Karl H Ström AB
553 02 Jönköping, Sweden
www.khs.se

Product Environmental Profile of luminaires for indoor lighting HERMAN family

Reference product: HERMAN 120W 30/60° DALI

General information

Company information
Karl H Ström AB
Verktygsvägen 4, 553 02 Jönköping, Sweden
https://www.khs.se
Author: Johan Eriksson (Johan@luminans.com)

Environmental commitments
Luminans 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. Luminans commitment to reducing carbon dioxide emissions is based on being at the development forefront of environmentally friendly and energy-saving products.

Reference product
HERHMAN 120W 30/60° DALI (1717x78x49mm)

The assessed products range covers indoor lighting luminaires from the HERMAN family.
The luminaires are used for professional lighting of indoor commercial applications, mainly for commercial buildings, warehouses, offices 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"
Calculations of environmental impacts of the manufacturing, distribution, installation, use and end-of-life stages are carried out as follows for each life cycle stages:
Enviromental impacts of PEP (for 1000 lumens over 35000 hours)=
Environmental impacts of the reference product x (1000/19500) x (35000/100000) = Reference product enviromental impacts x 0.01795

Homogeneous environmental family:

The reference product represents the HERMAN luminaire 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:

DL family	System power (W)	Luminous flux (lm)	Product mass (g)
HERMAN 120W 30/60° DALI	120	19 500	3 000
HERMAN 40W 30/60°	42	7 020	1 900
HERMAN 40W 30/60° DALI	42	7 020	1 920
HERMAN 40W 90/120°	42	7 020	1 900
HERMAN 40W 90/120° DALI	42	7 020	1 920
HERMAN 70W 30/60°	68	11 020	1 900
HERMAN 70W 30/60° DALI	68	11 020	1 920
HERMAN 70W 90/120°	68	11 020	1 900
HERMAN 70W 90/120° DALI	68	11 020	1 920
HERMAN 90W 30/60°	92	15 050	2 980
HERMAN 90W 30/60° DALI	92	15 050	3 000
HERMAN 90W 90/120°	92	15 050	2 980
HERMAN 90W 90/120° DALI	92	15 050	3 000
HERMAN 120W 30/60°	120	19 500	2 980
HERMAN 120W 90/120°	120	19 500	2 980
HERMAN 120W 90/120° DALI	120	19 500	3 000

Description of reference product

Specification	Unit	Value
Product category	-	Indoor lighting products supplied with light source and control gear
Product name	-	HERMAN 120W 30/60° DALI
Light Source / Lifetime @ L80	Hours	100 000
Color temperature	K	4000
Color rendering	Ra	80
Luminous flux	Lm	19500
Luminous efficency	Lm/W	162.5
Ingress protection	IP	23
Flicker	% (IEEE1789) / SVM / PstLM	<3% / <0,4 SVM / <1,0
Operating voltage	VAC	220-240
Unified Glare Rating	UGR	<25
Dimensions	mm	1717x78x49

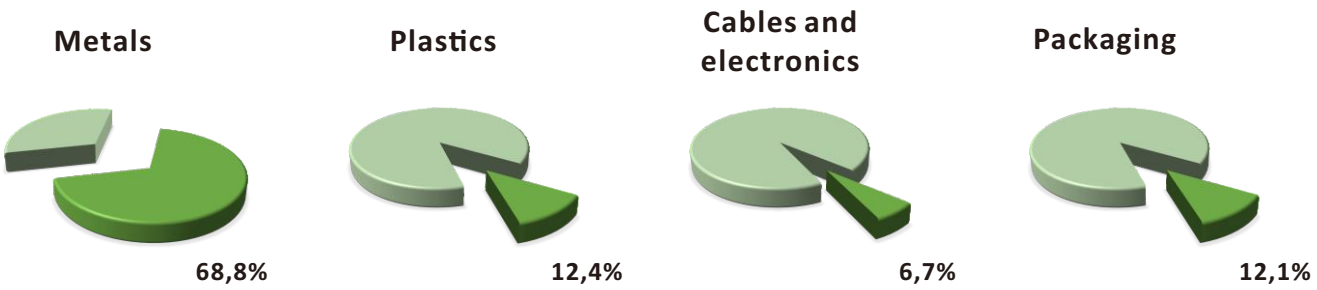
The geographical scope for this PEP was based on the following considerations:
- Technological representativeness takes place in Sweden and China, 2024.
- Supply of the raw materials take place in Europe, China and US while assembly of the products take place in China.
- Distribution centers in which storage takes place in Sweden.
- Installation, use and end-of-life of the products take place in Sweden.

