

# ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

**Copenhagen LED gen2 mini**  
**BPS/BDS/BWS559**  
Signify N.V.



## GENERAL INFORMATION

### MANUFACTURER

Manufacturer	Signify
Address	5600 VB Eindhoven, The Netherlands
Contact details	sustainability@signify.com
Website	<a href="https://www.signify.com/global">https://www.signify.com/global</a>

### EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Electrical product
Category of EPD	Pre-verified EPD
Scope of the EPD	Cradle to gate with options, A4-B7, and modules C1-C4, D
EPD author	Sustainability Signify
EPD verification	Independent verification of this EPD and data, according to ISO 14025: <input checked="" type="checkbox"/> Internal certification <input type="checkbox"/> External verification

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of lighting products may not be comparable if they do not comply with EN 15804 and if they are not compared in a lighting context.

### PRODUCT

Product name	Copenhagen LED gen2 mini
Additional labels	BPS559 LED20/830IIGLDM10 CLOLS850 C4K60P
Product reference	919008635356
Place of production	DENMARK
Period for data	2024
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	Not applicable

### ENVIRONMENTAL DATA SUMMARY

Declared unit	1 Unit
Declared unit mass	2.676 kg
GWP-fossil, A1-A3 (kgCO <sub>2</sub> e)	3.03E+01
GWP-total, A1-A3 (kgCO <sub>2</sub> e)	2.75E+01
Secondary material, inputs (%)	36.1
Secondary material, outputs (%)	58.9
Total energy use, A1-A3 (kWh)	161
Net fresh water use, A1-A3 (m <sup>3</sup> e)	0.44

## PRODUCT AND MANUFACTURER

### ABOUT THE MANUFACTURER

Signify is the world leader in lighting for professionals, consumers and lighting for the Internet of Things. Our energy efficient lighting products, systems and services enable our customers to enjoy a superior quality of light, and make people's lives safer and more comfortable, businesses more productive and cities more liveable.

For more information, please visit: <https://www.signify.com/global>

### PRODUCT DESCRIPTION

The original Copenhagen luminaire was co-designed with Copenhagen's Office of City Architecture in the 1960s. This timeless luminaire design comes in three types: Copenhagen LED gen2, which delivers high performance for road lighting applications; Copenhagen City LED gen2, which is for city and residential areas where balanced light comfort and cohesive design language are appreciated; Copenhagen City Comfort LED, which caters to the needs of sensitive inner-city areas with high demand for spill light control and high comfort. The second generation of Copenhagen LED is available in a range of sizes, from mini to mega. This makes it suitable for any type of application while ensuring the dimensions of the luminaire and pole are well balanced, so every installation blends harmoniously into its surroundings. Various suspensions are available, allowing a variety of mounting options to provide maximum freedom during installation. Thanks to the built in LEDGINE-O engine, and the wide range of application-tailored optics, Copenhagen LED luminaires deliver the right amount of light and in the right direction on your street, enabling important energy savings. In order to reduce the carbon footprint of the luminaires, the iconic canopy is made of bio-based plastic and main metal parts manufactured from recycled aluminium. The luminaire is available with one or two Zhaga-D4i (ZD4i) system ready sockets, which makes the luminaire future ready, ready to pair with advanced control and lighting software applications

such as Interact. Due to the plastic material usage, the top socket can be integrated into the canopy without impacting the clean design of the luminaire.

### PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	52.76	APAC , EU
Minerals	14.95	EU
Fossil materials	17.49	APAC , EU
Bio-based materials	14.8	EU

### BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0.285
Biogenic carbon content in packaging, kg C	0.265

### FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 Unit
Mass per declared unit	2.676 kg
Functional unit	1634 Lumens over 100000 hours
Reference service life	100000 hours

### SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0.1 % (1000 ppm).

# PRODUCT LIFE-CYCLE

## SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	MNR	MNR	MNR	MNR	MNR	x	MNR	MNR	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not relevant = MNR.

## MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, electricity, and waste formed in the production processes at Signify’s manufacturing facilities are included in this stage. The product is made of metals, plastics, and electronic components. All components are transported to Signify’s production facility, where the main manufacturing processes primarily are associated with assembly. The finished product is packaged with polyethylene, cardboard, and/or paper as packaging material before being sent to customers. Manufacturing loss, ancillaries and wastes are calculated according to the data that each manufacturing site is sharing with Signify. The total annual amount of waste in kg is allocated to the total annual production in kg at the specific manufacturing site responsible for the production of the studied luminaire. Thus, it is possible to allocate it according to the weight of the product analysed in this study. Some of the

waste are due to ancillary materials used during manufacturing while the rest is due to material losses.

## TRANSPORT AND INSTALLATION (A4-A5)

Transport distances were calculated on the base of the supplier location and manufacturing location and then made a cumulative group choosing the conservative scenario. Environmental impacts from installation include waste packaging materials (A5). The impacts of energy consumption and the used ancillary materials during installation are considered negligible.

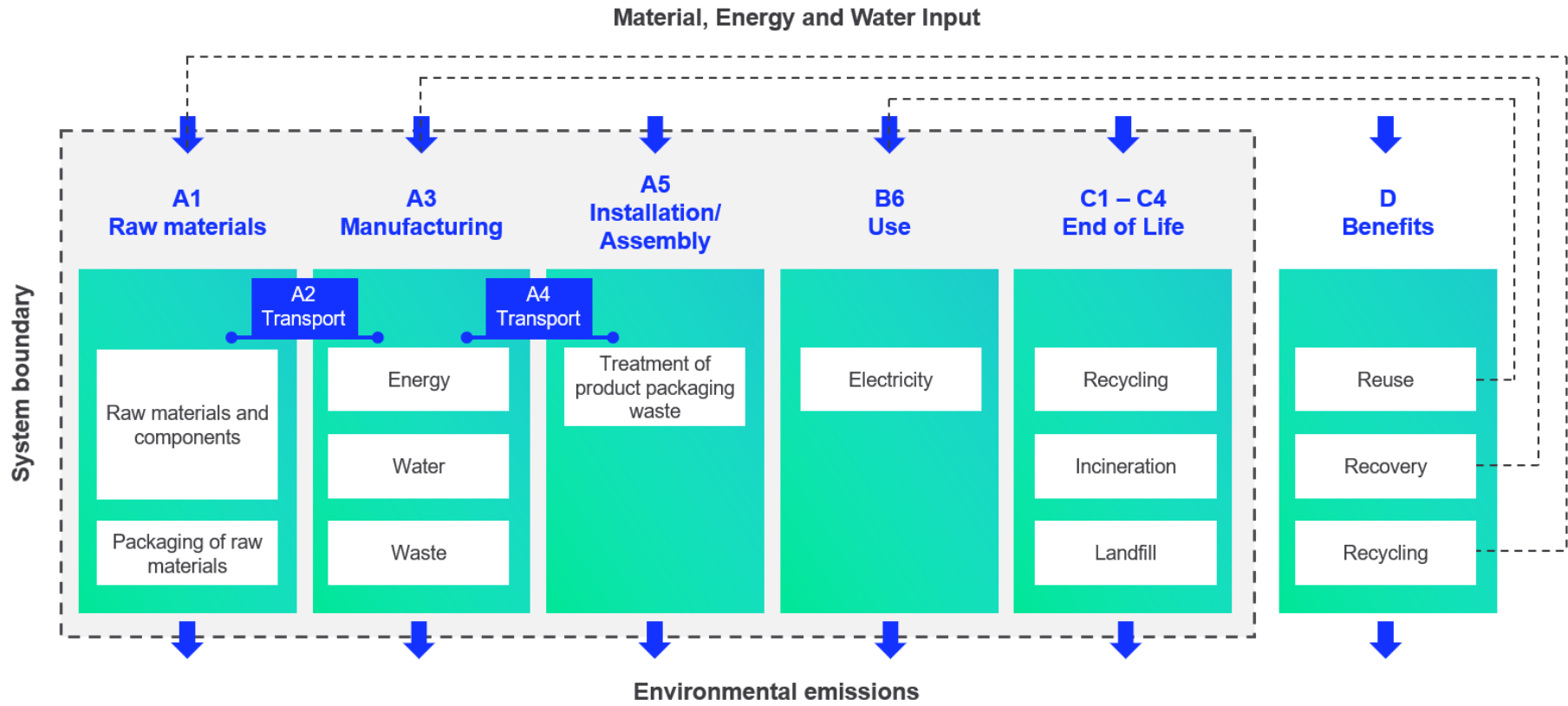
## PRODUCT USE AND MAINTENANCE (B1-B7)

During the use phase, the product consumes electricity from DENMARK’s electricity grid mix (B6). The total power consumption of the reference product is calculated as follows:  $Wattage \times Reference\ lifetime = kWh\ consumed\ throughout\ the\ entire\ use\ phase\ B6.$

## PRODUCT END OF LIFE (C1-C4, D)

Consumption of energy and natural resources in demolition process is assumed to be negligible. It is assumed that the waste is collected separately and transported to the waste treatment centre. Transportation distance to treatment is assumed as 150 km and the transportation method is assumed to be lorry (C2). According to EN 50693:2019, the sequence of treatment operations occurring to the product shall include de-pollution, fractions separation and preparation (dismantling, crushing, shredding, sorting), recycling, other material recovery, energy recovery and disposal. In this study, the default values from table G.4 of EN 50693 is used for treating materials in different waste treatment methods. Due to the material and energy recovery potential of parts in the lighting system, the end-of-life product is converted into recycled raw materials, while the energy recovered from incineration displaces electricity and heat production (D). The benefits and loads of incineration and recycling are included in Module D.

