

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Signify - Iridium gen4 Mini - BGP501

Signify N.V.



MANUFACTURER AND SITE

Manufacturer	Signify N.V.
Address	High Tech Campus 48, 5656 AE Eindhoven, The Netherlands
Contact details	sustainability@signify.com
Website	https://www.signify.com/global
Place of production	KETRZYN, POLAND
Place(s) of raw material origin	NAM, EU, APAC
Place(s) of installation and use	EU
Period for data	Calendar Year 2025

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR version 1.2, 24 Mar 2025
Sector	Electrical product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-A5, B6, and modules C1-C4, D
EPD author	Signify / Sustainability
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☒ External verification
EPD verifier	Yazan Badour

PRODUCT SPECIFICATION

Product name	Signify - Iridium gen4 Mini - BGP501
Product number / reference	910770247384 / BGP501 LED45/730
GTIN (Global Trade Item Number)	Not applicable
NOBB (Norwegian Building Product Database)	Not applicable
A1-A3 Specific data (%)	3.07

PRODUCT DESCRIPTION

Iridium gen4 is a road lighting luminaire designed for high optical performance, serviceability, and connectivity. It features curved bowls optimized for either guidance lighting or visual comfort, with IK10 impact resistance. The luminaire offers over 40 optical distributions, optional internal louvers, and system efficacy up to 181 lm/W.

Tool-free access and a plug-and-play GearFlex module simplify maintenance. Iridium gen4 supports advanced dimming, connectivity, and lighting management systems. Dedicated light recipes are available for bat-friendly lighting and dark-sky applications, helping to reduce ecological impact and light pollution.

This EPD is intended for business-to-business and/or business-to-consumer communication. Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1. 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 construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT CLASSIFICATION

Declared operating voltage, Volt	220-240V
Light source colour temperature, Kelvin	3000K
Protection index for water and dust (IP)	66
Impact resistance index (IK)	10
Luminous flux, Lumens	4128
Electrical power, Watt	25
Luminous efficiency, Lm/W	165
Additional characteristic	Not applicable

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 RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	80.45	EU , APAC
Minerals	3.47	EU
Fossil materials	16.08	NAM , EU , APAC
Bio-based materials	0	

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0.291

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit
Declared unit mass, kg	8.089
Mass of packaging, kg	0.737
Functional unit (from PEP PSR0014)	Provide lighting that delivers an outgoing artificial luminous flux of 1000 lumens during a reference lifetime of 35000 hours
Reference service life (years)	25
Assigned lifetime (hours)	100000
GWP-total, A1-A3 (kg CO ₂ e)	71.5
GWP-fossil, A1-A3 (kg CO ₂ e)	71.9
Secondary material, inputs (%)	67.5
Secondary material, outputs (%)	59
Total energy use, A1-A3 (kWh)	246
Net freshwater use, A1-A3 (m ³)	3.29E-01

LIFE CYCLE ASSESSMENT

SYSTEM BOUNDARY

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

Product stage			Installation stage		Use stage							End of life stage				Beyond the system
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
Raw materials	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demo.	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling

Modules not declared = ND.

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. 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.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

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
Manufacturing energy and waste	Allocated by mass

Proxy data is used for certain materials due to their unavailability in the database. Conservative choices have been adopted when exact information was missing. Regarding module C1-C4: EOL scenarios are based on default values from EN 50693. For stages description please refer to section 'Product life cycle' in this EPD report.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA Luminaire EPD Generator v2.2.7. The LCA and EPD have been prepared according to the reference standards, EN 50693, and ISO 14040/14044. Ecoinvent v 3.10.1 and One Click LCA databases were used as sources of environmental data. Allocation used in Ecoinvent 3.10.1 environmental data sources follow the methodology 'allocation, cut-off, EN 15804+A2'.

No other sources were used in the modelling of this EPD.

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	No grouping
Grouping method	Not applicable
Variation in GWP-fossil for A1-A3, %	-

SUBSTANCES, REACH - VERY HIGH CONCERN

Substances of very high concern	EC	CAS
2-(2H-benzotriazol-2-yl)-4-(1,1,3,3-		

PRODUCT LIFE CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production. The material losses occurring during the manufacturing processes are treated as per the waste handling practices in the factory, while scenario assumptions are made in the absence of exact data. The study also considers the fuels used by machines as well as losses during electricity transmission.

The product is made of metals, plastics, and electronic components. All components are transported to the production facility, where the main manufacturing processes primarily are associated with assembly. A2 transport distances are calculated always taking the capital city of component country of origin as a starting point and exact manufacturing location as destination. The finished product can be packaged with polyethylene, cardboard, and/or paper as packaging material before shipment 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 to produce the studied product. Thus, it is possible to allocate it according to the weight of the product analysed in this study.

Co-product allocation is neglected as revenue of co-product is very low, hence, the waste undergoes a conservative waste treatment.

The use of renewable energy in manufacturing is demonstrated through contractual instruments (GOs, RECs, etc), and its use is ensured throughout the validity period of this EPD.

TRANSPORT AND INSTALLATION (A4-A5)

A4 transport distances are calculated always taking the exact manufacturing location to customer location. If the customer's location is defined as a country or its capital city, the calculation is made to the respective capital city. If the

customer's location is specified as a region, the distance is calculated to the capital city of the best-performing sales country within that region. The transportation method is a combination of lorry and container ship where needed. To be conservative, empty returns are included in this study as implemented through an average load factor in the Ecoinvent transport datapoints. Environmental impacts from installation include waste packaging materials (A5). The packaging waste treatment is assumed to be conservative with incineration without energy recovery. The impacts of energy consumption and the used ancillary materials during installation are considered negligible.

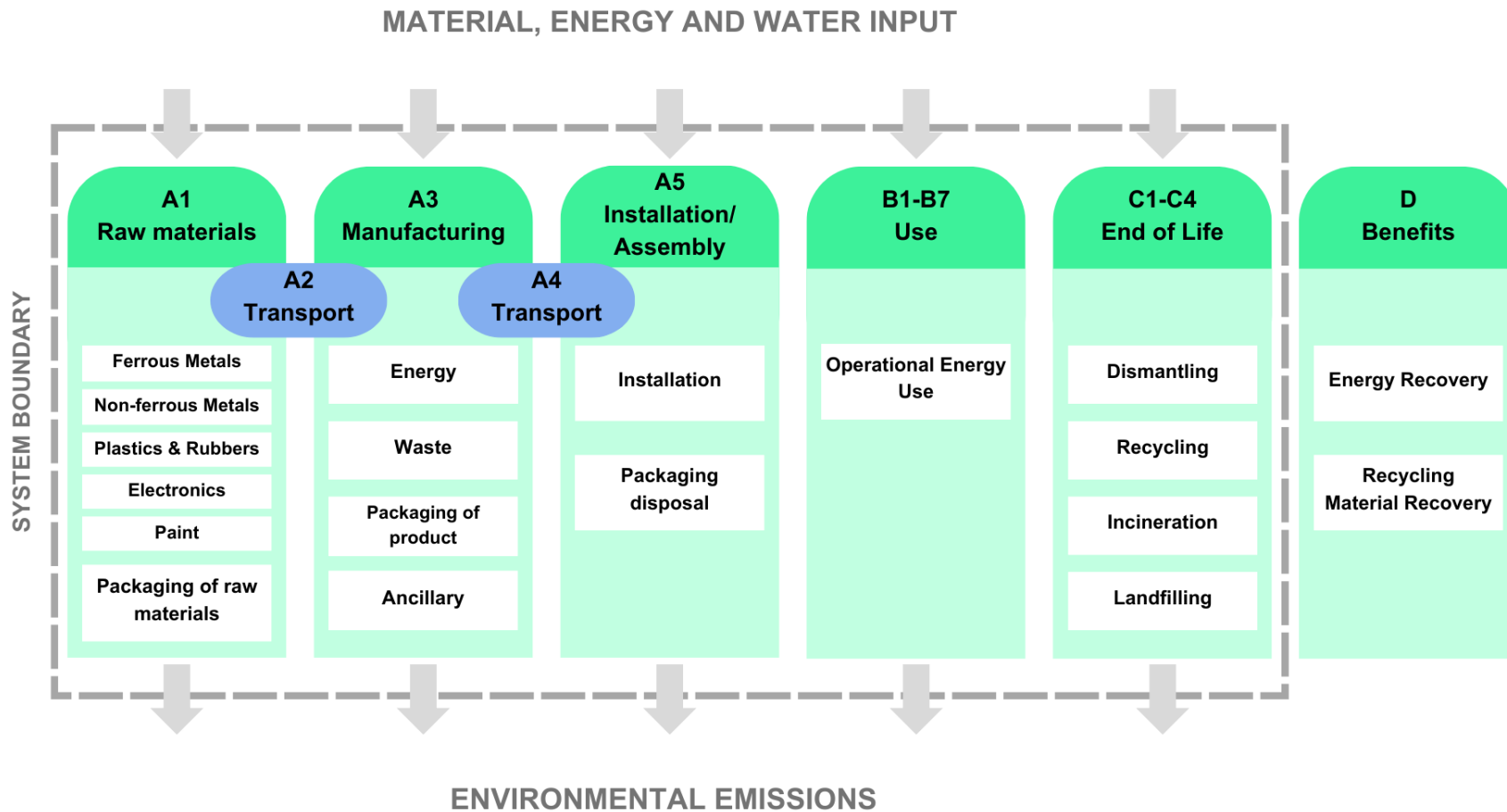
PRODUCT USE AND MAINTENANCE (B1-B7)

During the use phase, the product consumes electricity (B6), which is calculated multiplying the Wattage x Assigned lifetime (hours) x Country energy mix factor. To know which Country energy mix was used in this EPD, please refer to Annex 2. The Reference service life in years is calculated according to the main application type of the product, based on annual operating hours. Impacts due to electricity production include direct emissions to air, transformation, and transmission losses.

