NH00

Breaking capacity: 160 A with NH00 fuses

Terminal types: spike terminals or standard connection terminals

Configurations: 3P and 3P+N

Typical product weight range: 3.6–4.65 kg

400 A variants

Fuse sizes: NH1 and NH2

Breaking capacity:

250 A with NH1 fuses

400 A with NH2 fuses

Configurations: 3P and 3P+N

Typical product weight range: 5.3–6.5 kg

Further information can be found on:

<https://melbye.com/>

PRODUCT RAW MATERIAL MAIN COMPOSITION

| Raw material category | Amount, mass % | Material origin |
|-----------------------|----------------|-----------------|
| Metals | 64.89 | Austria |
| Minerals | - | - |
| Fossil materials | 35.11 | 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 | 0.15272 |

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 of the fuse switch disconnecter consists of in-house assembly and minor component processing of glass-fiber reinforced plastic, polyamide, rubber, and metallic components, including fitting, trimming, adjustment, fastening, terminal assembly, and final product assembly. Manufacturing waste generation is assumed to be 5% for glass-fiber reinforced plastic and polyamide and 3% for rubber, arising from trimming, adjustment, handling losses, and rejected components during assembly, based on internal manufacturing data. Packaging materials consist mainly of cardboard and wooden boxes. Generated manufacturing waste is collected and treated according to standard practice, with recyclable waste sent for recycling and remaining waste sent to landfills. Transport distances of 250 km for recycling and 50 km for landfills are assumed using truck transport. 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 fuse switch connectors are robust electrical components designed for long-term durability.

Additional Materials: Fuse switch connectors are installed directly into the electrical system without requiring additional materials such as adhesives or consumables.

Installation Method: Installation is conducted manually using standard hand tools. 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: Fuse switch connectors are typically packaged using wooden boxes or cardboard. Untreated wood waste is assumed to be incinerated with energy and heat recovery, following the EU waste wood packaging scenario.

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)

At end of life, fuse switch connectors are manually removed from the electrical installation (C1), with a standard energy consumption of 0.01 kWh/kg, consistent with typical assumptions for small electrical components. After dismantling, products are transported to waste treatment facilities (C2), with average assumed distances of 250 km to recycling facilities and 50 km to landfill, using 16–32 t EURO 6 lorries. In the waste processing stage (C3), end-of-life treatment depends on material type: plastic and rubber components are assumed to be 23% recycled, 50% incinerated with energy recovery, and 27% landfilled; copper components are assumed to be 60% recycled and 40% landfilled; aluminum components are assumed to be 70% recycled and 30% landfilled; and steel components

are assumed to be 85% recycled and 15% landfilled. Recycling and incineration processes are assumed to take place within Europe. The non-recycled fractions are disposed of in landfill (C4) and modelled using standard European landfill datasets.

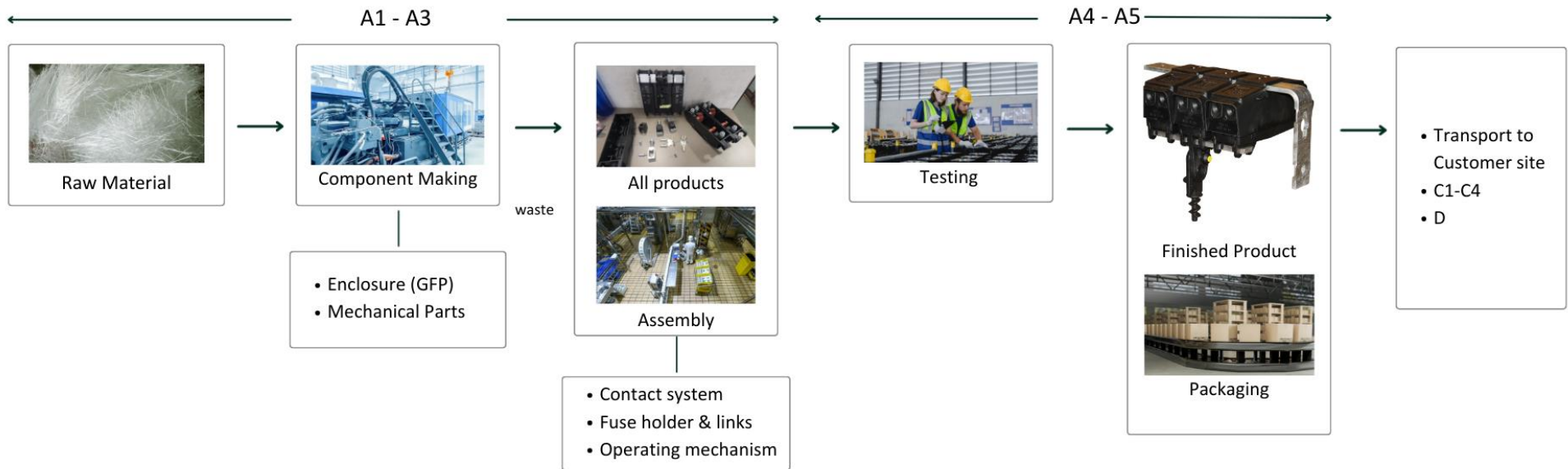
D – Benefits and Loads Beyond the System Boundary