# SYSTEM BOUNDARY



## LIFE-CYCLE ASSESSMENT

### CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

### ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, ancillary materials, energy & water consumption, material loss and waste generation at the manufacturing site are attributed to the bill of materials of the products, therefore, they are allocated by partitioning the quantities on the base of the total production in kg throughout the year. Thus, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	No allocation
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

This EPD is created with a most conservative scenario in A1-A3 in terms of material composition.

### AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	Not applicable

This EPD is product and factory specific and does not contain average calculations. It is created with a most conservative scenario in A1-A3 in terms of material composition.

### LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. EcoInvent 3.8 database was used as the source of environmental data.

# ENVIRONMENTAL IMPACT DATA

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total <sup>1)</sup>	kg CO <sub>2</sub> e	1.92E+01	6.29E-01	7.66E+00	2.75E+01	6.29E-01	9.99E-01	MNR	MNR	MNR	MNR	MNR	3.08E+02	MNR	MNR	3.77E-02	1.50E+00	1.56E+00	-3.36E+00
GWP – fossil	kg CO <sub>2</sub> e	2.10E+01	6.29E-01	8.60E+00	3.03E+01	6.29E-01	3.80E-02	MNR	MNR	MNR	MNR	MNR	3.08E+02	MNR	MNR	3.77E-02	9.09E-01	4.84E-01	-3.36E+00
GWP – biogenic	kg CO <sub>2</sub> e	-1.67E+00	0.00E+00	-9.61E-01	-2.63E+00	2.43E-04	9.61E-01	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	5.94E-01	1.07E+00	-2.63E-03
GWP – LULUC	kg CO <sub>2</sub> e	-1.24E-01	2.48E-04	1.88E-02	-1.05E-01	2.32E-04	9.68E-06	MNR	MNR	MNR	MNR	MNR	6.25E-01	MNR	MNR	1.39E-05	6.48E-05	2.98E-05	-1.32E-03
Ozone depletion pot.	kg CFC <sub>11</sub> e	1.20E-06	1.43E-07	8.97E-07	2.24E-06	1.45E-07	2.55E-09	MNR	MNR	MNR	MNR	MNR	8.74E-06	MNR	MNR	8.66E-09	5.19E-09	4.13E-09	-1.00E-07
Acidification potential	mol H <sup>+</sup> e	2.32E-01	3.93E-03	3.25E-02	2.68E-01	2.66E-03	2.14E-04	MNR	MNR	MNR	MNR	MNR	1.26E+00	MNR	MNR	1.59E-04	5.60E-04	2.12E-04	-8.89E-02
EP-freshwater <sup>2)</sup>	kg Pe	1.89E-03	4.94E-06	2.74E-04	2.17E-03	5.15E-06	2.75E-07	MNR	MNR	MNR	MNR	MNR	2.63E-02	MNR	MNR	3.08E-07	1.97E-06	4.86E-07	-3.37E-04
EP-marine	kg Ne	3.33E-02	1.09E-03	7.59E-03	4.20E-02	7.91E-04	9.35E-05	MNR	MNR	MNR	MNR	MNR	2.39E-01	MNR	MNR	4.74E-05	1.67E-04	1.18E-04	-5.07E-03
EP-terrestrial	mol Ne	3.59E-01	1.21E-02	7.10E-02	4.42E-01	8.73E-03	9.64E-04	MNR	MNR	MNR	MNR	MNR	3.13E+00	MNR	MNR	5.23E-04	1.81E-03	8.44E-04	-6.64E-02
POCP (“smog”) <sup>3)</sup>	kg NMVOCe	9.58E-02	3.63E-03	3.13E-02	1.31E-01	2.79E-03	2.40E-04	MNR	MNR	MNR	MNR	MNR	7.19E-01	MNR	MNR	1.67E-04	4.66E-04	2.33E-04	-1.95E-02
ADP-minerals & metals <sup>4)</sup>	kg Sbe	3.08E-03	1.43E-06	1.85E-04	3.27E-03	1.47E-06	8.19E-08	MNR	MNR	MNR	MNR	MNR	4.14E-03	MNR	MNR	8.83E-08	3.12E-06	8.64E-08	-1.82E-03
ADP-fossil resources	MJ	2.36E+02	9.34E+00	1.40E+02	3.85E+02	9.45E+00	2.10E-01	MNR	MNR	MNR	MNR	MNR	4.38E+03	MNR	MNR	5.66E-01	6.30E-01	3.64E-01	-3.34E+01
Water use <sup>5)</sup>	m <sup>3</sup> e depr.	1.05E+01	4.09E-02	5.51E+00	1.60E+01	4.23E-02	4.68E-02	MNR	MNR	MNR	MNR	MNR	2.32E+02	MNR	MNR	2.53E-03	4.28E-02	3.03E-02	-5.42E-01

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	1.64E-06	6.87E-08	3.96E-07	2.10E-06	7.25E-08	1.94E-09	MNR	MNR	MNR	MNR	MNR	7.79E-06	MNR	MNR	4.34E-09	5.56E-09	2.89E-09	-2.90E-07
Ionizing radiation <sup>6)</sup>	kBq U235e	1.60E+00	4.44E-02	4.18E-01	2.06E+00	4.50E-02	7.17E-04	MNR	MNR	MNR	MNR	MNR	7.57E+01	MNR	MNR	2.69E-03	4.04E-03	1.67E-03	-2.05E-01
Ecotoxicity (freshwater)	CTUe	1.49E+03	8.25E+00	1.96E+02	1.70E+03	8.50E+00	1.22E+00	MNR	MNR	MNR	MNR	MNR	7.90E+03	MNR	MNR	5.09E-01	3.66E+00	1.04E+02	-4.76E+02
Human toxicity, cancer	CTUh	7.32E-08	2.21E-10	6.36E-09	7.98E-08	2.09E-10	7.30E-11	MNR	MNR	MNR	MNR	MNR	1.97E-07	MNR	MNR	1.25E-11	1.28E-10	1.01E-09	-1.09E-08
Human tox. non-cancer	CTUh	1.69E-06	8.04E-09	1.71E-07	1.87E-06	8.41E-09	2.95E-09	MNR	MNR	MNR	MNR	MNR	5.98E-06	MNR	MNR	5.04E-10	5.21E-09	6.73E-08	-1.12E-06
SQP <sup>7)</sup>	-	1.59E+02	1.02E+01	5.23E+02	6.92E+02	1.09E+01	1.23E-01	MNR	MNR	MNR	MNR	MNR	5.31E+03	MNR	MNR	6.52E-01	7.25E-01	5.46E-01	-2.73E+01

6) EN 15804+A2 disclaimer for ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

### USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy <sup>8)</sup>	MJ	3.69E+01	1.03E-01	1.66E+02	2.03E+02	1.06E-01	6.12E-03	MNR	MNR	MNR	MNR	MNR	3.71E+03	MNR	MNR	6.37E-03	7.25E-02	1.26E-02	-2.17E+00
Renew. PER as material	MJ	4.81E+00	0.00E+00	8.82E+00	1.36E+01	0.00E+00	-8.82E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	-1.28E-01	-4.68E+00	0.00E+00
Total use of renew. PER	MJ	4.18E+01	1.03E-01	1.75E+02	2.17E+02	1.06E-01	-8.81E+00	MNR	MNR	MNR	MNR	MNR	3.71E+03	MNR	MNR	6.37E-03	-5.57E-02	-4.67E+00	-2.17E+00
Non-re. PER as energy	MJ	2.39E+02	9.34E+00	1.28E+02	3.76E+02	9.45E+00	2.10E-01	MNR	MNR	MNR	MNR	MNR	4.38E+03	MNR	MNR	5.66E-01	6.30E-01	3.64E-01	-3.34E+01
Non-re. PER as material	MJ	1.33E+01	0.00E+00	3.50E-01	1.36E+01	0.00E+00	-3.50E-01	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	-6.52E+00	-6.74E+00	0.00E+00
Total use of non-re. PER	MJ	2.52E+02	9.34E+00	1.28E+02	3.90E+02	9.45E+00	-1.40E-01	MNR	MNR	MNR	MNR	MNR	4.38E+03	MNR	MNR	5.66E-01	-5.89E+00	-6.38E+00	-3.34E+01
Secondary materials	kg	9.67E-01	2.69E-03	5.01E-01	1.47E+00	2.62E-03	2.41E-04	MNR	MNR	MNR	MNR	MNR	1.17E+00	MNR	MNR	1.57E-04	5.06E-04	8.17E-04	1.83E-01
Renew. secondary fuels	MJ	2.81E-02	2.53E-05	3.22E-02	6.03E-02	2.65E-05	3.23E-06	MNR	MNR	MNR	MNR	MNR	8.62E-03	MNR	MNR	1.58E-06	2.82E-05	7.75E-06	-6.43E-04
Non-ren. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m <sup>3</sup>	2.25E-01	1.17E-03	2.17E-01	4.43E-01	1.22E-03	5.73E-04	MNR	MNR	MNR	MNR	MNR	1.14E+01	MNR	MNR	7.33E-05	1.53E-03	7.76E-04	-3.00E-02

8) PER = Primary energy resources.

