# Environmental Fact Sheet

## Daylight Sensor

The aim of this document is to provide relevant and reliable information on the environmental performance of the Daylight Sensor. Results reported in this Environmental Information Sheet are based on a Life Cycle Assessment (LCA) carried out by an independent company (Sphera). This environmental information sheet is based on a Life Cycle Assessment (LCA) study conducted according to DIN ISO 14040/44 and inaccordance with the requirements of the PSR-0005 - Electrical Switchgear and Control Gear Solutions classification, from the PEP ecopassport® Program (PSR-0005-ed3-EN-2023 06 06, supplemented by the PSR-0006-ed2.1-EN-2023 12 08) and especially the specific requirements for “other equipment”.

All relevant environmental data relating to Climate Change (Carbon Footprint) as well as an overview of other environmental impact categories applying EN 15804+A2 methodology are disclosed in this information sheet.

## Manufacturer

Lutron Electronics Co., Inc.
7200 Suter Rd, Coopersburg, PA 18036

## Study conducted by

Sphera Solutions GmbH
Hauptstraße 111-113, 70771 Leinfel-den-Echterdingen, Germany

## Product description

Daylight Sensor - LRF2-DCRB-WH (as base scenario)
Daylight Sensor - LRF6-DCRB-WH (as a variant)
Daylight Sensor - LRF3-DCRB-WH (as a variant)
Daylight Sensor - LRF4-DCRB-WH (as a variant)
Daylight Sensor - LRF7-DCRB-WH (as a variant)
Daylight Sensor - LRF5-DCRB-WH (as a variant)

## System description

The product system for this study considers the Daylight Sensor product as a baseline (LRF2-DCRB-WH).

The functional unit is defined according to the PSR Standard mentioned above, and the reference unit for this study is one Daylight Sensor used over 10 years.

Primary data for the analysis was collected by Lutron. Other relevant data, e.g., upstream processing of polymers, metals, magnets, motor, and others including relevant manufacturing processes according to the Bill of Materials information was taken from Sphera’s 2024.2 Managed LCA Content, which is representative of the state-of-the-art processes.

## Product reference

The functional unit is one Daylight Sensor operating over 10 years which is a battery-powered sensor that automatically controls lights via RF communication to compatible dimming devices.

