Elektroskandia Sverige AB
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# Product Environmental Profile of luminaires for indoor lighting Cylli family

Reference product: Cylli 500



## General information

**Company information**
Elektroskandia Sverige AB
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**Environmental commitments**
CARDI develops and manufactures, luminaires that meets the markets standards and environmental requirements. based on the latest LED technology enclosed in the most sustainable materials.
Research and development take place continuously in order to meet the requirements of the future.

In times of global warming, efforts are needed to make a difference. CARDIs commitment to reducing carbon dioxide emissions is based on being at the development forefront of environmentally friendly and energy-saving products.

**Reference product**
Cylli 500 (Ø520x75mm)

The assessed products range covers indoor lighting luminaires from the Cylli family.
The luminaires are used for professional lighting of indoor commercial applications, mainly for commercial buildings, hotels and shopping malls.

**Functional unit**
The functional unit for this PEP is compliant with PSR rules, and is defined as follow:
*"Provide lighting that delivers an outgoing artificial luminous flux of 1,000 lumens during a reference lifetime of 35,000 hours"*
Accordingly, all impacts measured through the life cycle assessment were normalized based on the reference product's nominal lifetime and luminous flux values, leading to the following normalization factor for all life cycle stages:
***(1000/4075) x (35000/100000) = 0.0859***

**Homogeneous environmental family:**

The reference product represents the Cylli luminaires family, which differs in terms of power and useful output flux (lumens) of the integrated LED installed in the luminaires.

The range of variations for the products in the same family are the following:

| Cylli family | Unit | Cylli 500 XHO | Cylli 500 UHO | Cylli 300 MO | Cylli 300 MO | Cylli 200 MO | Cylli 200 LO |
|---|---|---|---|---|---|---|---|
| System power | W | 36 | 75 | 27 | 22 | 20 | 13.5 |
| Luminous flux | Lumen | 4075 | 8870 | 3090 | 2585 | 2585 | 1630 |
| Weight | Kg | 2.74 | 2.74 | 1.3 | 1.3 | 1.05 | 1.05 |

## Description of reference product

| Specification | Unit | Value |
|---|---|---|
| Product category | - | Indoor lighting products and control gear |
| Product name | - | Cylli 500 |
| Light Source / Lifetime @ L80 | Hours | 100 000 |
| Color temperature | K | 3000 / 4000 / 5000 |
| Color rendering | Ra | 90 |
| Luminous flux | Lm | 4075 |
| Luminous efficency | Lm/W | 113 |
| Ingress protection | IP | 44 |
| Flicker | % (IEEE1789) / SVM / PstLM | <3% / <0.4 SVM / <1.0 |
| Operating voltage | VAC | 220-240 |
| Unified Glare Rating | UGR | <22 |
| Dimensions | mm | Ø520x75 |

**The geographical scope for this PEP was based on the following considerations:**

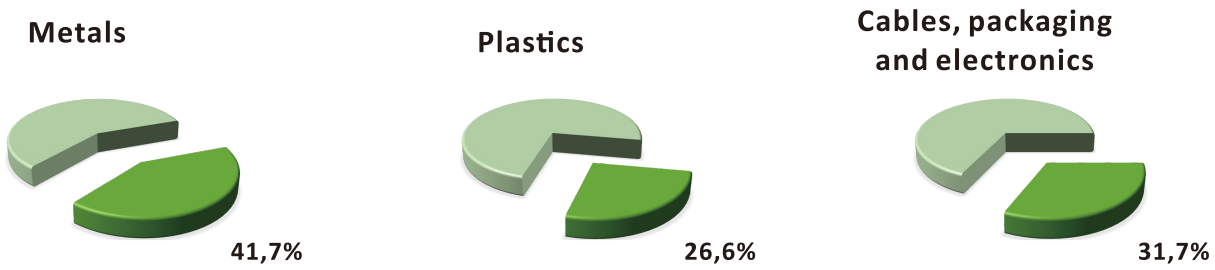
- Technological representativeness takes place in Sweden and China.
- Supply of the raw materials take place in Europe, China and US while assembly of the products take place in China.
- Distribution centers in which storage takes place in Sweden.
- Installation, use and end-of-life of the products take place in Sweden.