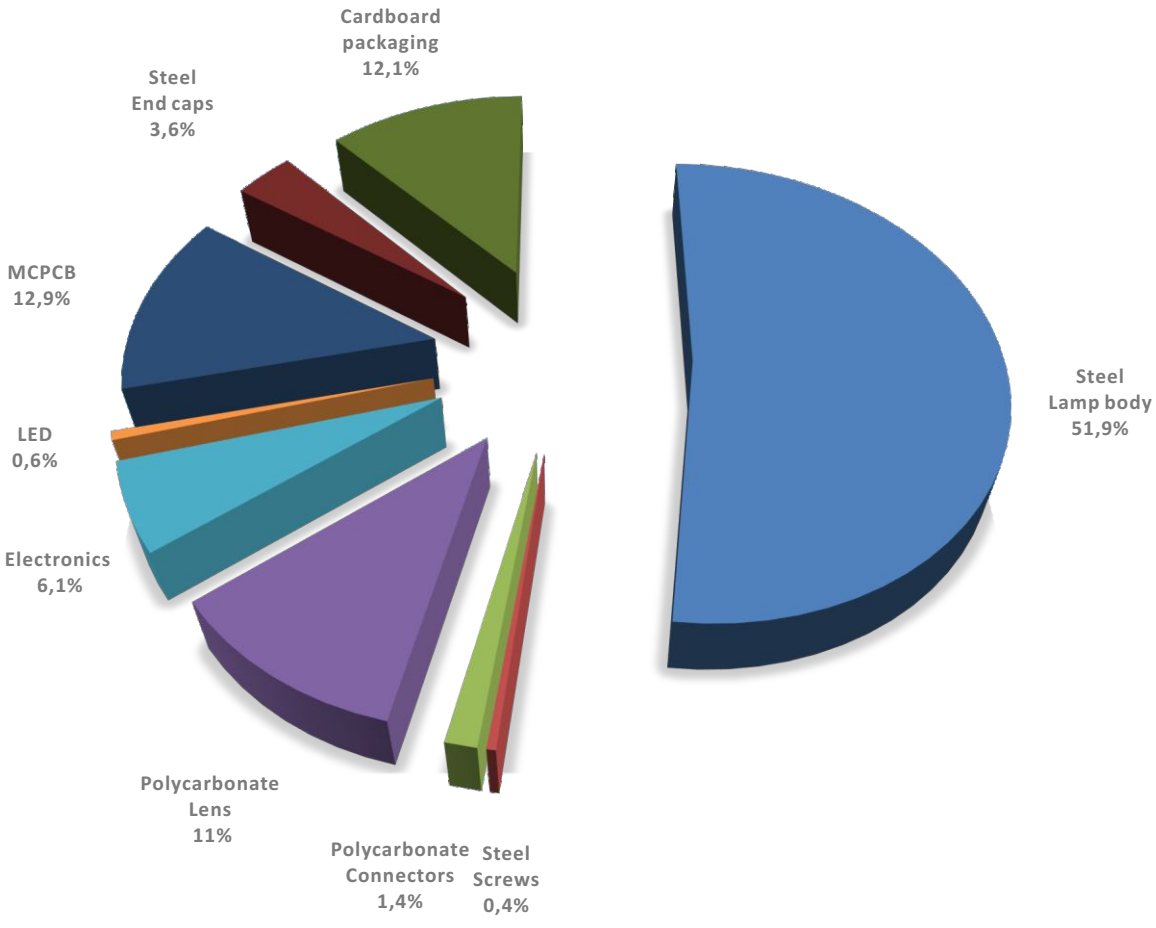
Constituent material

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 extruded aluminum;
The cardboard box of packaging is made of 82% of recycled content.

Total weight of reference product 2800g(packaging included)





Manufacturing

Luminaires and control gears are manufactured and assembled in Luminans Dongguan China.
The aluminum and plastic used comes from 100% recycle material.
The treatment of the losses in production are:
Turning of steel parts, casting of aluminum, injection of plastic, soldering of SMD components, HAL finishing and PWB, solder mask deposition.

The upstream transport used during the manufacturing phase is: Europe to China by Boat and Truck, Asia to China by Truck, Local China by Truck.

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".

Energy used: Electricity Mix; high voltage; 2020; China, CN.

