



2325 LED DOWNLIGHT

ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT ENVIRONMENTAL PROFILE OF 2325 LED DOWNLIGHT

Reference product: 2325 G3 C07 OA LED 20/14/08/ML-8MC ET

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PEPs are compliant with XP C08-100-1:2016 and EN 50693:2019 or NF E38-500:2022			
The components of the present PEP cannot be compared with elements from another program.			
Document complies with ISO 14025:2006 "Environmental labels and declarations. Type III environmental declarations"			

Content of the PEP report

1	General information	3
1.1	Company information	3
1.2	Product information	3
1.3	Functional unit	5
1.4	Homogeneous environmental family	5
2	Constituent materials	7
2.1	Overview	7
2.2	Product	7
2.3	Packaging	7
3	Information on life cycle stages	8
3.1	Manufacturing stage	8
3.2	Distribution stage	8
3.3	Installation stage	8
3.4	Use stage	8
3.5	End-of-life stage	9
3.6	Benefits and loads beyond the system boundaries stage	9
4	Environmental impacts	10
4.1	Introduction	10
4.2	Results per functional unit	11
4.3	Results per unit of product	12

1 General information



1.1 Company information

TRILUX Simplify Your Light represents the most simple and reliable path to customized, energy-efficient and sustainable lighting solutions. In the dynamic and ever more complex lighting market, customers are provided with optimal advice, ideal orientation and perfect light. To ensure this, TRILUX offers a wide portfolio of technologies as well as high-performance partners within the TRILUX Group, and unites single components to create custom-designed complete solutions – always perfectly matched to customer requirements and specific applications.

In this way, complex and extensive projects are simply and rapidly realized from a single source. According to the principle of "SIMPLIFY YOUR LIGHT", planning, installation and ease of use, besides quality and cost efficiency, is focused on for customers.

1.2 Product information

The name of the product under study is "2325 LED Downlight".

The 2325 LED G3 downlight is the perfect option for lighting refurbishments due to its versatility and flexibility. Multilumen technology provides three luminaire luminous fluxes and Multicolour offers a choice of light colors in one luminaire. With refurbishment rings it is suitable for most ceiling openings. The 2325 LED is ideal for reception areas, hotels, restaurants, sales, exhibition, meeting and recreation rooms as well as corridors.

- Multilumen and Multicolor: Adjustable luminous flux (2,000 lm, 1,400 lm, 800 lm) and light colors (3,000 K, 4,000 K)
- With refurbishment rings suitable for ceiling openings from 150 mm to 250 mm
- Toolless ceiling installation due to quick mounting springs
- Very low recess depth (43 mm incl. control gear unit)
- Pleasant light effect due to uniform illumination
- High efficiency (up to 105 lm/W)
- Reliable service life (50,000 h, L70)
- Sustainable luminaires 2325 S with higher efficiency and service life.

1 General information

Further technical information can be obtained by contacting Heidestraße, D-59759 Arnsberg, Germany or on the website <https://www.trilux.com> or by E-Mail s.ke@trilux.com.

The assessed products range covers lighting luminaires from the “2325 LED Downlight” family, which including 2325 G3 C07 S OA LED 20/14/08/ML-840 ET (TK: 10247749; TOC: 7791040), 2325 G3 C05 S OA LED 20/14/08/ML-840 ET (TK: 10247748; TOC: 7790940), 2325 G3 C05 OA LED 20/14/08/ML-8MC ET (TK: 10247750; TOC: 7791140) and 2325 G3 C07 OA LED 20/14/08/ML-8MC ET (TK: 10247751; TOC: 7791240). They have all characteristics described in PSR-0014-ed2.0-EN-2023 07 13 as belong to a homogeneous environmental family.

The reference product is 2325 G3 C07 OA LED 20/14/08/ML-8MC ET and the key information are summarized in the following table.

Table 1: Key technological data

Information	Unit	Value
Light source	-	Integrated LED module
Power supply	-	External
Color temperature	K	3000+4000
Protection index for water and dust (IP)	-	IP44 (Room side)
Impact resistance index (IK)	-	IK02
Nominal operating voltage	V	220-240
Declared lifetime of the luminaire	Hours	50000
Declaration lifetime of the light source	Hours	50000
Outgoing luminous flux/Useful output flux	Lumen	2000/1400/800@4000K 1860/1302/744@3000K
Electrical input power	W	20/14/8.5
Luminous efficiency	Lumen/W	100/100/94
Dimension	mm	D230xH46.7

For the 2325 LED Downlight with an assigned lifetime of 50,000 hours that can be installed in indoor applications, the 2325 LED Downlight has the following annual service time.