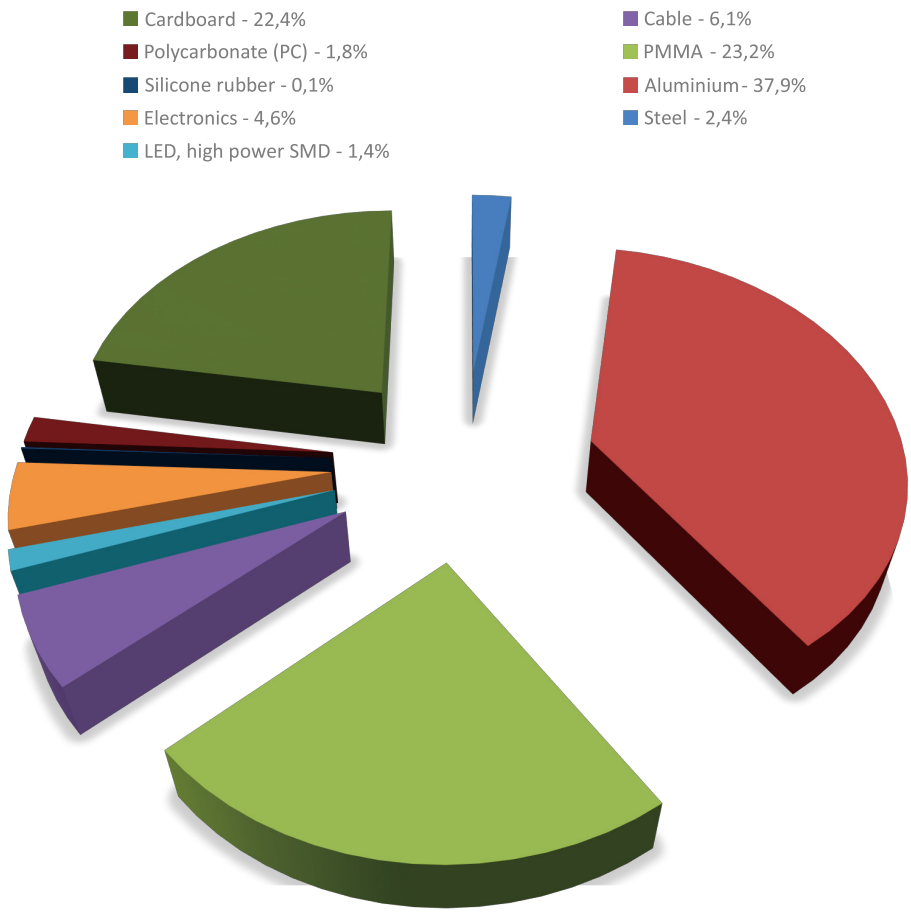
## Constituent material

The list below includes materials with a certain amount of recycled content, in order to reduce the impacts linked to production of original material.

In particular:
The main body of the luminaire is made of 100% of recycled PC and die-casting aluminum;
The cardboard box of packaging is made of 85% of recycled content.

**Total weight of reference product 3531g**(packaging included)



## Manufacturing

Luminaires and control gears are manufactured and assembled in Luminans Dongguan China.
The environmental management system is Certified according to ISO14001 and ISO 9001.

All lighting products manufactured by Luminans comply to the European directive “2011/65/EU RoHS 2.0 - Restriction of dangerous substances in electrical and electronical equipment”.

Electricity Mix: China.

## Distribution

Products leaving the manufacturing in Dongguan, China. Are delivered directly to the client's logistics centers.

