

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

# RS PRO P-Series

|                      |                        |
|----------------------|------------------------|
| Registration number: | EPD-Kiwa-EE-175445-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 PRO P-Series

### 1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-175445-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 PRO P-Series' with the calculation identifier ReTHiNK-75445.

## 2 Product

### 2.1 PRODUCT DESCRIPTION

The P Series is an luminaire with a **sensor**.

**The RS PRO P2 S is used as the reference product for this EPD.**

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

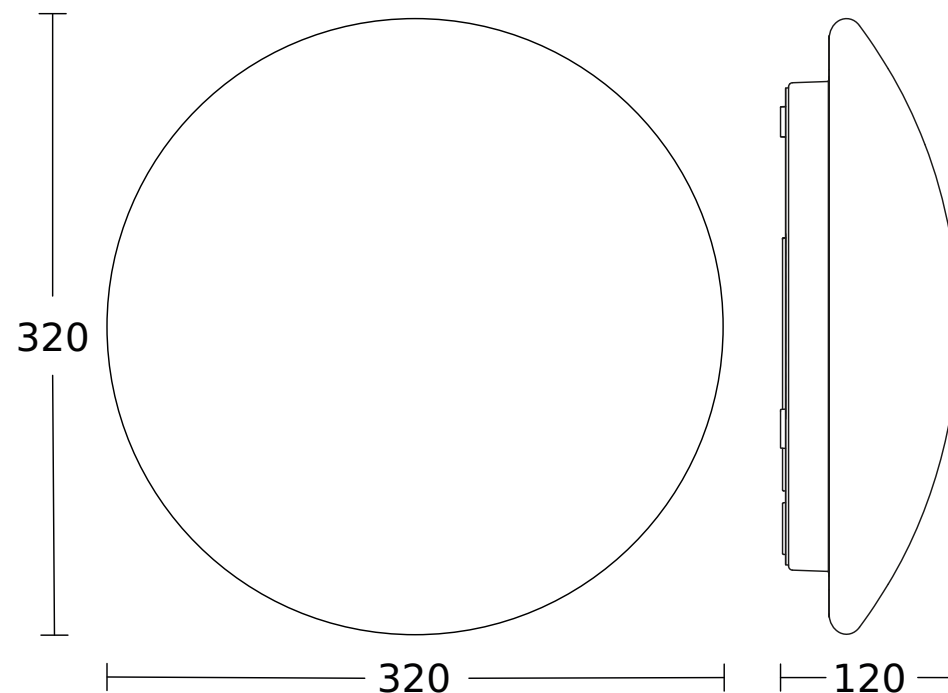
| Materialname           | EAN           |
|------------------------|---------------|
| RS PRO P1 S WW         | 4007841056063 |
| RS PRO P1 S NW         | 4007841056032 |
| RS PRO P1 Flat S WW    | 4007841069681 |
| RS PRO P1 Flat S NW    | 4007841069674 |
| RS PRO P2 S WW         | 4007841056100 |
| RS PRO P2 S NW         | 4007841056070 |
| RS PRO P2 S EM WW      | 4007841058586 |
| RS PRO P2 S EM NW      | 4007841058579 |
| RS PRO P2 Flat S WW    | 4007841069742 |
| RS PRO P2 Flat S NW    | 4007841069735 |
| RS PRO P2 Flat S EM WW | 4007841069728 |
| RS PRO P2 Flat S EM NW | 4007841069711 |
| RS PRO P3 S WW         | 4007841056148 |
| RS PRO P3 S NW         | 4007841056117 |
| RS PRO P3 S EM WW      | 4007841058609 |
| RS PRO P3 S EM NW      | 4007841058593 |
| RS PRO T27 S NW        | 4007841091897 |
| RS PRO T27 S WW        | 4007841091873 |
| RS PRO T32 S NW        | 4007841091958 |
| RS PRO T32 S WW        | 4007841091934 |
| RS 20 S                | 4007841079734 |
| RS M1 S                | 4007841052492 |
| RS D2 S                | 4007841052539 |

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
- RED Directive 2014/53/EU
- RoHS - Directive 2011/65/EU
- ERP - Directive 2009/125/EC