# Environmental Fact Sheet

**Daylight Sensor**

**Material content**

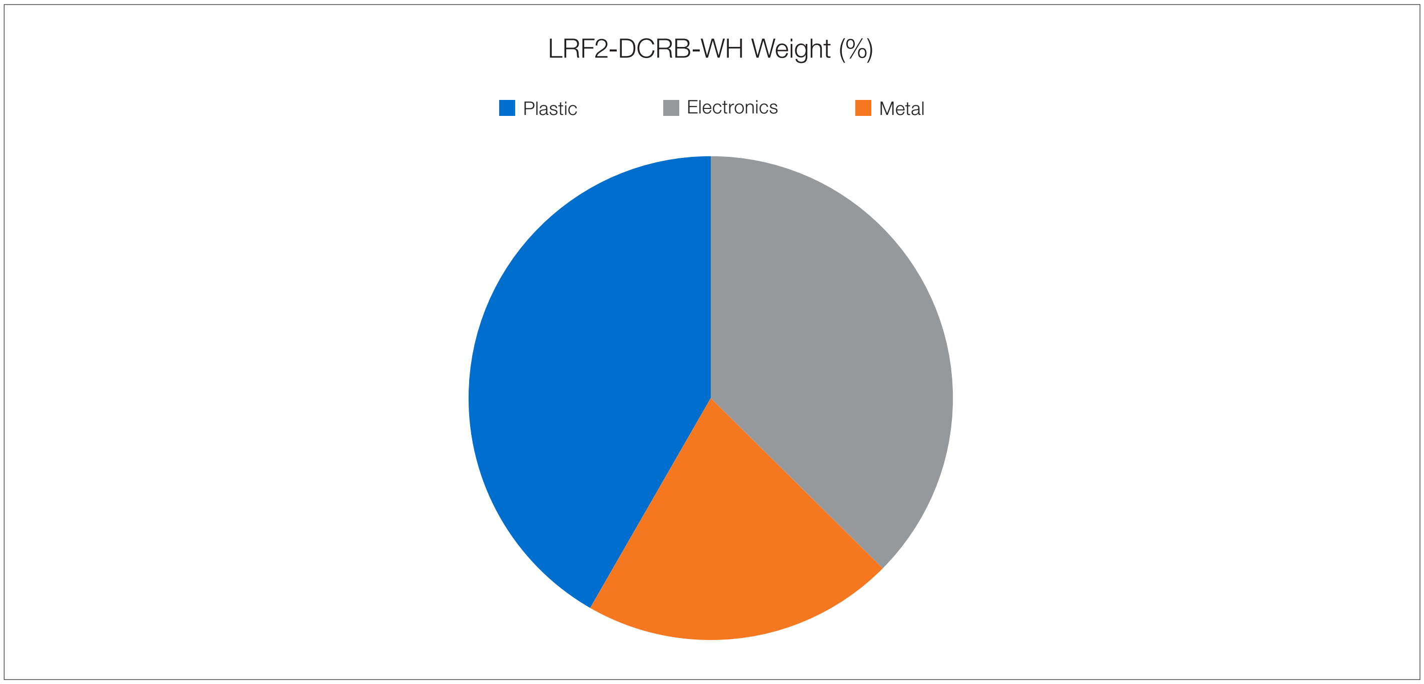



Figure 1: Material Content of Daylight Sensor, in weight

| Material | % of total weight |
|---|---|
| Electronics | 37% |
| Metals | 21% |
| Plastic | 42% |

# Environmental Fact Sheet

## Daylight Sensor

### Scope of the LCA

A Cradle-to-Grave LCA study was carried out according to DIN ISO 14040/44 using LCA for Experts software. The system boundary includes upstream raw material production in China and Puerto Rico and their transportation to the manufacturing site in Puerto Rico. The Use phase was considered in US, and End-of-Life (EoL) as treatment as base scenarios.

Environmental impacts of the system were calculated following EN15804+A2 methodology with a focus on Climate Change (kg CO2 eq.), while also addressing other midpoint impact categories.

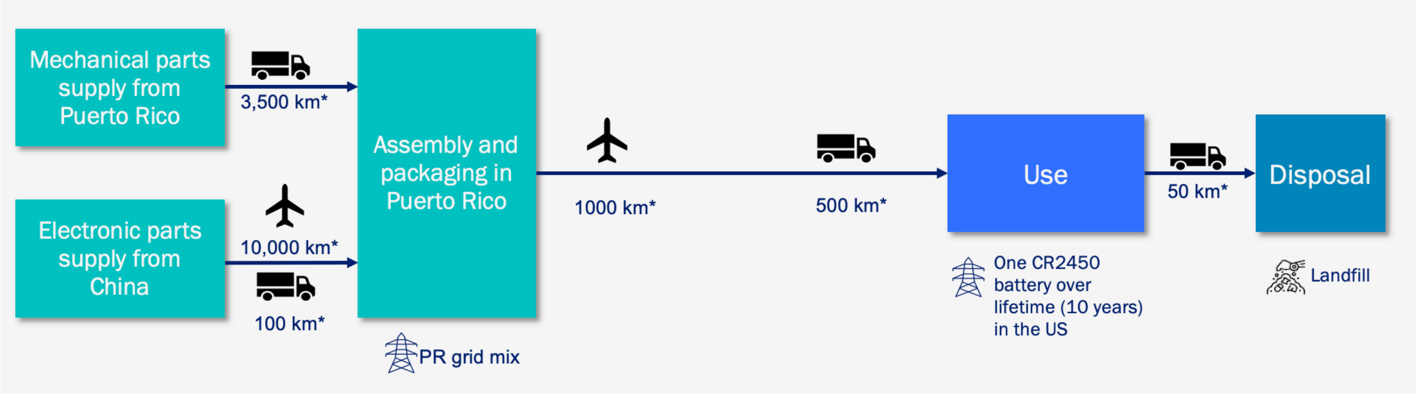



Figure 2: Schematic representation of the Daylight Sensor's life cycle
(*Default transportation scenario for continental, intercontinental and domestic transportation)

Parts manufacturing is performed in the Puerto Rico and China. Final assembly is performed in Puerto Rico. Installation, usage and EoL are in the US. Transports have been considered as per default scenario provided in the PCR (10,000 km air freight and 100 km truck for intercontinental transport, 3,500 km truck for continental transport, and 50 km for domestic transport). Default EoL is considered to be landfill.