The logistics centers are strategically located to optimize transport efficiency, both in terms of transport distance and means of transport.
The warehouse buildings have been appointed the status of Environmental Building Silver according to Sweden Green Building Council. *All transports are affiliated with Fair Transport and the $CO_2$ reporting from the transports are in accordance with the Global Logistics Emissions Councils (GLEC) framework.

During 2022, 70% of the goods were transported with vehicles running on HVO100 (Hydrotreated Vegetable Oil) made from 100% renewable resources and is free from any fossil fuels. During 2023 electrical trucks will be introduced to further lower the climate impact.

*This specific fuel wasn’t modelized due to lack of data.

## Installation

The luminaires are provided to the client with control gear for installation,
if wiring/connectors are available at point of installation, no further accessories are necessary.
Only standard tools might be necessary for connection.

Electricity Mix: Sweden.

## Use




Energy efficient LED light source with an energy efficency class of ”C” acording to the energy labeling regulation (EU) 2019/2015. The light source is integrated in the luminaire.

The use phase consists of electricity use during the whole lifetime of the product.

The assigned lifetime of the luminaire according to L80 = 100 000 hours.

The Cylli family luminaires are equipped with a light management system (named “DIP Switch Power Setting”) capable of reducing electricity consumption by switching the power (3 steps, $P_{max}$ 100% / 70% / 50%) during use.

Electricity Mix: Sweden.

## End of life

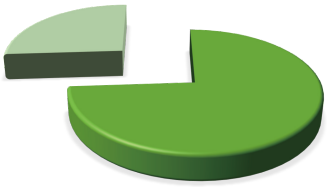
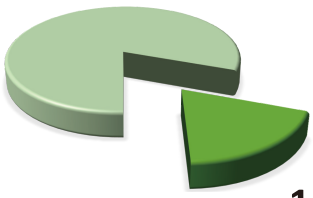
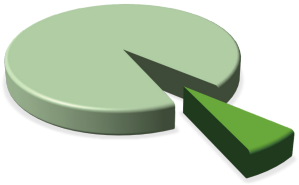
The product end of life factors is taken into consideration during the design phase. Dismantling and sorting of components or material is made as easy as possible with the perspective, ease of recycling.

Elements to process specifically:
In accordance with the requirements of this Directive, the electronic components can contain traces of heavy metals which must be removed and sent to specific channels for processing in compliance with the WEEE Directive 2012/19/EU:

- All brominated flame retardants have been replace with none-toxic alternatives.

Electricity Mix: Sweden.

According to the data available at the issuing of this report, waste treatment scenarios are as follows:
(Reference info by link: https://kunskapsrummet.com/en/sustainability-report-2022/)

| Proportion of luminaire | WEEE waste (Sweden) | Assumption |
|---|---|---|
|  74% | Recycling | Transport (100km) and handling of waste based on included materials. |
|  19% | Incineration with waste energy recovery | Transport (100km) and handling of waste based on included materials. |
|  7% | Landfill | Transport (100km) and handling of waste based on included materials. |

## Environmental impacts

The evaluation of environmental impacts examines the stages of the reference product life cycle: manufacturing, distribution, installation, use and end of life.

For each phase, the following modelling elements were taken into consideration:

| Unless otherwise specified, the energy models are those integrated in the modules used from the EIME database | |
|---|---|
| **Manufacture** | Material and components of the product, energy consumption, transports, packaging and the waste generated by the manufacturing. |
| **Distribution** | Transport between the factory and the final clients. |
| **Installation** | The end of life of the packaging. |
| **Use** | - Product category: Indoor lighting products and control gear<br>- Use scenario: 5000 hours per year for commercial application.<br>- Swedish energy Mix. |
| **End of life** | The default end of life scenario maximizing the environmental impacts. |
| **Software and database used** | EIME & database CODDE-2023-02 |