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 Product

### 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

### 2.4 TECHNICAL DATA

| Technical data              |                                     |
|-----------------------------|-------------------------------------|
| Dimensions                  | 320 x 120 mm (Ø x H)                |
| Impact resistance           | IK 03                               |
| IP Rating                   | IP 54                               |
| Color temperature           | 3000 K / 4000 K                     |
| Twilight setting            | 2 - 2000 lx                         |
| Protection class            | II                                  |
| Ambient temperature         | -10 - 40 °C                         |
| Housing material            | PC                                  |
| Cover material              | PMMA                                |
| Mains connection            | 220-240V / 50-60Hz                  |
| Power consumption           | 15.1 W (3000K) / 15.4 W (4000K)     |
| Radial range                | Ø 8 m (50 m²)                       |
| Tangential range            | Ø 8 m (50 m²)                       |
| Luminous flux total product | 1674 lm (3000K) / 1731 lm (4000K)   |
| Total product efficiency    | 111 lm/W (3000K) / 112 lm/W (4000K) |

#### Output

15.1 W (3000K) / 15.4 W(4000K)

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           | %          |
|------------------------|--------------|------------|
| Plastic - Polycarbonat | 0,337        | 50,6       |
| Plastic - ABS          | 0,006        | 0,9        |
| Plastic - PVC          | 0,025        | 3,8        |
| Plastic - PMMA         | 0,158        | 23,7       |
| Metal - Aluminium      | 0,012        | 1,8        |
| Metal - Steel          | 0,006        | 0,9        |
| Metal - Copper         | 0,006        | 0,9        |
| Electronic Components  | 0,074        | 11,1       |
| Electronic PCB         | 0,026        | 3,9        |
| Paper                  | 0,01         | 1,5        |
| others                 | 0,005        | 0,8        |
| <b>total</b>           | <b>0,664</b> | <b>100</b> |

| Packaging Materials   | kg             | %          |
|-----------------------|----------------|------------|
| Packaging – Cardboard | 0,455          | 96,5       |
| Packaging - Paper     | 0,01655        | 3,5        |
| <b>total</b>          | <b>0,47155</b> | <b>100</b> |

### 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

## 2 Product

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                 |

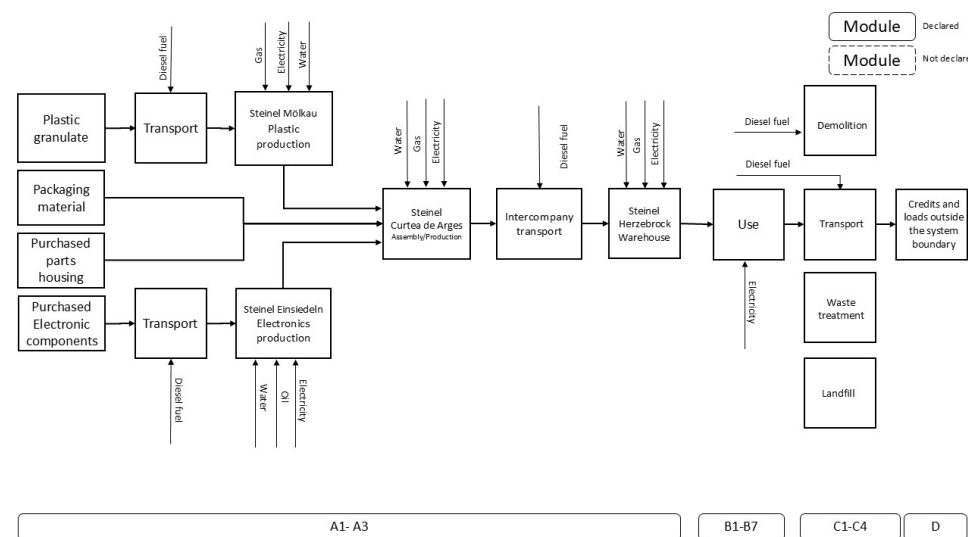
The LED luminaires are produced at three locations and then stored in Herzebrock Clarholz and delivered to customers.

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 a LED indoor luminaire from the RS PRO P series and similar luminaires with sensor.