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. The transport distance is 150 km while 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 depollution, 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.

LIFE CYCLE FLOW DIAGRAM - SYSTEM BOUNDARY



ENVIRONMENTAL IMPACT DATA, RESULTS PER DECLARED UNIT

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	6.85E+01	9.83E-01	1.98E+00	7.15E+01	2.89E-01	1.12E+00	ND	ND	ND	ND	ND	8.23E+02	ND	0.00E+00	2.38E-01	1.06E+00	4.79E-01	-1.50E+01
GWP – fossil	kg CO ₂ e	6.89E+01	9.83E-01	2.03E+00	7.19E+01	2.89E-01	5.16E-02	ND	ND	ND	ND	ND	8.18E+02	ND	0.00E+00	2.38E-01	1.06E+00	6.52E-01	-1.50E+01
GWP – biogenic	kg CO ₂ e	-4.89E-01	1.72E-04	-6.61E-02	-5.55E-01	6.54E-05	1.06E+00	ND	ND	ND	ND	ND	1.84E+00	ND	0.00E+00	5.20E-05	-3.94E-04	-1.73E-01	-4.82E-03
GWP – LULUC	kg CO ₂ e	1.08E-01	5.06E-04	2.41E-02	1.32E-01	1.29E-04	1.71E-05	ND	ND	ND	ND	ND	2.51E+00	ND	0.00E+00	1.05E-04	1.80E-04	9.44E-05	-4.92E-03
Ozone depletion pot.	kg CFC ₁₁ e	9.07E-07	1.42E-08	5.62E-08	9.77E-07	4.26E-09	6.36E-10	ND	ND	ND	ND	ND	1.51E-05	ND	0.00E+00	3.33E-09	1.78E-09	1.32E-09	-5.89E-08
Acidification potential	mol H ⁺ e	4.54E-01	2.18E-02	6.39E-03	4.82E-01	9.84E-04	2.75E-04	ND	ND	ND	ND	ND	4.81E+00	ND	0.00E+00	7.94E-04	1.62E-03	5.39E-04	-1.87E-01
EP-freshwater ²⁾	kg Pe	2.83E-02	4.35E-05	5.18E-04	2.88E-02	2.25E-05	4.65E-06	ND	ND	ND	ND	ND	7.62E-01	ND	0.00E+00	1.85E-05	7.63E-05	3.70E-05	-1.01E-02
EP-marine	kg Ne	7.41E-02	5.50E-03	2.86E-03	8.25E-02	3.23E-04	1.29E-04	ND	ND	ND	ND	ND	7.55E-01	ND	0.00E+00	2.57E-04	4.30E-04	1.25E-03	-2.01E-02
EP-terrestrial	mol Ne	7.67E-01	6.10E-02	1.88E-02	8.47E-01	3.52E-03	1.17E-03	ND	ND	ND	ND	ND	6.76E+00	ND	0.00E+00	2.80E-03	4.51E-03	2.28E-03	-2.13E-01
POCP ("smog") ³⁾	kg NMVOCe	2.61E-01	1.70E-02	6.84E-03	2.85E-01	1.45E-03	3.33E-04	ND	ND	ND	ND	ND	2.23E+00	ND	0.00E+00	1.11E-03	1.28E-03	7.37E-04	-6.39E-02
ADP-minerals & metals ⁴⁾	kg Sbe	2.30E-03	1.45E-06	5.69E-06	2.31E-03	8.05E-07	1.38E-07	ND	ND	ND	ND	ND	1.10E-02	ND	0.00E+00	7.82E-07	7.52E-06	1.97E-07	-7.55E-04
ADP-fossil resources	MJ	8.15E+02	1.26E+01	2.24E+01	8.50E+02	4.19E+00	4.78E-01	ND	ND	ND	ND	ND	1.90E+04	ND	0.00E+00	3.34E+00	1.82E+00	1.13E+00	-1.54E+02
Water use ⁵⁾	m ³ e depr.	2.06E+01	4.37E-02	5.46E-01	2.12E+01	2.07E-02	5.55E-02	ND	ND	ND	ND	ND	5.19E+02	ND	0.00E+00	1.55E-02	8.70E-02	4.70E-02	-1.48E+00

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, EF 3.1

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	5.21E-06	4.82E-08	1.14E-07	5.38E-06	2.89E-08	3.42E-09	ND	ND	ND	ND	ND	1.72E-05	ND	0.00E+00	1.89E-08	2.04E-08	8.60E-09	-8.46E-07
Ionizing radiation ⁶⁾	kBq U235e	3.14E+00	7.35E-03	6.11E-02	3.21E+00	3.65E-03	5.80E-04	ND	ND	ND	ND	ND	5.26E+02	ND	0.00E+00	2.70E-03	7.17E-03	1.81E-03	-9.14E-01
Ecotoxicity (freshwater)	CTUe	6.40E+02	1.20E+00	7.90E+00	6.49E+02	5.92E-01	1.33E+00	ND	ND	ND	ND	ND	2.90E+03	ND	0.00E+00	5.28E-01	2.71E+00	1.70E+02	-6.77E+01
Human toxicity, cancer	CTUh	5.84E-08	1.96E-10	7.73E-10	5.94E-08	4.76E-11	6.40E-11	ND	ND	ND	ND	ND	2.77E-07	ND	0.00E+00	4.05E-11	1.83E-10	2.17E-10	-1.04E-08
Human tox. non-cancer	CTUh	1.70E-06	4.67E-09	2.07E-08	1.72E-06	2.71E-09	2.61E-09	ND	ND	ND	ND	ND	1.43E-05	ND	0.00E+00	2.09E-09	9.50E-09	8.46E-09	-7.09E-07
SQP ⁷⁾	-	3.62E+02	4.65E+00	6.07E+01	4.27E+02	4.22E+00	2.34E-01	ND	ND	ND	ND	ND	4.24E+03	ND	0.00E+00	2.00E+00	2.91E+00	1.56E+00	-4.15E+01

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 ⁸⁾	MJ	8.57E+01	1.20E-01	-1.55E-02	8.58E+01	5.74E-02	-1.30E+01	ND	ND	ND	ND	ND	5.22E+03	ND	0.00E+00	4.58E-02	2.58E-01	-3.19E+00	-5.53E+00
Renew. PER as material	MJ	9.31E+00	0.00E+00	1.06E-01	9.42E+00	0.00E+00	-9.41E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-4.10E-03	-7.62E-03	0.00E+00
Total use of renew. PER	MJ	9.50E+01	1.20E-01	9.03E-02	9.52E+01	5.74E-02	-2.25E+01	ND	ND	ND	ND	ND	5.22E+03	ND	0.00E+00	4.58E-02	2.54E-01	-3.19E+00	-5.53E+00
Non-re. PER as energy	MJ	7.74E+02	1.26E+01	1.42E+01	8.01E+02	4.19E+00	3.93E-01	ND	ND	ND	ND	ND	1.90E+04	ND	0.00E+00	3.34E+00	-1.22E+01	-1.79E+01	-1.54E+02
Non-re. PER as material	MJ	3.52E+01	0.00E+00	-8.12E+00	2.70E+01	0.00E+00	-1.84E-01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-1.12E+01	-1.57E+01	0.00E+00
Total use of non-re. PER	MJ	8.09E+02	1.26E+01	6.07E+00	8.28E+02	4.19E+00	2.10E-01	ND	ND	ND	ND	ND	1.90E+04	ND	0.00E+00	3.34E+00	-2.34E+01	-3.36E+01	-1.54E+02
Secondary materials	kg	5.46E+00	0.00E+00	0.00E+00	5.46E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renew. secondary fuels	MJ	1.46E-01	3.03E-05	7.73E-02	2.23E-01	2.26E-05	5.96E-06	ND	ND	ND	ND	ND	2.51E-02	ND	0.00E+00	1.91E-05	8.95E-05	1.58E-05	-5.81E-04
Non-ren. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m ³	3.16E-01	1.17E-03	1.19E-02	3.29E-01	6.19E-04	9.00E-04	ND	ND	ND	ND	ND	1.65E+01	ND	0.00E+00	4.43E-04	1.68E-03	-5.19E-03	-6.64E-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	1.23E+01	1.82E-02	1.01E-01	1.24E+01	7.09E-03	1.46E-02	ND	ND	ND	ND	ND	4.82E+01	ND	0.00E+00	5.83E-03	2.85E-02	4.78E-02	-3.05E+00
Non-hazardous waste	kg	2.63E+02	2.79E-01	5.17E+00	2.69E+02	1.31E-01	7.88E-01	ND	ND	ND	ND	ND	3.73E+03	ND	0.00E+00	1.09E-01	8.89E-01	1.08E+01	-4.06E+01
Radioactive waste	kg	7.84E-04	1.79E-06	1.45E-05	8.00E-04	8.93E-07	1.45E-07	ND	ND	ND	ND	ND	1.35E-01	ND	0.00E+00	6.63E-07	1.77E-06	4.46E-07	-2.21E-04

