

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Signify - Iridium gen4 Medium - BGP502

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	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 Medium - BGP502
Product number / reference	910770247385 / BGP502 LED120/730
GTIN (Global Trade Item Number)	Not applicable
NOBB (Norwegian Building Product Database)	Not applicable
A1-A3 Specific data (%)	3.87

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	10887
Electrical power, Watt	62.7
Luminous efficiency, Lm/W	174
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	77.58	EU , APAC
Minerals	6.58	EU
Fossil materials	15.82	EU , APAC
Bio-based materials	0.02	EU

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0.001
Biogenic carbon content in packaging, kg C	0.331

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit
Declared unit mass, kg	11.312
Mass of packaging, kg	0.835
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)	99.2
GWP-fossil, A1-A3 (kg CO ₂ e)	99.5
Secondary material, inputs (%)	63.9
Secondary material, outputs (%)	55.7
Total energy use, A1-A3 (kWh)	341
Net freshwater use, A1-A3 (m ³)	4.63E-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.

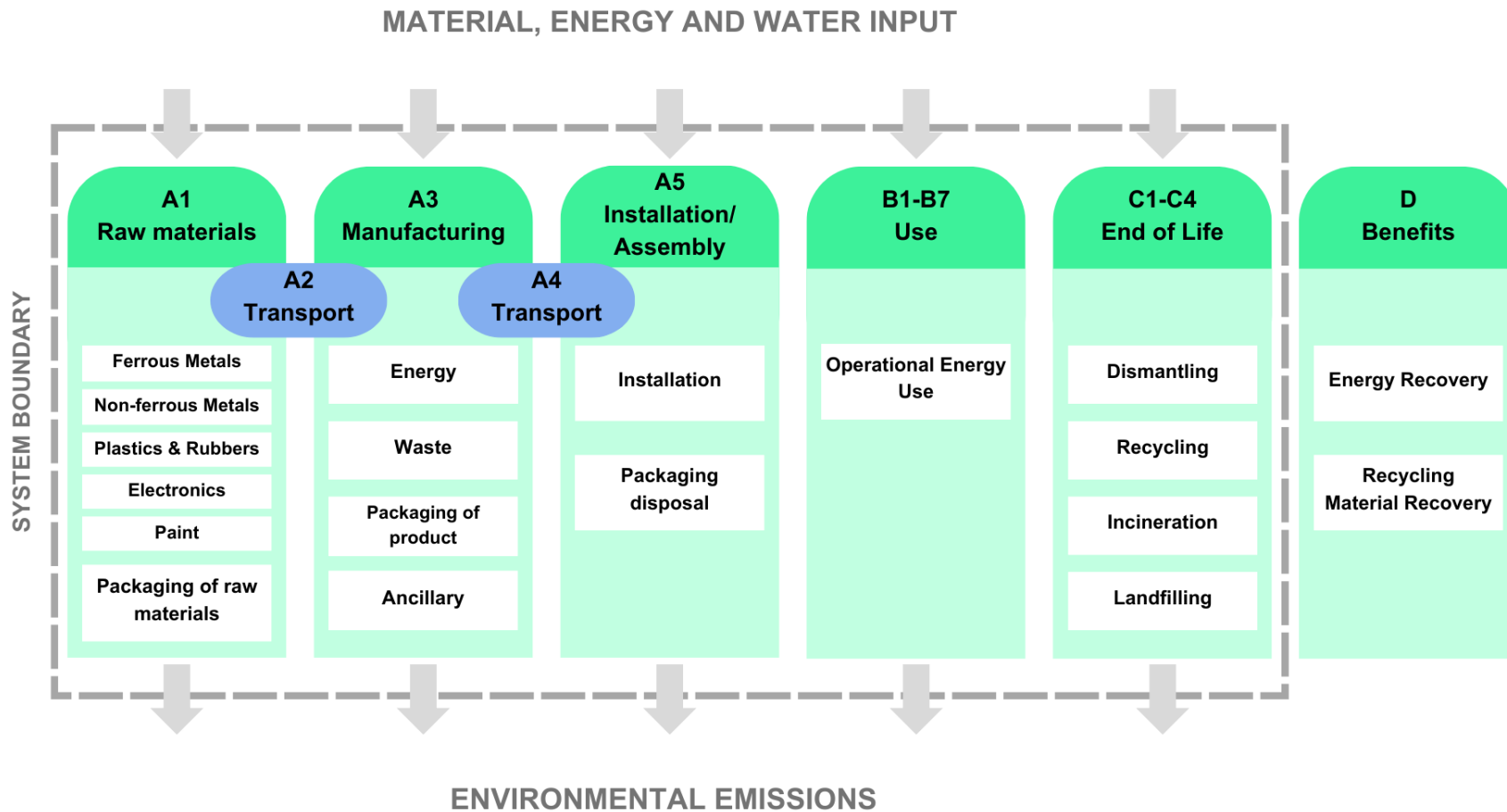
PRODUCT USE AND MAINTENANCE (B1-B7)

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 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.