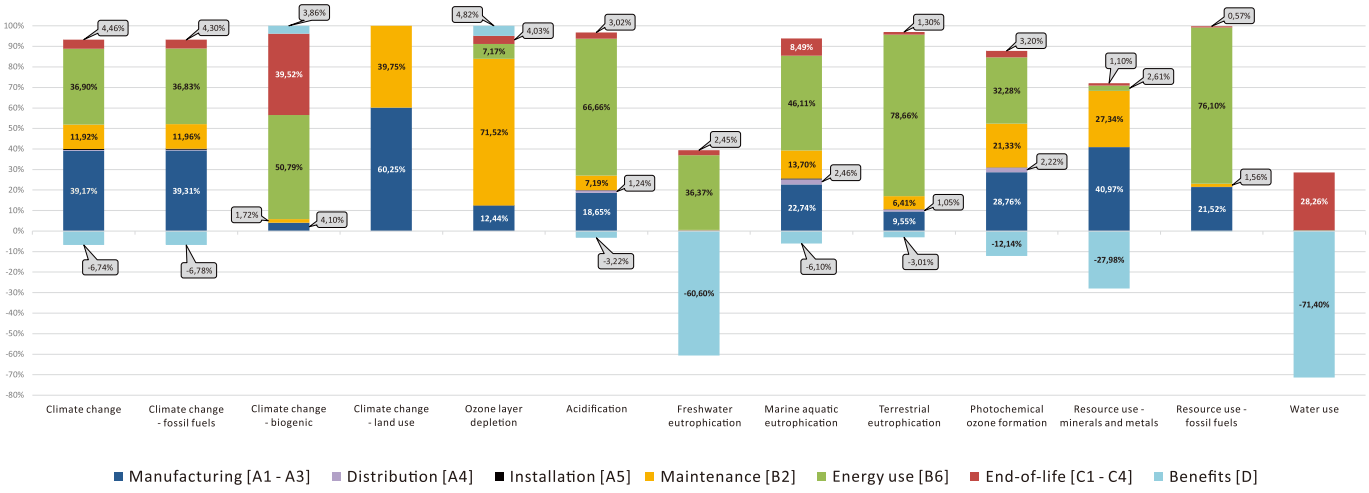
# Environmental impacts

The evaluation of environmental impacts examines the manufacturing, distribution, installation, use and end of life stages of the reference product life cycle.

The impacts indicators and impact models used are the ones indicated by the PCR-ed4-EN-2021 09 14.