Distribution

Products leaving the manufacturing in Dongguan, China by sea with 19,000km, arriving in Sweden then delivered directly to the client's logistics centers by truck 1,000km.

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.

The EoL treatment of the cardbord packaging used is mainly recycled, partially incinerated and landfill.

Energy used: Electricity Mix; Low voltage; 2020; Sweden, SE.

Use

Energy efficient LED light source with an energy efficency class of "B" 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 Herman 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.

Energy used: Electricity Mix; Low voltage; 2020; Sweden, SE.

End of life

The product end of life factors is taken into consideration during the design phase. By designing the luminaire according to The Ecodesign Directive (Directive 2009/125/EC). Dismantling and sorting of components or material is made as easy as possible with the perspective, ease of recycling.

the EoL treatment of the product used is mainly recycled, partially incinerated and landfill.

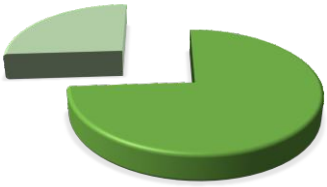
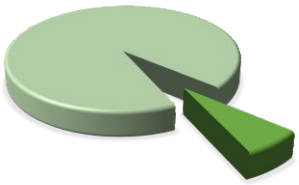
Elements to process specifically:
In accordance with the requirements of this Directive, the electronic components can contain traces of heavy metals which must be removed and sent to specific channels for processing in compliance with the WEEE Directive 2012/19/EU:

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

Energy used: Electricity Mix; Low voltage; 2020; Sweden, SE.

The ESR database was used to modelized the end of life of the product.

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:

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 - Use scenario: 5000 hours per year for commercial application. - Swedish energy Mix.
End of life	The ESR database was used to modelized the end of life of the product
Software and database use	EIME v6.2.2-5 Database CODDE-2024-06-04

Unless otherwise specified, the energy models are those integrated in the modules used from the EIME database

Extrapolation

The extrapolation coefficients are given for the environmental impact of the FU, which is the emission of an outgoing artificial luminous flux of 1,000 lumens over 35,000 hours. For each life cycle stage, the environmental impacts of the product are calculated by multiplying the reference product impacts of the declaration with the extrapolation coefficient. The "Total" column shall be calculated by adding the environmental impacts of each life cycle stage."

The extrapolation coefficients calculation at the FU level shall use the following formula:

$$\text{Extrapolation coefficient at the product level} \times \left(\frac{\text{Lighting output of reference product (lm)}}{\text{Lighting output of product concerned (lm)}} \right)$$

HERMAN family	System power (W)	Luminous flux (lm)	Product mass (g)	Structure mass (g)	Mass of Control Gear (g)	Light Source mass (g)	Mass Lighting Management (g)	Packaging mass (g)
HERMAN 120W 30/60° DALI	120	19 500	3 000	2 179	215	268	107	338
HERMAN 40W 30/60°	42	7 020	1 900	1 345	185	161	89	209
HERMAN 40W 30/60° DALI	42	7 020	1 920	1 345	205	161	97	209
HERMAN 40W 90/120°	42	7 020	1 900	1 345	185	161	89	209
HERMAN 40W 90/120° DALI	42	7 020	1 920	1 345	205	161	97	209
HERMAN 70W 30/60°	68	11 020	1 900	1 345	185	161	89	209
HERMAN 70W 30/60° DALI	68	11 020	1 920	1 345	205	161	97	209
HERMAN 70W 90/120°	68	11 020	1 900	1 345	185	161	89	209
HERMAN 70W 90/120° DALI	68	11 020	1 920	1 345	205	161	97	209
HERMAN 90W 30/60°	92	15 050	2 980	2 179	195	268	99	338
HERMAN 90W 30/60° DALI	92	15 050	3 000	2 179	215	268	107	338
HERMAN 90W 90/120°	92	15 050	2 980	2 179	195	268	99	338
HERMAN 90W 90/120° DALI	92	15 050	3 000	2 179	215	268	107	338
HERMAN 120W 30/60°	120	19 500	2 980	2 179	195	268	99	338
HERMAN 120W 90/120°	120	19 500	2 980	2 179	195	268	99	338
HERMAN 120W 90/120° DALI	120	19 500	3 000	2 179	215	268	107	338

