

Environmental Product Declaration (EPD)
According to ISO 14025 and EN 15804

RS 16

Registration number:	EPD-Kiwa-EE-187867-EN
Issue date:	05-02-2025
Valid until:	05-02-2030
Declaration owner:	Steinel GmbH
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Status:	verified



1 General information

1.1 PRODUCT

RS 16

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-187867-EN

1.3 VALIDITY

Issue date: 05-02-2025

Valid until: 05-02-2030

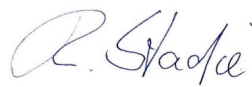
1.4 PROGRAMME OPERATOR

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin
DE



Raoul Mancke

(Head of programme operations, Kiwa-Ecobility Experts)



Dr. Ronny Stadie

(Verification body, Kiwa-Ecobility Experts)

1.5 OWNER OF THE DECLARATION

Manufacturer: Steinel GmbH

Address: Dieselstraße 80-84, 33442 Herzebrock Clarholz, Germany

E-mail: info@steinel.de

Website: <https://www.steinel.de/de/steinel-group/>

Production location: Steinel Romania

Address production location: DN73C 79, 115300 Curtea de Arges, Romania

1.6 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804:2012+A2:2019 serves as the core PCR.

Internal External



Kripanshi Gupta, Kiwa GmbH

1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The programme operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

1.8 PRODUCT CATEGORY RULES

Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

IBU PCR - Part B for luminaires, lamps, and components for luminaires (2024-09-30 v12)

1.9 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804+A2. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs

1 General information

and general program instructions of different EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

1.10 CALCULATION BASIS

LCA method R<THINK: Ecobility Experts | EN15804+A2

LCA software*: Simapro 9.1

Characterization method: EN 15804 +A2 Method v1.0

LCA database profiles: EcolInvent version 3.6

Version database: v3.17 (2024-05-22)

** Simapro is used for calculating the characterized results of the Environmental profiles within R<THINK.*

1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'RS 16' with the calculation identifier ReTHiNK-87867.

2 Product

2.1 PRODUCT DESCRIPTION

The RS 16 is a luminaire with an interior sensor.

This Environmental product declaration can be used for the following product:

Materialname	EAN
RS 16 S GLAS	4007841035105
RS 16 S PMMA	4007841008383
RS 16 L S (E 27)	4007841738013
RS 10 S (E 27)	4007841730512

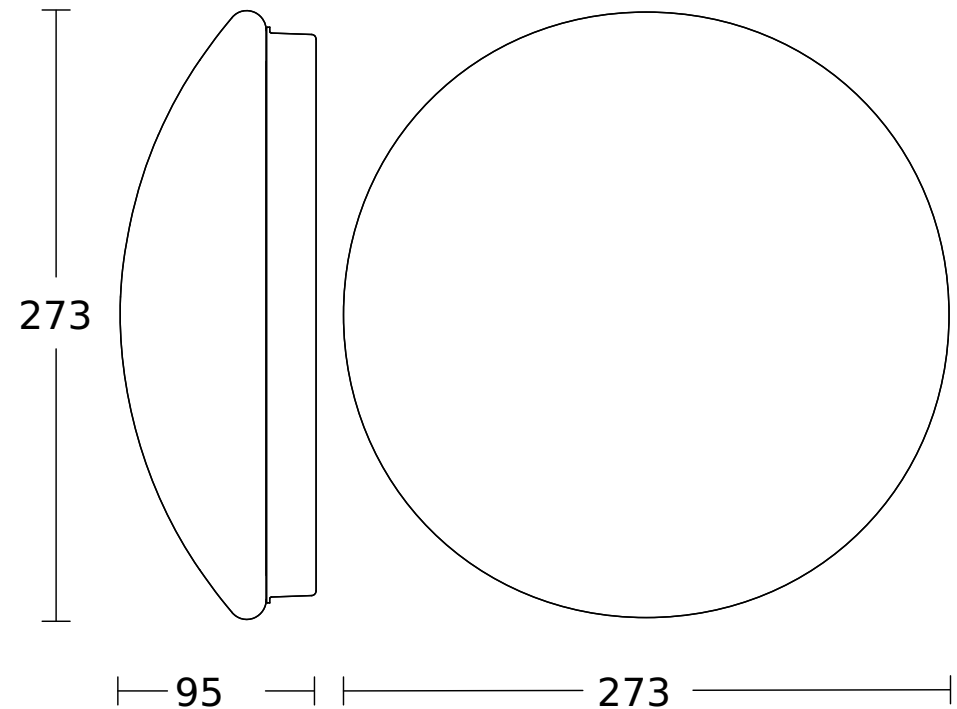
The RS 16 S Glas was used as the reference product for this EPD.