Reference unit: piece (p)

### 3.2 CONVERSION FACTORS

| Description               | Value    | Unit |
|---------------------------|----------|------|
| Reference unit            | 1        | p    |
| Weight per reference unit | 0.664    | kg   |
| Conversion factor to 1 kg | 1.506471 | 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 -<br>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<br>product system boundaries |
| Module B4 = Replacement                            |                                                                       |

### 3.4 REPRESENTATIVENESS

This EPD is representative for RS PRO P-Series, 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 P series) 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 CO<sub>2</sub>e per kilowatt-hour (kWh)

Switzerland: Electricity (CH) - low voltage (max 1kV) - 0.118 kg CO<sub>2</sub>e per kilowatt-hour (kWh)

Romania: Electricity (EU) - low voltage (max 1kV) - 0.443 kg CO<sub>2</sub>e 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                                                | 0.472 | 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                | 8.085            | 121.28       | 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)<br>[km] | Landfill<br>[km] | Incineration<br>[km] | Recycling<br>[km] | Re-use<br>[km] |
|------------------------------------------------|---------------------------------------------------------------|-------------------------------------|------------------|----------------------|-------------------|----------------|
| Electronic waste                               | 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              |
| Paper                                          | 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              |
| 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)                             |
| Bulk density of transported products           | inapplicable                                                  |
| Volume capacity utilisation factor             | 1                                                             |

## 4 Scenarios and additional technical information

### 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 [%] |
|------------------------------------------------|--------|---------------------------------|--------------|------------------|---------------|------------|
| Electronic waste                               | DE     | 0                               | 5            | 35               | 60            | 0          |
| Plastic waste                                  | DE     | 0                               | 0            | 9                | 91            | 0          |
| Paper                                          | DE     | 0                               | 0            | 0                | 100           | 0          |
| Copper, mixed (electricity cables) (NMD ID 42) | DE     | 0                               | 10           | 5                | 85            | 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]  |
|------------------------------------------------|----------------------------------|---------------|-------------------|----------------|--------------|
| Electronic waste                               | 0.000                            | 0.004         | 0.031             | 0.053          | 0.000        |
| Plastic waste                                  | 0.000                            | 0.000         | 0.044             | 0.443          | 0.000        |
| Paper                                          | 0.000                            | 0.000         | 0.000             | 0.010          | 0.000        |
| Copper, mixed (electricity cables) (NMD ID 42) | 0.000                            | 0.000         | 0.000             | 0.001          | 0.000        |
| Steel, fasteners (NMD ID 69)                   | 0.000                            | 0.000         | 0.000             | 0.003          | 0.000        |
| <b>Total</b>                                   | <b>0.000</b>                     | <b>0.005</b>  | <b>0.075</b>      | <b>0.510</b>   | <b>0.000</b> |

### 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.

| Waste Scenario                                 | Net output flow [kg] | Energy recovery [MJ] |
|------------------------------------------------|----------------------|----------------------|
| Electronic waste                               | 0.043                | 0.409                |
| Plastic waste                                  | 0.443                | 1.349                |
| Paper                                          | 0.010                | 0.000                |
| Copper, mixed (electricity cables) (NMD ID 42) | 0.001                | 0.000                |
| <b>Total</b>                                   | <b>0.499</b>         | <b>1.759</b>         |

## 4 Scenarios and additional technical information

| Waste Scenario               | Net output flow [kg] | Energy recovery [MJ] |
|------------------------------|----------------------|----------------------|
| Steel, fasteners (NMD ID 69) | 0.003                | 0.000                |
| <b>Total</b>                 | <b>0.499</b>         | <b>1.759</b>         |