HERMAN family	Manufacturing					Distribution	Installation	Use			End of Life
	Structure and Packaging	Control gear	Light Source	Lighting management	Max			Light Source	Electricity consumption	Max	
HERMAN 120W 30/60° DALI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
HERMAN 40W 30/60°	0.62	0.86	0.60	0.84	0.86	0.64	0.62	0.60	0.35	0.60	0.71
HERMAN 40W 30/60° DALI	0.62	0.95	0.60	0.91	0.95	0.65	0.62	0.60	0.35	0.60	0.71
HERMAN 40W 90/120°	0.62	0.86	0.60	0.84	0.86	0.64	0.62	0.60	0.35	0.60	0.71
HERMAN 40W 90/120° DALI	0.62	0.95	0.60	0.91	0.95	0.65	0.62	0.60	0.35	0.60	0.71
HERMAN 70W 30/60°	0.62	0.86	0.60	0.84	0.86	0.64	0.62	0.60	0.57	0.60	0.71
HERMAN 70W 30/60° DALI	0.62	0.95	0.60	0.91	0.95	0.65	0.62	0.60	0.57	0.60	0.71
HERMAN 70W 90/120°	0.62	0.86	0.60	0.84	0.86	0.64	0.62	0.60	0.57	0.60	0.71
HERMAN 70W 90/120° DALI	0.62	0.95	0.60	0.91	0.95	0.65	0.62	0.60	0.57	0.60	0.71
HERMAN 90W 30/60°	1.00	0.91	1.00	0.92	1.00	0.99	1.00	1.00	0.77	1.00	1.00
HERMAN 90W 30/60° DALI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.77	1.00	1.00
HERMAN 90W 90/120°	1.00	0.91	1.00	0.92	1.00	0.99	1.00	1.00	0.77	1.00	0.96
HERMAN 90W 90/120° DALI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.77	1.00	1.00
HERMAN 120W 30/60°	1.00	0.91	1.00	0.92	1.00	0.99	1.00	1.00	1.00	1.00	0.96
HERMAN 120W 90/120°	1.00	0.91	1.00	0.92	1.00	0.99	1.00	1.00	1.00	1.00	0.96
HERMAN 120W 90/120° DALI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