Daylight Sensor - LRF6-DCRB-WH, LRF3-DCRB-WH, LRF4-DCRB-WH, LRF7-DCRB-WH and LRF5-DCRB-WH are presented as scenarios of the baseline product. These differ in use location.

### Calculation Rules

Calculation Rules are defined in the PSR and considers the following:

- The reference flow associated with the Life Cycle Assessment analysis consists of: the Product and its primary Packaging during the reference service life of 10 years.
- The electricity consumption in the use phase was calculated assuming one battery (CR2450) with the duration in 24 hours/day.
- The energy consumption of the different parts constituting the functional unit are determined according to the rules of the in force PSR by considering figures communicated by the manufacturer to its customers (catalogues, datasheets, etc.).
- Waste from the Manufacturing Stage is defined in the PSR and considers that "10% manufacturing scrap was considered. Therefore, the input quantities were multiplied by a factor of 1.11 to get the same mass as output."
- Upstream packaging is defined in the PSR as 5% of product weight was considered as upstream packaging with the following proportions (wood: 50%, cardboard: 40% and plastic: 10%).
- The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

# Environmental Fact Sheet

**Daylight Sensor**

### Climate change results for the base scenario

The Climate Change Potential of one Daylight Sensor is 1.36 kg CO2 eq. Manufacturing and transport to use site stages contribute to 96% and 3.9% of this value respectively, 99% together. In particular, EoL (assuming landfilling as default EoL destination) only contributes to 0.1% of the impact over the whole product life cycle and is not presented in more detail here. Since the product uses only one CR2450 battery over its lifetime of 10 years, use phase impact is zero. The impact of battery manufacturing and transport is included in the manufacturing stage (A1-A3).