Table 2: 2325 LED Downlight annual operating times according to the type of building

Type of building	Annual operating hours by default	Operational lifetime (years)
Residential building	3500	14.3
Office	2500	20
Educational institutions	2000	25
Hospital	5000	10
Hotel	5000	10
Catering	2500	20
Sports establishments	4000	12.5
Retail (wholesale and retail services)	5000	10
Industry (manufacturing plants)	4000	12.5

Following the requirements of the PSR, the operational lifetime of 2325 LED Downlight is 10 years.

1 General information

1.3 Functional Unit

The functional unit of 2325 LED Downlight is defined as “Provide lighting that delivers an outgoing artificial luminous flux of 1,000 lumens during a reference lifetime of 35,000 hours”.

The reference flow is the amounts of products needed to provide the defined function. All other input and output flows in the analysis quantitatively relate to it. The reference flow of 2325 LED Downlight corresponding to the functional unit shall consider the value of the outgoing artificial luminous flux as well as the rated lifetime of the luminaire. According to test report, the outgoing artificial luminous flux of the 2325 LED Downlight is 2,000 Lumen. The assigned lifetime of the 2325 LED Downlight is 50,000 Hours, which estimated by the test report. The reference flow is calculated as: (1,000/outgoing luminous flux of the analyzed product in lumens) x (35,000/declared product lifetime of the analyzed product in hours). Consequently, the reference flow of the 2325 LED Downlight corresponds to:

$$(1,000/2,000) \times (35,000/50,000) = 0.350$$

1.4 Homogeneous environmental family

The present PEP declaration is valid for all the products in the described homogenous environmental family. The parameters used to calculate the coefficients according to the rules of extrapolation required in PSR-0014-ed2.0-EN-2023 07 13 are listed in Table 3.

Table 4 showed the extrapolation coefficients at product level based on the technical parameters of 2325 Planar LED Downlight, and the extrapolation coefficients at functional unit level shall be considered with the following formula:

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

Table 3: The parameters of homogeneous environmental family was used in rules of extrapolation

Parameter	Unit	2325 G3 C07 OA LED 20/14/08/ML-8MC ET	2325 G3 C05 OA LED 20/14/08/ML-8MC ET	2325 G3 C05 S OA LED 20/14/08/ML-840 ET	2325 G3 C07 S OA LED 20/14/08/ML-840 ET
Lighting output	Lumens	2000/1400/800@4000K 1860/1302/744@3000K	2000/1400/800@4000K 1860/1302/744@3000K	2000/1400/800	2000/1400/800
Weight of light source	g	48.83	24.83	26.02	50.54
Weight of luminaire structure	g	369.35	317.96	257.7	367.18
Weight of control gear	g	46.28	46.28	46.28	46.28
Weight of light management system	g	0	0	0	0
Weight of product	g	464.46	389.07	330.00	464.00
Weight of packaging	g	326.89	232.49	232.49	326.89
Power	W	20/14/8.5	19/13.5/8.5	16.5/11.5/7.5	16.5/11.5/7.5

1 General information

Table 4: The extrapolation coefficients at product level (declared unit)

	2325 G3 C07 OA LED 20/14/08/ML- 8MC ET	2325 G3 C05 OA LED 20/14/08/ML- 8MC ET	2325 G3 C05 S OA LED 20/14/08/ML- 840 ET	2325 G3 C07 S OA LED 20/14/08/ML- 840 ET
Manufacturing stage	1.00	0.79	0.72	1.00
Distribution stage	1.00	0.79	0.71	1.00
Installation stage	1.00	0.71	0.71	1.00
Use stage	1.00	0.95	0.83	0.83
End of life stage	1.00	0.84	0.71	1.00
Module D	1.00	0.80	0.72	1.00

2 Constituent materials

2.1 Overview

Table 5: Product composition

Information	Weight [in kg]	Share [in %]
Product	0.475	59.25
Packaging	0.327	40.75

2.2 Product

Table 6: Material composition – Product

Information	Weight [in kg]	Share [in %]
Metal	0.017	3.58
Plastics	0.351	73.89
Others	0.107	22.53