Includes loads and benefits beyond the system boundary (Module D) arising from energy recovery through incineration of plastics, rubber, and packaging materials and from recycling of metals. Benefits are calculated from the substitution of average European energy production (for incinerated fractions) and average European primary metal production (for recycled metal fractions), while all treatment-related loads are accounted for to avoid double counting. Substituted processes are modelled using European average datasets representative of current conditions, with the reference year aligned with the background database used in One Click LCA, in accordance with EN 15804 and EPD Hub PCR requirements.

The end-of-life scenarios applied in modules C1–C4 and D reflect current and commonly used practices in Europe and are considered representative of one of the most likely end-of-life scenarios for fuse switch connectors.

MANUFACTURING PROCESS

Fuse Switch Disconnecter



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 that is 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 only excluded inputs are minor packaging materials, such as adhesive tapes and plastic films, which individually and cumulatively contribute less than 0.5% of the total product mass and are therefore considered negligible.

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, % | -0.5, -1.1% |

This EPD is a site-specific averaged product group EPD covering multiple fuse switch disconnecter variants manufactured at a single production site in Weiz, Austria.

Grouping method:

The declared environmental results are calculated using weighted averaging based on annual production volumes of representative product variants

manufactured during the reference year. All grouped products share similar function, materials, and manufacturing processes.

Range of products covered

The EPD covers fuse switch disconnectors with:

- Rated current: 160–400 A
- Fuse sizes: NH00, NH1, NH2
- Configurations: 3P and 3P+N
- Typical product weight range: 3.6–6.5 kg

Variation in GWP fossil (A1–A3)

The variation in GWP fossil within the product group ranges from –0.5% to +1.1% relative to the declared average value.

Explanation of variation

The percentage variation is calculated by comparing the minimum and maximum GWP fossil results of the representative product variants to the weighted average GWP fossil value declared in this EPD.

Applicability

This EPD shall only be used for products falling within the defined product group and technical specifications and is valid only for products manufactured at the declared production site.