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 reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	8.36E-02	8.36E-02	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	4.77E+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	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	4.41E+00	0.00E+00	0.00E+00
Exported energy – Electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	1.86E+00	0.00E+00	0.00E+00
Exported energy – Heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	2.55E+00	0.00E+00	0.00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

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 ₂ e	6.90E+01	9.78E-01	2.12E+00	7.21E+01	2.87E-01	5.13E-02	ND	ND	ND	ND	ND	8.19E+02	ND	0.00E+00	2.37E-01	1.06E+00	8.29E-01	-1.49E+01
Ozone depletion Pot.	kg CFC-11e	8.85E-07	1.13E-08	5.25E-08	9.48E-07	3.40E-09	5.41E-10	ND	ND	ND	ND	ND	1.26E-05	ND	0.00E+00	2.66E-09	1.50E-09	1.07E-09	-5.41E-08
Acidification	kg SO ₂ e	3.81E-01	1.74E-02	4.49E-03	4.03E-01	7.51E-04	2.02E-04	ND	ND	ND	ND	ND	4.10E+00	ND	0.00E+00	6.08E-04	1.28E-03	3.93E-04	-1.62E-01
Eutrophication	kg PO ₄ ³ e	1.08E-01	2.00E-03	2.94E-03	1.13E-01	1.83E-04	6.28E-05	ND	ND	ND	ND	ND	5.30E-01	ND	0.00E+00	1.48E-04	2.15E-04	4.82E-04	-9.43E-03
POCP ("smog")	kg C ₂ H ₄ e	3.10E-02	8.90E-04	5.33E-04	3.24E-02	6.70E-05	1.54E-05	ND	ND	ND	ND	ND	2.23E-01	ND	0.00E+00	5.45E-05	7.67E-05	7.46E-05	-8.92E-03
ADP-elements	kg Sbe	2.28E-03	1.42E-06	5.52E-06	2.29E-03	7.85E-07	1.15E-07	ND	ND	ND	ND	ND	1.10E-02	ND	0.00E+00	7.64E-07	7.48E-06	1.80E-07	-7.53E-04
ADP-fossil	MJ	7.64E+02	1.25E+01	2.14E+01	7.98E+02	4.13E+00	4.69E-01	ND	ND	ND	ND	ND	9.77E+03	ND	0.00E+00	3.30E+00	1.71E+00	1.10E+00	-1.39E+02

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG 9)	kg CO ₂ e	6.90E+01	9.83E-01	2.05E+00	7.21E+01	2.89E-01	5.17E-02	ND	ND	ND	ND	ND	8.21E+02	ND	0.00E+00	2.38E-01	1.06E+00	6.52E-01	-1.50E+01

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows - CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide - were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO₂ is set to zero.

ENVIRONMENTAL IMPACT DATA, RESULTS PER FUNCTIONAL UNIT

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ éq/FU	5.81E+00	8.34E-02	1.68E-01	6.06E+00	2.45E-02	9.46E-02	ND	ND	ND	ND	ND	6.97E+01	ND	0.00E+00	2.02E-02	8.97E-02	4.06E-02	-1.27E+00
GWP – fossil	kg CO ₂ éq/FU	5.84E+00	8.33E-02	1.72E-01	6.10E+00	2.45E-02	4.38E-03	ND	ND	ND	ND	ND	6.94E+01	ND	0.00E+00	2.02E-02	8.98E-02	5.53E-02	-1.27E+00
GWP – biogenic	kg CO ₂ éq/FU	-4.15E-02	1.46E-05	-5.61E-03	-4.71E-02	5.54E-06	9.02E-02	ND	ND	ND	ND	ND	1.56E-01	ND	0.00E+00	4.41E-06	-3.34E-05	-1.47E-02	-4.08E-04
GWP – LULUC	kg CO ₂ éq/FU	9.12E-03	4.29E-05	2.04E-03	1.12E-02	1.09E-05	1.45E-06	ND	ND	ND	ND	ND	2.13E-01	ND	0.00E+00	8.94E-06	1.53E-05	8.00E-06	-4.17E-04
Ozone depletion pot.	kg CFC-11e/FU	7.69E-08	1.21E-09	4.76E-09	8.28E-08	3.61E-10	5.39E-11	ND	ND	ND	ND	ND	1.28E-06	ND	0.00E+00	2.82E-10	1.51E-10	1.12E-10	-4.99E-09
Acidification potential	mole H ⁺ e/FU	3.85E-02	1.85E-03	5.42E-04	4.09E-02	8.34E-05	2.33E-05	ND	ND	ND	ND	ND	4.08E-01	ND	0.00E+00	6.73E-05	1.37E-04	4.57E-05	-1.59E-02
EP-freshwater ²⁾	kg Pe/FU	2.40E-03	3.69E-06	4.39E-05	2.44E-03	1.90E-06	3.94E-07	ND	ND	ND	ND	ND	6.46E-02	ND	0.00E+00	1.57E-06	6.47E-06	3.14E-06	-8.54E-04
EP-marine	kg Ne/FU	6.28E-03	4.67E-04	2.42E-04	6.99E-03	2.74E-05	1.09E-05	ND	ND	ND	ND	ND	6.40E-02	ND	0.00E+00	2.18E-05	3.65E-05	1.06E-04	-1.70E-03
EP-terrestrial	mol Ne/FU	6.51E-02	5.18E-03	1.60E-03	7.18E-02	2.98E-04	9.93E-05	ND	ND	ND	ND	ND	5.74E-01	ND	0.00E+00	2.37E-04	3.82E-04	1.93E-04	-1.80E-02
POCP (“smog”) ³⁾	kg NMVOCe/	2.22E-02	1.44E-03	5.80E-04	2.42E-02	1.23E-04	2.83E-05	ND	ND	ND	ND	ND	1.89E-01	ND	0.00E+00	9.37E-05	1.09E-04	6.25E-05	-5.42E-03
ADP-minerals & metals ⁴⁾	kg Sbe/FU	1.95E-04	1.23E-07	4.82E-07	1.96E-04	6.83E-08	1.17E-08	ND	ND	ND	ND	ND	9.37E-04	ND	0.00E+00	6.63E-08	6.38E-07	1.67E-08	-6.40E-05
ADP-fossil resources	MJ/FU	6.91E+01	1.07E+00	1.90E+00	7.21E+01	3.55E-01	4.05E-02	ND	ND	ND	ND	ND	1.61E+03	ND	0.00E+00	2.83E-01	1.54E-01	9.61E-02	-1.31E+01
Water use ⁵⁾	m ³ e priv. /FU	1.75E+00	3.71E-03	4.63E-02	1.80E+00	1.75E-03	4.70E-03	ND	ND	ND	ND	ND	4.40E+01	ND	0.00E+00	1.31E-03	7.37E-03	3.99E-03	-1.26E-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, EF 3.1

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 /FU	4.42E-07	4.09E-09	9.69E-09	4.56E-07	2.45E-09	2.90E-10	ND	ND	ND	ND	ND	1.46E-06	ND	0.00E+00	1.60E-09	1.73E-09	7.29E-10	-7.17E-08
Ionizing radiation ⁶⁾	kBq U235e/FU	2.66E-01	6.23E-04	5.18E-03	2.72E-01	3.09E-04	4.91E-05	ND	ND	ND	ND	ND	4.46E+01	ND	0.00E+00	2.29E-04	6.08E-04	1.54E-04	-7.75E-02
Ecotoxicity (freshwater)	CTUe/FU	5.43E+01	1.02E-01	6.69E-01	5.51E+01	5.02E-02	1.13E-01	ND	ND	ND	ND	ND	2.46E+02	ND	0.00E+00	4.48E-02	2.30E-01	1.44E+01	-5.74E+00
Human toxicity, cancer	CTUh/FU	4.95E-09	1.66E-11	6.55E-11	5.03E-09	4.04E-12	5.42E-12	ND	ND	ND	ND	ND	2.34E-08	ND	0.00E+00	3.43E-12	1.55E-11	1.84E-11	-8.80E-10
Human tox. non-cancer	CTUh/FU	1.44E-07	3.96E-10	1.75E-09	1.46E-07	2.30E-10	2.21E-10	ND	ND	ND	ND	ND	1.22E-06	ND	0.00E+00	1.77E-10	8.06E-10	7.18E-10	-6.01E-08
SQP ⁷⁾	-/FU	3.07E+01	3.94E-01	5.15E+00	3.62E+01	3.58E-01	1.98E-02	ND	ND	ND	ND	ND	3.59E+02	ND	0.00E+00	1.69E-01	2.46E-01	1.32E-01	-3.52E+00