2.3 Packaging

Table 7: Material composition – Packaging

Information	Weight [in kg]	Share [in %]
Paper/board	0.241	73.84
Wooden pallet	0.085	25.86
Plastics	0.001	0.30

3 Information on life cycle stages



3.1 Manufacturing stage

The manufacturer acquires all parts from suppliers. At the manufacturing site located in China, the manufacturer fabricated Printed Circuit Board Assembly through surface mounting and hole-through mounting processes from the Printed Circuit Board by utilizing energy and auxiliaries. Subsequently, the product was assembled and tested with the application of energy. In the end, the product is packaged in packaging materials and distributed to the client.



3.2 Distribution stage

The main market for product is Europe and there is no specific data are available. For this reason, an Intercontinental transport from China to the arrival of the product at the place of use following PCR-ed4-EN-2021 09 06 is considered in the model:

Ship: 19,000 km

Lorry: 1,000 km



3.3 Installation stage

During installation, product testing takes 0.05 hours and consumes 0.001 kWh electricity. The energy model was used for installation stage is the same as for use stage. There is no material input is required to installation. The End-of-life scenario of packaging materials was used according to PSR-0014-ed2.0-EN-2023 07 13. The transport of packaging materials following PSR-0014-ed2.0-EN-2023 07 13:

Lorry: 100km



3.4 Use stage

The product has no direct emissions, and no maintenance is required. Given that the assigned lifetime of integrated LED module is 50,000 Hours, which is the same as 2325 Planar LED Downlight, there is no light sources need replacement. Furthermore, no standard repairs or refurbishments are anticipated. The use of the product does consume electricity, but no water.

The main market of the product is Europe, and the distribution ratio of country/region is as follows:

Country/Region	Share (%)	Energy model
Germany	4	Electricity, low voltage {DE} market for electricity, low voltage Cut-off, S
France	23	Electricity, low voltage {FR} market for electricity, low voltage Cut-off, S
Poland	22	Electricity, low voltage {PL} market for electricity, low voltage Cut-off, S
Spain	8	Electricity, low voltage {ES} market for electricity, low voltage Cut-off, S
Netherland	18	Electricity, low voltage {NL} market for electricity, low voltage Cut-off, S
Other countries in EU	25	Electricity, low voltage {RER} market group for Cut-off, S

3 Information on life cycle stages



3.5 End-of-life stage

There is no specific data available to calculate the shipment of product from the installation site to the approved treatment centers. The default distance is 1000 km by lorry was used according to PCR-ed4-EN-2021 09 06. There is no energy LCI dataset was used in this stage, the process of deinstallation used the LCI dataset of mechanical treatment of used industrial electronic device.

The product and its PCB falls under the Waste from Electrical and Electronic Equipment (WEEE) directive 2012/19/EU. The valuable fractions (Aluminum, Steel and Plastics, etc) are recycling within the default recycling recovering rate established in EN 50693. The remaining parts, based on mass balance, are sent to sanitary landfill.

3.6 Benefits and loads beyond the system boundaries stage

The reuse/recycling of the product (incl. packaging) and incineration with energy recovery generates environmental benefits by avoiding the production of primary materials or energy. The scope of the Module D is With Net Benefits and the net benefits and loads beyond the system boundaries are calculated using the formulas described in PCR-ed4-EN-2021 09 06. The amount and type of material flows used for the calculation of benefits are listed in Table 8.

Table 8: Material flows for reuse, recycling and/or recovery per unit of product (declared unit, 2,000 lumens during a lifetime of 50,000 hours)

Information	Unit	Value
Total weight of product going into reuse	kg	0.000
Total weight of product going into recycling	kg	0.040
Share of metals	%	30.25
Share of plastics	%	0
Share of others	%	69.75
Total weight of product going into incineration with energy recovery	kg	0.176
Share of plastics	%	100
Share of others	%	0
Total weight of packaging going into reuse	kg	0.085
Total weight of packaging going into recycling	kg	0.198
Share of Paper/board	%	99.79
Share of Plastics	%	0.21
Total weight of packaging going into incineration with energy recovery	kg	0.022
Share of Paper/board	%	98.33
Share of Plastics	%	1.67

4 Environmental impacts

4.1 Introduction

The “2325 Planar LED Downlight” family evaluated in this PEP are in lined with EN 60598-1.