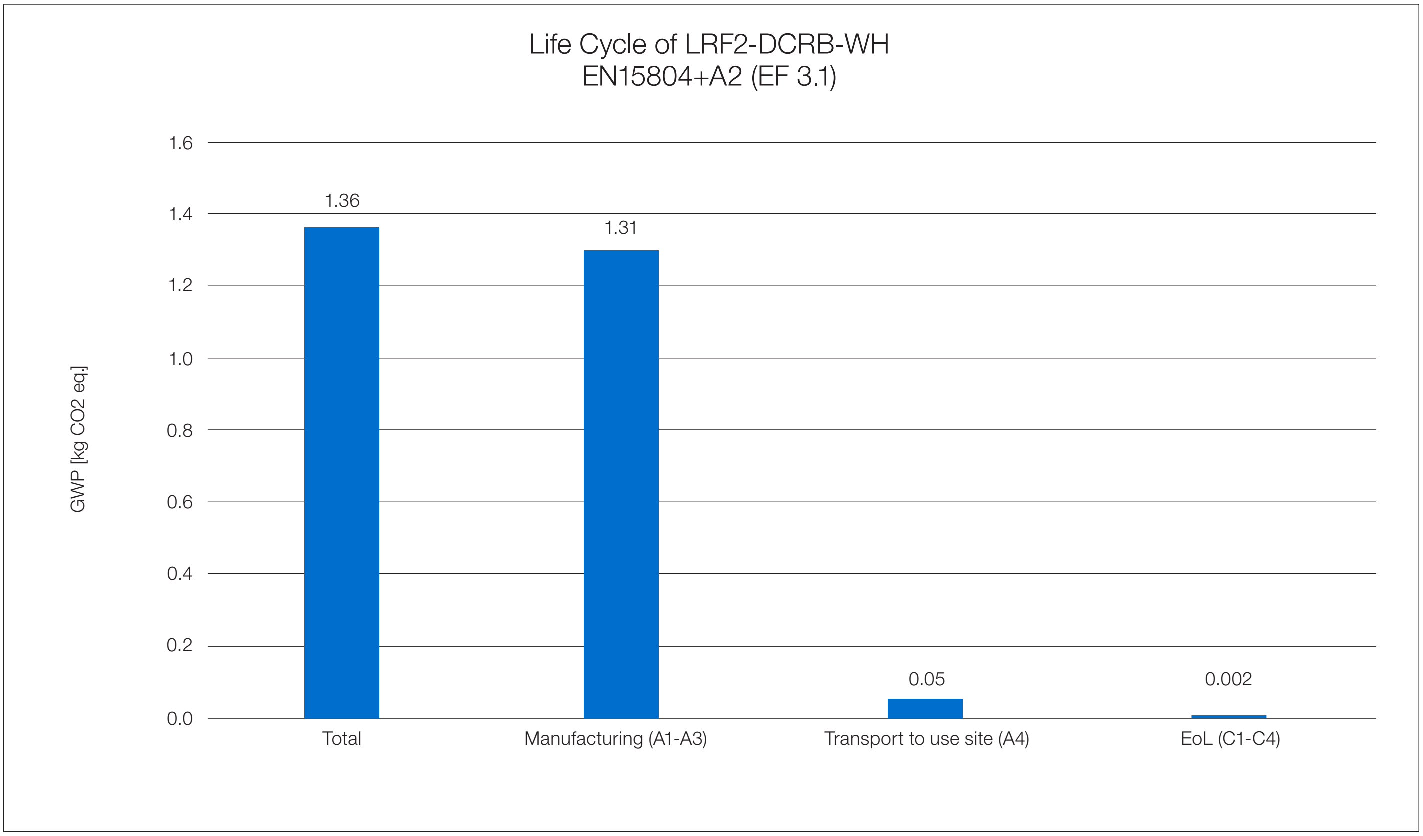



Figure 3: Climate Change Potential of one unit of Daylight Sensor

# Environmental Fact Sheet

**Daylight Sensor**

## Climate change results for the base scenario

The manufacturing stage contributes to 96.02% of the total life cycle impacts in terms of climate change. The raw material supply contributes to 90% of this value.

This product does not have any impact during use (other than A4 - transport to use site as shown in Figure 2) because no batteries are exchanged during the lifetime of the product.