For the placing on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the following legal provisions apply:

- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility Directive 2014/30/EU
- RoHS - Directive 2011/65/EU

The CE-marking takes into account the proof of conformity with the respective harmonized standards based on the legal provisions above.

For the application and use the respective national provisions apply.



2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The luminaires are ideal for offices, corridors, hallways, toilet facilities, stairwells, parking garage and reception.

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

The reference service life for the product was taken from the IBU PCR "Luminaires, lamps and components for luminaires" for Office use. The service life is therefore 15 years.

USED RSL (YR) IN THIS LCA CALCULATION:

15

2 Product

2.4 TECHNICAL DATA

Technical data

Dimensions	273 x 95 mm (Ø x H)
Impact resistance	IK 03
IP Rating	IP 44
Color temperature	3000 K
Twilight setting	2 - 2000 lx
Protection class	II
Ambient temperature	-10 - 40 °C
Housing material	PC
Cover material	Glass
Mains connection	220-240V / 50-60Hz
Power consumption	0,38 W
Radial range	Ø 8 m (50 m ²)
Tangential range	Ø 8 m (50 m ²)
Luminous flux total product	918 lm
Output	9,3 W

More product information can be found on the company website: <https://www.steinel.de/steinel-group/>

The products are developed and tested in accordance with internal and external standards and comply with country-specific standards.

Materials	kg	%
Glas	0,775	66,58
Plastic - Polycarbonat	0,184	15,81
Plastic - PVC	0,025	2,15
Plastics - ABS	0,006	0,52
Metal - Aluminium	0,002	0,17

Metal - Copper	0,003	0,26
Metal - Steel	0,006	0,52
Electronic Components	0,069	5,93
Electronic PCB	0,032	2,8
Paper	0,010	0,86
others	0,05	4,30
total	1,14	100

Materials	kg	%
Packaging – Cardboard	0,465	99,3
Packaging - Paper	0,003	0,7
total	0,468	100

2.5 SUBSTANCES OF VERY HIGH CONCERN

The luminaires may contain the following SVHC with a content greater than 0.1 mass%.

LEAD with CAS-Nr. 7439-92-1

Information about the SVHC are available on the following website:

<https://www.steinel.de/de/leuchten-sensoren/service/unser-serviceangebot/reach/>

2.6 DESCRIPTION PRODUCTION PROCESS

Country	City	Business
Germany	Herzebrock Clarholz	Warehouse / Development
Germany	Leipzig Mölkau	Production plastic parts
Switzerland	Einsiedeln	Electronic production
Romania	Curtea de Arges	Assembly

The LED luminaires are produced at three locations and then stored in Herzebrock Clarholz and delivered to customers.