## 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.    | 3.20E-1 | 1.68E-3 | 1.30E-2  | 3.35E-1  | 4.44E-4 | 1.67E-4 | 3.04E-1 | 0.00E+0 | 3.42E-5 | 5.85E-4 | 7.89E-7  | -5.21E-3 |
| GWP-total | kg CO2 eqv.    | 3.14E+1 | 1.94E-1 | 2.92E+0  | 3.45E+1  | 7.67E-2 | 8.02E-1 | 5.37E+1 | 0.00E+0 | 5.90E-3 | 4.36E-1 | 1.11E-3  | -6.43E-1 |
| GWP-b     | kg CO2 eqv.    | 6.32E-2 | 7.23E-5 | -7.50E-1 | -6.86E-1 | 3.54E-5 | 7.70E-1 | 1.56E+0 | 0.00E+0 | 2.72E-6 | 1.56E-2 | 1.06E-6  | 4.58E-1  |
| GWP-f     | kg CO2 eqv.    | 3.13E+1 | 1.93E-1 | 3.66E+0  | 3.51E+1  | 7.66E-2 | 3.20E-2 | 5.21E+1 | 0.00E+0 | 5.90E-3 | 4.20E-1 | 1.11E-3  | -1.09E+0 |
| GWP-luluc | kg CO2 eqv.    | 4.48E-2 | 8.12E-5 | 7.42E-3  | 5.23E-2  | 2.81E-5 | 9.56E-6 | 1.21E-1 | 0.00E+0 | 2.16E-6 | 1.12E-4 | 4.54E-8  | -8.76E-3 |
| EP-m      | kg N eqv.      | 5.20E-2 | 3.99E-4 | 2.16E-3  | 5.46E-2  | 1.57E-4 | 5.93E-5 | 3.86E-2 | 0.00E+0 | 1.21E-5 | 1.66E-4 | 2.34E-6  | -1.24E-3 |
| EP-fw     | kg P eq        | 1.35E-2 | 1.43E-6 | 1.37E-4  | 1.36E-2  | 7.73E-7 | 4.64E-7 | 5.56E-3 | 0.00E+0 | 5.95E-8 | 3.33E-6 | 2.54E-9  | -5.95E-5 |
| EP-T      | mol N eqv.     | 6.31E-1 | 4.44E-3 | 2.44E-2  | 6.60E-1  | 1.73E-3 | 6.31E-4 | 4.75E-1 | 0.00E+0 | 1.33E-4 | 1.81E-3 | 2.94E-6  | -1.30E-2 |
| ODP       | kg CFC 11 eqv. | 2.14E-6 | 4.29E-8 | 6.43E-7  | 2.83E-6  | 1.69E-8 | 4.71E-9 | 4.38E-6 | 0.00E+0 | 1.30E-9 | 1.60E-8 | 2.71E-11 | -8.93E-8 |
| POCP      | kg NMVOC eqv.  | 1.66E-1 | 1.27E-3 | 7.43E-3  | 1.75E-1  | 4.93E-4 | 2.11E-4 | 1.21E-1 | 0.00E+0 | 3.79E-5 | 5.60E-4 | 1.06E-6  | -3.89E-3 |
| ADP-f     | MJ             | 3.99E+2 | 2.84E+0 | 5.14E+1  | 4.53E+2  | 1.16E+0 | 3.53E-1 | 1.07E+3 | 0.00E+0 | 8.89E-2 | 1.78E+0 | 2.07E-3  | -2.94E+1 |
| ADP-mm    | kg Sb-eqv.     | 2.86E-2 | 4.57E-6 | 1.72E-4  | 2.88E-2  | 1.94E-6 | 9.81E-7 | 3.79E-4 | 0.00E+0 | 1.49E-7 | 2.36E-6 | 9.48E-10 | -1.79E-5 |
| WDP       |                | 7.68E+0 | 7.53E-3 | 3.45E-1  | 8.03E+0  | 4.13E-3 | 1.94E-3 | 1.20E+1 | 0.00E+0 | 3.18E-4 | 4.03E-2 | 8.77E-5  | -1.84E+0 |