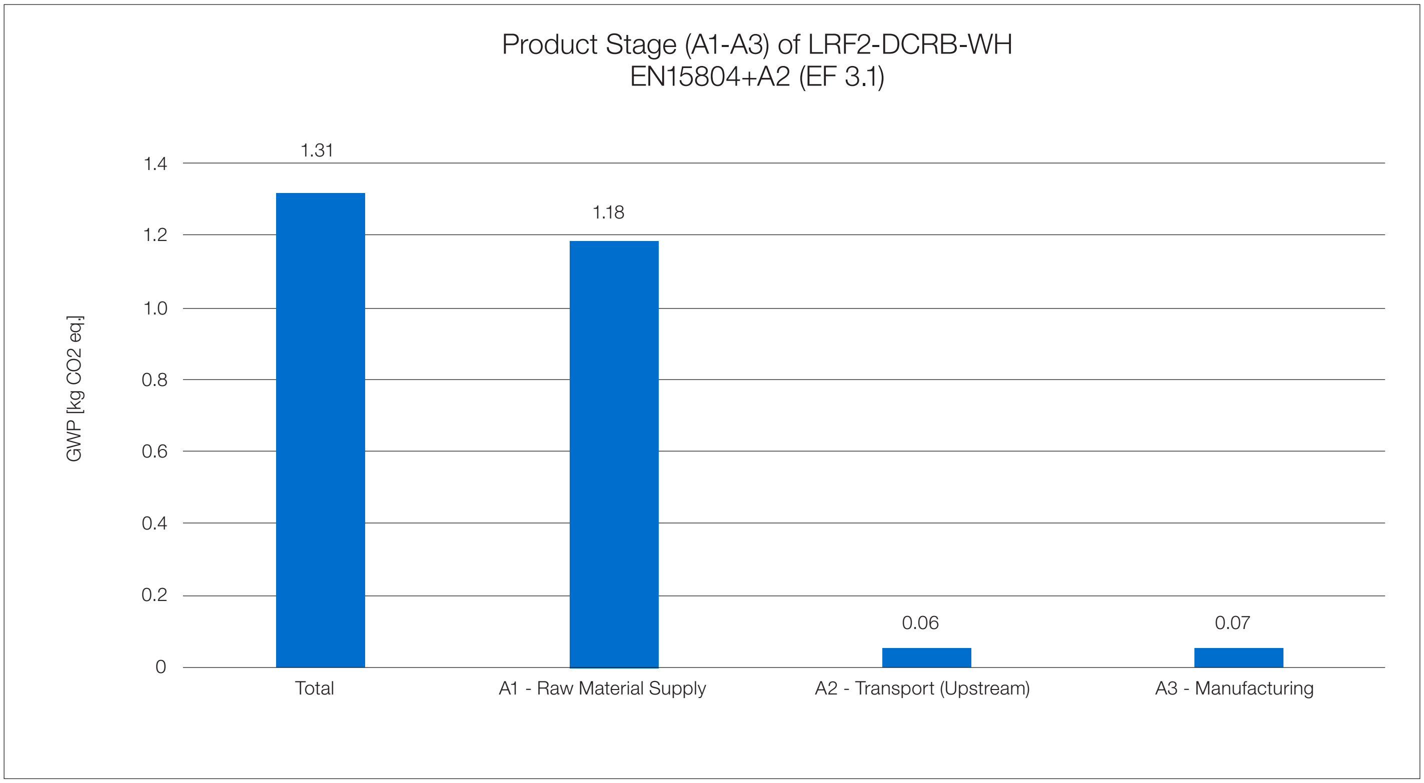



Figure 4: Climate Change Potential in the Manufacturing Stage of one unit of Daylight Sensor

# Environmental Fact Sheet

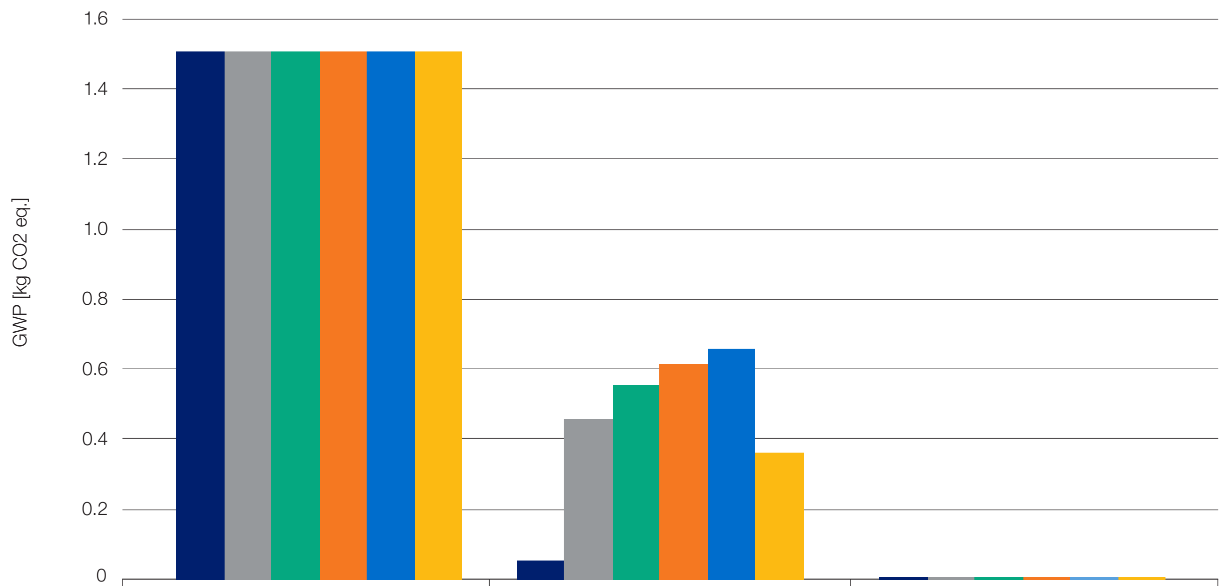
**Daylight Sensor**

## Climate Change results comparing the base scenario with different Daylight Sensor variants

Daylight Sensor variants (LRF*-DCRB-WH) differ only in use location while the impact of manufacturing an EoL stages are the same. The LRF5-DCRB-WH, which has a use location in India, has the highest contribution.

Daylight Sensor Family Scenarios: GWP Over Life Cycle of Different Products

(EN 15804+A2 – EF 3.1)




| | Manufacturing (A1-A3) | Use (A4-B6) | EoL (C1-C4) |
|---|---|---|---|
| LRF2 (US) | 1.31 | 0.05 | 0.002 |
| LRF6 (Japan) | 1.31 | 0.45 | 0.002 |
| LRF4 (China) | 1.31 | 0.55 | 0.002 |
| LRF7 (Hong Kong) | 1.31 | 0.61 | 0.002 |
| LRF5 (India) | 1.31 | 0.66 | 0.002 |
| LRF3 (Great Britain) | 1.31 | 0.35 | 0.002 |

Figure 5: Climate Change potential in the Life Cycle of different Daylight Sensor variants

Daylight Sensor variants (LRF*-DCRB-WH) differ only in transportation to use location while the impact of manufacturing and EoL stages are the same.