| | | Total | Manufacturing [A1 - A3] | Distribution [A4] | Installation [A5] | Use [B1] | Maintenance [B2] | Repair [B3] | Replacement [B4] | Refurbishment [B5] | Operational energy use [B6] | Operational energy use [B7] | Extrapolation rules applied to end-of-life stage [C1 - C4] | Extrapolation rules applied to benefits [D] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEF-GWP | kg CO2 eq | 1,54E+01 | 6,45E+00 | 5,51E-02 | 7,88E-02 | 0,00E+00 | 1,96E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,08E+00 | 0,00E+00 | 7,34E-01 | -1,11E+00 |
| PEF-GWPf | kg CO2 eq | 1,53E+01 | 6,45E+00 | 5,51E-02 | 7,88E-02 | 0,00E+00 | 1,96E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,04E+00 | 0,00E+00 | 7,05E-01 | -1,11E+00 |
| PEF-GWPb | kg CO2 eq | 6,95E-02 | 2,96E-03 | 0,00E+00 | -7,53E-11 | 0,00E+00 | 1,24E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,67E-02 | 0,00E+00 | 2,86E-02 | 2,79E-03 |
| PEF-GWPlu | kg CO2 eq | 6,27E-09 | 3,78E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,49E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PEF-ODP | kg CFC-11 eq | 1,57E-06 | 2,05E-07 | 7,18E-11 | 1,70E-10 | 0,00E+00 | 1,18E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,18E-07 | 0,00E+00 | 6,65E-08 | 7,95E-08 |
| PEF-AP | mol H+ eq | 1,43E-01 | 2,76E-02 | 1,84E-03 | 1,07E-05 | 0,00E+00 | 1,06E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 9,85E-02 | 0,00E+00 | 4,46E-03 | -4,75E-03 |
| PEF-Epf | kg $(PO4)^{3-}$ eq | 4,06E-04 | 3,83E-06 | 1,89E-08 | 2,08E-10 | 0,00E+00 | 2,13E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,74E-04 | 0,00E+00 | 2,53E-05 | -6,24E-04 |
| PEF-Epm | kg N eq | 1,67E-02 | 4,04E-03 | 4,37E-04 | 7,45E-05 | 0,00E+00 | 2,44E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 8,20E-03 | 0,00E+00 | 1,51E-03 | -1,08E-03 |
| PEF-Ept | mol N eq | 4,41E-01 | 4,34E-02 | 4,78E-03 | 2,91E-05 | 0,00E+00 | 2,92E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,58E-01 | 0,00E+00 | 5,93E-03 | -1,37E-02 |
| PEF-POCP | kg COVNM eq | 4,87E-02 | 1,59E-02 | 1,23E-03 | 2,95E-05 | 0,00E+00 | 1,18E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,79E-02 | 0,00E+00 | 1,77E-03 | -6,73E-03 |
| PEF-ADPe | kg Sb eq | 1,73E-04 | 9,82E-05 | 1,97E-09 | 1,75E-11 | 0,00E+00 | 6,55E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,26E-06 | 0,00E+00 | 2,64E-06 | -6,70E-05 |
| PEF-ADPf | MJ | 1,91E+03 | 4,13E+02 | 6,96E-01 | 1,53E-02 | 0,00E+00 | 2,99E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,46E+03 | 0,00E+00 | 1,09E+01 | -4,18E+00 |
| PEF-WU | m3 eq | 2,65E+02 | 2,32E+00 | 1,81E-04 | 5,61E-05 | 0,00E+00 | 2,49E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,85E-01 | 0,00E+00 | 2,62E+02 | -6,62E+02 |
| | | | | | | | | | | | | | | |
| ERP | MJ | 6,18E+02 | 8,57E-01 | 8,92E-04 | 8,05E-06 | 0,00E+00 | 1,58E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,16E+02 | 0,00E+00 | 1,12E+00 | -3,81E+00 |
| ERM | MJ | 2,83E-01 | 2,83E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,60E-01 |
| ER | MJ | 6,18E+02 | 1,14E+00 | 8,92E-04 | 8,05E-06 | 0,00E+00 | 1,58E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,16E+02 | 0,00E+00 | 1,12E+00 | -3,25E+00 |