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 ⁸⁾	MJ/FU	7.27E+00	1.02E-02	-1.32E-03	7.28E+00	4.87E-03	-1.11E+00	ND	ND	ND	ND	ND	4.43E+02	ND	0.00E+00	3.89E-03	2.19E-02	-2.70E-01	-4.69E-01
Renew. PER as material	MJ/FU	7.90E-01	0.00E+00	8.97E-03	7.99E-01	0.00E+00	-7.98E-01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-3.48E-04	-6.46E-04	0.00E+00
Total use of renew. PER	MJ/FU	8.06E+00	1.02E-02	7.65E-03	8.08E+00	4.87E-03	-1.90E+00	ND	ND	ND	ND	ND	4.43E+02	ND	0.00E+00	3.89E-03	2.15E-02	-2.71E-01	-4.69E-01
Non-re. PER as energy	MJ/FU	6.56E+01	1.07E+00	1.20E+00	6.79E+01	3.55E-01	3.34E-02	ND	ND	ND	ND	ND	1.61E+03	ND	0.00E+00	2.83E-01	-1.04E+00	-1.52E+00	-1.31E+01
Non-re. PER as material	MJ/FU	2.98E+00	0.00E+00	-6.89E-01	2.29E+00	0.00E+00	-1.56E-02	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-9.47E-01	-1.33E+00	0.00E+00
Total use of non-re. PER	MJ/FU	6.86E+01	1.07E+00	5.15E-01	7.02E+01	3.55E-01	1.78E-02	ND	ND	ND	ND	ND	1.61E+03	ND	0.00E+00	2.83E-01	-1.98E+00	-2.85E+00	-1.31E+01
Secondary materials	kg/FU	4.63E-01	0.00E+00	0.00E+00	4.63E-01	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renew. secondary fuels	MJ/FU	1.23E-02	2.57E-06	6.55E-03	1.89E-02	1.92E-06	5.06E-07	ND	ND	ND	ND	ND	2.13E-03	ND	0.00E+00	1.62E-06	7.59E-06	1.34E-06	-4.93E-05
Non-ren. secondary fuels	MJ/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m ³ /FU	2.68E-02	9.96E-05	1.01E-03	2.79E-02	5.25E-05	7.63E-05	ND	ND	ND	ND	ND	1.40E+00	ND	0.00E+00	3.75E-05	1.43E-04	-4.40E-04	-5.63E-03

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/FU	1.04E+00	1.54E-03	8.59E-03	1.05E+00	6.02E-04	1.24E-03	ND	ND	ND	ND	ND	4.08E+00	ND	0.00E+00	4.94E-04	2.41E-03	4.05E-03	-2.59E-01
Non-hazardous waste	kg/FU	2.23E+01	2.37E-02	4.38E-01	2.28E+01	1.11E-02	6.68E-02	ND	ND	ND	ND	ND	3.16E+02	ND	0.00E+00	9.26E-03	7.54E-02	9.12E-01	-3.44E+00
Radioactive waste	kg/FU	6.64E-05	1.52E-07	1.23E-06	6.78E-05	7.57E-08	1.23E-08	ND	ND	ND	ND	ND	1.15E-02	ND	0.00E+00	5.62E-08	1.50E-07	3.78E-08	-1.87E-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 reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	7.09E-03	7.09E-03	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	4.05E-01	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	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	3.74E-01	0.00E+00	0.00E+00
Exported energy – Electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	1.57E-01	0.00E+00	0.00E+00
Exported energy – Heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	2.17E-01	0.00E+00	0.00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

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 ₂ eq./FU	5.85E+00	8.29E-02	1.80E-01	6.11E+00	2.43E-02	4.35E-03	ND	ND	ND	ND	ND	6.94E+01	ND	0.00E+00	2.01E-02	8.97E-02	7.03E-02	-1.26E+00
Ozone depletion Pot.	kg CFC ₁₁ /FU	7.50E-08	9.58E-10	4.45E-09	8.04E-08	2.88E-10	4.58E-11	ND	ND	ND	ND	ND	1.07E-06	ND	0.00E+00	2.26E-10	1.27E-10	9.08E-11	-4.59E-09
Acidification	kg SO ₂ e/FU	3.23E-02	1.47E-03	3.80E-04	3.42E-02	6.37E-05	1.71E-05	ND	ND	ND	ND	ND	3.48E-01	ND	0.00E+00	5.16E-05	1.09E-04	3.33E-05	-1.37E-02
Eutrophication	kg PO ₄ ³ e/FU	9.12E-03	1.70E-04	2.49E-04	9.54E-03	1.55E-05	5.32E-06	ND	ND	ND	ND	ND	4.50E-02	ND	0.00E+00	1.25E-05	1.82E-05	4.09E-05	-8.00E-04
POCP (“smog”)	kg C ₂ H ₄ e/FU	2.63E-03	7.54E-05	4.52E-05	2.75E-03	5.68E-06	1.30E-06	ND	ND	ND	ND	ND	1.89E-02	ND	0.00E+00	4.62E-06	6.50E-06	6.33E-06	-7.57E-04
ADP-elements	kg Sbe/FU	1.94E-04	1.21E-07	4.68E-07	1.94E-04	6.66E-08	9.74E-09	ND	ND	ND	ND	ND	9.34E-04	ND	0.00E+00	6.48E-08	6.34E-07	1.52E-08	-6.39E-05
ADP-fossil	MJ/FU	6.48E+01	1.06E+00	1.81E+00	6.76E+01	3.50E-01	3.98E-02	ND	ND	ND	ND	ND	8.28E+02	ND	0.00E+00	2.80E-01	1.45E-01	9.37E-02	-1.18E+01

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ⁹⁾	kg CO ₂ e/FU	5.85E+00	8.34E-02	1.74E-01	6.11E+00	2.45E-02	4.38E-03	ND	ND	ND	ND	ND	6.96E+01	ND	0.00E+00	2.02E-02	8.98E-02	5.53E-02	-1.27E+00

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows - CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide - were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO₂ is set to zero.

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation – A3 (Energy data source)

1. Energy supply, electricity production, wind, Electricity production, wind, 1-3MW turbine, onshore, Poland,ecoinvent 3.10.1, 0.0176 kgCO₂e/kWh
2. Construction, specialized activities, demolition and site preparation, Market for diesel, burned in building machine, World,ecoinvent 3.10.1, 0.10 kgCO₂e/MJ
3. Energy supply, electricity production, co-generation oil and gas, Heat and power co-generation, natural gas, combined cycle power plant, 400MW electrical, Poland,ecoinvent 3.10.1, 0.0295 kgCO₂e/MJ

Transport scenario documentation - A4

1. Transport, freight, lorry >32 metric ton, EURO5, 303.77 km
2. Transport, freight, sea, container ship, 0.0 km

Installation scenario documentation - A5 (Waste materials data source)

1. Market for corrugated board box, 0.7 kg
2. Market for printed paper, offset, 0.0347 kg
3. Market for packaging film, low density polyethylene, 0.00233 kg

Use stages scenario documentation - B6-B7 (Energy data source)

1. Energy supply, electricity transformation and distribution, distribution low voltage, Market group for electricity, low voltage, Europe, 2500.0 kWh

TRANSPORT SCENARIO DOCUMENTATION - A4

Scenario parameter	Value
Capacity utilization (including empty return) %	50 %
Bulk density of transported products / kg/m ³	305
Volume capacity utilization factor (factor: =1 or <1 or ≥1 for compressed or nested packaged products)	1

INSTALLATION SCENARIO DOCUMENTATION - A5

Scenario parameter	Value
Ancillary materials for installation (specified by material) / kg or other units as appropriate	0
Water use / m ³	0
Other resource use / kg	0
Direct emissions to ambient air, soil and water / kg	0

USE STAGES SCENARIO DOCUMENTATION - B6-B7 USE OF ENERGY AND WATER

Scenario information	Value
Ancillary materials specified by material / kg or units as appropriate	Not applicable
Net fresh water consumption / m ³	0
Power output of equipment / kW	25
Characteristic performance, e.g., energy efficiency, emissions, variation of performance with capacity utilization, etc. / Units as appropriate	For more details see product classification table and product description.
Further assumptions for scenario development, e.g., frequency and period of use, number of occupants / Units as appropriate	For more details see product classification table and product description.

END OF LIFE SCENARIO DOCUMENTATION

Scenario information	Value
Collection process – kg collected separately	8.089
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	4.77
Recovery process – kg for energy recovery	0
Disposal (total) – kg for final deposition	2.94
Scenario assumptions e.g. transportation	Lorry, 16-32 metric ton, EURO5; 150 km

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.



Program assistant: Xinyuan Zhang



The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

[Verified tools](#)

Tool verifier: Hai Ha Nguyen

Tool verification validity: 28 March 2025 - 27 March 2028

APPENDIX 1

MATERIAL COMPOSITION

The product material composition is illustrated in the table below. The material weight is given in grams and in percentage on total product weight.

Table 1: Material composition

Material	Weight (g)	Weight-%
Aluminium	6090.62	75.3
Copper	59.91	0.74
Glass	280	3.46
PA - Polyamide (Nylon)	52.1	0.64
Paint	391.38	4.84
PC - Polycarbonate	498.99	6.17
PCB Alu	27.9	0.34
PCB Copper	34.6	0.43
PCB Iron	30.6	0.38
PCB Support	122.11	1.51

PCB Tin	1.8	0.02
PMMA - Polymethyl Methacrylate	44	0.54
PVC - Polyvinyl Chloride	61.31	0.76
Silicone	130.74	1.62
Silica Sand	0.5	0.01
Stainless Steel	101.51	1.25
Steel	160.23	1.98
Tin	0.63	0.01

APPENDIX 2

USE PHASE (B6) VALUES FOR DIFFERENT COUNTRY MIX

In this EPD the B6 impact has been calculated using the energy mix of (EU). The table in this appendix is useful for conversion and comparison of B6 values with other country energy 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:

If for example this 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, RESULTS PER DECLARED UNIT

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ^[1]	kg CO ₂ e	1.08E+01	2.33E-01	5.06E-01	1.15E+01	3.27E+00	1.68E+00	ND	ND	ND	ND	ND	4.06E-02	ND	0.00E+00	2.88E-02	5.13E-01	2.80E-01	-9.88E-01

Divide that value according to the EU value from the following table (EU = 3.30E-01) and then multiplying for the Finland value from the same table (FINLAND = 1.54E-01).