**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-<br>A3 | A4 | A5 | B6 | C1 | C2 | C3 | C4 | D |
|-------|------------------|----|----|----|-----------|----|----|----|----|----|----|----|---|
|       | m3 world<br>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-<br>A3 | A4       | A5       | B6      | C1      | C2       | C3       | C4       | D         |
|--------|----------------------|---------|----------|---------|-----------|----------|----------|---------|---------|----------|----------|----------|-----------|
| ETP-fw | CTUe                 | 4.66E+3 | 2.23E+0  | 7.43E+1 | 4.74E+3   | 1.03E+0  | 5.83E-1  | 7.34E+2 | 0.00E+0 | 7.93E-2  | 4.04E+0  | 9.53E-3  | -2.42E+1  |
| PM     | disease<br>incidence | 1.89E-6 | 1.14E-8  | 1.05E-7 | 2.00E-6   | 6.89E-9  | 3.06E-9  | 7.95E-7 | 0.00E+0 | 5.31E-10 | 8.91E-9  | 1.45E-11 | -6.48E-8  |
| HTP-c  | CTUh                 | 2.36E-8 | 7.51E-11 | 1.09E-9 | 2.47E-8   | 3.34E-11 | 2.44E-11 | 1.89E-8 | 0.00E+0 | 2.57E-12 | 2.16E-10 | 9.08E-14 | -4.68E-10 |
| HTP-nc | CTUh                 | 1.32E-6 | 2.28E-9  | 3.60E-8 | 1.36E-6   | 1.13E-9  | 4.26E-10 | 6.46E-7 | 0.00E+0 | 8.68E-11 | 6.32E-9  | 3.61E-12 | -8.78E-9  |
| IR     | kBq U235 eqv.        | 1.79E+0 | 1.23E-2  | 2.19E-1 | 2.02E+0   | 4.84E-3  | 1.60E-3  | 9.26E+0 | 0.00E+0 | 3.73E-4  | 5.54E-3  | 8.14E-6  | -4.69E-2  |
| SQP    | Pt                   | 1.85E+2 | 1.75E+0  | 7.92E+1 | 2.66E+2   | 1.00E+0  | 1.42E-1  | 2.62E+2 | 0.00E+0 | 7.71E-2  | 1.35E+0  | 4.90E-3  | -8.40E+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-<br>A3 | A4      | A5      | B6      | C1      | C2      | C3      | C4      | D        |
|-------|------|---------|---------|---------|-----------|---------|---------|---------|---------|---------|---------|---------|----------|
| PERE  | MJ   | 3.51E+1 | 3.68E-2 | 8.24E+0 | 4.34E+1   | 1.45E-2 | 1.19E-2 | 2.03E+2 | 0.00E+0 | 1.11E-3 | 8.81E-2 | 1.39E-6 | -8.66E+0 |
| PERM  | MJ   | 1.41E-1 | 0.00E+0 | 7.33E+0 | 7.47E+0   | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -6.79E+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-<br>A3 | A4      | A5      | B6      | C1      | C2      | C3      | C4      | D        |
|-------|------|---------|---------|---------|-----------|---------|---------|---------|---------|---------|---------|---------|----------|
| PERT  | MJ   | 3.52E+1 | 3.68E-2 | 1.56E+1 | 5.08E+1   | 1.45E-2 | 1.19E-2 | 2.03E+2 | 0.00E+0 | 1.11E-3 | 9.66E-2 | 3.94E-5 | -1.55E+1 |
| PENRE | MJ   | 4.09E+2 | 3.01E+0 | 5.45E+1 | 4.67E+2   | 1.23E+0 | 3.74E-1 | 1.12E+3 | 0.00E+0 | 9.44E-2 | 1.80E+0 | 3.02E-5 | -1.90E+1 |
| PENRM | MJ   | 1.62E+1 | 0.00E+0 | 2.85E-1 | 1.64E+1   | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -1.26E+1 |
| PENRT | MJ   | 4.25E+2 | 3.01E+0 | 5.48E+1 | 4.83E+2   | 1.23E+0 | 3.74E-1 | 1.12E+3 | 0.00E+0 | 9.44E-2 | 1.90E+0 | 2.20E-3 | -3.16E+1 |
| SM    | Kg   | 1.14E-2 | 0.00E+0 | 5.86E-4 | 1.20E-2   | 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   | 2.72E-1 | 2.81E-4 | 1.49E-2 | 2.87E-1   | 1.41E-4 | 8.13E-5 | 8.96E-1 | 0.00E+0 | 1.08E-5 | 1.16E-3 | 2.17E-6 | -4.28E-2 |