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 ₂ e | 7.24E+00 | 4.14E-02 | -3.42E-01 | 6.94E+00 | ND | 5.41E-01 | ND | ND | ND | ND | ND | ND | ND | 3.61E-03 | 3.16E-02 | 6.12E-01 | 1.34E-02 | -7.03E-03 |
| GWP – fossil | kg CO ₂ e | 7.16E+00 | 4.14E-02 | 6.70E-01 | 7.88E+00 | ND | 1.51E-02 | ND | ND | ND | ND | ND | ND | ND | 3.60E-03 | 3.16E-02 | 6.12E-01 | 1.34E-02 | -3.93E-02 |
| GWP – biogenic | kg CO ₂ e | 7.22E-02 | 8.31E-06 | -1.02E+00 | -9.43E-01 | ND | 5.26E-01 | ND | ND | ND | ND | ND | ND | ND | 3.68E-07 | 6.94E-06 | -3.78E-05 | -9.36E-06 | 3.24E-02 |
| GWP – LULUC | kg CO ₂ e | 4.11E-03 | 1.85E-05 | 2.98E-03 | 7.11E-03 | ND | 1.60E-05 | ND | ND | ND | ND | ND | ND | ND | 3.69E-07 | 1.40E-05 | 2.38E-05 | 2.43E-06 | -6.43E-05 |
| Ozone depletion pot. | kg CFC ₋₁₁ e | 3.86E-08 | 6.11E-10 | 1.67E-08 | 5.59E-08 | ND | 2.32E-10 | ND | ND | ND | ND | ND | ND | ND | 5.52E-11 | 4.46E-10 | 2.78E-10 | 6.32E-11 | -4.87E-10 |
| Acidification potential | mol H ⁺ e | 3.63E-02 | 1.41E-04 | 2.89E-03 | 3.93E-02 | ND | 9.34E-05 | ND | ND | ND | ND | ND | ND | ND | 3.25E-05 | 1.06E-04 | 2.34E-04 | 1.77E-05 | -2.48E-04 |
| EP-freshwater ²⁾ | kg Pe | 4.34E-01 | 3.22E-06 | 5.92E-04 | 4.35E-01 | ND | 3.11E-06 | ND | ND | ND | ND | ND | ND | ND | 1.04E-07 | 2.46E-06 | 9.57E-06 | 3.19E-07 | -2.44E-05 |
| EP-marine | kg Ne | 7.09E-03 | 4.64E-05 | 7.42E-04 | 7.88E-03 | ND | 8.50E-05 | ND | ND | ND | ND | ND | ND | ND | 1.51E-05 | 3.43E-05 | 8.00E-05 | 4.49E-05 | -3.77E-05 |
| EP-terrestrial | mol Ne | 5.31E-02 | 5.05E-04 | 6.33E-03 | 5.99E-02 | ND | 4.07E-04 | ND | ND | ND | ND | ND | ND | ND | 1.65E-04 | 3.74E-04 | 7.91E-04 | 7.07E-05 | -3.72E-04 |
| POCP (“smog”) ³⁾ | kg NMVOCe | 1.79E-02 | 2.08E-04 | 1.93E-03 | 2.00E-02 | ND | 1.30E-04 | ND | ND | ND | ND | ND | ND | ND | 4.93E-05 | 1.49E-04 | 2.17E-04 | 2.68E-05 | -1.21E-04 |
| ADP-minerals & metals ⁴⁾ | kg Sbe | 1.51E-04 | 1.15E-07 | 9.44E-06 | 1.61E-04 | ND | 3.92E-08 | ND | ND | ND | ND | ND | ND | ND | 1.29E-09 | 1.01E-07 | 8.71E-07 | 6.06E-09 | -5.05E-08 |
| ADP-fossil resources | MJ | 9.99E+01 | 6.01E-01 | 9.43E+00 | 1.10E+02 | ND | 2.02E-01 | ND | ND | ND | ND | ND | ND | ND | 4.72E-02 | 4.46E-01 | 2.55E-01 | 5.53E-02 | -6.48E-01 |
| Water use ⁵⁾ | m ³ e depr. | 3.88E+00 | 2.97E-03 | 5.65E-01 | 4.45E+00 | ND | 4.27E-03 | ND | ND | ND | ND | ND | ND | ND | 1.18E-04 | 2.09E-03 | 2.01E-02 | 5.66E-04 | -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 | 4.32E-07 | 4.14E-09 | 2.27E-08 | 4.59E-07 | ND | 1.98E-09 | ND | ND | ND | ND | ND | ND | ND | 9.25E-10 | 2.63E-09 | 2.57E-09 | 3.76E-10 | -2.11E-09 |
| Ionizing radiation ⁶⁾ | kBq | 2.27E-01 | 5.23E-04 | 1.28E-01 | 3.56E-01 | ND | 4.86E-04 | ND | ND | ND | ND | ND | ND | ND | 2.09E-05 | 3.66E-04 | 1.56E-03 | 6.97E-05 | -1.24E-02 |
| Ecotoxicity (freshwater) | CTUe | 1.58E+02 | 8.50E-02 | 4.09E+01 | 1.99E+02 | ND | 1.32E-01 | ND | ND | ND | ND | ND | ND | ND | 2.60E-03 | 6.91E-02 | 3.43E-01 | 6.90E+00 | -7.75E-02 |
| Human toxicity, cancer | CTUh | 1.27E-08 | 6.83E-12 | 6.18E-10 | 1.34E-08 | ND | 6.39E-12 | ND | ND | ND | ND | ND | ND | ND | 3.71E-13 | 5.34E-12 | 3.26E-11 | 1.47E-12 | -8.21E-12 |