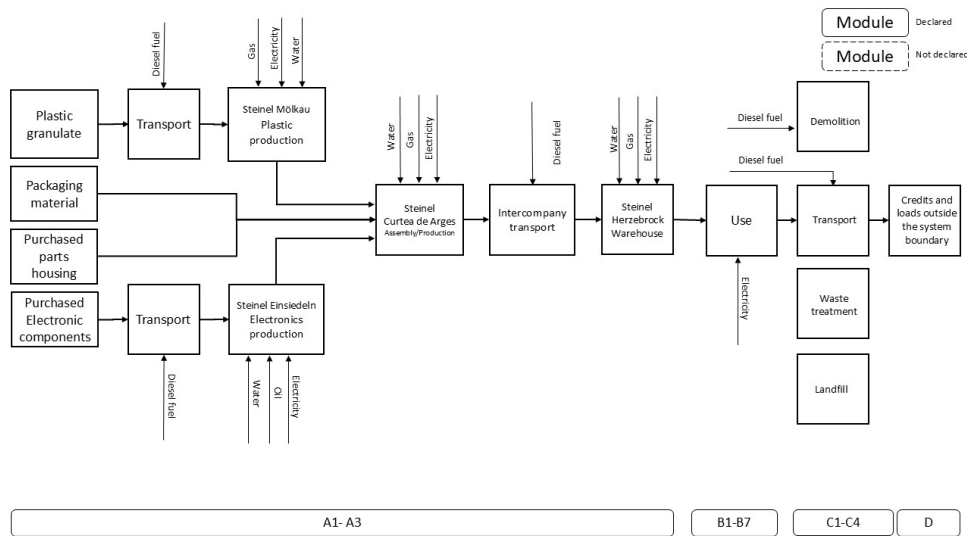
2 Product

The Injection molded parts are produced at the Leipzig-Mölkau site. The resulting production waste, which averages 5%, can normally be reground and reused. However, we consider the 5% to be production waste in our calculation.

The Printed circuit boards are produced in Einsiedeln. Here, the PCBs are fitted with electronic components using THT and SMD processes at the Swiss site in Einsiedeln.

The preproducts manufactured in Mölkau and Einsiedeln are assembled and packaged in Curtea de Arges together with other purchased preproducts and then transported to the dispatch warehouse in Herzebrock-Clarholz.

Steinel determined the electricity, gas, oil and water consumption per product for the sites by dividing the annual consumption by the production figures. The activity data collected by the company related to the year 2023.



2.7 CONSTRUCTION DESCRIPTION

To install the luminaires, holes must be drilled in the ceiling or wall. A drill is required for the construction. The luminaire is then mounted to the ceiling or wall by using screws and a screwdriver.

Due to the short use of the drill, It is assumed that energy consumption and construction waste during installation is negligible.

3 Calculation rules

3.1 DECLARED UNIT

1 LED Indoor Luminaire

The environmental product declaration refers to the luminaire RS 16 GLAS

Reference unit: piece (p)

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	p
Weight per reference unit	1.135	kg
Conversion factor to 1 kg	0.880671	p

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with options EPD. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	ND	ND	ND	ND	ND	X	ND	X	X	X	X	X

The modules of the EN15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

3.4 REPRESENTATIVENESS

This EPD is representative for RS 16, a product of Steinel GmbH. The results of this EPD are representative for European Union.

3.5 CUT-OFF CRITERIA

Manufacturing stage (Module A1-A3)

All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

3 Calculation rules

Construction stage (A4-A5)

All input flows (e.g. transportation to the construction site, additional raw material use for construction, installation energy (use) of energy use for assembly, etc.) and output flows (e.g. construction waste, packaging waste, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass

Usage stage (Module B6)

All (known) input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. emissions to soil, air and water, construction waste, packaging waste, end-of-life waste, etc.) related to the building fabric are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

End of product life stage (Module C1-C4)

All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Credits and debits beyond the system boundary (Modul D)

All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

3.6 ALLOCATION

Steinel determined the electricity, gas, oil and water consumption per product for the sites by dividing the annual consumption by the production figures for all products manufactured at the site.

No other allocation rules were applied.

3.7 DATA COLLECTION & REFERENCE PERIOD

The data was collected in 2023.

3.8 ESTIMATES AND ASSUMPTIONS

Generic data from the ecoinvent v.3.6 database (system model allocation, cut-off) were used for primary products, raw materials and supplies as well as energy generation and disposal processes. Purchased parts for which no generic data was available were accounted for on the basis of the material composition, which leads to a neglect of production costs and transportation.

The highest proportion of environmental impacts is caused by the use phase, which is, however, based on assumptions about the daily usage time. This assumption is therefore of great importance. For this reason, an average period of use was selected. However, even with a minimum daily usage time, the contribution of the usage phase would dominate.

Use-Stage:

Unlike described in PCR Part B, the full load hours were determined with the help of an analysis by an external project. Taking the formula into account would make luminaires with sensors look worse in terms of environmental performance.

Therefore, in one project, intelligent lighting from the R series (similar to the RS16) was installed in the stairwell of a residential complex in order to determine the actual full-load hours and consumption of these luminaires.

To determine the full load hours, load profile measurements were carried out in summer July 29, 2021 - August 29, 2021 and in winter October 15, 2021 - November 04, 2021. The measurements were used to determine the full load hours of 525h/a.

The electricity consumption was calculated for the use phase.

Origin of the electricity: A European electricity mix was assumed for the usage scenario (low-voltage electricity market - RER).