### END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	3.51E+00	1.24E-02	5.48E-01	4.07E+00	1.25E-02	9.57E-03	MNR	MNR	MNR	MNR	MNR	3.47E+01	MNR	MNR	7.50E-04	3.41E-03	4.20E-02	-5.99E-01
Non-hazardous waste	kg	5.68E+01	1.97E-01	8.85E+00	6.59E+01	2.06E-01	4.37E-01	MNR	MNR	MNR	MNR	MNR	1.13E+03	MNR	MNR	1.23E-02	4.83E-01	1.06E+00	-2.84E+01
Radioactive waste	kg	6.44E-04	6.27E-05	2.37E-04	9.43E-04	6.32E-05	4.86E-07	MNR	MNR	MNR	MNR	MNR	1.91E-02	MNR	MNR	3.78E-06	1.87E-06	0.00E+00	-7.69E-05

### END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	1.21E+00	0.00E+00	0.00E+00
Materials for energy rec	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	3.66E-01	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	4.66E-01	4.66E-01	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	8.04E+00	0.00E+00	0.00E+00

### ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO <sub>2</sub> e	2.13E+01	6.23E-01	8.55E+00	3.05E+01	6.23E-01	3.66E-02	MNR	MNR	MNR	MNR	MNR	3.04E+02	MNR	MNR	3.73E-02	9.07E-01	4.76E-01	-3.29E+00
Ozone depletion Pot.	kg CFC <sub>11</sub> e	1.09E-06	1.13E-07	8.05E-07	2.00E-06	1.15E-07	2.20E-09	MNR	MNR	MNR	MNR	MNR	7.81E-06	MNR	MNR	6.86E-09	4.38E-09	3.39E-09	-8.46E-08
Acidification	kg SO <sub>2</sub> e	1.85E-01	3.09E-03	2.63E-02	2.14E-01	2.07E-03	1.55E-04	MNR	MNR	MNR	MNR	MNR	9.97E-01	MNR	MNR	1.24E-04	4.34E-04	1.58E-04	-7.82E-02
Eutrophication	kg PO <sub>4</sub> <sup>3</sup> e	6.19E-02	5.68E-04	1.14E-02	7.39E-02	4.71E-04	1.19E-04	MNR	MNR	MNR	MNR	MNR	9.93E-01	MNR	MNR	2.82E-05	2.01E-04	2.13E-03	-1.70E-02
POCP ("smog")	kg C <sub>2</sub> H <sub>4</sub> e	1.12E-02	1.05E-04	1.84E-03	1.31E-02	8.08E-05	4.55E-06	MNR	MNR	MNR	MNR	MNR	4.80E-02	MNR	MNR	4.84E-06	1.44E-05	1.16E-05	-3.26E-03
ADP-elements	kg Sbe	3.26E-03	1.39E-06	1.84E-04	3.44E-03	1.43E-06	6.48E-08	MNR	MNR	MNR	MNR	MNR	4.13E-03	MNR	MNR	8.55E-08	3.10E-06	7.55E-08	-1.82E-03
ADP-fossil	MJ	2.65E+02	9.34E+00	1.40E+02	4.14E+02	9.45E+00	2.10E-01	MNR	MNR	MNR	MNR	MNR	4.37E+03	MNR	MNR	5.66E-01	6.30E-01	3.64E-01	-3.34E+01

## APPENDIX (EPD HUB ALIGNED)

This section represents the scaling method for the **B6 module**, following the PEP EcoPassport PSR for luminaires (PSR-0014-ed2.0-EN-2023 07 13). The GWP results were scaled from a reference variant of a product family, based on various light management scenarios and power inputs of the luminaires within the same product family

To calculate the Scaled Impact (*SI*), we have followed the below methods:

1. Calculate the power scaling factor (PSF), which is the ratio of the power input of the variant in questions  $P_{in}$  and the power input of the base variant  $P_{base}$ .

$$PSF = \frac{P_{in}}{P_{base}}$$

2. Calculate the Total Scaling factor by multiplying the PSF by the control scaling factor (CSF), where the CSF is determined according the relevant control factor scenario (e.g. if the luminaire has a presence detection system). The presented controls factors values in Table A1 are based on BS EN 15193-1:2017. Please refer to this publication or contact Signify directly for more information.

$$TSF = PSF * CSF$$

**Table A1: Light management function (PEP EcoPassport aligned)**

Scenario	Abbrev.	CSF
No control	NC	1
Daylight dependency factor	DD	0.75
Presence sensing	PS	0.75
Daylight dependency and presence sensing	DD+PS	0.55

3. Lastly, the GWP of the base variant is then scaled by the TSF.

$$\text{Scaled Impact} = \text{GWP}_{\text{case}} * \text{TSF}$$

**Table A2 Scaled GWP per scaling factor (EPD Hub aligned)**

Configuration	Flux [lm]	Power [W]	Efficacy [lm/W]	PSF	Total Scaling Factor (TSF)				Scaled Impacts (GWP100 B6 - kg CO2eq.)			
					NC	DD	PS	DD+PS	NC	DD	PS	DD+PS
BDS559,BPS559,BWS559 LED10-CLO/722	852.6	9.2	92.7	0.568	0.568	0.426	0.426	0.312	174.9	131.2	131.2	96.1
BDS559,BPS559,BWS559 LED11-CLO/722	913.5	10.2	89.6	0.63	0.63	0.473	0.473	0.347	194.0	145.7	145.7	106.9
BDS559,BPS559,BWS559 LED12-CLO/722	1000.5	10.6	94.4	0.654	0.654	0.491	0.491	0.36	201.4	151.2	151.2	110.9
BDS559,BPS559,BWS559 LED13-CLO/722	1087.5	11.4	95.4	0.704	0.704	0.528	0.528	0.387	216.8	162.6	162.6	119.2
BDS559,BPS559,BWS559 LED14-CLO/722	1174.5	12.2	96.3	0.753	0.753	0.565	0.565	0.414	231.9	174.0	174.0	127.5
BDS559,BPS559,BWS559 LED15-CLO/722	1261.5	13.2	95.6	0.815	0.815	0.611	0.611	0.448	251.0	188.2	188.2	138.0
BDS559,BPS559,BWS559 LED16-CLO/722	1333.0	14.0	95.2	0.864	0.864	0.648	0.648	0.475	266.1	199.6	199.6	146.3
BDS559,BPS559,BWS559 LED17-CLO/722	1419.0	15.0	94.6	0.926	0.926	0.695	0.695	0.509	285.2	214.1	214.1	156.8
BDS559,BPS559,BWS559 LED18-CLO/722	1505.0	15.6	96.5	0.963	0.963	0.722	0.722	0.53	296.6	222.4	222.4	163.2
BDS559,BPS559,BWS559 LED19-CLO/722	1548.0	16.4	94.4	1.012	1.012	0.759	0.759	0.557	311.7	233.8	233.8	171.6
BDS559,BPS559,BWS559 LED20-CLO/722	1634.0	17.4	93.9	1.074	1.074	0.806	0.806	0.591	330.8	248.2	248.2	182.0
BDS559,BPS559,BWS559 LED21-CLO/722	1720.0	18.4	93.5	1.136	1.136	0.852	0.852	0.625	349.9	262.4	262.4	192.5
BDS559,BPS559,BWS559 LED22-CLO/722	1806.0	19.2	94.1	1.185	1.185	0.889	0.889	0.652	365.0	273.8	273.8	200.8
BDS559,BPS559,BWS559 LED23-CLO/722	1892.0	20.0	94.6	1.235	1.235	0.926	0.926	0.679	380.4	285.2	285.2	209.1
BDS559,BPS559,BWS559 LED24-CLO/722	1978.0	21.0	94.2	1.296	1.296	0.972	0.972	0.713	399.2	299.4	299.4	219.6
BDS559,BPS559,BWS559 LED25-CLO/722	2040.0	22.0	92.7	1.358	1.358	1.018	1.018	0.747	418.3	313.5	313.5	230.1
BDS559,BPS559,BWS559 LED30-CLO/722	2465.0	24.5	100.6	1.512	1.512	1.134	1.134	0.832	465.7	349.3	349.3	256.3