Thus, the calculation of this example would be:

New B6 GWP tot for Finland = (4.06E-02 / 3.30E-01) x 1.54E-01 = 1.89E-02.

Country	GWP tot (kg CO2 eq. per kwh)		
AFRICA	7.30E-01	GERMANY	3.90E-01
APAC	9.50E-01	INDIA	1.50E+00
AUSTRALIA	8.40E-01	ITALY	3.50E-01
AUSTRIA	2.30E-01	LATAM	3.90E-01
BELGIUM	2.00E-01	NAM	4.50E-01
CHINA	1.02E+00	NETHERLANDS	3.90E-01
DENMARK	1.60E-01	NORWAY	4.50E-02
EU	3.30E-01	ROW	7.30E-01
FINLAND	1.54E-01	SPAIN	2.10E-01
FRANCE	8.70E-02	SWEDEN	3.70E-02
		IRELAND	3.50E-01
		UK	2.60E-01

Source Ecoinvent 3.10.1

APPENDIX 3 - EPD HUB 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 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 1: 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

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

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

The following list of product configurations is not exhaustive. Please use the formula defined in point 1 above to calculate the exact power scaling factor (PSF) for any specific configuration.

Table 2: GWP per scaling factor (EPD Hub aligned)

	12NC or Product Family Code	Description	Flux [lm]	Power [W]	Efficacy [L/W]	PSF	Total Scaling Factor (TSF)				Scaled Impacts (GWP100 B6 - kg CO2eq.)			
							NC	DD	PS	DD+PS	NC	DD	PS	DD+PS
1	BGP501	BGP501 LED10-4S/730 DM32	888	7.3	121.6	0.292	0.292	0.219	0.219	0.161	240.2	180.1	180.1	132.1
2	BGP501	BGP501 LED12/730 DM32P	1110	7.5	148.0	0.300	0.300	0.225	0.225	0.165	246.8	185.1	185.1	135.7
3	BGP501	BGP501 LED12-4S/730 DM32	1066	8.1	131.6	0.324	0.324	0.243	0.243	0.178	266.5	199.9	199.9	146.6
4	BGP501	BGP501 LED14/730 DM32P	1295	8.4	154.2	0.336	0.336	0.252	0.252	0.185	276.4	207.3	207.3	152.0
5	BGP501	BGP501 LED12-4S/730 DM32	1065	8.4	126.8	0.336	0.336	0.252	0.252	0.185	276.4	207.3	207.3	152.0
6	BGP501	BGP501 LED14-4S/730 DM32	1243	9.2	135.1	0.368	0.368	0.276	0.276	0.202	302.7	227.0	227.0	166.5
7	BGP501	BGP501 LED16/730 DM32P	1478	9.4	157.2	0.376	0.376	0.282	0.282	0.207	309.3	231.9	231.9	170.1
8	BGP501	BGP501 LED14-4S/730 DM32	1237	9.7	127.5	0.388	0.388	0.291	0.291	0.213	319.1	239.3	239.3	175.5

9	BGP501	BGP501 LED18/730 DM32P	1663	10.4	159.9	0.416	0.416	0.312	0.312	0.229	342.2	256.6	256.6	188.2
10	BGP501	BGP501 LED16-4S/730 DM32	1421	10.4	136.6	0.416	0.416	0.312	0.312	0.229	342.2	256.6	256.6	188.2
11	BGP501	BGP501 LED16-4S/730 DM32	1410	11.0	128.2	0.440	0.440	0.330	0.330	0.242	361.9	271.4	271.4	199.0
12	BGP501	BGP501 LED20/730 DM32P	1848	11.3	163.5	0.452	0.452	0.339	0.339	0.249	371.8	278.8	278.8	204.5
13	BGP501	BGP501 LED18-4S/730 DM32	1599	11.6	137.8	0.464	0.464	0.348	0.348	0.255	381.6	286.2	286.2	209.9
14	BGP501	BGP501 LED22/730 DM32P	2030	12.4	163.7	0.496	0.496	0.372	0.372	0.273	408.0	306.0	306.0	224.4
15	BGP501	BGP501 LED18-4S/730 DM32	1578	12.4	127.3	0.496	0.496	0.372	0.372	0.273	408.0	306.0	306.0	224.4
16	BGP501	BGP501 LED20-4S/730 DM32	1775	12.9	137.6	0.516	0.516	0.387	0.387	0.284	424.4	318.3	318.3	233.4
17	BGP501	BGP501 LED24/730 DM32P	2215	13.4	165.3	0.536	0.536	0.402	0.402	0.295	440.9	330.6	330.6	242.5
18	BGP501	BGP501 LED20-4S/730 DM32	1743	13.8	126.3	0.552	0.552	0.414	0.414	0.304	454.0	340.5	340.5	249.7
19	BGP501	BGP501 LED22-4S/730 DM32	1950	14.2	137.3	0.568	0.568	0.426	0.426	0.312	467.2	350.4	350.4	256.9
20	BGP501	BGP501 LED24-4S/730 DM32	2132	14.9	143.1	0.596	0.596	0.447	0.447	0.328	490.2	367.7	367.7	269.6
21	BGP501	BGP501 LED27/730 DM32P	2492	15.0	166.1	0.600	0.600	0.450	0.450	0.330	493.5	370.1	370.1	271.4
22	BGP501	BGP501 LED24-4S/730 DM32	2123	15.5	137.0	0.620	0.620	0.465	0.465	0.341	510.0	382.5	382.5	280.5
23	BGP501	BGP501 LED30/730 DM32P	2766	16.5	167.6	0.660	0.660	0.495	0.495	0.363	542.9	407.1	407.1	298.6

24	BGP501	BGP501 LED27-4S/730 DM32	2396	16.7	143.5	0.668	0.668	0.501	0.501	0.367	549.4	412.1	412.1	302.2
25	BGP501	BGP501 LED27-4S/730 DM32	2381	17.5	136.1	0.700	0.700	0.525	0.525	0.385	575.8	431.8	431.8	316.7
26	BGP501	BGP501 LED30-4S/730 DM32	2659	18.4	144.5	0.736	0.736	0.552	0.552	0.405	605.4	454.0	454.0	332.9
27	BGP501	BGP501 LED35/730 DM32P	3223	19.2	167.9	0.768	0.768	0.576	0.576	0.422	631.7	473.8	473.8	347.4
28	BGP501	BGP501 LED30-4S/730 DM32	2635	19.6	134.4	0.784	0.784	0.588	0.588	0.431	644.8	483.6	483.6	354.7
29	BGP501	BGP501 LED35-4S/730 DM32	3093	21.4	144.5	0.856	0.856	0.642	0.642	0.471	704.1	528.0	528.0	387.2
30	BGP501	BGP501 LED40/730 DM32P	3680	21.9	168.0	0.876	0.876	0.657	0.657	0.482	720.5	540.4	540.4	396.3
31	BGP501	BGP501 LED40-4S/730 DM32	3524	24.5	143.8	0.980	0.980	0.735	0.735	0.539	806.1	604.5	604.5	443.3
32	<u>BGP501</u>	<u>BGP501 LED45/730 DM32P</u>	<u>4128</u>	<u>25.0</u>	165.1	1.000	1.000	0.750	0.750	0.550	822.5	616.9	616.9	452.4
33	BGP501	BGP501 LED45-4S/730 DM32	3949	27.6	143.1	1.104	1.104	0.828	0.828	0.607	908.0	681.0	681.0	499.4
34	BGP501	BGP501 LED50/730 DM32P	4577	27.7	165.2	1.108	1.108	0.831	0.831	0.609	911.3	683.5	683.5	501.2
35	BGP501	BGP501 LED55/730 DM32P	5020	30.3	165.7	1.212	1.212	0.909	0.909	0.667	996.9	747.7	747.7	548.3
36	BGP501	BGP501 LED50-4S/730 DM32	4365	30.6	142.6	1.224	1.224	0.918	0.918	0.673	1006.7	755.1	755.1	553.7
37	BGP501	BGP501 LED60/730 DM32P	5465	33.2	164.6	1.328	1.328	0.996	0.996	0.730	1092.3	819.2	819.2	600.8
38	BGP501	BGP501 LED55-4S/730 DM32	4773	34.0	140.4	1.360	1.360	1.020	1.020	0.748	1118.6	839.0	839.0	615.2