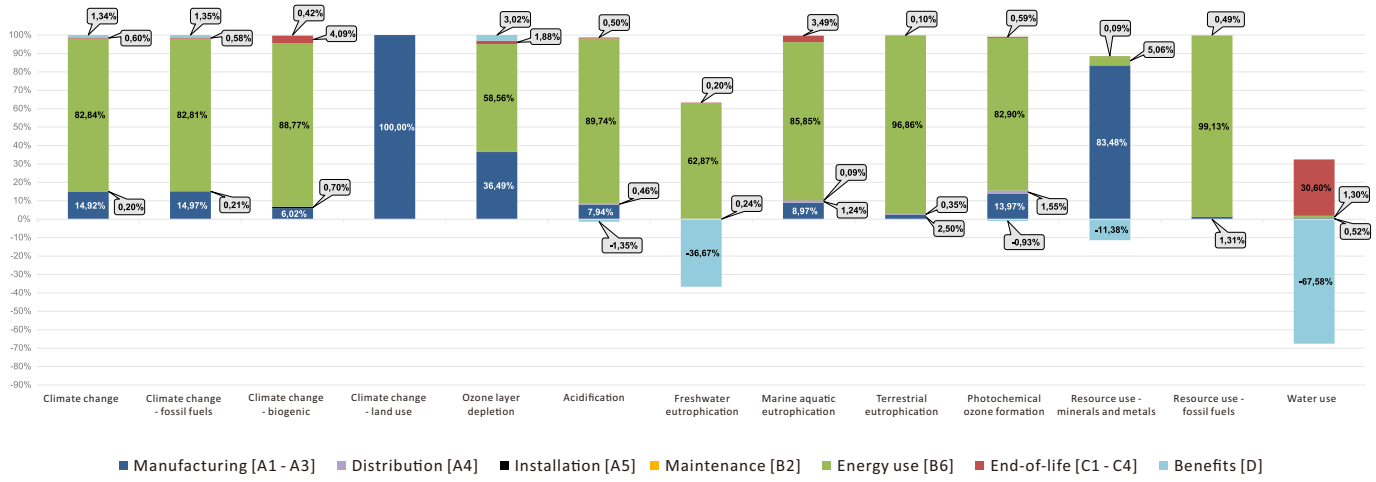
Environmental impacts

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	7,45E+00	1,14E+00	1,58E-02	8,22E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,25E+00	0,00E+00	4,62E-02	1,00E-01
PEF-GWPf	kg CO2 eq	7,39E+00	1,14E+00	1,58E-02	6,68E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,18E+00	0,00E+00	4,44E-02	1,00E-01
PEF-GWPb	kg CO2 eq	6,56E-02	-2,61E-03	0,00E+00	1,54E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,49E-02	0,00E+00	1,78E-03	2,08E-04
PEF-GWPlu	kg CO2 eq	3,29E-09	3,29E-09	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
PEF-ODP	kg CFC-11 eq	2,70E-07	7,63E-08	2,07E-11	8,52E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,90E-07	0,00E+00	4,04E-09	6,19E-09
PEF-AP	mol H+ eq	1,17E-01	9,06E-03	5,30E-04	1,87E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,06E-01	0,00E+00	5,84E-04	-1,58E-03
PEF-Epf	kg $(PO4)^{3-}$ eq	2,86E-04	1,49E-06	5,47E-09	9,10E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,83E-04	0,00E+00	1,27E-06	-2,32E-04
PEF-Epm	kg N eq	1,26E-02	8,91E-04	1,26E-04	8,93E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E-02	0,00E+00	3,53E-04	-3,76E-05
PEF-Ept	mol N eq	4,05E-01	9,60E-03	1,38E-03	5,61E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,94E-01	0,00E+00	4,05E-04	-6,87E-04
PEF-POCP	kg COVNM eq	2,99E-02	3,13E-03	3,55E-04	1,31E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,63E-02	0,00E+00	1,34E-04	-2,19E-04
PEF-ADPe	kg Sb eq	1,43E-04	1,10E-04	5,68E-10	1,56E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,31E-05	0,00E+00	1,14E-07	-1,49E-05
PEF-ADPf	MJ	1,17E+03	2,05E+01	2,01E-01	6,35E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,14E+03	0,00E+00	5,87E-01	7,71E+00
PEF-WU	m3 eq	1,88E+01	2,47E-01	5,24E-05	4,95E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,98E+00	0,00E+00	1,46E+01	-3,22E+01
ERP	MJ	8,01E+02	7,33E-01	2,58E-04	8,40E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,01E+02	0,00E+00	6,31E-02	-1,65E-01
ERM	MJ	9,27E-02	9,27E-02	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	8,96E-02
ER	MJ	8,01E+02	8,26E-01	2,58E-04	8,40E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,01E+02	0,00E+00	6,31E-02	-7,51E-02
ENRP	MJ	1,17E+03	2,03E+01	2,01E-01	6,35E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,14E+03	0,00E+00	5,87E-01	7,53E+00
ENRM	MJ	1,42E-01	1,42E-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	1,72E-01
ENR	MJ	1,17E+03	2,05E+01	2,01E-01	6,35E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,14E+03	0,00E+00	5,87E-01	7,71E+00
USM	kg	4,96E-02	4,96E-02	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
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	5,04E-01	5,76E-03	1,22E-06	1,15E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,44E-02	0,00E+00	4,04E-01	-7,68E-01
HWD	kg	3,89E+00	7,32E-01	0,00E+00	1,62E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,16E+00	0,00E+00	4,40E-07	4,02E-03
NHWD	kg	7,87E+00	7,00E-01	4,86E-04	2,72E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,16E+00	0,00E+00	1,19E-03	2,14E-01
RWD	kg	6,92E-04	2,33E-04	3,38E-07	3,27E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,58E-04	0,00E+00	3,24E-08	7,59E-05
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	1,12E-02	1,12E-02	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	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 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	9,46E-02	0,00E+00	-9,46E-02	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	1,97E+03	2,13E+01	2,01E-01	7,19E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,95E+03	0,00E+00	6,50E-01	7,63E+00
PEF-PM	Décès/Kg eq	1,86E-06	5,12E-08	2,81E-09	1,13E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,80E-06	0,00E+00	2,20E-09	-3,80E-09
PEF-IR	kBq U235 eq	1,66E+02	1,17E+01	3,30E-05	9,89E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,54E+02	0,00E+00	2,74E-03	1,82E-02
PEF-CTUe	CTUe	8,70E+01	3,65E+00	9,49E-03	9,58E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,29E+01	0,00E+00	3,91E-01	5,92E-01
PEF-CTUh-c	CTUh	2,75E-09	4,45E-10	2,37E-13	7,32E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,52E-09	0,00E+00	5,37E-11	-7,13E-10
PEF-CTUh-nc	CTUh	8,10E-08	1,83E-08	5,25E-12	2,14E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,84E-08	0,00E+00	4,31E-09	-2,42E-08
PEF-LU	pas de dimension	1,51E+00	2,09E-03	0,00E+00	1,77E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,40E+00	0,00E+00	1,06E-01	-6,81E-01