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	9.50E+01	1.39E+00	2.78E+00	9.92E+01	3.97E-01	1.26E+00	ND	ND	ND	ND	ND	2.06E+03	ND	0.00E+00	3.33E-01	1.50E+00	3.98E-01	-2.03E+01
GWP – fossil	kg CO ₂ e	9.56E+01	1.39E+00	2.57E+00	9.95E+01	3.97E-01	5.31E-02	ND	ND	ND	ND	ND	2.05E+03	ND	0.00E+00	3.33E-01	1.50E+00	9.45E-01	-2.03E+01
GWP – biogenic	kg CO ₂ e	-7.25E-01	2.46E-04	1.85E-01	-5.40E-01	9.00E-05	1.21E+00	ND	ND	ND	ND	ND	4.60E+00	ND	0.00E+00	7.27E-05	-5.83E-04	-5.47E-01	-6.04E-03
GWP – LULUC	kg CO ₂ e	1.49E-01	7.12E-04	2.74E-02	1.77E-01	1.78E-04	1.93E-05	ND	ND	ND	ND	ND	6.30E+00	ND	0.00E+00	1.47E-04	2.23E-04	1.37E-04	-6.40E-03
Ozone depletion pot.	kg CFC-11e	1.29E-06	2.01E-08	7.23E-08	1.39E-06	5.86E-09	7.19E-10	ND	ND	ND	ND	ND	3.78E-05	ND	0.00E+00	4.66E-09	2.33E-09	1.97E-09	-7.85E-08
Acidification potential	mol H ⁺ e	6.45E-01	3.00E-02	7.49E-03	6.83E-01	1.35E-03	3.11E-04	ND	ND	ND	ND	ND	1.21E+01	ND	0.00E+00	1.11E-03	2.10E-03	8.32E-04	-2.23E-01
EP-freshwater ²⁾	kg Pe	4.10E-02	6.27E-05	5.96E-04	4.16E-02	3.09E-05	5.26E-06	ND	ND	ND	ND	ND	1.91E+00	ND	0.00E+00	2.59E-05	9.67E-05	9.79E-05	-1.20E-02
EP-marine	kg Ne	1.04E-01	7.59E-03	3.35E-03	1.15E-01	4.45E-04	1.45E-04	ND	ND	ND	ND	ND	1.89E+00	ND	0.00E+00	3.60E-04	5.70E-04	2.45E-03	-2.62E-02
EP-terrestrial	mol Ne	1.08E+00	8.42E-02	2.23E-02	1.19E+00	4.84E-03	1.32E-03	ND	ND	ND	ND	ND	1.70E+01	ND	0.00E+00	3.91E-03	5.94E-03	3.40E-03	-2.73E-01
POCP (“smog”) ³⁾	kg NMVOCe	3.67E-01	2.35E-02	8.27E-03	3.99E-01	2.00E-03	3.77E-04	ND	ND	ND	ND	ND	5.59E+00	ND	0.00E+00	1.55E-03	1.69E-03	1.20E-03	-8.22E-02
ADP-minerals & metals ⁴⁾	kg Sbe	3.66E-03	2.10E-06	6.89E-06	3.67E-03	1.11E-06	1.56E-07	ND	ND	ND	ND	ND	2.77E-02	ND	0.00E+00	1.09E-06	9.73E-06	2.87E-07	-4.96E-04
ADP-fossil resources	MJ	1.13E+03	1.79E+01	2.76E+01	1.18E+03	5.76E+00	5.41E-01	ND	ND	ND	ND	ND	4.78E+04	ND	0.00E+00	4.67E+00	2.31E+00	1.70E+00	-2.08E+02
Water use ⁵⁾	m ³ e depr.	2.84E+01	6.29E-02	6.37E-01	2.91E+01	2.85E-02	6.27E-02	ND	ND	ND	ND	ND	1.30E+03	ND	0.00E+00	2.17E-02	1.20E-01	6.82E-02	-1.84E+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	7.20E-06	7.02E-08	1.32E-07	7.40E-06	3.98E-08	3.88E-09	ND	ND	ND	ND	ND	4.30E-05	ND	0.00E+00	2.64E-08	2.64E-08	1.28E-08	-1.10E-06
Ionizing radiation ⁶⁾	kBq U235e	4.49E+00	1.06E-02	6.99E-02	4.57E+00	5.02E-03	6.56E-04	ND	ND	ND	ND	ND	1.32E+03	ND	0.00E+00	3.78E-03	8.49E-03	2.92E-03	-1.23E+00
Ecotoxicity (freshwater)	CTUe	8.70E+02	1.73E+00	9.49E+00	8.81E+02	8.15E-01	1.50E+00	ND	ND	ND	ND	ND	7.28E+03	ND	0.00E+00	7.39E-01	3.76E+00	2.34E+02	-6.31E+01
Human toxicity, cancer	CTUh	7.92E-08	2.75E-10	9.17E-10	8.04E-08	6.56E-11	7.22E-11	ND	ND	ND	ND	ND	6.94E-07	ND	0.00E+00	5.66E-11	2.46E-10	3.06E-10	-9.59E-09
Human tox. non-cancer	CTUh	2.39E-06	6.78E-09	2.49E-08	2.42E-06	3.73E-09	2.95E-09	ND	ND	ND	ND	ND	3.60E-05	ND	0.00E+00	2.92E-09	1.25E-08	1.39E-08	-4.92E-07
SQP ⁷⁾	-	5.07E+02	6.97E+00	6.87E+01	5.82E+02	5.80E+00	2.65E-01	ND	ND	ND	ND	ND	1.06E+04	ND	0.00E+00	2.79E+00	3.77E+00	2.41E+00	-4.53E+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	1.19E+02	1.73E-01	-6.23E-01	1.18E+02	7.90E-02	-1.48E+01	ND	ND	ND	ND	ND	1.31E+04	ND	0.00E+00	6.40E-02	3.25E-01	-1.01E+01	-6.91E+00
Renew. PER as material	MJ	1.31E+01	0.00E+00	-2.31E+00	1.07E+01	0.00E+00	-1.07E+01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-1.23E-02	-5.04E-02	0.00E+00
Total use of renew. PER	MJ	1.32E+02	1.73E-01	-2.93E+00	1.29E+02	7.90E-02	-2.55E+01	ND	ND	ND	ND	ND	1.31E+04	ND	0.00E+00	6.40E-02	3.12E-01	-1.02E+01	-6.91E+00
Non-re. PER as energy	MJ	1.08E+03	1.79E+01	1.62E+01	1.11E+03	5.76E+00	5.29E-01	ND	ND	ND	ND	ND	4.78E+04	ND	0.00E+00	4.67E+00	-1.79E+01	-2.57E+01	-2.08E+02
Non-re. PER as material	MJ	5.22E+01	0.00E+00	-1.15E+01	4.07E+01	0.00E+00	-1.09E-01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-1.45E+01	-2.61E+01	0.00E+00
Total use of non-re. PER	MJ	1.13E+03	1.79E+01	4.73E+00	1.15E+03	5.76E+00	4.20E-01	ND	ND	ND	ND	ND	4.78E+04	ND	0.00E+00	4.67E+00	-3.24E+01	-5.19E+01	-2.08E+02