39	BGP501	BGP501 LED65/730 DM32P	5902	36.1	163.5	1.444	1.444	1.083	1.083	0.794	1187.7	890.8	890.8	653.2
40	BGP501	BGP501 LED60-4S/730 DM32	5175	37.3	138.7	1.492	1.492	1.119	1.119	0.821	1227.2	920.4	920.4	674.9
41	BGP501	BGP501 LED70/730 DM32P	6337	39.0	162.5	1.560	1.560	1.170	1.170	0.858	1283.1	962.3	962.3	705.7
42	BGP501	BGP501 LED65-4S/730 DM32	5560	40.8	136.3	1.632	1.632	1.224	1.224	0.898	1342.3	1006.7	1006.7	738.3
43	BGP501	BGP501 LED75/730 DM32P	6768	41.9	161.5	1.676	1.676	1.257	1.257	0.922	1378.5	1033.9	1033.9	758.2
44	BGP501	BGP501 LED79/730 DM32P	7115	44.3	160.6	1.772	1.772	1.329	1.329	0.975	1457.5	1093.1	1093.1	801.6
45	BGP501	BGP501 LED8-4S/740 DM32	711	5.7	124.7	0.228	0.228	0.171	0.171	0.125	187.5	140.6	140.6	103.1
46	BGP501	BGP501 LED10-4S/740 DM32	888	6.9	128.7	0.276	0.276	0.207	0.207	0.152	227.0	170.3	170.3	124.9
47	BGP501	BGP501 LED12-4S/740 DM32	1066	7.7	138.4	0.308	0.308	0.231	0.231	0.169	253.3	190.0	190.0	139.3
48	BGP501	BGP501 LED12-4S/740 DM32	1066	8.0	133.3	0.320	0.320	0.240	0.240	0.176	263.2	197.4	197.4	144.8
49	BGP501	BGP501 LED14/740 DM32P	1295	8.1	159.9	0.324	0.324	0.243	0.243	0.178	266.5	199.9	199.9	146.6
50	BGP501	BGP501 LED14-4S/740 DM32	1243	8.7	142.9	0.348	0.348	0.261	0.261	0.191	286.2	214.7	214.7	157.4
51	BGP501	BGP501 LED16/740 DM32P	1480	9.0	164.4	0.360	0.360	0.270	0.270	0.198	296.1	222.1	222.1	162.9
52	BGP501	BGP501 LED14-4S/740 DM32	1240	9.1	136.3	0.364	0.364	0.273	0.273	0.200	299.4	224.5	224.5	164.7
53	BGP501	BGP501 LED16-4S/740 DM32	1421	9.8	145.0	0.392	0.392	0.294	0.294	0.216	322.4	241.8	241.8	177.3

54	BGP501	BGP501 LED18/740 DM32P	1663	9.9	168.0	0.396	0.396	0.297	0.297	0.218	325.7	244.3	244.3	179.1
55	BGP501	BGP501 LED16-4S/740 DM32	1411	10.4	135.7	0.416	0.416	0.312	0.312	0.229	342.2	256.6	256.6	188.2
56	BGP501	BGP501 LED20/740 DM32P	1848	10.9	169.5	0.436	0.436	0.327	0.327	0.240	358.6	269.0	269.0	197.2
57	BGP501	BGP501 LED18-4S/740 DM32	1599	11.0	145.4	0.440	0.440	0.330	0.330	0.242	361.9	271.4	271.4	199.0
58	BGP501	BGP501 LED18-4S/740 DM32	1581	11.6	136.3	0.464	0.464	0.348	0.348	0.255	381.6	286.2	286.2	209.9
59	BGP501	BGP501 LED22/740 DM32P	2032	11.8	172.2	0.472	0.472	0.354	0.354	0.260	388.2	291.2	291.2	213.5
60	BGP501	BGP501 LED20-4S/740 DM32	1776	12.1	146.8	0.484	0.484	0.363	0.363	0.266	398.1	298.6	298.6	218.9
61	BGP501	BGP501 LED24/740 DM32P	2215	12.8	173.0	0.512	0.512	0.384	0.384	0.282	421.1	315.8	315.8	231.6
62	BGP501	BGP501 LED20-4S/740 DM32	1750	13.0	134.6	0.520	0.520	0.390	0.390	0.286	427.7	320.8	320.8	235.2
63	BGP501	BGP501 LED22-4S/740 DM32	1952	13.4	145.7	0.536	0.536	0.402	0.402	0.295	440.9	330.6	330.6	242.5
64	BGP501	BGP501 LED24-4S/740 DM32	2132	14.2	150.1	0.568	0.568	0.426	0.426	0.312	467.2	350.4	350.4	256.9
65	BGP501	BGP501 LED27/740 DM32P	2492	14.3	174.3	0.572	0.572	0.429	0.429	0.315	470.5	352.9	352.9	258.8
66	BGP501	BGP501 LED22-4S/740 DM32	1913	14.4	132.8	0.576	0.576	0.432	0.432	0.317	473.8	355.3	355.3	260.6
67	BGP501	BGP501 LED24-4S/740 DM32	2125	14.6	145.5	0.584	0.584	0.438	0.438	0.321	480.3	360.3	360.3	264.2
68	BGP501	BGP501 LED27-4S/740 DM32	2398	15.7	152.7	0.628	0.628	0.471	0.471	0.345	516.5	387.4	387.4	284.1

69	BGP501	BGP501 LED30/740 DM32P	2766	15.8	175.1	0.632	0.632	0.474	0.474	0.348	519.8	389.9	389.9	285.9
70	BGP501	BGP501 LED27-4S/740 DM32	2384	16.5	144.5	0.660	0.660	0.495	0.495	0.363	542.9	407.1	407.1	298.6
71	BGP501	BGP501 LED30-4S/740 DM32	2662	17.4	153.0	0.696	0.696	0.522	0.522	0.383	572.5	429.3	429.3	314.9
72	BGP501	BGP501 LED35/740 DM32P	3223	18.2	177.1	0.728	0.728	0.546	0.546	0.400	598.8	449.1	449.1	329.3
73	BGP501	BGP501 LED30-4S/740 DM32	2641	18.4	143.5	0.736	0.736	0.552	0.552	0.405	605.4	454.0	454.0	332.9
74	BGP501	BGP501 LED35-4S/740 DM32	3096	20.2	153.3	0.808	0.808	0.606	0.606	0.444	664.6	498.4	498.4	365.5
75	BGP501	BGP501 LED40/740 DM32P	3680	20.8	176.9	0.832	0.832	0.624	0.624	0.458	684.3	513.2	513.2	376.4
76	BGP501	BGP501 LED35-4S/740 DM32	3059	21.8	140.3	0.872	0.872	0.654	0.654	0.480	717.2	537.9	537.9	394.5
77	BGP501	BGP501 LED40-4S/740 DM32	3528	23.0	153.4	0.920	0.920	0.690	0.690	0.506	756.7	567.5	567.5	416.2
78	BGP501	BGP501 LED45/740 DM32P	4132	23.8	173.6	0.952	0.952	0.714	0.714	0.524	783.0	587.3	587.3	430.7
79	BGP501	BGP501 LED45-4S/740 DM32	3957	25.9	152.8	1.036	1.036	0.777	0.777	0.570	852.1	639.1	639.1	468.7
80	BGP501	BGP501 LED50/740 DM32P	4582	26.3	174.2	1.052	1.052	0.789	0.789	0.579	865.3	649.0	649.0	475.9
81	BGP501	BGP501 LED55/740 DM32P	5030	28.9	174.0	1.156	1.156	0.867	0.867	0.636	950.8	713.1	713.1	522.9
82	BGP501	BGP501 LED50-4S/740 DM32	4379	28.9	151.5	1.156	1.156	0.867	0.867	0.636	950.8	713.1	713.1	522.9
83	BGP501	BGP501 LED60/740 DM32P	5470	31.5	173.7	1.260	1.260	0.945	0.945	0.693	1036.4	777.3	777.3	570.0

84	BGP501	BGP501 LED55-4S/740 DM32	4792	31.8	150.7	1.272	1.272	0.954	0.954	0.700	1046.2	784.7	784.7	575.4
85	BGP501	BGP501 LED65/740 DM32P	5914	34.2	172.9	1.368	1.368	1.026	1.026	0.752	1125.2	843.9	843.9	618.8
86	BGP501	BGP501 LED60-4S/740 DM32	5196	35.0	148.5	1.400	1.400	1.050	1.050	0.770	1151.5	863.6	863.6	633.3
87	BGP501	BGP501 LED70/740 DM32P	6350	37.0	171.6	1.480	1.480	1.110	1.110	0.814	1217.3	913.0	913.0	669.5
88	BGP501	BGP501 LED65-4S/740 DM32	5594	38.2	146.4	1.528	1.528	1.146	1.146	0.840	1256.8	942.6	942.6	691.2
89	BGP501	BGP501 LED75/740 DM32P	6782	39.7	170.8	1.588	1.588	1.191	1.191	0.873	1306.1	979.6	979.6	718.4
90	BGP501	BGP501 LED70-4S/740 DM32	5975	41.4	144.3	1.656	1.656	1.242	1.242	0.911	1362.1	1021.5	1021.5	749.1
91	BGP501	BGP501 LED79/740 DM32P	7129	41.9	170.1	1.676	1.676	1.257	1.257	0.922	1378.5	1033.9	1033.9	758.2
92	BGP501	BGP501 LED12/830 DM32P	1110	8.0	138.8	0.320	0.320	0.240	0.240	0.176	263.2	197.4	197.4	144.8
93	BGP501	BGP501 LED14/830 DM32P	1295	8.9	145.5	0.356	0.356	0.267	0.267	0.196	292.8	219.6	219.6	161.0
94	BGP501	BGP501 LED16/830 DM32P	1478	10.0	147.8	0.400	0.400	0.300	0.300	0.220	329.0	246.8	246.8	181.0
95	BGP501	BGP501 LED18/830 DM32P	1663	11.1	149.8	0.444	0.444	0.333	0.333	0.244	365.2	273.9	273.9	200.9
96	BGP501	BGP501 LED16-4S/830 DM32	1420	11.7	121.4	0.468	0.468	0.351	0.351	0.257	384.9	288.7	288.7	211.7
97	BGP501	BGP501 LED20/830 DM32P	1846	12.2	151.3	0.488	0.488	0.366	0.366	0.268	401.4	301.0	301.0	220.8
98	BGP501	BGP501 LED18-4S/830 DM32	1596	13.2	120.9	0.528	0.528	0.396	0.396	0.290	434.3	325.7	325.7	238.9

99	BGP501	BGP501 LED22/830 DM32P	2030	13.3	152.6	0.532	0.532	0.399	0.399	0.293	437.6	328.2	328.2	240.7
100	BGP501	BGP501 LED20-4S/830 DM32	1776	14.3	124.2	0.572	0.572	0.429	0.429	0.315	470.5	352.9	352.9	258.8

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 3: 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.