The primary data collected were representative of a current scenario in terms of geographical coverage and technological, which coverage averaged one year. The environmental information included in this study cover all the stages of the life cycle ("cradle to grave"). The environmental information included in this study cover all the stages of the life cycle ("cradle to grave"). The life cycle be divided into manufacturing stage (A1-A3), distribution stage (A4), installation stage (A5), use stage (B1-B7, but only B6 in this study), End-of-life stage (C1-C4) and benefits and loads beyond the system boundaries stage (D).

The environmental impacts assessment of the reference product has been performed using Simapro 9.5 software. Background datasets have been retrieved from Ecoinvent 3.9.1. The results refer to the core environmental impact indicators and mandatory indicators describing resource use, waste categories, and output flows according to PCR-ed4-EN-2021 09 06.

4.2 Results per functional unit

The following results of the environmental declaration have been developed by considering an outgoing artificial luminous flux of 1,000 lumens over a reference lifetime of 35,000 hours.

Table 9: Results core environmental impact indicators per functional unit

Impact category	Unit	Total	Manufacturing			Distribution	Installation
			A1	A2	A3	A4	A5
GWP-total	kg CO ₂ eq	2.21E+02	2.95E+00	3.97E-03	4.76E-02	8.54E-02	2.26E-02
ODP	kg CFC11 eq	3.19E-06	8.72E-08	6.14E-11	9.85E-11	1.30E-09	1.08E-10
POCP	kg NMVOC eq	5.07E-01	1.26E-02	2.30E-05	1.47E-04	1.39E-03	5.31E-05
AP	mol H+ eq	1.10E+00	2.01E-02	1.70E-05	2.53E-04	1.74E-03	3.53E-05
EP-freshwater	kg P eq	2.28E-01	1.85E-03	3.15E-07	9.18E-06	4.20E-06	1.03E-06
EP-marine	kg N eq	1.92E-01	3.35E-03	6.25E-06	5.21E-05	4.50E-04	2.76E-05
EP-terrestrial	mol N eq	1.68E+00	3.42E-02	6.69E-05	5.55E-04	4.96E-03	1.35E-04
WDP	m ³ depriv.	3.62E+01	8.09E-01	2.46E-04	5.33E-03	3.75E-03	6.06E-04
ADPF	MJ	4.12E+03	3.84E+01	5.49E-02	4.47E-01	1.09E+00	9.14E-02
ADPE	kg Sb eq	2.41E-03	3.17E-04	1.25E-08	1.88E-07	1.32E-07	2.94E-08
GWP-fossil	kg CO ₂ eq	2.19E+02	2.92E+00	3.97E-03	4.76E-02	8.53E-02	7.66E-03
GWP-biogenic	kg CO ₂ eq	1.51E+00	1.78E-02	1.28E-06	9.50E-06	2.24E-05	1.49E-02
GWP-lulut	kg CO ₂ eq	2.78E-01	4.95E-03	2.04E-06	1.88E-05	5.70E-05	3.38E-06

4 Environmental impacts

Table 9: Results core environmental impact indicators per functional unit

Impact category	Unit	Use					Benefits and loads beyond the system boundaries stage
		B6	C1	C2	C3	C4	
GWP-total	kg CO ₂ eq	2.18E+02	5.28E-02	1.76E-02	2.72E-02	6.91E-02	-3.35E-01
ODP	kg CFC11 eq	3.10E-06	9.10E-11	3.77E-10	5.51E-10	3.22E-11	-3.18E-09
POCP	kg NMVOC eq	4.93E-01	4.35E-05	1.08E-04	1.17E-04	3.35E-05	-1.36E-03
AP	mol H ⁺ eq	1.08E+00	5.83E-05	7.12E-05	3.15E-04	1.56E-05	-2.87E-03
EP-freshwater	kg P eq	2.26E-01	4.33E-06	1.23E-06	2.77E-05	1.44E-06	-3.32E-04
EP-marine	kg N eq	1.88E-01	1.67E-05	2.70E-05	3.30E-05	1.62E-04	-4.69E-04
EP-terrestrial	mol N eq	1.64E+00	1.59E-04	2.88E-04	3.43E-04	4.41E-05	-4.59E-03
WDP	m ³ depriv.	3.54E+01	2.24E-03	1.22E-03	5.33E-03	1.09E-03	-9.44E-02
ADPF	MJ	4.08E+03	1.18E-01	2.52E-01	3.64E-01	3.11E-02	-4.08E+00
ADPE	kg Sb eq	2.09E-03	7.59E-08	4.66E-08	2.97E-06	5.68E-09	-1.67E-05
GWP-fossil	kg CO ₂ eq	2.16E+02	5.28E-02	1.76E-02	2.63E-02	5.58E-03	-3.31E-01
GWP-biogenic	kg CO ₂ eq	1.42E+00	2.63E-05	6.36E-06	9.29E-04	6.35E-02	-3.26E-03
GWP-lulut	kg CO ₂ eq	2.73E-01	1.85E-05	8.18E-06	3.07E-05	1.99E-06	-7.96E-04