Transport to construction site:

The customers of Steinel are B2B as well as B2C customers. This means that either partners with their own storage space or customers can be supplied directly.

An average distance of 500 km was used to calculate the transport to the customer.

Excluded processes are:

3 Calculation rules

Long-term emissions

The manufacture of equipment used in production, buildings or any other capital goods;

The transport of personnel to the plant;

The transportation of personnel within the plant;

Research and development activities.

3.9 DATA QUALITY

The data for the manufacture of the product are average values derived from an analysis of the factory over 12 months in year 2023. The data used is no more than 5 years old. The data on which the calculation is based is consistent, comparable and up-to-date. The necessary background data comes from the Ecoinvent database 3.6.

The data quality can be rated as medium to good. For the most parts, the materials could be assigned directly to a generic data set, although substitutes had to be used in some cases. If no direct assignment was possible, preliminary products were balanced on the basis of their material composition. Assumptions were made for the associated masses.

3.10 POWER MIX

The electricity profiles were selected by using a market-based-approach, aligned with the geographical reference area, as defined in Ecoinvent 3.6. The electricity it uses has the following Global Warming Potential (GWP-total).

Germany: Steinel electricity mix (100% Hydropower) - 0.076 kg CO₂e per kilowatt-hour (kWh)

Switzerland: Electricity (CH) - low voltage (max 1kV) - 0.118 kg CO₂e per kilowatt-hour (kWh)

Romania: Electricity (EU) - low voltage (max 1kV) - 0.443 kg CO₂e per kilowatt-hour (kWh)

4 Scenarios and additional technical information

4.1 TRANSPORT TO CONSTRUCTION SITE (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD.

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default) market group for (GLO)
Fuel type and consumption of vehicle	not available
Distance	500 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.2 ASSEMBLY (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module A5.

FLOWS ENTERING THE SYSTEM

There are no significant environment impacts as a result of materials or energy used in the construction stage (A5).

FLOWS LEAVING THE SYSTEM

The following output flows leaving the system at module A5 are assumed.

Description	Value	Unit
Output materials as result of loss during construction	0	%
Output materials as result of waste processing of materials used for installation/assembly at the building site	0.000	kg
Output materials as result of waste processing of used packaging	0.468	kg

4.3 OPERATIONAL ENERGY USE (B6)

Description	Service cycle (yr)	Number of cycles (n)	Amount per cycle	Total Amount	Unit
Electricity (EU) - low voltage (max 1kV) - Electricity consumption (kWh/a)	1	15.00	4.88	73.20	kWh

4 Scenarios and additional technical information

4.4 DE-CONSTRUCTION, DEMOLITION (C1)

No inputs are needed for the product at the de-construction / demolition phase

4.5 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
glass (i.a. flat glass) (NMD ID 28)	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0
Electronic waste	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0
Copper, mixed (electricity cables) (NMD ID 42)	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0
Aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0
Paper	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0
Plastic waste	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0
Steel, fasteners (NMD ID 69)	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default) market group for (GLO)
Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)

4 Scenarios and additional technical information

Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.6 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables. First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
glass (i.a. flat glass) (NMD ID 28)	NL	0	30	0	70	0
Electronic waste	DE	0	5	35	60	0
Copper, mixed (electricity cables) (NMD ID 42)	DE	0	10	5	85	0
Aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	DE	0	3	3	94	0
Paper	DE	0	0	0	100	0
Plastic waste	DE	0	0	9	91	0
Steel, fasteners (NMD ID 69)	DE	0	1	0	99	0

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
glass (i.a. flat glass) (NMD ID 28)	0.000	0.233	0.000	0.543	0.000
Electronic waste	0.000	0.013	0.092	0.159	0.000
Copper, mixed (electricity cables) (NMD ID 42)	0.000	0.000	0.000	0.001	0.000
Aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	0.000	0.000	0.000	0.002	0.000
Paper	0.000	0.000	0.000	0.010	0.000
Plastic waste	0.000	0.000	0.001	0.011	0.000
Steel, fasteners (NMD ID 69)	0.000	0.000	0.000	0.004	0.000
Total	0.000	0.246	0.094	0.729	0.000

4.7 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

4 Scenarios and additional technical information

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
glass (i.a. flat glass) (NMD ID 28)	0.543	0.000
Electronic waste	0.157	2.170
Copper, mixed (electricity cables) (NMD ID 42)	0.001	0.000
Aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	0.000	0.000
Paper	0.010	0.000
Plastic waste	0.011	0.033
Steel, fasteners (NMD ID 69)	0.003	0.000
Total	0.725	2.203