| ENRP | MJ | 1,91E+03 | 4,13E+02 | 6,96E-01 | 1,53E-02 | 0,00E+00 | 2,97E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,46E+03 | 0,00E+00 | 1,09E+01 | -5,53E+00 |
| ENRM | MJ | 2,76E-01 | 1,44E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,31E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,35E+00 |
| ENR | MJ | 1,91E+03 | 4,13E+02 | 6,96E-01 | 1,53E-02 | 0,00E+00 | 2,99E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,46E+03 | 0,00E+00 | 1,09E+01 | -4,18E+00 |
| USM | kg | 1,60E-01 | 1,57E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,12E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| URSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| UNRSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| NUFW-A2 | $m^3$ | 7,41E+00 | 5,39E-02 | 4,23E-06 | 1,31E-06 | 0,00E+00 | 5,79E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,36E-02 | 0,00E+00 | 7,34E+00 | -1,69E+01 |
| HWD | kg | 4,26E-01 | 1,48E-01 | 0,00E+00 | 4,07E-05 | 0,00E+00 | 8,17E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,97E-01 | 0,00E+00 | 1,17E-06 | 7,86E-02 |
| NHWD | kg | 3,73E+00 | 2,12E+00 | 1,68E-03 | 3,90E-02 | 0,00E+00 | 6,55E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,50E+00 | 0,00E+00 | 3,14E-03 | 2,54E+00 |
| RWD | kg | 1,70E-03 | 1,25E-03 | 1,17E-06 | 7,27E-08 | 0,00E+00 | 2,88E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,56E-04 | 0,00E+00 | 8,14E-08 | 1,44E-03 |
| CRU | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MRE | kg | 4,75E-03 | 4,75E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MER | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| EE | MJ | 1,40E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,40E-03 | 0,00E+00 |
| Biogenic carbon of product | kg de C | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Biogenic carbon of packaging | kg de C | 0,00E+00 | 2,21E-01 | 0,00E+00 | -2,21E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| | | | | | | | | | | | | | | |
| TPE | MJ | 2,53E+03 | 4,14E+02 | 6,97E-01 | 1,53E-02 | 0,00E+00 | 3,00E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,08E+03 | 0,00E+00 | 1,20E+01 | -7,43E+00 |
| PEF-PM | Décès/Kg eq | 2,34E-06 | 1,53E-07 | 9,72E-09 | 6,37E-11 | 0,00E+00 | 4,71E-08 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,09E-06 | 0,00E+00 | 3,18E-08 | -1,11E-07 |
| PEF-IR | kBq U235 eq | 6,01E+02 | 1,98E+02 | 1,14E-04 | 3,82E-05 | 0,00E+00 | 1,98E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,04E+02 | 0,00E+00 | 6,24E-02 | 1,96E-02 |
| PEF-CTUe | CTUe | 1,56E+02 | 2,40E+01 | 3,37E-02 | 3,93E-01 | 0,00E+00 | 1,77E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,52E+01 | 0,00E+00 | 5,92E+01 | 7,06E+00 |
| PEF-CTUh-c | CTUh | 3,68E-09 | 1,14E-09 | 8,21E-13 | 8,63E-12 | 0,00E+00 | 6,46E-10 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,10E-09 | 0,00E+00 | 7,76E-10 | -1,45E-08 |
| PEF-CTUh-nc | CTUh | 2,72E-07 | 1,29E-07 | 1,63E-10 | 1,42E-10 | 0,00E+00 | 5,79E-08 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,18E-08 | 0,00E+00 | 3,33E-08 | -5,33E-08 |
| PEF-LU | pas de dimension | 2,32E+00 | 3,67E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,59E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,95E-01 | 0,00E+00 | 1,62E+00 | -7,10E+00 |