BDS559,BPS559,BWS559 LED35-CLO/722	2856.0	28.5	100.2	1.759	1.759	1.319	1.319	0.967	541.8	406.3	406.3	297.8
BDS559,BPS559,BWS559 LED40-CLO/722	3154.0	32.5	97.0	2.006	2.006	1.504	1.504	1.103	617.8	463.2	463.2	339.7
BDS559,BPS559,BWS559 LED6-CLO/722	522.0	5.9	88.5	0.364	0.364	0.273	0.273	0.2	112.1	84.1	84.1	61.6
BDS559,BPS559,BWS559 LED7-CLO/722	591.6	6.8	87.0	0.42	0.42	0.315	0.315	0.231	129.4	97.0	97.0	71.1
BDS559,BPS559,BWS559 LED8-CLO/722	678.6	7.5	90.5	0.463	0.463	0.347	0.347	0.255	142.6	106.9	106.9	78.5
BDS559,BPS559,BWS559 LED9-CLO/722	765.6	8.3	92.2	0.512	0.512	0.384	0.384	0.282	157.7	118.3	118.3	86.9
BDS559,BPS559,BWS559 LED10-CLO/722	852.6	7.9	107.9	0.488	0.488	0.366	0.366	0.268	150.3	112.7	112.7	82.5
BDS559,BPS559,BWS559 LED11-CLO/722	913.5	8.7	105.0	0.537	0.537	0.403	0.403	0.295	165.4	124.1	124.1	90.9
BDS559,BPS559,BWS559 LED12-CLO/722	1044.0	9.4	111.1	0.58	0.58	0.435	0.435	0.319	178.6	134.0	134.0	98.3
BDS559,BPS559,BWS559 LED13-CLO/722	1087.5	10.0	108.8	0.617	0.617	0.463	0.463	0.339	190.0	142.6	142.6	104.4
BDS559,BPS559,BWS559 LED14-CLO/722	1174.5	10.6	110.8	0.654	0.654	0.491	0.491	0.36	201.4	151.2	151.2	110.9
BDS559,BPS559,BWS559 LED15-CLO/722	1261.5	11.4	110.7	0.704	0.704	0.528	0.528	0.387	216.8	162.6	162.6	119.2
BDS559,BPS559,BWS559 LED16-CLO/722	1333.0	12.0	111.1	0.741	0.741	0.556	0.556	0.408	228.2	171.2	171.2	125.7
BDS559,BPS559,BWS559 LED17-CLO/722	1419.0	12.8	110.9	0.79	0.79	0.593	0.593	0.435	243.3	182.6	182.6	134.0
BDS559,BPS559,BWS559 LED18-CLO/722	1505.0	13.6	110.7	0.84	0.84	0.63	0.63	0.462	258.7	194.0	194.0	142.3
BDS559,BPS559,BWS559 LED19-CLO/722	1591.0	14.4	110.5	0.889	0.889	0.667	0.667	0.489	273.8	205.4	205.4	150.6
BDS559,BPS559,BWS559 LED20-CLO/722	1677.0	15.0	111.8	0.926	0.926	0.695	0.695	0.509	285.2	214.1	214.1	156.8
BDS559,BPS559,BWS559 LED21-CLO/722	1720.0	15.6	110.3	0.963	0.963	0.722	0.722	0.53	296.6	222.4	222.4	163.2
BDS559,BPS559,BWS559 LED22-CLO/722	1806.0	16.4	110.1	1.012	1.012	0.759	0.759	0.557	311.7	233.8	233.8	171.6
BDS559,BPS559,BWS559 LED23-CLO/722	1892.0	17.2	110.0	1.062	1.062	0.796	0.796	0.584	327.1	245.2	245.2	179.9
BDS559,BPS559,BWS559 LED24-CLO/722	1978.0	18.0	109.9	1.111	1.111	0.833	0.833	0.611	342.2	256.6	256.6	188.2
BDS559,BPS559,BWS559 LED25-CLO/722	2040.0	18.8	108.5	1.16	1.16	0.87	0.87	0.638	357.3	268.0	268.0	196.5
BDS559,BPS559,BWS559 LED30-CLO/722	2465.0	21.0	117.4	1.296	1.296	0.972	0.972	0.713	399.2	299.4	299.4	219.6
BDS559,BPS559,BWS559 LED35-CLO/722	2890.0	24.5	118.0	1.512	1.512	1.134	1.134	0.832	465.7	349.3	349.3	256.3

BDS559,BPS559,BWS559 LED40-CLO/727	3192.0	28.0	114.0	1.728	1.728	1.296	1.296	0.95	532.2	399.2	399.2	292.6
BDS559,BPS559,BWS559 LED6-CLO/727	522.0	5.2	100.4	0.321	0.321	0.241	0.241	0.177	98.9	74.2	74.2	54.5
BDS559,BPS559,BWS559 LED7-CLO/727	591.6	5.9	100.3	0.364	0.364	0.273	0.273	0.2	112.1	84.1	84.1	61.6
BDS559,BPS559,BWS559 LED8-CLO/727	678.6	6.6	102.8	0.407	0.407	0.305	0.305	0.224	125.4	93.9	93.9	69.0
BDS559,BPS559,BWS559 LED9-CLO/727	765.6	7.2	106.3	0.444	0.444	0.333	0.333	0.244	136.8	102.6	102.6	75.2
BDS559,BPS559,BWS559 LED10-CLO/730	852.6	7.3	116.8	0.451	0.451	0.338	0.338	0.248	138.9	104.1	104.1	76.4
BDS559,BPS559,BWS559 LED11-CLO/730	913.5	7.9	115.6	0.488	0.488	0.366	0.366	0.268	150.3	112.7	112.7	82.5
BDS559,BPS559,BWS559 LED12-CLO/730	1056.0	8.5	124.2	0.525	0.525	0.394	0.394	0.289	161.7	121.4	121.4	89.0
BDS559,BPS559,BWS559 LED13-CLO/730	1131.0	9.2	122.9	0.568	0.568	0.426	0.426	0.312	174.9	131.2	131.2	96.1
BDS559,BPS559,BWS559 LED14-CLO/730	1174.5	9.8	119.8	0.605	0.605	0.454	0.454	0.333	186.3	139.8	139.8	102.6
BDS559,BPS559,BWS559 LED15-CLO/730	1261.5	10.4	121.3	0.642	0.642	0.482	0.482	0.353	197.7	148.5	148.5	108.7
BDS559,BPS559,BWS559 LED16-CLO/730	1348.5	11.0	122.6	0.679	0.679	0.509	0.509	0.373	209.1	156.8	156.8	114.9
BDS559,BPS559,BWS559 LED17-CLO/730	1435.5	11.6	123.8	0.716	0.716	0.537	0.537	0.394	220.5	165.4	165.4	121.4
BDS559,BPS559,BWS559 LED18-CLO/730	1522.5	12.2	124.8	0.753	0.753	0.565	0.565	0.414	231.9	174.0	174.0	127.5
BDS559,BPS559,BWS559 LED19-CLO/730	1609.5	13.0	123.8	0.802	0.802	0.602	0.602	0.441	247.0	185.4	185.4	135.8
BDS559,BPS559,BWS559 LED20-CLO/730	1677.0	13.6	123.3	0.84	0.84	0.63	0.63	0.462	258.7	194.0	194.0	142.3
BDS559,BPS559,BWS559 LED21-CLO/730	1720.0	14.2	121.1	0.877	0.877	0.658	0.658	0.482	270.1	202.7	202.7	148.5
BDS559,BPS559,BWS559 LED22-CLO/730	1806.0	15.0	120.4	0.926	0.926	0.695	0.695	0.509	285.2	214.1	214.1	156.8
BDS559,BPS559,BWS559 LED23-CLO/730	1892.0	15.6	121.3	0.963	0.963	0.722	0.722	0.53	296.6	222.4	222.4	163.2
BDS559,BPS559,BWS559 LED24-CLO/730	1978.0	16.2	122.1	1.0	1.0	0.75	0.75	0.55	308.0	231.0	231.0	169.4
BDS559,BPS559,BWS559 LED25-CLO/730	2064.0	16.8	122.9	1.037	1.037	0.778	0.778	0.57	319.4	239.6	239.6	175.6
BDS559,BPS559,BWS559 LED30-CLO/730	2494.0	19.2	129.9	1.185	1.185	0.889	0.889	0.652	365.0	273.8	273.8	200.8
BDS559,BPS559,BWS559 LED35-CLO/730	2924.0	22.0	132.9	1.358	1.358	1.018	1.018	0.747	418.3	313.5	313.5	230.1
BDS559,BPS559,BWS559 LED40-CLO/730	3230.0	25.0	129.2	1.543	1.543	1.157	1.157	0.849	475.2	356.4	356.4	261.5