Acronyms: GWP-total = Global Warming Potential total; GWP-biogenic = Global Warming Potential biogenic; GWP-fossil = Global Warming Potential fossil; GWP-lulut = Global Warming Potential land use and land use transformation; ODP = Ozone Depletion; AP = Acidification; EP = Eutrophication; POCP = Photochemical ozone formation; ADPE = Depletion of abiotic resources-minerals and metals; ADPF = Depletion of abiotic resources-fossil fuels; WDP = Water resource deprivation.

Table 10: Results of mandatory indicators per functional unit

Indicators	Unit	Value
Renewable primary energy (without raw material)	MJ	7.20E+02
Renewable primary energy (raw material)	MJ	2.31E+00
Total use of renewable primary energy	MJ	7.22E+02
Non-renewable primary energy (without raw material)	MJ	4.11E+03
Non-renewable primary energy (raw material)	MJ	4.21E+00
Total use of non-renewable primary energy	MJ	4.12E+03
Use of secondary materials	kg	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00
Net use of fresh water	m ³	3.92E+00
Hazardous waste disposed	kg	0.00E+00
Non-hazardous waste disposed	kg	9.83E-02
Radioactive waste disposed	kg	0.00E+00
Components for reuse	kg	2.96E-02
Materials for recycling	kg	9.37E-02

4 Environmental impacts

Table 10: Results of mandatory indicators per functional unit

Indicators	Unit	Value
Materials for energy recovery	kg	6.93E-02
Exported energy	MJ	0.00E+00
Biogenic carbon content of the product	kg of C	0.00E+00
Biogenic carbon content of the associated packaging	kg of C	5.70E-02

4.3 Results per unit of product

The following results of the environmental declaration have been developed by considering one product (outgoing artificial luminous flux of 2,000 lumens over a declared lifetime of 50,000 hours).

Table 11: Results core environmental impact indicators per unit of product (declared unit, 2,000 lumens during a lifetime of 50,000 hours)

Impact category	Unit	Total	Manufacturing			Distribution		Installation
			A1	A2	A3	A4	A5	
GWP-total	kg CO ₂ eq	6.32E+02	8.42E+00	1.13E-02	1.36E-01	2.44E-01	6.44E-02	
ODP	kg CFC11 eq	9.11E-06	2.49E-07	1.75E-10	2.81E-10	3.73E-09	3.09E-10	
POCP	kg NMVOC eq	1.45E+00	3.60E-02	6.56E-05	4.21E-04	3.96E-03	1.52E-04	
AP	mol H+ eq	3.15E+00	5.75E-02	4.87E-05	7.23E-04	4.98E-03	1.01E-04	
EP-freshwater	kg P eq	6.50E-01	5.28E-03	9.01E-07	2.62E-05	1.20E-05	2.95E-06	
EP-marine	kg N eq	5.49E-01	9.58E-03	1.79E-05	1.49E-04	1.29E-03	7.88E-05	
EP-terrestrial	mol N eq	4.81E+00	9.76E-02	1.91E-04	1.59E-03	1.42E-02	3.86E-04	
WDP	m ³ depriv.	1.03E+02	2.31E+00	7.03E-04	1.52E-02	1.07E-02	1.73E-03	
ADPF	MJ	1.18E+04	1.10E+02	1.57E-01	1.28E+00	3.12E+00	2.61E-01	
ADPE	kg Sb eq	6.88E-03	9.04E-04	3.57E-08	5.36E-07	3.78E-07	8.39E-08	
GWP-fossil	kg CO ₂ eq	6.27E+02	8.35E+00	1.13E-02	1.36E-01	2.44E-01	2.19E-02	
GWP-biogenic	kg CO ₂ eq	4.32E+00	5.09E-02	3.67E-06	2.72E-05	6.41E-05	4.26E-02	
GWP-lulut	kg CO ₂ eq	7.95E-01	1.42E-02	5.82E-06	5.36E-05	1.63E-04	9.65E-06	