## Relative contribution of life cycle stages to impact categories



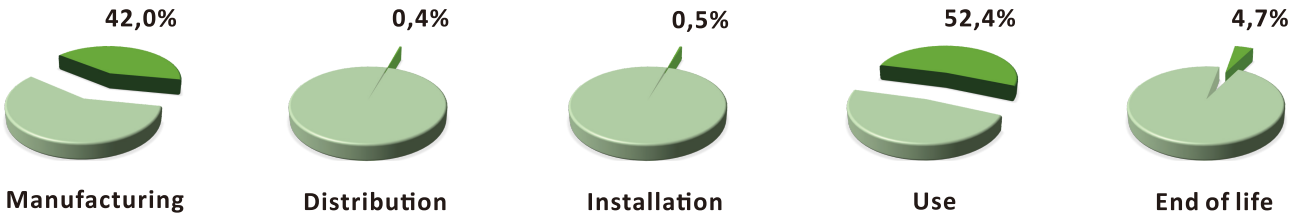
## Environmental impacts

The evaluation of environmental impacts examines the manufacturing, distribution, installation, use and end of life stages of the reference product life cycle.

The impacts indicators and impact models used are the ones indicated by the PCR-ed4-EN-2021 09 14.

| | | Total | Manufacturing [A1 - A3] | Distribution [A4] | Installation [A5] | Maintenance [B2] | Operational energy use [B6] | Extrapolation rules applied to end-of-life stage [C1 - C4] | Extrapolation rules applied to benefits [D] |
|---|---|---|---|---|---|---|---|---|---|
| Climate change | kg $CO_2$ eq | 1,54E+01 | 6,45E+00 | 5,51E-02 | 7,88E-02 | 1,96E+00 | 6,08E+00 | 7,34E-01 | -1,11E+00 |
| Climate change - fossil fuels | kg $CO_2$ eq | 1,53E+01 | 6,45E+00 | 5,51E-02 | 7,88E-02 | 1,96E+00 | 6,04E+00 | 7,05E-01 | -1,11E+00 |
| Climate change - biogenic | kg $CO_2$ eq | 6,95E-02 | 2,96E-03 | 0,00E+00 | -7,53E-11 | 1,24E-03 | 3,67E-02 | 2,86E-02 | 2,79E-03 |
| Climate change - land use | kg $CO_2$ eq | 6,27E-09 | 3,78E-09 | 0,00E+00 | 0,00E+00 | 2,49E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Ozone layer depletion | kg CFC-11 eq | 1,57E-06 | 2,05E-07 | 7,18E-11 | 1,70E-10 | 1,18E-06 | 1,18E-07 | 6,65E-08 | 7,95E-08 |
| Acidification | mol H+ eq | 1,43E-01 | 2,76E-02 | 1,84E-03 | 1,07E-05 | 1,06E-02 | 9,85E-02 | 4,46E-03 | -4,75E-03 |
| Freshwater eutrophication | kg $(PO4)^{3-}$eq | 4,06E-04 | 3,83E-06 | 1,89E-08 | 2,08E-10 | 2,13E-06 | 3,74E-04 | 2,53E-05 | -6,24E-04 |
| Marine aquatic eutrophication | kg N eq | 1,67E-02 | 4,04E-03 | 4,37E-04 | 7,45E-05 | 2,44E-03 | 8,20E-03 | 1,51E-03 | -1,08E-03 |
| Terrestrial eutrophication | mol N eq | 4,41E-01 | 4,34E-02 | 4,78E-03 | 2,91E-05 | 2,92E-02 | 3,58E-01 | 5,93E-03 | -1,37E-02 |
| Photochemical ozone formation | kg COVNM eq | 4,87E-02 | 1,59E-02 | 1,23E-03 | 2,95E-05 | 1,18E-02 | 1,79E-02 | 1,77E-03 | -6,73E-03 |
| Resource use - minerals and metals | kg Sb eq | 1,73E-04 | 9,82E-05 | 1,97E-09 | 1,75E-11 | 6,55E-05 | 6,26E-06 | 2,64E-06 | -6,70E-05 |
| Resource use - fossil fuels | MJ | 1,91E+03 | 4,13E+02 | 6,96E-01 | 1,53E-02 | 2,99E+01 | 1,46E+03 | 1,09E+01 | -4,18E+00 |
| Water use | $m^3$ eq | 2,65E+02 | 2,32E+00 | 1,81E-04 | 5,61E-05 | 2,49E-01 | 5,85E-01 | 2,62E+02 | -6,62E+02 |

**The Global Warming Potential of the reference product is 15,4kg $CO_2$ distributed among the life cycle steps:**




Contact Luminans if you have any questions regarding the calculation of coefficients for impacts others than those presented in this PEP

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|---|---|
| Registration number: LUM-00001-V01.01-EN | Drafting rules: "PCR-ed4-EN-2021 09 06"<br>Supplemented by "PSR-0014-ed1-EN-2018 07 18" |
| Verifier accreditation No.: VH32 | Information and reference documents: **www.pep-ecopassport.org** |
| Date of issue: 07-2023 | Validity period: 5 years |
| Independent verification of the declaration and data, in compliance with ISO 14025 : 2006 | |
| Internal: ☐ External: ☒ | |
| The PCR review was conducted by a panel of experts chaired by Julie Orgelet (Ddemain) | |
| PEPs are compliant with XP C08-100-1:2016 or EN 50693:2019<br>The components of the present PEP may not be compared with components from any other program. | |
| Document complies with ISO 14025:2006 "Environmental labels and declarations.<br>Type III environmental declarations" Indicator calculated with EF 3.0 methodology (EN 15804+A2:2019) | |