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

Table 4: Impact per scaling factor (PEP EcoPassport aligned)

	12NC or Product Family Code	Description	Flux [lm]	Power [W]	Efficacy [L/W]	PSF	Total Scaling Factor (TSF)				Scaled Impacts (GWP100 B6 - kg CO2eq.)			
							NC	DD	PS	DD+PS	NC	DD	PS	DD+PS
1	BGP501	BGP501 LED10-4S/730 DM32	888	7.3	121.6	0.292	0.115	0.086	0.086	0.063	94.7	71.0	71.0	52.1
2	BGP501	BGP501 LED12/730 DM32P	1110	7.5	148.0	0.300	0.095	0.071	0.071	0.052	77.8	58.4	58.4	42.8
3	BGP501	BGP501 LED12-4S/730 DM32	1066	8.1	131.6	0.324	0.106	0.080	0.080	0.059	87.5	65.6	65.6	48.1
4	BGP501	BGP501 LED14/730 DM32P	1295	8.4	154.2	0.336	0.091	0.068	0.068	0.050	74.7	56.0	56.0	41.1
5	BGP501	BGP501 LED12-4S/730 DM32	1065	8.4	126.8	0.336	0.110	0.083	0.083	0.061	90.8	68.1	68.1	50.0
6	BGP501	BGP501 LED14-4S/730 DM32	1243	9.2	135.1	0.368	0.104	0.078	0.078	0.057	85.2	63.9	63.9	46.9
7	BGP501	BGP501 LED16/730 DM32P	1478	9.4	157.2	0.376	0.089	0.067	0.067	0.049	73.2	54.9	54.9	40.3
8	BGP501	BGP501 LED14-4S/730 DM32	1237	9.7	127.5	0.4	0.1	0.1	0.1	0.1	90.3	67.7	67.7	49.7
9	BGP501	BGP501 LED18/730 DM32P	1663	10.4	159.9	0.4	0.1	0.1	0.1	0.0	72.0	54.0	54.0	39.6
10	BGP501	BGP501 LED16-4S/730 DM32	1421	10.4	136.6	0.4	0.1	0.1	0.1	0.1	84.3	63.2	63.2	46.4
11	BGP501	BGP501 LED16-4S/730 DM32	1410	11.0	128.2	0.4	0.1	0.1	0.1	0.1	89.8	67.4	67.4	49.4
12	BGP501	BGP501 LED20/730 DM32P	1848	11.3	163.5	0.5	0.1	0.1	0.1	0.0	70.4	52.8	52.8	38.7

13	BGP501	BGP501 LED18-4S/730 DM32	1599	11.6	137.8	0.5	0.1	0.1	0.1	0.1	83.5	62.7	62.7	45.9
14	BGP501	BGP501 LED22/730 DM32P	2030	12.4	163.7	0.5	0.1	0.1	0.1	0.0	70.3	52.8	52.8	38.7
15	BGP501	BGP501 LED18-4S/730 DM32	1578	12.4	127.3	0.5	0.1	0.1	0.1	0.1	90.5	67.9	67.9	49.8
16	BGP501	BGP501 LED20-4S/730 DM32	1775	12.9	137.6	0.5	0.1	0.1	0.1	0.1	83.7	62.8	62.8	46.0
17	BGP501	BGP501 LED24/730 DM32P	2215	13.4	165.3	0.5	0.1	0.1	0.1	0.0	69.7	52.2	52.2	38.3
18	BGP501	BGP501 LED20-4S/730 DM32	1743	13.8	126.3	0.6	0.1	0.1	0.1	0.1	91.2	68.4	68.4	50.1
19	BGP501	BGP501 LED22-4S/730 DM32	1950	14.2	137.3	0.6	0.1	0.1	0.1	0.1	83.9	62.9	62.9	46.1
20	BGP501	BGP501 LED24-4S/730 DM32	2132	14.9	143.1	0.6	0.1	0.1	0.1	0.1	80.5	60.4	60.4	44.3
21	BGP501	BGP501 LED27/730 DM32P	2492	15.0	166.1	0.6	0.1	0.1	0.1	0.0	69.3	52.0	52.0	38.1
22	BGP501	BGP501 LED24-4S/730 DM32	2123	15.5	137.0	0.6	0.1	0.1	0.1	0.1	84.1	63.1	63.1	46.2
23	BGP501	BGP501 LED30/730 DM32P	2766	16.5	167.6	0.7	0.1	0.1	0.1	0.0	68.7	51.5	51.5	37.8
24	BGP501	BGP501 LED27-4S/730 DM32	2396	16.7	143.5	0.7	0.1	0.1	0.1	0.1	80.3	60.2	60.2	44.1
25	BGP501	BGP501 LED27-4S/730 DM32	2381	17.5	136.1	0.7	0.1	0.1	0.1	0.1	84.6	63.5	63.5	46.5
26	BGP501	BGP501 LED30-4S/730 DM32	2659	18.4	144.5	0.7	0.1	0.1	0.1	0.1	79.7	59.8	59.8	43.8
27	BGP501	BGP501 LED35/730 DM32P	3223	19.2	167.9	0.8	0.1	0.1	0.1	0.0	68.6	51.4	51.4	37.7

28	BGP501	BGP501 LED30-4S/730 DM32	2635	19.6	134.4	0.8	0.1	0.1	0.1	0.1	85.7	64.2	64.2	47.1
29	BGP501	BGP501 LED35-4S/730 DM32	3093	21.4	144.5	0.9	0.1	0.1	0.1	0.1	79.7	59.8	59.8	43.8
30	BGP501	BGP501 LED40/730 DM32P	3680	21.9	168.0	0.9	0.1	0.1	0.1	0.0	68.5	51.4	51.4	37.7
31	BGP501	BGP501 LED40-4S/730 DM32	3524	24.5	143.8	1.0	0.1	0.1	0.1	0.1	80.1	60.0	60.0	44.0
32	<u>BGP501</u>	<u>BGP501 LED45/730 DM32P</u>	<u>4128</u>	<u>25.0</u>	165.1	1.0	0.1	0.1	0.1	0.0	69.7	52.3	52.3	38.4
33	BGP501	BGP501 LED45-4S/730 DM32	3949	27.6	143.1	1.1	0.1	0.1	0.1	0.1	80.5	60.4	60.4	44.3
34	BGP501	BGP501 LED50/730 DM32P	4577	27.7	165.2	1.1	0.1	0.1	0.1	0.0	69.7	52.3	52.3	38.3
35	BGP501	BGP501 LED55/730 DM32P	5020	30.3	165.7	1.2	0.1	0.1	0.1	0.0	69.5	52.1	52.1	38.2
36	BGP501	BGP501 LED50-4S/730 DM32	4365	30.6	142.6	1.2	0.1	0.1	0.1	0.1	80.7	60.5	60.5	44.4
37	BGP501	BGP501 LED60/730 DM32P	5465	33.2	164.6	1.3	0.1	0.1	0.1	0.0	70.0	52.5	52.5	38.5
38	BGP501	BGP501 LED55-4S/730 DM32	4773	34.0	140.4	1.4	0.1	0.1	0.1	0.1	82.0	61.5	61.5	45.1
39	BGP501	BGP501 LED65/730 DM32P	5902	36.1	163.5	1.4	0.1	0.1	0.1	0.0	70.4	52.8	52.8	38.7
40	BGP501	BGP501 LED60-4S/730 DM32	5175	37.3	138.7	1.5	0.1	0.1	0.1	0.1	83.0	62.2	62.2	45.6
41	BGP501	BGP501 LED70/730 DM32P	6337	39.0	162.5	1.6	0.1	0.1	0.1	0.0	70.9	53.2	53.2	39.0
42	BGP501	BGP501 LED65-4S/730 DM32	5560	40.8	136.3	1.6	0.1	0.1	0.1	0.1	84.5	63.4	63.4	46.5