5 Results

For the impact assessment, the characterization factors of the LCIA method EN 15804 +A2 Method v1.0 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER PIECE

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1- A3	A4	A5	B6	C1	C2	C3	C4	D
AP	mol H+ eqv.	4.40E-1	6.09E-3	1.35E-2	4.59E-1	6.32E-4	2.16E-4	1.83E-1	0.00E+0	6.42E-5	1.78E-4	1.14E-5	-3.36E-3
GWP-total	kg CO2 eqv.	3.65E+1	3.60E-1	2.85E+0	3.97E+1	1.09E-1	7.79E-1	3.24E+1	0.00E+0	1.11E-2	3.31E-1	3.34E-3	-6.49E-1
GWP-b	kg CO2 eqv.	6.86E-2	5.08E-5	-7.52E-1	-6.84E-1	5.03E-5	7.65E-1	9.43E-1	0.00E+0	5.11E-6	2.06E-2	5.43E-6	3.56E-3
GWP-f	kg CO2 eqv.	3.63E+1	3.60E-1	3.59E+0	4.03E+1	1.09E-1	1.39E-2	3.14E+1	0.00E+0	1.11E-2	3.10E-1	3.34E-3	-6.50E-1
GWP-luluc	kg CO2 eqv.	5.92E-2	1.84E-4	7.47E-3	6.68E-2	4.00E-5	9.35E-6	7.31E-2	0.00E+0	4.06E-6	2.66E-5	2.94E-7	-3.15E-3
EP-m	kg N eqv.	6.33E-2	1.51E-3	2.25E-3	6.70E-2	2.23E-4	9.10E-5	2.33E-2	0.00E+0	2.26E-5	6.17E-5	8.59E-6	-9.31E-4
EP-fw	kg P eq	1.53E-2	2.35E-6	1.44E-4	1.54E-2	1.10E-6	3.79E-7	3.36E-3	0.00E+0	1.12E-7	9.16E-7	1.29E-8	-3.93E-5
EP-T	mol N eqv.	7.75E-1	1.68E-2	2.56E-2	8.17E-1	2.46E-3	1.02E-3	2.87E-1	0.00E+0	2.50E-4	6.36E-4	4.65E-5	-9.72E-3
ODP	kg CFC 11 eqv.	2.73E-6	7.72E-8	6.52E-7	3.46E-6	2.41E-8	4.03E-9	2.65E-6	0.00E+0	2.44E-9	2.22E-9	5.43E-10	-6.30E-8
POCP	kg NMVOC eqv.	2.03E-1	4.49E-3	7.63E-3	2.15E-1	7.02E-4	2.63E-4	7.28E-2	0.00E+0	7.12E-5	1.64E-4	1.37E-5	-2.01E-3
ADP-f	MJ	4.59E+2	5.06E+0	5.10E+1	5.15E+2	1.64E+0	1.56E-1	6.47E+2	0.00E+0	1.67E-1	3.06E-1	3.65E-2	-8.53E+0
ADP-mm	kg Sb-eqv.	3.37E-2	6.49E-6	2.00E-4	3.39E-2	2.76E-6	2.18E-7	2.29E-4	0.00E+0	2.81E-7	7.06E-7	1.08E-8	-1.99E-5
WDP		8.96E+0	1.20E-2	3.22E-1	9.30E+0	5.88E-3	6.25E-3	7.24E+0	0.00E+0	5.98E-4	1.06E-2	2.83E-4	-2.78E-1

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

5 Results

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
	m3 world eqv.												