BDS559,BPS559,BWS559 LED7-CLO/730	598.4	5.4	110.8	0.333	0.333	0.25	0.25	0.183	102.6	77.0	77.0	56.4
BDS559,BPS559,BWS559 LED8-CLO/730	678.6	6.1	111.2	0.377	0.377	0.283	0.283	0.207	116.1	87.2	87.2	63.8
BDS559,BPS559,BWS559 LED9-CLO/730	765.6	6.7	114.3	0.414	0.414	0.31	0.31	0.228	127.5	95.5	95.5	70.2
BDS559,BPS559,BWS559 LED10-CLO/740	852.6	6.9	123.6	0.426	0.426	0.32	0.32	0.234	131.2	98.6	98.6	72.1
BDS559,BPS559,BWS559 LED11-CLO/740	913.5	7.5	121.8	0.463	0.463	0.347	0.347	0.255	142.6	106.9	106.9	78.5
BDS559,BPS559,BWS559 LED12-CLO/740	1044.0	8.1	128.9	0.5	0.5	0.375	0.375	0.275	154.0	115.5	115.5	84.7
BDS559,BPS559,BWS559 LED13-CLO/740	1131.0	8.7	130.0	0.537	0.537	0.403	0.403	0.295	165.4	124.1	124.1	90.9
BDS559,BPS559,BWS559 LED14-CLO/740	1174.5	9.3	126.3	0.574	0.574	0.43	0.43	0.316	176.8	132.4	132.4	97.3
BDS559,BPS559,BWS559 LED15-CLO/740	1261.5	9.9	127.4	0.611	0.611	0.458	0.458	0.336	188.2	141.1	141.1	103.5
BDS559,BPS559,BWS559 LED16-CLO/740	1348.5	10.4	129.7	0.642	0.642	0.482	0.482	0.353	197.7	148.5	148.5	108.7
BDS559,BPS559,BWS559 LED17-CLO/740	1435.5	11.0	130.5	0.679	0.679	0.509	0.509	0.373	209.1	156.8	156.8	114.9
BDS559,BPS559,BWS559 LED18-CLO/740	1522.5	11.6	131.2	0.716	0.716	0.537	0.537	0.394	220.5	165.4	165.4	121.4
BDS559,BPS559,BWS559 LED19-CLO/740	1609.5	12.2	131.9	0.753	0.753	0.565	0.565	0.414	231.9	174.0	174.0	127.5
BDS559,BPS559,BWS559 LED20-CLO/740	1696.5	12.8	132.5	0.79	0.79	0.593	0.593	0.435	243.3	182.6	182.6	134.0
BDS559,BPS559,BWS559 LED21-CLO/740	1740.0	13.4	129.9	0.827	0.827	0.62	0.62	0.455	254.7	191.0	191.0	140.1
BDS559,BPS559,BWS559 LED22-CLO/740	1827.0	14.0	130.5	0.864	0.864	0.648	0.648	0.475	266.1	199.6	199.6	146.3
BDS559,BPS559,BWS559 LED23-CLO/740	1892.0	14.8	127.8	0.914	0.914	0.685	0.685	0.503	281.5	211.0	211.0	154.9
BDS559,BPS559,BWS559 LED24-CLO/740	1978.0	15.4	128.4	0.951	0.951	0.713	0.713	0.523	292.9	219.6	219.6	161.1
BDS559,BPS559,BWS559 LED25-CLO/740	2064.0	15.8	130.6	0.975	0.975	0.731	0.731	0.536	300.3	225.1	225.1	165.1
BDS559,BPS559,BWS559 LED30-CLO/740	2494.0	18.2	137.0	1.123	1.123	0.842	0.842	0.618	345.9	259.3	259.3	190.3
BDS559,BPS559,BWS559 LED35-CLO/740	2924.0	21.0	139.2	1.296	1.296	0.972	0.972	0.713	399.2	299.4	299.4	219.6
BDS559,BPS559,BWS559 LED40-CLO/740	3268.0	23.5	139.1	1.451	1.451	1.088	1.088	0.798	446.9	335.1	335.1	245.8
BDS559,BPS559,BWS559 LED7-CLO/740	591.6	5.2	113.8	0.321	0.321	0.241	0.241	0.177	98.9	74.2	74.2	54.5
BDS559,BPS559,BWS559 LED8-CLO/740	686.4	5.8	118.3	0.358	0.358	0.268	0.268	0.197	110.3	82.5	82.5	60.7

BDS559,BPS559,BWS559 LED9-CLO/740	774.4	6.4	121.0	0.395	0.395	0.296	0.296	0.217	121.7	91.2	91.2	66.8
BDS559,BPS559,BWS559 LED10-CLO/830	852.6	8.6	99.1	0.531	0.531	0.398	0.398	0.292	163.5	122.6	122.6	89.9
BDS559,BPS559,BWS559 LED11-CLO/830	913.5	9.4	97.2	0.58	0.58	0.435	0.435	0.319	178.6	134.0	134.0	98.3
BDS559,BPS559,BWS559 LED12-CLO/830	1044.0	10.2	102.4	0.63	0.63	0.473	0.473	0.347	194.0	145.7	145.7	106.9
BDS559,BPS559,BWS559 LED13-CLO/830	1087.5	10.8	100.7	0.667	0.667	0.5	0.5	0.367	205.4	154.0	154.0	113.0
BDS559,BPS559,BWS559 LED14-CLO/830	1174.5	11.4	103.0	0.704	0.704	0.528	0.528	0.387	216.8	162.6	162.6	119.2
BDS559,BPS559,BWS559 LED15-CLO/830	1261.5	12.2	103.4	0.753	0.753	0.565	0.565	0.414	231.9	174.0	174.0	127.5
BDS559,BPS559,BWS559 LED16-CLO/830	1348.5	13.0	103.7	0.802	0.802	0.602	0.602	0.441	247.0	185.4	185.4	135.8
BDS559,BPS559,BWS559 LED17-CLO/830	1435.5	13.8	104.0	0.852	0.852	0.639	0.639	0.469	262.4	196.8	196.8	144.5
BDS559,BPS559,BWS559 LED18-CLO/830	1505.0	14.6	103.1	0.901	0.901	0.676	0.676	0.496	277.5	208.2	208.2	152.8
BDS559,BPS559,BWS559 LED19-CLO/830	1591.0	15.6	102.0	0.963	0.963	0.722	0.722	0.53	296.6	222.4	222.4	163.2
<u>BDS559,BPS559,BWS559 LED20-CLO/830</u>	1634.0	16.2	100.9	1.0	1.0	0.75	0.75	0.55	308.0	231.0	231.0	169.4
BDS559,BPS559,BWS559 LED21-CLO/830	1720.0	17.0	101.2	1.049	1.049	0.787	0.787	0.577	323.1	242.4	242.4	177.7
BDS559,BPS559,BWS559 LED22-CLO/830	1806.0	17.8	101.5	1.099	1.099	0.824	0.824	0.604	338.5	253.8	253.8	186.0
BDS559,BPS559,BWS559 LED23-CLO/830	1892.0	18.6	101.7	1.148	1.148	0.861	0.861	0.631	353.6	265.2	265.2	194.3
BDS559,BPS559,BWS559 LED24-CLO/830	1978.0	19.6	100.9	1.21	1.21	0.907	0.907	0.665	372.7	279.4	279.4	204.8
BDS559,BPS559,BWS559 LED25-CLO/830	2064.0	20.5	100.7	1.265	1.265	0.949	0.949	0.696	389.6	292.3	292.3	214.4
BDS559,BPS559,BWS559 LED30-CLO/830	2494.0	23.0	108.4	1.42	1.42	1.065	1.065	0.781	437.4	328.0	328.0	240.5
BDS559,BPS559,BWS559 LED35-CLO/830	2890.0	26.5	109.1	1.636	1.636	1.227	1.227	0.9	503.9	377.9	377.9	277.2
BDS559,BPS559,BWS559 LED40-CLO/830	3192.0	30.0	106.4	1.852	1.852	1.389	1.389	1.019	570.4	427.8	427.8	313.9
BDS559,BPS559,BWS559 LED6-CLO/830	510.4	5.6	91.1	0.346	0.346	0.259	0.259	0.19	106.6	79.8	79.8	58.5
BDS559,BPS559,BWS559 LED7-CLO/830	598.4	6.4	93.5	0.395	0.395	0.296	0.296	0.217	121.7	91.2	91.2	66.8
BDS559,BPS559,BWS559 LED8-CLO/830	678.6	7.0	96.9	0.432	0.432	0.324	0.324	0.238	133.1	99.8	99.8	73.3
BDS559,BPS559,BWS559 LED9-CLO/830	765.6	7.8	98.2	0.481	0.481	0.361	0.361	0.265	148.1	111.2	111.2	81.6

*\* Note that if the product is non-dimmable, only the values for “NC (No Control)” are valid; if the driver type is PSU, only the values for “NC (No Control)” and “PS (presence sensing)” for are valid.*

## APPENDIX (PEP ECOPASSPORT ALIGNED)

This section represents the scaling method for the **B6 module**, following the PEP EcoPassport PSR for luminaries (PSR-0014-ed2.0-EN-2023 07 13). The GWP results were scaled from a reference variant of a product family, based on various light management functions, the lumen output ( $O_{lum}$ ) and reference service life (RSL) of each product within the same product family.