43	BGP501	BGP501 LED75/730 DM32P	6768	41.9	161.5	1.7	0.1	0.1	0.1	0.0	71.3	53.5	53.5	39.2
44	BGP501	BGP501 LED79/730 DM32P	7115	44.3	160.6	1.8	0.1	0.1	0.1	0.0	71.7	53.8	53.8	39.4
45	BGP501	BGP501 LED8-4S/740 DM32	711	5.7	124.7	0.2	0.1	0.1	0.1	0.1	92.3	69.2	69.2	50.8
46	BGP501	BGP501 LED10-4S/740 DM32	888	6.9	128.7	0.3	0.1	0.1	0.1	0.1	89.5	67.1	67.1	49.2
47	BGP501	BGP501 LED12-4S/740 DM32	1066	7.7	138.4	0.3	0.1	0.1	0.1	0.1	83.2	62.4	62.4	45.7
48	BGP501	BGP501 LED12-4S/740 DM32	1066	8.0	133.3	0.3	0.1	0.1	0.1	0.1	86.4	64.8	64.8	47.5
49	BGP501	BGP501 LED14/740 DM32P	1295	8.1	159.9	0.3	0.1	0.1	0.1	0.0	72.0	54.0	54.0	39.6
50	BGP501	BGP501 LED14-4S/740 DM32	1243	8.7	142.9	0.3	0.1	0.1	0.1	0.1	80.6	60.4	60.4	44.3
51	BGP501	BGP501 LED16/740 DM32P	1480	9.0	164.4	0.4	0.1	0.1	0.1	0.0	70.0	52.5	52.5	38.5
52	BGP501	BGP501 LED14-4S/740 DM32	1240	9.1	136.3	0.4	0.1	0.1	0.1	0.1	84.5	63.4	63.4	46.5
53	BGP501	BGP501 LED16-4S/740 DM32	1421	9.8	145.0	0.4	0.1	0.1	0.1	0.1	79.4	59.6	59.6	43.7
54	BGP501	BGP501 LED18/740 DM32P	1663	9.9	168.0	0.4	0.1	0.1	0.1	0.0	68.5	51.4	51.4	37.7
55	BGP501	BGP501 LED16-4S/740 DM32	1411	10.4	135.7	0.4	0.1	0.1	0.1	0.1	84.9	63.7	63.7	46.7
56	BGP501	BGP501 LED20/740 DM32P	1848	10.9	169.5	0.4	0.1	0.1	0.1	0.0	67.9	50.9	50.9	37.4
57	BGP501	BGP501 LED18-4S/740 DM32	1599	11.0	145.4	0.4	0.1	0.1	0.1	0.1	79.2	59.4	59.4	43.6

58	BGP501	BGP501 LED18-4S/740 DM32	1581	11.6	136.3	0.5	0.1	0.1	0.1	0.1	84.5	63.4	63.4	46.5
59	BGP501	BGP501 LED22/740 DM32P	2032	11.8	172.2	0.5	0.1	0.1	0.1	0.0	66.9	50.2	50.2	36.8
60	BGP501	BGP501 LED20-4S/740 DM32	1776	12.1	146.8	0.5	0.1	0.1	0.1	0.1	78.5	58.8	58.8	43.1
61	BGP501	BGP501 LED24/740 DM32P	2215	12.8	173.0	0.5	0.1	0.1	0.1	0.0	66.5	49.9	49.9	36.6
62	BGP501	BGP501 LED20-4S/740 DM32	1750	13.0	134.6	0.5	0.1	0.1	0.1	0.1	85.5	64.2	64.2	47.0
63	BGP501	BGP501 LED22-4S/740 DM32	1952	13.4	145.7	0.5	0.1	0.1	0.1	0.1	79.0	59.3	59.3	43.5
64	BGP501	BGP501 LED24-4S/740 DM32	2132	14.2	150.1	0.6	0.1	0.1	0.1	0.1	76.7	57.5	57.5	42.2
65	BGP501	BGP501 LED27/740 DM32P	2492	14.3	174.3	0.6	0.1	0.1	0.1	0.0	66.1	49.6	49.6	36.3
66	BGP501	BGP501 LED22-4S/740 DM32	1913	14.4	132.8	0.6	0.1	0.1	0.1	0.1	86.7	65.0	65.0	47.7
67	BGP501	BGP501 LED24-4S/740 DM32	2125	14.6	145.5	0.6	0.1	0.1	0.1	0.1	79.1	59.3	59.3	43.5
68	BGP501	BGP501 LED27-4S/740 DM32	2398	15.7	152.7	0.6	0.1	0.1	0.1	0.1	75.4	56.5	56.5	41.5
69	BGP501	BGP501 LED30/740 DM32P	2766	15.8	175.1	0.6	0.1	0.1	0.1	0.0	65.8	49.3	49.3	36.2
70	BGP501	BGP501 LED27-4S/740 DM32	2384	16.5	144.5	0.7	0.1	0.1	0.1	0.1	79.7	59.8	59.8	43.8
71	BGP501	BGP501 LED30-4S/740 DM32	2662	17.4	153.0	0.7	0.1	0.1	0.1	0.1	75.3	56.5	56.5	41.4
72	BGP501	BGP501 LED35/740 DM32P	3223	18.2	177.1	0.7	0.1	0.1	0.1	0.0	65.0	48.8	48.8	35.8

73	BGP501	BGP501 LED30-4S/740 DM32	2641	18.4	143.5	0.7	0.1	0.1	0.1	0.1	80.2	60.2	60.2	44.1
74	BGP501	BGP501 LED35-4S/740 DM32	3096	20.2	153.3	0.8	0.1	0.1	0.1	0.1	75.1	56.3	56.3	41.3
75	BGP501	BGP501 LED40/740 DM32P	3680	20.8	176.9	0.8	0.1	0.1	0.1	0.0	65.1	48.8	48.8	35.8
76	BGP501	BGP501 LED35-4S/740 DM32	3059	21.8	140.3	0.9	0.1	0.1	0.1	0.1	82.1	61.5	61.5	45.1
77	BGP501	BGP501 LED40-4S/740 DM32	3528	23.0	153.4	0.9	0.1	0.1	0.1	0.1	75.1	56.3	56.3	41.3
78	BGP501	BGP501 LED45/740 DM32P	4132	23.8	173.6	1.0	0.1	0.1	0.1	0.0	66.3	49.7	49.7	36.5
79	BGP501	BGP501 LED45-4S/740 DM32	3957	25.9	152.8	1.0	0.1	0.1	0.1	0.1	75.4	56.5	56.5	41.5
80	BGP501	BGP501 LED50/740 DM32P	4582	26.3	174.2	1.1	0.1	0.1	0.1	0.0	66.1	49.6	49.6	36.4
81	BGP501	BGP501 LED55/740 DM32P	5030	28.9	174.0	1.2	0.1	0.1	0.1	0.0	66.2	49.6	49.6	36.4
82	BGP501	BGP501 LED50-4S/740 DM32	4379	28.9	151.5	1.2	0.1	0.1	0.1	0.1	76.0	57.0	57.0	41.8
83	BGP501	BGP501 LED60/740 DM32P	5470	31.5	173.7	1.3	0.1	0.1	0.1	0.0	66.3	49.7	49.7	36.5
84	BGP501	BGP501 LED55-4S/740 DM32	4792	31.8	150.7	1.3	0.1	0.1	0.1	0.1	76.4	57.3	57.3	42.0
85	BGP501	BGP501 LED65/740 DM32P	5914	34.2	172.9	1.4	0.1	0.1	0.1	0.0	66.6	49.9	49.9	36.6
86	BGP501	BGP501 LED60-4S/740 DM32	5196	35.0	148.5	1.4	0.1	0.1	0.1	0.1	77.6	58.2	58.2	42.7
87	BGP501	BGP501 LED70/740 DM32P	6350	37.0	171.6	1.5	0.1	0.1	0.1	0.0	67.1	50.3	50.3	36.9

88	BGP501	BGP501 LED65-4S/740 DM32	5594	38.2	146.4	1.5	0.1	0.1	0.1	0.1	78.6	59.0	59.0	43.2
89	BGP501	BGP501 LED75/740 DM32P	6782	39.7	170.8	1.6	0.1	0.1	0.1	0.0	67.4	50.6	50.6	37.1
90	BGP501	BGP501 LED70-4S/740 DM32	5975	41.4	144.3	1.7	0.1	0.1	0.1	0.1	79.8	59.8	59.8	43.9
91	BGP501	BGP501 LED79/740 DM32P	7129	41.9	170.1	1.7	0.1	0.1	0.1	0.0	67.7	50.8	50.8	37.2
92	BGP501	BGP501 LED12/830 DM32P	1110	8.0	138.8	0.3	0.1	0.1	0.1	0.1	83.0	62.2	62.2	45.6
93	BGP501	BGP501 LED14/830 DM32P	1295	8.9	145.5	0.4	0.1	0.1	0.1	0.1	79.1	59.4	59.4	43.5
94	BGP501	BGP501 LED16/830 DM32P	1478	10.0	147.8	0.4	0.1	0.1	0.1	0.1	77.9	58.4	58.4	42.9
95	BGP501	BGP501 LED18/830 DM32P	1663	11.1	149.8	0.4	0.1	0.1	0.1	0.1	76.9	57.6	57.6	42.3
96	BGP501	BGP501 LED16-4S/830 DM32	1420	11.7	121.4	0.5	0.1	0.1	0.1	0.1	94.9	71.2	71.2	52.2
97	BGP501	BGP501 LED20/830 DM32P	1846	12.2	151.3	0.5	0.1	0.1	0.1	0.1	76.1	57.1	57.1	41.9
98	BGP501	BGP501 LED18-4S/830 DM32	1596	13.2	120.9	0.5	0.1	0.1	0.1	0.1	95.2	71.4	71.4	52.4
99	BGP501	BGP501 LED22/830 DM32P	2030	13.3	152.6	0.5	0.1	0.1	0.1	0.1	75.4	56.6	56.6	41.5
100	BGP501	BGP501 LED20-4S/830 DM32	1776	14.3	124.2	0.6	0.1	0.1	0.1	0.1	92.7	69.5	69.5	51.0