Secondary materials	kg	7.23E+00	0.00E+00	0.00E+00	7.23E+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	2.11E-01	4.48E-05	8.82E-02	2.99E-01	3.12E-05	6.74E-06	ND	ND	ND	ND	ND	6.30E-02	ND	0.00E+00	2.67E-05	1.13E-04	2.23E-05	-7.16E-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	4.47E-01	1.70E-03	1.37E-02	4.63E-01	8.52E-04	1.02E-03	ND	ND	ND	ND	ND	4.13E+01	ND	0.00E+00	6.19E-04	2.25E-03	-9.12E-03	-7.88E-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	1.64E+01	2.59E-02	1.24E-01	1.66E+01	9.76E-03	1.65E-02	ND	ND	ND	ND	ND	1.21E+02	ND	0.00E+00	8.14E-03	3.86E-02	3.91E-02	-4.02E+00
Non-hazardous waste	kg	3.59E+02	4.01E-01	6.72E+00	3.66E+02	1.81E-01	8.92E-01	ND	ND	ND	ND	ND	9.35E+03	ND	0.00E+00	1.53E-01	1.25E+00	1.74E+01	-4.41E+01
Radioactive waste	kg	1.12E-03	2.58E-06	1.66E-05	1.14E-03	1.23E-06	1.64E-07	ND	ND	ND	ND	ND	3.39E-01	ND	0.00E+00	9.26E-07	2.09E-06	7.17E-07	-2.97E-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	1.17E-01	1.17E-01	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	6.30E+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	6.35E+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	2.67E+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	3.67E+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	9.57E+01	1.38E+00	2.68E+00	9.98E+01	3.95E-01	5.27E-02	ND	ND	ND	ND	ND	2.05E+03	ND	0.00E+00	3.31E-01	1.50E+00	1.51E+00	-2.02E+01
Ozone depletion Pot.	kg CFC-11e	1.28E-06	1.60E-08	6.71E-08	1.36E-06	4.68E-09	6.12E-10	ND	ND	ND	ND	ND	3.16E-05	ND	0.00E+00	3.72E-09	1.96E-09	1.60E-09	-7.23E-08
Acidification	kg SO ₂ e	5.42E-01	2.39E-02	5.27E-03	5.71E-01	1.03E-03	2.29E-04	ND	ND	ND	ND	ND	1.03E+01	ND	0.00E+00	8.50E-04	1.66E-03	6.09E-04	-1.92E-01
Eutrophication	kg PO ₄ ³ e	1.46E-01	2.77E-03	3.32E-03	1.52E-01	2.52E-04	7.10E-05	ND	ND	ND	ND	ND	1.33E+00	ND	0.00E+00	2.07E-04	2.83E-04	1.19E-03	-1.19E-02
POCP ("smog")	kg C ₂ H ₄ e	4.34E-02	1.23E-03	6.19E-04	4.52E-02	9.22E-05	1.74E-05	ND	ND	ND	ND	ND	5.60E-01	ND	0.00E+00	7.61E-05	9.96E-05	1.77E-04	-1.10E-02
ADP-elements	kg Sbe	3.64E-03	2.06E-06	6.68E-06	3.65E-03	1.08E-06	1.30E-07	ND	ND	ND	ND	ND	2.76E-02	ND	0.00E+00	1.07E-06	9.68E-06	2.63E-07	-4.94E-04
ADP-fossil	MJ	1.06E+03	1.78E+01	2.65E+01	1.10E+03	5.68E+00	5.31E-01	ND	ND	ND	ND	ND	2.45E+04	ND	0.00E+00	4.61E+00	2.18E+00	1.66E+00	-1.88E+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	9.57E+01	1.39E+00	2.59E+00	9.97E+01	3.97E-01	5.31E-02	ND	ND	ND	ND	ND	2.06E+03	ND	0.00E+00	3.33E-01	1.50E+00	9.45E-01	-2.03E+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	3.05E+00	4.46E-02	8.93E-02	3.19E+00	1.28E-02	4.06E-02	ND	ND	ND	ND	ND	6.63E+01	ND	0.00E+00	1.07E-02	4.81E-02	1.28E-02	-6.54E-01
GWP – fossil	kg CO ₂ éq/FU	3.07E+00	4.46E-02	8.25E-02	3.20E+00	1.28E-02	1.71E-03	ND	ND	ND	ND	ND	6.60E+01	ND	0.00E+00	1.07E-02	4.81E-02	3.04E-02	-6.53E-01
GWP – biogenic	kg CO ₂ éq/FU	-2.33E-02	7.89E-06	5.94E-03	-1.74E-02	2.89E-06	3.88E-02	ND	ND	ND	ND	ND	1.48E-01	ND	0.00E+00	2.34E-06	-1.87E-05	-1.76E-02	-1.94E-04
GWP – LULUC	kg CO ₂ éq/FU	4.78E-03	2.29E-05	8.82E-04	5.68E-03	5.71E-06	6.21E-07	ND	ND	ND	ND	ND	2.03E-01	ND	0.00E+00	4.74E-06	7.18E-06	4.40E-06	-2.06E-04
Ozone depletion pot.	kg CFC-11e/FU	4.16E-08	6.46E-10	2.33E-09	4.46E-08	1.88E-10	2.31E-11	ND	ND	ND	ND	ND	1.22E-06	ND	0.00E+00	1.50E-10	7.48E-11	6.32E-11	-2.52E-09
Acidification potential	mole H ⁺ e/FU	2.07E-02	9.66E-04	2.41E-04	2.19E-02	4.35E-05	1.00E-05	ND	ND	ND	ND	ND	3.88E-01	ND	0.00E+00	3.57E-05	6.74E-05	2.67E-05	-7.16E-03
EP-freshwater ²⁾	kg Pe/FU	1.32E-03	2.02E-06	1.91E-05	1.34E-03	9.94E-07	1.69E-07	ND	ND	ND	ND	ND	6.14E-02	ND	0.00E+00	8.32E-07	3.11E-06	3.15E-06	-3.85E-04
EP-marine	kg Ne/FU	3.34E-03	2.44E-04	1.08E-04	3.69E-03	1.43E-05	4.67E-06	ND	ND	ND	ND	ND	6.09E-02	ND	0.00E+00	1.16E-05	1.83E-05	7.87E-05	-8.43E-04
EP-terrestrial	mol Ne/FU	3.47E-02	2.71E-03	7.16E-04	3.81E-02	1.56E-04	4.26E-05	ND	ND	ND	ND	ND	5.45E-01	ND	0.00E+00	1.26E-04	1.91E-04	1.09E-04	-8.79E-03
POCP (“smog”) ³⁾	kg NMVOCe/	1.18E-02	7.56E-04	2.66E-04	1.28E-02	6.42E-05	1.21E-05	ND	ND	ND	ND	ND	1.80E-01	ND	0.00E+00	4.97E-05	5.43E-05	3.86E-05	-2.64E-03
ADP-minerals & metals ⁴⁾	kg Sbe/FU	1.18E-04	6.76E-08	2.21E-07	1.18E-04	3.56E-08	5.01E-09	ND	ND	ND	ND	ND	8.91E-04	ND	0.00E+00	3.51E-08	3.13E-07	9.24E-09	-1.59E-05
ADP-fossil resources	MJ/FU	3.65E+01	5.76E-01	8.88E-01	3.79E+01	1.85E-01	1.74E-02	ND	ND	ND	ND	ND	1.54E+03	ND	0.00E+00	1.50E-01	7.44E-02	5.48E-02	-6.69E+00
Water use ⁵⁾	m ³ e priv. /FU	9.12E-01	2.02E-03	2.05E-02	9.34E-01	9.15E-04	2.01E-03	ND	ND	ND	ND	ND	4.18E+01	ND	0.00E+00	6.97E-04	3.85E-03	2.19E-03	-5.91E-02