To calculate the Scaled Impact ( $SI_{pep}$ ), we have followed the below methods:

1. Calculate the power scaling factor (PSF), which is the ratio of the power input of the variant in questions  $P_{in}$  and the power input of the base variant  $P_{base}$ .

$$PSF = \frac{P_{in}}{P_{base}}$$

2. Using this scaled GWP, we then can apply the PEP Ecopassport method for calculating the environmental impact of the functional unit for a luminary (1000 lumens over 35000 hours), applied to B6, where the Functional Unit application considers the lumen output ( $O_{lum}$ ) and reference service lifetime (RSL) of the product to estimate the final environmental impact. The scaled impact ( $SI_{pep}$ ) is presented in Table A4.

$$GSF = \frac{FU_{pep}}{FU_p} = \frac{1,000}{O_{lum}} * \frac{35,000}{RSL}$$

3. Calculate the GWP scaling factor (PGSF), by multiplying the PSF by the GSF.

$$PGSF = PSF * GSF$$

4. Calculate the Total Scaling factor by multiplying the PSF by the control scaling factor (CSF), where the CSF is determined according the relevant control factor scenario (e.g. if the luminaire has a presence detection system), as presented in Table A1.

$$TSF = PGSF * CSF$$

**Table A3: Light management functions (PEP EcoPassport aligned)**

Scenario	Abbrev.	CSF
No control	NC	1
Daylight dependency factor	DD	0.75
Presence sensing	PS	0.75
Daylight dependency and presence sensing	DD+PS	0.55

5. Lastly, the GWP of the base variant is then scaled by the TSF.

$$Scaled\ GWP = GWP_{case} * TSF$$

As described in the EPD, calculations are made based on dataset describing electricity available on the low voltage level in Europe for year 2022 (source Ecoinvent 3.8 database). This value should be adjusted depending on specific project requirements. Presented controls factors and functional unit conversion values are based on the PEP EcoPassport PSR for luminaries (PSR-0014-ed2.0-EN-2023 07 13). Please refer to this publication or contact Signify directly for more information.

**Table A4 Scale impact per scaling factor (PEP EcoPassport aligned)**

Configuration	Flux [lm]	Power [W]	Efficacy [lm/W]	PSF	Total Scaling Factor (TSF)				Scaled Impacts (GWP100 B6 - kg CO2eq.)			
					NC	DD	PS	DD+PS	NC	DD	PS	DD+PS
BDS559,BPS559,BWS559 LED10-CLO/722	852.6	9.2	92.7	0.568	0.233	0.175	0.175	0.128	71.8	53.9	53.9	39.4
BDS559,BPS559,BWS559 LED11-CLO/722	913.5	10.2	89.6	0.63	0.241	0.181	0.181	0.133	74.2	55.7	55.7	41.0
BDS559,BPS559,BWS559 LED12-CLO/722	1000.5	10.6	94.4	0.654	0.229	0.172	0.172	0.126	70.5	53.0	53.0	38.8
BDS559,BPS559,BWS559 LED13-CLO/722	1087.5	11.4	95.4	0.704	0.227	0.17	0.17	0.125	69.9	52.4	52.4	38.5
BDS559,BPS559,BWS559 LED14-CLO/722	1174.5	12.2	96.3	0.753	0.224	0.168	0.168	0.123	69.0	51.7	51.7	37.9

BDS559,BPS559,BWS559 LED15-CLO/722	1261.5	13.2	95.6	0.815	0.226	0.17	0.17	0.124	69.6	52.4	52.4	38.2
BDS559,BPS559,BWS559 LED16-CLO/722	1333.0	14.0	95.2	0.864	0.227	0.17	0.17	0.125	69.9	52.4	52.4	38.5
BDS559,BPS559,BWS559 LED17-CLO/722	1419.0	15.0	94.6	0.926	0.229	0.172	0.172	0.126	70.5	53.0	53.0	38.8
BDS559,BPS559,BWS559 LED18-CLO/722	1505.0	15.6	96.5	0.963	0.224	0.168	0.168	0.123	69.0	51.7	51.7	37.9
BDS559,BPS559,BWS559 LED19-CLO/722	1548.0	16.4	94.4	1.012	0.229	0.172	0.172	0.126	70.5	53.0	53.0	38.8
BDS559,BPS559,BWS559 LED20-CLO/722	1634.0	17.4	93.9	1.074	0.23	0.173	0.173	0.127	70.8	53.3	53.3	39.1
BDS559,BPS559,BWS559 LED21-CLO/722	1720.0	18.4	93.5	1.136	0.231	0.173	0.173	0.127	71.1	53.3	53.3	39.1
BDS559,BPS559,BWS559 LED22-CLO/722	1806.0	19.2	94.1	1.185	0.23	0.173	0.173	0.127	70.8	53.3	53.3	39.1
BDS559,BPS559,BWS559 LED23-CLO/722	1892.0	20.0	94.6	1.235	0.228	0.171	0.171	0.125	70.2	52.7	52.7	38.5
BDS559,BPS559,BWS559 LED24-CLO/722	1978.0	21.0	94.2	1.296	0.229	0.172	0.172	0.126	70.5	53.0	53.0	38.8
BDS559,BPS559,BWS559 LED25-CLO/722	2040.0	22.0	92.7	1.358	0.234	0.176	0.176	0.129	72.1	54.2	54.2	39.7
BDS559,BPS559,BWS559 LED30-CLO/722	2465.0	24.5	100.6	1.512	0.215	0.161	0.161	0.118	66.2	49.6	49.6	36.3
BDS559,BPS559,BWS559 LED35-CLO/722	2856.0	28.5	100.2	1.759	0.216	0.162	0.162	0.119	66.5	49.9	49.9	36.7
BDS559,BPS559,BWS559 LED40-CLO/722	3154.0	32.5	97.0	2.006	0.223	0.167	0.167	0.123	68.7	51.4	51.4	37.9
BDS559,BPS559,BWS559 LED6-CLO/722	522.0	5.9	88.5	0.364	0.244	0.183	0.183	0.134	75.2	56.4	56.4	41.3
BDS559,BPS559,BWS559 LED7-CLO/722	591.6	6.8	87.0	0.42	0.249	0.187	0.187	0.137	76.7	57.6	57.6	42.2
BDS559,BPS559,BWS559 LED8-CLO/722	678.6	7.5	90.5	0.463	0.239	0.179	0.179	0.131	73.6	55.1	55.1	40.3
BDS559,BPS559,BWS559 LED9-CLO/722	765.6	8.3	92.2	0.512	0.234	0.176	0.176	0.129	72.1	54.2	54.2	39.7
BDS559,BPS559,BWS559 LED10-CLO/722	852.6	7.9	107.9	0.488	0.201	0.151	0.151	0.111	61.9	46.5	46.5	34.2
BDS559,BPS559,BWS559 LED11-CLO/722	913.5	8.7	105.0	0.537	0.206	0.154	0.154	0.113	63.4	47.4	47.4	34.8
BDS559,BPS559,BWS559 LED12-CLO/722	1044.0	9.4	111.1	0.58	0.194	0.146	0.146	0.107	59.8	45.0	45.0	33.0
BDS559,BPS559,BWS559 LED13-CLO/722	1087.5	10.0	108.8	0.617	0.199	0.149	0.149	0.109	61.3	45.9	45.9	33.6
BDS559,BPS559,BWS559 LED14-CLO/722	1174.5	10.6	110.8	0.654	0.195	0.146	0.146	0.107	60.1	45.0	45.0	33.0
BDS559,BPS559,BWS559 LED15-CLO/722	1261.5	11.4	110.7	0.704	0.195	0.146	0.146	0.107	60.1	45.0	45.0	33.0