4 Environmental impacts

Table 11: Results core environmental impact indicators per unit of product (declared unit, 2,000 lumens during a lifetime of 50,000 hours)

Impact category	Unit	End of life					Benefits and loads beyond the system boundaries stage
		B6	C1	C2	C3	C4	
GWP-total	kg CO ₂ eq	6.23E+02	1.51E-01	5.03E-02	7.78E-02	1.97E-01	-9.57E-01
ODP	kg CFC11 eq	8.85E-06	2.60E-10	1.08E-09	1.57E-09	9.19E-11	-9.09E-09
POCP	kg NMVOC eq	1.41E+00	1.24E-04	3.09E-04	3.35E-04	9.56E-05	-3.89E-03
AP	mol H ⁺ eq	3.09E+00	1.67E-04	2.03E-04	9.00E-04	4.45E-05	-8.21E-03
EP-freshwater	kg P eq	6.45E-01	1.24E-05	3.51E-06	7.90E-05	4.12E-06	-9.47E-04
EP-marine	kg N eq	5.37E-01	4.78E-05	7.72E-05	9.43E-05	4.63E-04	-1.34E-03
EP-terrestrial	mol N eq	4.69E+00	4.53E-04	8.23E-04	9.81E-04	1.26E-04	-1.31E-02
WDP	m ³ depriv.	1.01E+02	6.40E-03	3.49E-03	1.52E-02	3.12E-03	-2.70E-01
ADPF	MJ	1.16E+04	3.38E-01	7.21E-01	1.04E+00	8.89E-02	-1.16E+01
ADPE	kg Sb eq	5.97E-03	2.17E-07	1.33E-07	8.50E-06	1.62E-08	-4.76E-05
GWP-fossil	kg CO ₂ eq	6.18E+02	1.51E-01	5.03E-02	7.50E-02	1.60E-02	-9.45E-01
GWP-biogenic	kg CO ₂ eq	4.05E+00	7.51E-05	1.82E-05	2.65E-03	1.81E-01	-9.33E-03
GWP-lulut	kg CO ₂ eq	7.80E-01	5.28E-05	2.34E-05	8.77E-05	5.68E-06	-2.28E-03

Acronyms: GWP-total=Global Warming Potential total; GWP-biogenic=Global Warming Potential biogenic; GWP-fossil=Global Warming Potential fossil; GWP-lulut=Global Warming Potential land use and land use transformation; ODP=Ozone Depletion; AP=Acidification; EP=Eutrophication; POCP=Photochemical ozone formation; ADPE=Depletion of abiotic resources-minerals and metals; ADPF=Depletion of abiotic resources-fossil fuels; WDP=Water resource deprivation.

Table 12: Results of mandatory indicators per unit of product (declared unit, 2,000 lumens during a lifetime of 50,000 hours)

Indicators	Unit	Value
Renewable primary energy (without raw material)	MJ	2.06E+03
Renewable primary energy (raw material)	MJ	6.59E+00
Total use of renewable primary energy	MJ	2.06E+03
Non-renewable primary energy (without raw material)	MJ	1.17E+04
Non-renewable primary energy (raw material)	MJ	1.20E+01
Total use of non-renewable primary energy	MJ	1.18E+04
Use of secondary materials	kg	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00
Net use of fresh water	m ³	1.12E+01
Hazardous waste disposed	kg	0.00E+00
Non-hazardous waste disposed	kg	2.81E-01

4 Environmental impacts

Table 12: Results of mandatory indicators per unit of product (declared unit, 2,000 lumens during a lifetime of 50,000 hours)

Indicators	Unit	Value
Radioactive waste disposed	kg	0.00E+00
Components for reuse	kg	8.45E-02
Materials for recycling	kg	2.68E-01
Materials for energy recovery	kg	1.98E-01
Exported energy	MJ	0.00E+00
Biogenic carbon content of the product	kg of C	0.00E+00
Biogenic carbon content of the associated packaging	kg of C	1.63E-01