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	2.31E-07	2.26E-09	4.23E-09	2.38E-07	1.28E-09	1.25E-10	ND	ND	ND	ND	ND	1.38E-06	ND	0.00E+00	8.49E-10	8.50E-10	4.13E-10	-3.55E-08
Ionizing radiation ⁶⁾	kBq U235e/FU	1.44E-01	3.40E-04	2.25E-03	1.47E-01	1.61E-04	2.11E-05	ND	ND	ND	ND	ND	4.24E+01	ND	0.00E+00	1.22E-04	2.73E-04	9.38E-05	-3.96E-02
Ecotoxicity (freshwater)	CTUe/FU	2.80E+01	5.55E-02	3.05E-01	2.83E+01	2.62E-02	4.82E-02	ND	ND	ND	ND	ND	2.34E+02	ND	0.00E+00	2.37E-02	1.21E-01	7.51E+00	-2.03E+00
Human toxicity, cancer	CTUh/FU	2.55E-09	8.83E-12	2.95E-11	2.58E-09	2.11E-12	2.32E-12	ND	ND	ND	ND	ND	2.23E-08	ND	0.00E+00	1.82E-12	7.92E-12	9.83E-12	-3.08E-10
Human tox. non-cancer	CTUh/FU	7.69E-08	2.18E-10	8.02E-10	7.79E-08	1.20E-10	9.47E-11	ND	ND	ND	ND	ND	1.16E-06	ND	0.00E+00	9.40E-11	4.03E-10	4.48E-10	-1.58E-08
SQP ⁷⁾	-/FU	1.63E+01	2.24E-01	2.21E+00	1.87E+01	1.87E-01	8.52E-03	ND	ND	ND	ND	ND	3.42E+02	ND	0.00E+00	8.97E-02	1.21E-01	7.74E-02	-1.46E+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	3.81E+00	5.57E-03	-2.00E-02	3.80E+00	2.54E-03	-4.76E-01	ND	ND	ND	ND	ND	4.21E+02	ND	0.00E+00	2.06E-03	1.04E-02	-3.26E-01	-2.22E-01
Renew. PER as material	MJ/FU	4.20E-01	0.00E+00	-7.41E-02	3.45E-01	0.00E+00	-3.43E-01	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-3.96E-04	-1.62E-03	0.00E+00
Total use of renew. PER	MJ/FU	4.23E+00	5.57E-03	-9.42E-02	4.14E+00	2.54E-03	-8.20E-01	ND	ND	ND	ND	ND	4.21E+02	ND	0.00E+00	2.06E-03	1.00E-02	-3.28E-01	-2.22E-01
Non-re. PER as energy	MJ/FU	3.46E+01	5.76E-01	5.22E-01	3.57E+01	1.85E-01	1.70E-02	ND	ND	ND	ND	ND	1.54E+03	ND	0.00E+00	1.50E-01	-5.76E-01	-8.28E-01	-6.69E+00
Non-re. PER as material	MJ/FU	1.68E+00	0.00E+00	-3.70E-01	1.31E+00	0.00E+00	-3.51E-03	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	-4.65E-01	-8.39E-01	0.00E+00
Total use of non-re. PER	MJ/FU	3.62E+01	5.76E-01	1.52E-01	3.70E+01	1.85E-01	1.35E-02	ND	ND	ND	ND	ND	1.54E+03	ND	0.00E+00	1.50E-01	-1.04E+00	-1.67E+00	-6.69E+00
Secondary materials	kg/FU	2.32E-01	0.00E+00	0.00E+00	2.32E-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	6.78E-03	1.44E-06	2.83E-03	9.62E-03	1.00E-06	2.17E-07	ND	ND	ND	ND	ND	2.03E-03	ND	0.00E+00	8.59E-07	3.64E-06	7.18E-07	-2.30E-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	1.44E-02	5.45E-05	4.42E-04	1.49E-02	2.74E-05	3.27E-05	ND	ND	ND	ND	ND	1.33E+00	ND	0.00E+00	1.99E-05	7.25E-05	-2.93E-04	-2.53E-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	5.29E-01	8.34E-04	3.99E-03	5.34E-01	3.14E-04	5.30E-04	ND	ND	ND	ND	ND	3.88E+00	ND	0.00E+00	2.62E-04	1.24E-03	1.26E-03	-1.29E-01
Non-hazardous waste	kg/FU	1.15E+01	1.29E-02	2.16E-01	1.18E+01	5.81E-03	2.87E-02	ND	ND	ND	ND	ND	3.00E+02	ND	0.00E+00	4.91E-03	4.00E-02	5.61E-01	-1.42E+00
Radioactive waste	kg/FU	3.59E-05	8.31E-08	5.34E-07	3.65E-05	3.95E-08	5.28E-09	ND	ND	ND	ND	ND	1.09E-02	ND	0.00E+00	2.98E-08	6.72E-08	2.30E-08	-9.56E-06