Relative contribution of life cycle stages to impact categories



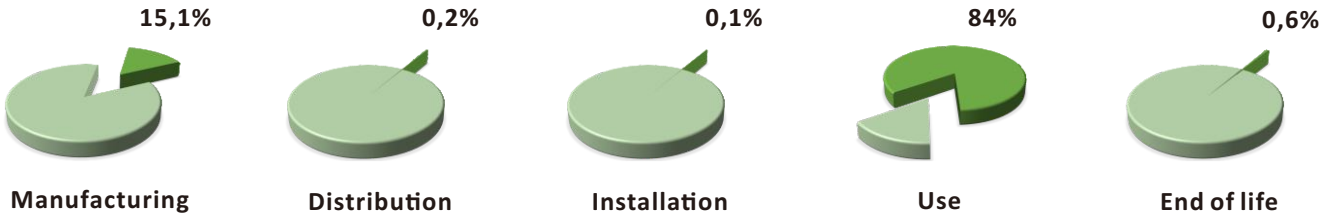
Environmental impacts

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.
Indicator calculated with PEP EF 3.1 methodology (EN 15804+A2) v2.0.

		Total	Manufacturing [A1 - A3]	Distribution [A4]	Installation [A5]	Operational energy use [B6]	Operational energy use [B7]	Extrapolation rules applied to end-of-life stage [C1 - C4]	Extrapolation rules applied to benefits [D]
Climate change	kg CO2 eq	7,45E+00	1,14E+00	1,58E-02	8,22E-03	6,25E+00	0,00E+00	4,62E-02	1,00E-01
Climate change - fossil fuels	kg CO2 eq	7,39E+00	1,14E+00	1,58E-02	6,68E-03	6,18E+00	0,00E+00	4,44E-02	1,00E-01
Climate change - Biogenic	kg CO2 eq	6,56E-02	-2,61E-03	0,00E+00	1,54E-03	6,49E-02	0,00E+00	1,78E-03	2,08E-04
Climate change - Land use	kg CO2 eq	3,29E-09	3,29E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Ozone layer depletion	kg CFC-11 eq	2,70E-07	7,63E-08	2,07E-11	8,52E-11	1,90E-07	0,00E+00	4,04E-09	6,19E-09
Acidification	mol H+ eq	1,17E-01	9,06E-03	5,30E-04	1,87E-05	1,06E-01	0,00E+00	5,84E-04	-1,58E-03
Freshwater eutrophication	kg $(PO4)^{3-}$eq	2,86E-04	1,49E-06	5,47E-09	9,10E-08	2,83E-04	0,00E+00	1,27E-06	-2,32E-04
Marine aquatic eutrophication	kg N eq	1,26E-02	8,91E-04	1,26E-04	8,93E-06	1,12E-02	0,00E+00	3,53E-04	-3,76E-05
Terrestrial eutrophication	mol N eq	4,05E-01	9,60E-03	1,38E-03	5,61E-05	3,94E-01	0,00E+00	4,05E-04	-6,87E-04
Photochemical ozone formation	kg COVNM eq	2,99E-02	3,13E-03	3,55E-04	1,31E-05	2,63E-02	0,00E+00	1,34E-04	-2,19E-04
Resource use - minerals and metals	kg Sb eq	1,43E-04	1,10E-04	5,68E-10	1,56E-10	3,31E-05	0,00E+00	1,14E-07	-1,49E-05
Resource use - fossil fuels	MJ	1,17E+03	2,05E+01	2,01E-01	6,35E-02	1,14E+03	0,00E+00	5,87E-01	7,71E+00
Water use	m3 eq	1,88E+01	2,47E-01	5,24E-05	4,95E-04	3,98E-01	0,00E+00	1,46E+01	-3,22E+01

The Global Warming Potential of the reference product is 7,68kg 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

Registration number: KHS-00004-V01.01-EN	Drafting rules: "PCR-ed4-EN-2021 09 06" Supplemented by "PSR-0014-ed2-FR-2023 07 13"
Verifier accreditation No.: VH48	Information and reference documents: **www.pep-ecopassport.org**
Date of issue: 08-2024	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 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. Type III environmental declarations".	