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
ETP-fw	CTUe	5.85E+3	3.80E+0	7.89E+1	5.94E+3	1.47E+0	1.21E+0	4.43E+2	0.00E+0	1.49E-1	3.77E+0	8.23E-2	-6.67E+1
PM	disease incidence	2.25E-6	1.89E-8	9.98E-8	2.36E-6	9.81E-9	1.76E-9	4.80E-7	0.00E+0	9.96E-10	1.50E-9	2.38E-10	-4.68E-8
HTP-c	CTUh	3.03E-8	1.65E-10	1.14E-9	3.16E-8	4.76E-11	1.61E-10	1.14E-8	0.00E+0	4.83E-12	6.59E-11	5.65E-13	-2.73E-10
HTP-nc	CTUh	1.75E-6	3.69E-9	3.79E-8	1.79E-6	1.60E-9	1.13E-9	3.90E-7	0.00E+0	1.63E-10	7.50E-9	1.73E-11	-5.11E-9
IR	kBq U235 eqv.	2.16E+0	2.18E-2	2.22E-1	2.40E+0	6.89E-3	5.86E-4	5.59E+0	0.00E+0	7.00E-4	1.20E-3	1.57E-4	-2.66E-2
SQP	Pt	2.35E+2	2.48E+0	7.93E+1	3.16E+2	1.43E+0	7.57E-2	1.58E+2	0.00E+0	1.45E-1	1.63E-1	8.11E-2	-2.28E+1

ETP-fw=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP)

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP)	None
		None

5 Results

ILCD classification	Indicator	Disclaimer
ILCD type / level 3	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – 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.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
PERE	MJ	4.38E+1	5.50E-2	8.30E+0	5.21E+1	2.06E-2	9.43E-3	1.22E+2	0.00E+0	2.09E-3	7.10E-3	4.98E-4	2.89E+0
PERM	MJ	1.41E-1	0.00E+0	7.30E+0	7.44E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-7.59E+0

PERE=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

5 Results

Abbr.	Unit	A1	A2	A3	A1- A3	A4	A5	B6	C1	C2	C3	C4	D
PERT	MJ	4.39E+1	5.50E-2	1.56E+1	5.96E+1	2.06E-2	9.43E-3	1.22E+2	0.00E+0	2.09E-3	2.50E-2	5.78E-4	-4.68E+0
PENRE	MJ	4.83E+2	5.37E+0	5.42E+1	5.42E+2	1.75E+0	1.66E-1	6.78E+2	0.00E+0	1.77E-1	1.23E-1	3.42E-2	-8.92E+0
PENRM	MJ	6.57E+0	0.00E+0	1.52E-1	6.72E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-3.01E-1
PENRT	MJ	4.89E+2	5.37E+0	5.43E+1	5.49E+2	1.75E+0	1.66E-1	6.78E+2	0.00E+0	1.77E-1	3.26E-1	3.88E-2	-9.17E+0
SM	Kg	4.07E-3	0.00E+0	3.55E-4	4.42E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	3.27E-1	4.37E-4	1.44E-2	3.41E-1	2.00E-4	3.54E-4	5.41E-1	0.00E+0	2.03E-5	3.52E-4	4.29E-5	-9.14E-3

PERE=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1- A3	A4	A5	B6	C1	C2	C3	C4	D
HWD	Kg	2.31E-3	9.58E-6	1.05E-4	2.42E-3	4.17E-6	3.69E-7	4.31E-4	0.00E+0	4.23E-7	1.54E-5	4.28E-8	6.84E-6
NHWD	Kg	3.46E+0	1.60E-1	2.30E-1	3.85E+0	1.04E-1	8.47E-3	2.19E+0	0.00E+0	1.06E-2	2.67E-2	2.50E-1	-9.33E-2
RWD	Kg	1.41E-3	3.46E-5	3.02E-4	1.74E-3	1.08E-5	6.80E-7	4.59E-3	0.00E+0	1.10E-6	1.18E-6	2.45E-7	-2.56E-5

HWD=hazardous waste disposed | **NHWD**=non hazardous waste disposed | **RWD**=radioactive waste disposed

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1- A3	A4	A5	B6	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

5 Results

Abbr.	Unit	A1	A2	A3	A1- A3	A4	A5	B6	C1	C2	C3	C4	D
MFR	Kg	0.00E+0	0.00E+0	3.33E-2	3.33E-2	0.00E+0	3.10E-3	0.00E+0	0.00E+0	0.00E+0	5.70E-1	0.00E+0	0.00E+0
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	-4.27E-3	-4.27E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.04E-2
EEE	MJ	0.00E+0	0.00E+0	-2.48E-3	-2.48E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-6.02E-3

CRU=Components for re-use | MFR=Materials for recycling | MER=Materials for energy recovery | EET=Exported Energy Thermic | EEE=Exported Energy Electric

5 Results

5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER PIECE

BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per piece:

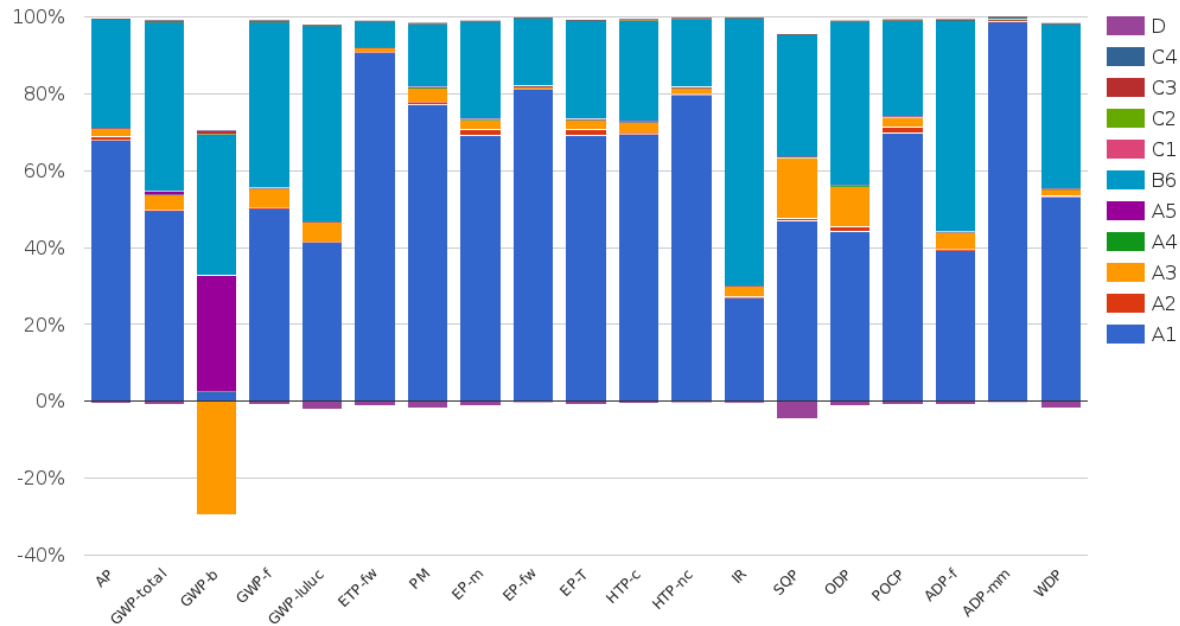
Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0.2071	kg C

UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount of carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results. One kilogram of biogenic Carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

Uptake Biogenic Carbon dioxide	Amount	Unit
Packaging	0.7595	kg CO2 (biogenic)

6 Interpretation of results



The chart shows the contribution analysis in the individual modules. It can be seen that the greatest impact on the environment is caused by the manufacturing of the luminaires and their use in the usage phase. *The actual impact in B6 depends on the usage scenario, luminaire settings and the energy mix. The impact can therefore vary depending on the usage scenario.*

The remaining phases have only a minor influence on the environment.

7 References

ISO 14040

ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044

ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14044:2006

ISO 14025

ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A2

EN 15804+A2: 2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

EcoInvent database version 3.6

NMD Nationale Milieudatabase NATIONAL ENVIRONMENTAL DATABASE

PCR

Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

IBU PCR - Part B for luminaires, lamps, and components for luminaires (2024-09-30 v12)

8 Contact information

Publisher	Operator	Owner of declaration
 <p>Kiwa-Ecobility Experts Wattstraße 11-13 13355 Berlin, DE</p>	 <p>Kiwa-Ecobility Experts Wattstraße 11-13 13355 Berlin, DE</p>	 <p>Steinel GmbH Dieselstraße 80-84 33442 Herzebrock Clarholz, Germany, DE</p>
<p>E-mail: DE.Ecobility.Experts@kiwa.com</p> <p>Website: https://www.kiwa.com/de/en/themes/ecobility-experts/ecobility-experts-epd-program/</p>	<p>E-mail: DE.Ecobility.Experts@kiwa.com</p> <p>Website: https://www.kiwa.com/de/en/themes/ecobility-experts/ecobility-experts-epd-program/</p>	<p>E-mail: info@steinel.de</p> <p>Website: https://www.steinel.de/de/steinel-group/</p>

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