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	3.75E-03	3.75E-03	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	0.00E+00	ND	0.00E+00	0.00E+00	2.03E-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	2.04E-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	8.59E-02	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	1.18E-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	3.08E+00	4.44E-02	8.60E-02	3.21E+00	1.27E-02	1.69E-03	ND	ND	ND	ND	ND	6.60E+01	ND	0.00E+00	1.06E-02	4.81E-02	4.85E-02	-6.49E-01
Ozone depletion Pot.	kg CFC ₁₁ /FU	4.12E-08	5.13E-10	2.16E-09	4.39E-08	1.50E-10	1.97E-11	ND	ND	ND	ND	ND	1.02E-06	ND	0.00E+00	1.20E-10	6.29E-11	5.15E-11	-2.32E-09
Acidification	kg SO ₂ e/FU	1.74E-02	7.70E-04	1.69E-04	1.84E-02	3.32E-05	7.35E-06	ND	ND	ND	ND	ND	3.31E-01	ND	0.00E+00	2.73E-05	5.33E-05	1.96E-05	-6.17E-03
Eutrophication	kg PO ₄ ³ e/FU	4.70E-03	8.91E-05	1.07E-04	4.89E-03	8.10E-06	2.28E-06	ND	ND	ND	ND	ND	4.28E-02	ND	0.00E+00	6.65E-06	9.10E-06	3.83E-05	-3.82E-04
POCP ("smog")	kg C ₂ H ₄ e/FU	1.39E-03	3.95E-05	1.99E-05	1.45E-03	2.96E-06	5.60E-07	ND	ND	ND	ND	ND	1.80E-02	ND	0.00E+00	2.45E-06	3.20E-06	5.70E-06	-3.53E-04
ADP-elements	kg Sbe/FU	1.17E-04	6.63E-08	2.15E-07	1.17E-04	3.47E-08	4.18E-09	ND	ND	ND	ND	ND	8.88E-04	ND	0.00E+00	3.43E-08	3.11E-07	8.44E-09	-1.59E-05
ADP-fossil	MJ/FU	3.41E+01	5.71E-01	8.51E-01	3.55E+01	1.83E-01	1.71E-02	ND	ND	ND	ND	ND	7.88E+02	ND	0.00E+00	1.48E-01	7.01E-02	5.33E-02	-6.05E+00