| Human tox. non-cancer | CTUh | 1.01E-07 | 3.89E-10 | 1.18E-08 | 1.13E-07 | ND | 3.34E-10 | ND | ND | ND | ND | ND | ND | ND | 5.87E-12 | 2.81E-10 | 1.56E-09 | 2.84E-10 | -3.32E-10 |
| SQP ⁷⁾ | - | 1.17E+01 | 6.05E-01 | 2.38E+01 | 3.61E+01 | ND | 1.45E-01 | ND | ND | ND | ND | ND | ND | ND | 3.30E-03 | 3.01E-01 | 3.93E-01 | 1.11E-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 | 7.36E+00 | 8.23E-03 | 4.85E+00 | 1.22E+01 | ND | -5.00E+00 | ND | ND | ND | ND | ND | ND | ND | 2.99E-04 | 6.11E-03 | 3.48E-02 | 1.05E-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 | 7.36E+00 | 8.23E-03 | 8.32E+00 | 1.57E+01 | ND | -8.47E+00 | ND | ND | ND | ND | ND | ND | ND | 2.99E-04 | 6.11E-03 | 3.48E-02 | 1.05E-03 | 1.01E+00 |
| Non-re. PER as energy | MJ | 9.90E+01 | 6.01E-01 | 8.80E+00 | 1.08E+02 | ND | 2.02E-01 | ND | ND | ND | ND | ND | ND | ND | 4.72E-02 | 4.46E-01 | -1.04E+01 | -3.87E+00 | -6.48E-01 |
| Non-re. PER as material | MJ | 1.37E+00 | 0.00E+00 | -4.12E-02 | 1.33E+00 | ND | -2.09E-03 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | -9.66E-01 | -3.57E-01 | 7.60E-02 |
| Total use of non-re. PER | MJ | 1.00E+02 | 6.01E-01 | 8.76E+00 | 1.10E+02 | ND | 2.00E-01 | ND | ND | ND | ND | ND | ND | ND | 4.72E-02 | 4.46E-01 | -1.14E+01 | -4.22E+00 | -5.72E-01 |
| Secondary materials | kg | 2.69E-01 | 2.56E-04 | 5.20E-02 | 3.22E-01 | ND | 1.38E-04 | ND | ND | ND | ND | ND | ND | ND | 1.96E-05 | 1.98E-04 | 5.48E-04 | 1.91E-05 | -6.02E-05 |
| Renew. secondary fuels | MJ | 1.10E-02 | 3.25E-06 | 4.68E-03 | 1.57E-02 | ND | 1.13E-06 | ND | ND | ND | ND | ND | ND | ND | 5.12E-08 | 2.52E-06 | 1.15E-05 | 3.33E-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 | 5.87E-01 | 8.88E-05 | 1.30E-02 | 6.00E-01 | ND | -3.74E-04 | ND | ND | ND | ND | ND | ND | ND | 3.12E-06 | 6.04E-05 | 2.65E-04 | -5.06E-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 | 8.24E-01 | 1.02E-03 | 3.05E-02 | 8.56E-01 | ND | 1.20E-03 | ND | ND | ND | ND | ND | ND | ND | 5.25E-05 | 7.73E-04 | 8.23E-03 | 1.85E-04 | -2.81E-03 |
| Non-hazardous waste | kg | 9.59E+00 | 1.88E-02 | 4.63E+00 | 1.42E+01 | ND | 6.74E-01 | ND | ND | ND | ND | ND | ND | ND | 7.15E-04 | 1.45E-02 | 2.66E-01 | 7.13E-01 | -1.23E-01 |
| Radioactive waste | kg | 1.46E-04 | 1.28E-07 | 3.26E-05 | 1.78E-04 | ND | 1.22E-07 | ND | ND | ND | ND | ND | ND | ND | 5.12E-09 | 8.97E-08 | 3.99E-07 | 1.70E-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 | 5.84E-01 | 0.00E+00 | 0.00E+00 |
| Materials for energy rec | kg | 0.00E+00 | 0.00E+00 | 1.77E-02 | 1.77E-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 | 2.89E+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 | 1.22E+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 | 1.68E+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 ₂ e | 7.14E+00 | 4.12E-02 | 6.73E-01 | 7.85E+00 | ND | 2.64E-02 | ND | ND | ND | ND | ND | ND | ND | 3.59E-03 | 3.14E-02 | 6.12E-01 | 1.29E-02 | -3.93E-02 |