**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-<br>A3 | A4      | A5      | B6      | C1      | C2      | C3      | C4      | D        |
|-------|------|---------|---------|---------|-----------|---------|---------|---------|---------|---------|---------|---------|----------|
| HWD   | Kg   | 1.67E-3 | 6.62E-6 | 1.11E-4 | 1.79E-3   | 2.93E-6 | 1.00E-6 | 7.14E-4 | 0.00E+0 | 2.25E-7 | 2.86E-6 | 3.31E-9 | -5.60E-5 |
| NHWD  | Kg   | 2.49E+0 | 1.19E-1 | 2.17E-1 | 2.83E+0   | 7.33E-2 | 1.01E-2 | 3.62E+0 | 0.00E+0 | 5.64E-3 | 8.29E-2 | 8.30E-3 | -9.05E-2 |
| RWD   | Kg   | 1.11E-3 | 1.94E-5 | 2.98E-4 | 1.43E-3   | 7.59E-6 | 2.28E-6 | 7.60E-3 | 0.00E+0 | 5.84E-7 | 6.75E-6 | 1.23E-8 | -4.41E-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-<br>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-<br>A3 | A4      | A5      | B6      | C1      | C2      | C3      | C4      | D        |
|-------|------|---------|---------|----------|-----------|---------|---------|---------|---------|---------|---------|---------|----------|
| MFR   | Kg   | 0.00E+0 | 0.00E+0 | 2.46E-2  | 2.46E-2   | 0.00E+0 | 4.72E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 4.57E-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 | -2.18E-2 | -2.18E-2  | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -4.18E-1 |
| EEE   | MJ   | 0.00E+0 | 0.00E+0 | -1.27E-2 | -1.27E-2  | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | -2.43E-1 |

**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:

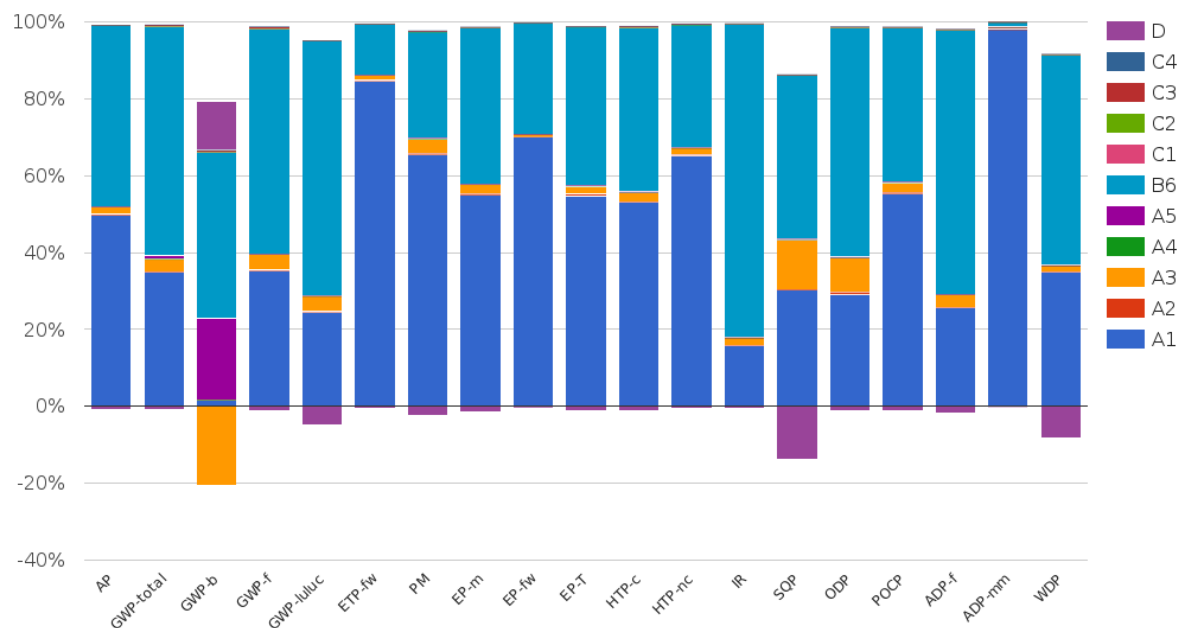
| Biogenic carbon content                           | Amount | Unit |
|---------------------------------------------------|--------|------|
| Biogenic carbon content in the product            | 0      | kg C |
| Biogenic carbon content in accompanying packaging | 0.2027 | kg C |

#### 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                      | 0.7432 | 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                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
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