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	3.08E+00	4.46E-02	8.33E-02	3.21E+00	1.28E-02	1.71E-03	ND	ND	ND	ND	ND	6.62E+01	ND	0.00E+00	1.07E-02	4.82E-02	3.04E-02	-6.53E-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.

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, 0.8 kg
2. Market for printed paper, offset, 0.0347 kg
3. Market for packaging film, low density polyethylene, 3.3E-4 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, 6270.0 kWh

TRANSPORT SCENARIO DOCUMENTATION - A4

Scenario parameter	Value
Capacity utilization (including empty return) %	50 %
Bulk density of transported products / kg/m ³	275
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	62.7
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	11.312
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	6.3
Recovery process – kg for energy recovery	0
Disposal (total) – kg for final deposition	4.5
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	8074.75	71.38
Copper	60.10	0.53
Glass	486.00	4.30
Other Plastics	83.60	0.74
PA - Polyamide (Nylon)	55.10	0.49
Paint	405.85	3.59
Printing Paper	2.00	0.02
PC - Polycarbonate	679.82	6.01
PCB Alu	83.69	0.74
PCB Copper	141.43	1.25
PCB Iron	131.24	1.16
PCB Support	173.04	1.53

PCB Tin	7.76	0.07
PMMA - Polymethyl Methacrylate	132.00	1.17
PVC - Polyvinyl Chloride	60.95	0.54
Silicone	198.74	1.76
Silica Sand	258.90	2.29
Stainless Steel	97.51	0.86
Steel	178.99	1.58
Tin	0.87	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	BGP502	BGP502 LED12-4S/730 DM32	1066	8.1	131.6	0.129	0.129	0.097	0.097	0.071	266.5	199.9	199.9	146.6
2	BGP502	BGP502 LED14-4S/730 DM32	1242	9.7	128.0	0.155	0.155	0.116	0.116	0.085	319.1	239.3	239.3	175.5
3	BGP502	BGP502 LED18-4S/730 DM32	1599	11.6	137.8	0.185	0.185	0.139	0.139	0.102	381.6	286.2	286.2	209.9
4	BGP502	BGP502 LED24/730 DM32P	2245	13.9	161.5	0.222	0.222	0.166	0.166	0.122	457.3	343.0	343.0	251.5
5	BGP502	BGP502 LED24-4S/730 DM32	2132	14.9	143.1	0.238	0.238	0.178	0.178	0.131	490.2	367.7	367.7	269.6
6	BGP502	BGP502 LED30/730 DM32P	2806	16.7	168.0	0.266	0.266	0.200	0.200	0.146	549.4	412.1	412.1	302.2
7	BGP502	BGP502 LED30-4S/730 DM32	2665	18.5	144.1	0.295	0.295	0.221	0.221	0.162	608.7	456.5	456.5	334.8
8	BGP502	BGP502 LED35/730 DM32P	3214	20.0	160.7	0.319	0.319	0.239	0.239	0.175	658.0	493.5	493.5	361.9