| Ozone depletion Pot. | kg CFC ₁₁ e | 3.70E-08 | 4.88E-10 | 1.45E-08 | 5.20E-08 | ND | 1.87E-10 | ND | ND | ND | ND | ND | ND | ND | 4.37E-11 | 3.56E-10 | 2.32E-10 | 5.05E-11 | -4.05E-10 |
| Acidification | kg SO ₂ e | 3.11E-02 | 1.08E-04 | 2.35E-03 | 3.36E-02 | ND | 6.82E-05 | ND | ND | ND | ND | ND | ND | ND | 2.29E-05 | 8.09E-05 | 1.80E-04 | 1.31E-05 | -2.10E-04 |
| Eutrophication | kg PO ₄ ³ e | 5.75E-03 | 2.63E-05 | 3.27E-03 | 9.05E-03 | ND | 2.82E-05 | ND | ND | ND | ND | ND | ND | ND | 5.34E-06 | 1.97E-05 | 3.73E-05 | 8.20E-06 | -2.22E-05 |
| POCP (“smog”) | kg C ₂ H ₄ e | 1.92E-03 | 9.60E-06 | 1.76E-04 | 2.11E-03 | ND | 7.93E-06 | ND | ND | ND | ND | ND | ND | ND | 1.71E-06 | 7.24E-06 | 1.16E-05 | 2.79E-06 | -1.18E-05 |
| ADP-elements | kg Sbe | 1.27E-04 | 1.13E-07 | 9.40E-06 | 1.36E-04 | ND | 3.79E-08 | ND | ND | ND | ND | ND | ND | ND | 1.26E-09 | 9.84E-08 | 8.63E-07 | 5.89E-09 | -4.99E-08 |
| ADP-fossil | MJ | 4.55E+03 | 5.92E-01 | 7.09E+00 | 4.56E+03 | ND | 1.94E-01 | ND | ND | ND | ND | ND | ND | ND | 4.68E-02 | 4.40E-01 | 2.29E-01 | 5.42E-02 | -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 ₂ e | 7.17E+00 | 4.14E-02 | 6.73E-01 | 7.88E+00 | ND | 1.51E-02 | ND | ND | ND | ND | ND | ND | ND | 3.61E-03 | 3.16E-02 | 6.12E-01 | 1.34E-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 | 3.33E+00 |
| 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, 0.0042 kg
2. Treatment of waste polyethylene, for recycling, unsorted, sorting, Ecoinvent, Materials for recycling, 0.078 kg
3. Treatment of waste polypropylene, municipal incineration, Ecoinvent, 0.0091 kg
4. Exported Energy: Electricity, Ecoinvent, 0.048 MJ
5. Exported Energy: Electricity, Ecoinvent, 0.089 MJ
6. Exported Energy: Electricity, Ecoinvent, 1.081 MJ
7. Exported Energy: Thermal, Ecoinvent, 0.065 MJ
8. Exported Energy: Thermal, Ecoinvent, 0.12 MJ
9. Exported Energy: Thermal, Ecoinvent, 1.49 MJ
10. Treatment of waste polyethylene, sanitary landfill, Ecoinvent, 0.0049 kg
11. Treatment of waste polyethylene, sanitary landfill, Ecoinvent, 0.088 kg
12. Treatment of waste rubber, unspecified, municipal incineration, Ecoinvent, 0.021 kg
13. Treatment of waste plastic, mixture, sanitary landfill, Ecoinvent, 0.0078 kg
14. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.033 kg
15. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.068 kg
16. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.023 kg
17. Treatment of scrap steel, inert material landfill, Ecoinvent, 0.022 kg
18. Treatment of scrap steel, inert material landfill, Ecoinvent, 0.016 kg
19. Treatment of scrap steel, inert material landfill, Ecoinvent, 0.051 kg
20. Treatment of waste aluminium, sanitary landfill, Ecoinvent, 0.029 kg
21. Treatment of waste aluminium, sanitary landfill, Ecoinvent, 0.0098 kg
22. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.088 kg
23. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.29 kg
24. Diesel, burned in building machine, Ecoinvent, 0.01 kWh
25. Treatment of waste polyethylene, municipal incineration, Ecoinvent, 0.16 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