BDS559,BPS559,BWS559 LED16-CLO/727	1333.0	12.0	111.1	0.741	0.195	0.146	0.146	0.107	60.1	45.0	45.0	33.0
BDS559,BPS559,BWS559 LED17-CLO/727	1419.0	12.8	110.9	0.79	0.195	0.146	0.146	0.107	60.1	45.0	45.0	33.0
BDS559,BPS559,BWS559 LED18-CLO/727	1505.0	13.6	110.7	0.84	0.196	0.147	0.147	0.108	60.4	45.3	45.3	33.3
BDS559,BPS559,BWS559 LED19-CLO/727	1591.0	14.4	110.5	0.889	0.196	0.147	0.147	0.108	60.4	45.3	45.3	33.3
BDS559,BPS559,BWS559 LED20-CLO/727	1677.0	15.0	111.8	0.926	0.194	0.146	0.146	0.107	59.8	45.0	45.0	33.0
BDS559,BPS559,BWS559 LED21-CLO/727	1720.0	15.6	110.3	0.963	0.195	0.146	0.146	0.107	60.1	45.0	45.0	33.0
BDS559,BPS559,BWS559 LED22-CLO/727	1806.0	16.4	110.1	1.012	0.196	0.147	0.147	0.108	60.4	45.3	45.3	33.3
BDS559,BPS559,BWS559 LED23-CLO/727	1892.0	17.2	110.0	1.062	0.196	0.147	0.147	0.108	60.4	45.3	45.3	33.3
BDS559,BPS559,BWS559 LED24-CLO/727	1978.0	18.0	109.9	1.111	0.197	0.148	0.148	0.108	60.7	45.6	45.6	33.3
BDS559,BPS559,BWS559 LED25-CLO/727	2040.0	18.8	108.5	1.16	0.2	0.15	0.15	0.11	61.6	46.2	46.2	33.9
BDS559,BPS559,BWS559 LED30-CLO/727	2465.0	21.0	117.4	1.296	0.184	0.138	0.138	0.101	56.7	42.5	42.5	31.1
BDS559,BPS559,BWS559 LED35-CLO/727	2890.0	24.5	118.0	1.512	0.183	0.137	0.137	0.101	56.4	42.2	42.2	31.1
BDS559,BPS559,BWS559 LED40-CLO/727	3192.0	28.0	114.0	1.728	0.19	0.143	0.143	0.105	58.5	44.0	44.0	32.3
BDS559,BPS559,BWS559 LED6-CLO/727	522.0	5.2	100.4	0.321	0.215	0.161	0.161	0.118	66.2	49.6	49.6	36.3
BDS559,BPS559,BWS559 LED7-CLO/727	591.6	5.9	100.3	0.364	0.215	0.161	0.161	0.118	66.2	49.6	49.6	36.3
BDS559,BPS559,BWS559 LED8-CLO/727	678.6	6.6	102.8	0.407	0.21	0.158	0.158	0.116	64.7	48.7	48.7	35.7
BDS559,BPS559,BWS559 LED9-CLO/727	765.6	7.2	106.3	0.444	0.203	0.152	0.152	0.112	62.5	46.8	46.8	34.5
BDS559,BPS559,BWS559 LED10-CLO/730	852.6	7.3	116.8	0.451	0.185	0.139	0.139	0.102	57.0	42.8	42.8	31.4
BDS559,BPS559,BWS559 LED11-CLO/730	913.5	7.9	115.6	0.488	0.187	0.14	0.14	0.103	57.6	43.1	43.1	31.7
BDS559,BPS559,BWS559 LED12-CLO/730	1056.0	8.5	124.2	0.525	0.174	0.131	0.131	0.096	53.6	40.3	40.3	29.6
BDS559,BPS559,BWS559 LED13-CLO/730	1131.0	9.2	122.9	0.568	0.176	0.132	0.132	0.097	54.2	40.7	40.7	29.9
BDS559,BPS559,BWS559 LED14-CLO/730	1174.5	9.8	119.8	0.605	0.18	0.135	0.135	0.099	55.4	41.6	41.6	30.5
BDS559,BPS559,BWS559 LED15-CLO/730	1261.5	10.4	121.3	0.642	0.178	0.134	0.134	0.098	54.8	41.3	41.3	30.2
BDS559,BPS559,BWS559 LED16-CLO/730	1348.5	11.0	122.6	0.679	0.177	0.133	0.133	0.097	54.5	41.0	41.0	29.9

BDS559,BPS559,BWS559 LED17-CLO/730	1435.5	11.6	123.8	0.716	0.175	0.131	0.131	0.096	53.9	40.3	40.3	29.6
BDS559,BPS559,BWS559 LED18-CLO/730	1522.5	12.2	124.8	0.753	0.173	0.13	0.13	0.095	53.3	40.0	40.0	29.3
BDS559,BPS559,BWS559 LED19-CLO/730	1609.5	13.0	123.8	0.802	0.174	0.131	0.131	0.096	53.6	40.3	40.3	29.6
BDS559,BPS559,BWS559 LED20-CLO/730	1677.0	13.6	123.3	0.84	0.176	0.132	0.132	0.097	54.2	40.7	40.7	29.9
BDS559,BPS559,BWS559 LED21-CLO/730	1720.0	14.2	121.1	0.877	0.178	0.134	0.134	0.098	54.8	41.3	41.3	30.2
BDS559,BPS559,BWS559 LED22-CLO/730	1806.0	15.0	120.4	0.926	0.18	0.135	0.135	0.099	55.4	41.6	41.6	30.5
BDS559,BPS559,BWS559 LED23-CLO/730	1892.0	15.6	121.3	0.963	0.178	0.134	0.134	0.098	54.8	41.3	41.3	30.2
BDS559,BPS559,BWS559 LED24-CLO/730	1978.0	16.2	122.1	1.0	0.177	0.133	0.133	0.097	54.5	41.0	41.0	29.9
BDS559,BPS559,BWS559 LED25-CLO/730	2064.0	16.8	122.9	1.037	0.176	0.132	0.132	0.097	54.2	40.7	40.7	29.9
BDS559,BPS559,BWS559 LED30-CLO/730	2494.0	19.2	129.9	1.185	0.166	0.124	0.124	0.091	51.1	38.2	38.2	28.0
BDS559,BPS559,BWS559 LED35-CLO/730	2924.0	22.0	132.9	1.358	0.163	0.122	0.122	0.09	50.2	37.6	37.6	27.7
BDS559,BPS559,BWS559 LED40-CLO/730	3230.0	25.0	129.2	1.543	0.167	0.125	0.125	0.092	51.4	38.5	38.5	28.3
BDS559,BPS559,BWS559 LED7-CLO/730	598.4	5.4	110.8	0.333	0.195	0.146	0.146	0.107	60.1	45.0	45.0	33.0
BDS559,BPS559,BWS559 LED8-CLO/730	678.6	6.1	111.2	0.377	0.195	0.146	0.146	0.107	60.1	45.0	45.0	33.0
BDS559,BPS559,BWS559 LED9-CLO/730	765.6	6.7	114.3	0.414	0.189	0.142	0.142	0.104	58.2	43.7	43.7	32.0
BDS559,BPS559,BWS559 LED10-CLO/740	852.6	6.9	123.6	0.426	0.175	0.131	0.131	0.096	53.9	40.3	40.3	29.6
BDS559,BPS559,BWS559 LED11-CLO/740	913.5	7.5	121.8	0.463	0.177	0.133	0.133	0.097	54.5	41.0	41.0	29.9
BDS559,BPS559,BWS559 LED12-CLO/740	1044.0	8.1	128.9	0.5	0.168	0.126	0.126	0.092	51.7	38.8	38.8	28.3
BDS559,BPS559,BWS559 LED13-CLO/740	1131.0	8.7	130.0	0.537	0.166	0.124	0.124	0.091	51.1	38.2	38.2	28.0
BDS559,BPS559,BWS559 LED14-CLO/740	1174.5	9.3	126.3	0.574	0.171	0.128	0.128	0.094	52.7	39.4	39.4	29.0
BDS559,BPS559,BWS559 LED15-CLO/740	1261.5	9.9	127.4	0.611	0.169	0.127	0.127	0.093	52.1	39.1	39.1	28.6
BDS559,BPS559,BWS559 LED16-CLO/740	1348.5	10.4	129.7	0.642	0.167	0.125	0.125	0.092	51.4	38.5	38.5	28.3
BDS559,BPS559,BWS559 LED17-CLO/740	1435.5	11.0	130.5	0.679	0.166	0.124	0.124	0.091	51.1	38.2	38.2	28.0
BDS559,BPS559,BWS559 LED18-CLO/740	1522.5	11.6	131.2	0.716	0.165	0.124	0.124	0.091	50.8	38.2	38.2	28.0