9	BGP502	BGP502 LED35-4S/730 DM32	3109	21.9	142.0	0.349	0.349	0.262	0.262	0.192	720.5	540.4	540.4	396.3
10	BGP502	BGP502 LED40-4S/730 DM32	3549	24.6	144.3	0.392	0.392	0.294	0.294	0.216	809.3	607.0	607.0	445.1
11	BGP502	BGP502 LED50/730 DM32P	4667	26.6	175.5	0.424	0.424	0.318	0.318	0.233	875.1	656.4	656.4	481.3
12	BGP502	BGP502 LED50/730 DM32P	4587	27.8	165.0	0.443	0.443	0.333	0.333	0.244	914.6	686.0	686.0	503.0
13	BGP502	BGP502 LED50-4S/730 DM32	4437	29.6	149.9	0.472	0.472	0.354	0.354	0.260	973.8	730.4	730.4	535.6
14	BGP502	BGP502 LED50-4S/730 DM32	4423	31.0	142.7	0.494	0.494	0.371	0.371	0.272	1019.9	764.9	764.9	560.9
15	BGP502	BGP502 LED60/730 DM32P	5504	32.7	168.3	0.522	0.522	0.391	0.391	0.287	1075.8	806.9	806.9	591.7
16	BGP502	BGP502 LED55-4S/730 DM32	4846	34.3	141.3	0.547	0.547	0.410	0.410	0.301	1128.5	846.4	846.4	620.7
17	BGP502	BGP502 LED60-4S/730 DM32	5287	36.7	144.1	0.585	0.585	0.439	0.439	0.322	1207.4	905.6	905.6	664.1
18	BGP502	BGP502 LED60-4S/730 DM32	5271	37.7	139.8	0.601	0.601	0.451	0.451	0.331	1240.3	930.2	930.2	682.2
19	BGP502	BGP502 LED65-4S/730 DM32	5710	39.5	144.6	0.630	0.630	0.472	0.472	0.346	1299.6	974.7	974.7	714.8
20	BGP502	BGP502 LED65-4S/730 DM32	5687	41.2	138.0	0.657	0.657	0.493	0.493	0.361	1355.5	1016.6	1016.6	745.5
21	BGP502	BGP502 LED80/730 DM32P	7437	42.1	176.7	0.671	0.671	0.504	0.504	0.369	1385.1	1038.8	1038.8	761.8
22	BGP502	BGP502 LED85/730 DM32P	7774	44.2	175.9	0.705	0.705	0.529	0.529	0.388	1454.2	1090.6	1090.6	799.8
23	BGP502	BGP502 LED80-4S/730 DM32	6939	45.8	151.5	0.730	0.730	0.548	0.548	0.402	1506.8	1130.1	1130.1	828.8

24	BGP502	BGP502 LED80-4S/730 DM32	7020	47.7	147.2	0.761	0.761	0.571	0.571	0.418	1569.3	1177.0	1177.0	863.1
25	BGP502	BGP502 LED80-4S/730 DM32	6956	48.8	142.5	0.778	0.778	0.584	0.584	0.428	1605.5	1204.1	1204.1	883.0
26	BGP502	BGP502 LED95/730 DM32P	8796	51.5	170.8	0.821	0.821	0.616	0.616	0.452	1694.4	1270.8	1270.8	931.9
27	BGP502	BGP502 LED85-4S/730 DM32	7353	52.2	140.9	0.833	0.833	0.624	0.624	0.458	1717.4	1288.0	1288.0	944.6
28	BGP502	BGP502 LED95-4S/730 DM32	8215	54.5	150.7	0.869	0.869	0.652	0.652	0.478	1793.1	1344.8	1344.8	986.2
29	BGP502	BGP502 LED110/730 DM32P	10010	57.4	174.4	0.915	0.915	0.687	0.687	0.504	1888.5	1416.3	1416.3	1038.7
30	BGP502	BGP502 LED110/730 DM32P	10144	59.7	169.9	0.952	0.952	0.714	0.714	0.524	1964.1	1473.1	1473.1	1080.3
31	<u>BGP502</u>	<u>BGP502 LED120/730 DM32P</u>	<u>10887</u>	<u>62.7</u>	173.6	1.000	1.000	0.750	0.750	0.550	2062.8	1547.1	1547.1	1134.6
32	BGP502	BGP502 LED110-4S/730 DM32	9457	66.6	142.0	1.062	1.062	0.797	0.797	0.584	2191.1	1643.4	1643.4	1205.1
33	BGP502	BGP502 LED130/730 DM32P	11915	71.1	167.6	1.134	1.134	0.850	0.850	0.624	2339.2	1754.4	1754.4	1286.6
34	BGP502	BGP502 LED130-4S/730 DM32	11128	75.7	147.0	1.207	1.207	0.906	0.906	0.664	2490.5	1867.9	1867.9	1369.8
35	BGP502	BGP502 LED130-4S/730 DM32	10934	80.1	136.5	1.278	1.278	0.958	0.958	0.703	2635.3	1976.5	1976.5	1449.4
36	BGP502	BGP502 LED160/730 DM32P	14442	85.0	169.9	1.356	1.356	1.017	1.017	0.746	2796.5	2097.4	2097.4	1538.1
37	BGP502	BGP502 LED160-4S/730 DM32	13529	95.0	142.4	1.515	1.515	1.136	1.136	0.833	3125.5	2344.1	2344.1	1719.0
38	BGP502	BGP502 LED170-4S/730 DM32	14285	101.8	140.3	1.624	1.624	1.218	1.218	0.893	3349.2	2511.9	2511.9	1842.1