# Environmental Fact Sheet

**Daylight Sensor**

## Additional environmental impact indicators

| Impact category | A1-Raw Material Supply | A2-Transport (Upstream) | A3 - Manufacturing | A4 - Transport to use site | B6 - Use | C1-C4 - EoL |
|---|---|---|---|---|---|---|
| 01 EN15804+A2 (EF 3.1) Climate Change - total [kg CO2 eq.] | 1.18E+00 | 6.39E-02 | 6.69E-02 | 5.26E-02 | 0.00E+00 | 1.75E-03 |
| 02 EN15804+A2 (EF 3.1) Ozone depletion [kg CFC-11 eq.] | 6.91E-12 | 5.59E-15 | 1.03E-13 | 3.45E-15 | 0.00E+00 | 3.63E-15 |
| 03 EN15804+A2 (EF 3.1) Acidification [Mole of H+ eq.] | 1.03E-02 | 1.88E-04 | 2.48E-04 | 1.91E-04 | 0.00E+00 | 9.24E-06 |
| 04 EN15804+A2 (EF 3.1) Eutrophication, freshwater [kg P eq.] | 6.44E-06 | 9.23E-08 | 5.87E-07 | 2.07E-08 | 0.00E+00 | 3.83E-09 |
| 05 EN15804+A2 (EF 3.1) Eutrophication, marine [kg N eq.] | 1.16E-03 | 8.23E-05 | 5.09E-05 | 8.55E-05 | 0.00E+00 | 2.34E-06 |
| 06 EN15804+A2 (EF 3.1) Eutrophication, terrestrial [Mole of N eq.] | 1.26E-02 | 9.08E-04 | 5.35E-04 | 9.37E-04 | 0.00E+00 | 2.57E-05 |
| 07 EN15804+A2 (EF 3.1) Photochemical ozone formation, human health [kg NMVOC eq.] | 3.68E-03 | 2.33E-04 | 1.40E-04 | 2.43E-04 | 0.00E+00 | 7.14E-06 |
| 08 EN15804+A2 (EF 3.1) Resource use, mineral and metals [kg Sb eq.] | 1.04E-04 | 2.78E-09 | 6.19E-09 | 1.44E-09 | 0.00E+00 | 1.76E-10 |
| 09 EN15804+A2 (EF 3.1) Resource use, fossils [MJ] | 1.68E+01 | 8.35E-01 | 8.20E-01 | 6.89E-01 | 0.00E+00 | 2.61E-02 |
| 10 EN15804+A2 (EF 3.1) Water use [$m^3$ world equiv.] | 3.19E-01 | 3.73E-04 | 1.05E-02 | 1.19E-04 | 0.00E+00 | 8.53E-05 |

Table 1: Life Cycle Impact of one piece of Daylight Sensor in EN 15804+A2 categories

The trend indicated by the carbon footprint (indicator climate change, total, under focus in this document) is reflected in most of the other indicators. In this case, particularly, due to the high relative contribution of energy consumption in the manufacturing stage. It is the hotspot for most indicators except Resource use, minerals and metals.

Impact categories that relate to electricity consumption and fossil fuels behave similar to Climate Change, such as Resource Use fossils and Water use. The Eutrophication categories (which are slightly higher for A1) refer to the Manufacturing Stage's raw material extraction, specifically related to Phosphorus and Nitrogen emissions. Acidification Potential (AP) and POCP are also sensitive to raw material extraction and production processes, particularly copper and precious metals in electronics for AP due to sulfuric ores, and the energy consumption in their production associated with nitrogen oxide emissions. Resource Use, Mineral and Metals are by definition related to the extraction and production of raw materials and is here greatly dominated by the production of electronic components in A1. Ozone Depletion Potential is included for reasons of completeness, but the foreground system does not relate to relevant emissions and the background data have very few and minor non-representative residues left in the LCI, which make a meaningful interpretation impossible.