BDS559,BPS559,BWS559 LED19-CLO/740	1609.5	12.2	131.9	0.753	0.163	0.122	0.122	0.09	50.2	37.6	37.6	27.7
BDS559,BPS559,BWS559 LED20-CLO/740	1696.5	12.8	132.5	0.79	0.163	0.122	0.122	0.09	50.2	37.6	37.6	27.7
BDS559,BPS559,BWS559 LED21-CLO/740	1740.0	13.4	129.9	0.827	0.166	0.124	0.124	0.091	51.1	38.2	38.2	28.0
BDS559,BPS559,BWS559 LED22-CLO/740	1827.0	14.0	130.5	0.864	0.166	0.124	0.124	0.091	51.1	38.2	38.2	28.0
BDS559,BPS559,BWS559 LED23-CLO/740	1892.0	14.8	127.8	0.914	0.169	0.127	0.127	0.093	52.1	39.1	39.1	28.6
BDS559,BPS559,BWS559 LED24-CLO/740	1978.0	15.4	128.4	0.951	0.168	0.126	0.126	0.092	51.7	38.8	38.8	28.3
BDS559,BPS559,BWS559 LED25-CLO/740	2064.0	15.8	130.6	0.975	0.166	0.124	0.124	0.091	51.1	38.2	38.2	28.0
BDS559,BPS559,BWS559 LED30-CLO/740	2494.0	18.2	137.0	1.123	0.157	0.118	0.118	0.086	48.4	36.3	36.3	26.5
BDS559,BPS559,BWS559 LED35-CLO/740	2924.0	21.0	139.2	1.296	0.156	0.117	0.117	0.086	48.0	36.0	36.0	26.5
BDS559,BPS559,BWS559 LED40-CLO/740	3268.0	23.5	139.1	1.451	0.155	0.116	0.116	0.085	47.7	35.7	35.7	26.2
BDS559,BPS559,BWS559 LED7-CLO/740	591.6	5.2	113.8	0.321	0.19	0.143	0.143	0.105	58.5	44.0	44.0	32.3
BDS559,BPS559,BWS559 LED8-CLO/740	686.4	5.8	118.3	0.358	0.183	0.137	0.137	0.101	56.4	42.2	42.2	31.1
BDS559,BPS559,BWS559 LED9-CLO/740	774.4	6.4	121.0	0.395	0.179	0.134	0.134	0.098	55.1	41.3	41.3	30.2
BDS559,BPS559,BWS559 LED10-CLO/830	852.6	8.6	99.1	0.531	0.218	0.164	0.164	0.12	67.1	50.5	50.5	37.0
BDS559,BPS559,BWS559 LED11-CLO/830	913.5	9.4	97.2	0.58	0.222	0.167	0.167	0.122	68.4	51.4	51.4	37.6
BDS559,BPS559,BWS559 LED12-CLO/830	1044.0	10.2	102.4	0.63	0.211	0.158	0.158	0.116	65.0	48.7	48.7	35.7
BDS559,BPS559,BWS559 LED13-CLO/830	1087.5	10.8	100.7	0.667	0.215	0.161	0.161	0.118	66.2	49.6	49.6	36.3
BDS559,BPS559,BWS559 LED14-CLO/830	1174.5	11.4	103.0	0.704	0.21	0.158	0.158	0.116	64.7	48.7	48.7	35.7
BDS559,BPS559,BWS559 LED15-CLO/830	1261.5	12.2	103.4	0.753	0.209	0.157	0.157	0.115	64.4	48.4	48.4	35.4
BDS559,BPS559,BWS559 LED16-CLO/830	1348.5	13.0	103.7	0.802	0.209	0.157	0.157	0.115	64.4	48.4	48.4	35.4
BDS559,BPS559,BWS559 LED17-CLO/830	1435.5	13.8	104.0	0.852	0.208	0.156	0.156	0.114	64.1	48.0	48.0	35.1
BDS559,BPS559,BWS559 LED18-CLO/830	1505.0	14.6	103.1	0.901	0.21	0.158	0.158	0.116	64.7	48.7	48.7	35.7
BDS559,BPS559,BWS559 LED19-CLO/830	1591.0	15.6	102.0	0.963	0.212	0.159	0.159	0.117	65.3	49.0	49.0	36.0
<u>BDS559,BPS559,BWS559 LED20-CLO/830</u>	1634.0	16.2	100.9	1.0	0.214	0.161	0.161	0.118	65.9	49.6	49.6	36.3

BDS559,BPS559,BWS559 LED21-CLO/830	1720.0	17.0	101.2	1.049	0.213	0.16	0.16	0.117	65.6	49.3	49.3	36.0
BDS559,BPS559,BWS559 LED22-CLO/830	1806.0	17.8	101.5	1.099	0.213	0.16	0.16	0.117	65.6	49.3	49.3	36.0
BDS559,BPS559,BWS559 LED23-CLO/830	1892.0	18.6	101.7	1.148	0.212	0.159	0.159	0.117	65.3	49.0	49.0	36.0
BDS559,BPS559,BWS559 LED24-CLO/830	1978.0	19.6	100.9	1.21	0.214	0.161	0.161	0.118	65.9	49.6	49.6	36.3
BDS559,BPS559,BWS559 LED25-CLO/830	2064.0	20.5	100.7	1.265	0.215	0.161	0.161	0.118	66.2	49.6	49.6	36.3
BDS559,BPS559,BWS559 LED30-CLO/830	2494.0	23.0	108.4	1.42	0.199	0.149	0.149	0.109	61.3	45.9	45.9	33.6
BDS559,BPS559,BWS559 LED35-CLO/830	2890.0	26.5	109.1	1.636	0.198	0.149	0.149	0.109	61.0	45.9	45.9	33.6
BDS559,BPS559,BWS559 LED40-CLO/830	3192.0	30.0	106.4	1.852	0.204	0.153	0.153	0.112	62.8	47.1	47.1	34.5
BDS559,BPS559,BWS559 LED6-CLO/830	510.4	5.6	91.1	0.346	0.237	0.178	0.178	0.13	73.0	54.8	54.8	40.0
BDS559,BPS559,BWS559 LED7-CLO/830	598.4	6.4	93.5	0.395	0.231	0.173	0.173	0.127	71.1	53.3	53.3	39.1
BDS559,BPS559,BWS559 LED8-CLO/830	678.6	7.0	96.9	0.432	0.223	0.167	0.167	0.123	68.7	51.4	51.4	37.9
BDS559,BPS559,BWS559 LED9-CLO/830	765.6	7.8	98.2	0.481	0.22	0.165	0.165	0.121	67.8	50.8	50.8	37.3

*\*\* Note that if the product is non-dimmable, only the values for "NC (No Control)" are valid; if the driver type is PSU, only the values for "NC (No Control)" and "PS (presence sensing)" for are valid.*

## ANNEX

### USE PHASE (B6) VALUES FOR DIFFERENT COUNTRY MIX

The table in this annex is useful for conversion and comparison of B6 values with other energy country mix. The Global Warming Potential Total (GWP tot) value is illustrated for each country. The value refers to 1 kwh.

Example on how to use the table:

This EPD was done according to a specific customer use location that can be read in the paragraph **PRODUCT USE AND MAINTENANCE (B1-B7)**.

If for example the EPD was done according to EU energy mix and you want to see how the GWP total changes according to a Finland country energy mix, you can take the original value in the results table here highlighted in yellow:

## ENVIRONMENTAL IMPACT DATA

### CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total <sup>21</sup>	kg CO <sub>2e</sub>	5,88E+00	2,61E-01	-1,25E-01	6,02E+00	3,02E-01	5,41E-01	MND	MND	MND	MND	MND	4,06E+02	MND	MNR	1,77E-02	2,62E-01	1,88E-01	-1,09E+01

Divide that value according to the EU value from the following table (EU = 3,96E-01) and then multiplying for the Finland value from the same table (FINLAND = 2,70E-01).

Thus, the calculation of this example would be:

$$\text{New B6 GWP tot for Finland} = (4,06E+02 / 3,96E-01) \times 2,70E-01 = 2,76 E+02$$

Country	GWP tot (kg CO2 eq. per kwh)
AUSTRALIA	9,59E-01
AUSTRIA	3,37E-01
BELGIUM	2,63E-01
CHINA	1,14E+00
DENMARK	2,91E-01
EU	3,96E-01
FINLAND	2,70E-01
FRANCE	8,77E-02
GERMANY	5,32E-01
HUNGARY	4,67E-01
IRELAND	4,26E-01
ITALY	3,94E-01
LATAM	3,50E-01
NAM	4,83E-01
NETHERLANDS	5,88E-01
NORWAY	2,59E-02

POLAND	1,05E+00
PORTUGAL	4,22E-01
ROW	7,32E-01
SPAIN	3,34E-01
SWEDEN	4,95E-02
SWITZERLAND	5,38E-02
UK	3,17E-01

Source Ecoinvent 3.8