# Environmental Fact Sheet

**Daylight Sensor**

## Additional environmental impact indicators

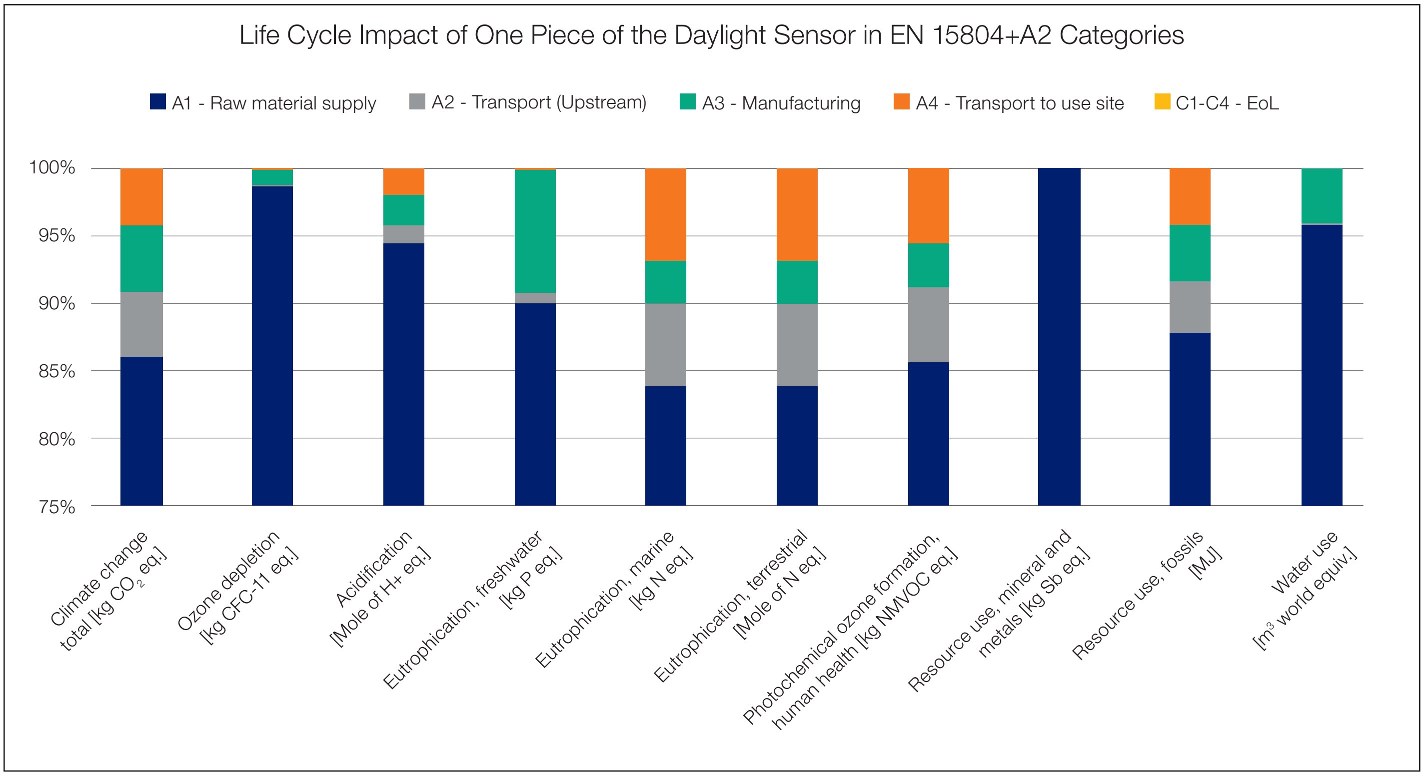



Figure 7: Life Cycle Impact of one piece of the Daylight Sensor in EN 15804+A2 categories

# Environmental Fact Sheet

**Daylight Sensor**

## Summary and conclusion

With the aim to assess the environmental impact of the Daylight Sensor family produced by Lutron, Climate Change Potential was used as a reference indicator in this study due to its stability and global importance.

Climate Change was used as a reference indicator to assess the environmental impact of the Daylight Sensor produced by Lutron. The results on all impact categories show that climate change can be used as a good proxy to estimate the environmental impacts of this product and identifying its impacts. Exception to this rule is the impact category “resource use, minerals and metals”, which is specifically influenced by metal contents in electronics and hence behave differently from the other impact categories.

Within the Cradle-to-Grave system boundary of the device, the LCA study shows electricity consumption during the Manufacturing Stage as the main hotspot for Global Warming Potential, followed by the transport to use site. The observation of the hotspot is seen as a trend in most other environmental categories as well.

The scenario analysis shows that the Climate Change for the LRF5-DCRB-WH variant of the Daylight Sensor which has a use location in India, has the highest contribution.