39	BGP502	BGP502 LED8-4S/740 DM32	711	5.7	124.7	0.091	0.091	0.068	0.068	0.050	187.5	140.6	140.6	103.1
40	BGP502	BGP502 LED12-4S/740 DM32	1066	8.0	133.3	0.128	0.128	0.096	0.096	0.070	263.2	197.4	197.4	144.8
41	BGP502	BGP502 LED16-4S/740 DM32	1421	9.8	145.0	0.156	0.156	0.117	0.117	0.086	322.4	241.8	241.8	177.3
42	BGP502	BGP502 LED18-4S/740 DM32	1591	11.7	136.0	0.187	0.187	0.140	0.140	0.103	384.9	288.7	288.7	211.7
43	BGP502	BGP502 LED22-4S/740 DM32	1952	13.4	145.7	0.214	0.214	0.160	0.160	0.118	440.9	330.6	330.6	242.5
44	BGP502	BGP502 LED27/740 DM32P	2525	14.6	172.9	0.233	0.233	0.175	0.175	0.128	480.3	360.3	360.3	264.2
45	BGP502	BGP502 LED30/740 DM32P	2806	15.9	176.5	0.254	0.254	0.190	0.190	0.139	523.1	392.3	392.3	287.7
46	BGP502	BGP502 LED35/740 DM32P	3270	18.3	178.7	0.292	0.292	0.219	0.219	0.161	602.1	451.6	451.6	331.1
47	BGP502	BGP502 LED40/740 DM32P	3737	20.5	182.3	0.327	0.327	0.245	0.245	0.180	674.5	505.8	505.8	370.9
48	BGP502	BGP502 LED45/740 DM32P	4200	23.0	182.6	0.367	0.367	0.275	0.275	0.202	756.7	567.5	567.5	416.2
49	BGP502	BGP502 LED45/740 DM32P	4132	24.1	171.5	0.384	0.384	0.288	0.288	0.211	792.9	594.7	594.7	436.1
50	BGP502	BGP502 LED45-4S/740 DM32	3993	26.4	151.3	0.421	0.421	0.316	0.316	0.232	868.6	651.4	651.4	477.7
51	BGP502	BGP502 LED50-4S/740 DM32	4441	27.9	159.2	0.445	0.445	0.334	0.334	0.245	917.9	688.4	688.4	504.9
52	BGP502	BGP502 LED50-4S/740 DM32	4428	29.2	151.6	0.466	0.466	0.349	0.349	0.256	960.7	720.5	720.5	528.4
53	BGP502	BGP502 LED60/740 DM32P	5504	31.2	176.4	0.498	0.498	0.373	0.373	0.274	1026.5	769.9	769.9	564.6

54	BGP502	BGP502 LED65/740 DM32P	6061	32.5	186.5	0.518	0.518	0.389	0.389	0.285	1069.3	801.9	801.9	588.1
55	BGP502	BGP502 LED60-4S/740 DM32	5292	34.8	152.1	0.555	0.555	0.416	0.416	0.305	1144.9	858.7	858.7	629.7
56	BGP502	BGP502 LED70/740 DM32P	6415	35.8	179.2	0.571	0.571	0.428	0.428	0.314	1177.8	883.4	883.4	647.8
57	BGP502	BGP502 LED75/740 DM32P	6987	37.5	186.3	0.598	0.598	0.449	0.449	0.329	1233.8	925.3	925.3	678.6
58	BGP502	BGP502 LED70-4S/740 DM32	6180	39.0	158.5	0.622	0.622	0.467	0.467	0.342	1283.1	962.3	962.3	705.7
59	BGP502	BGP502 LED70-4S/740 DM32	6143	40.0	153.6	0.638	0.638	0.478	0.478	0.351	1316.0	987.0	987.0	723.8
60	BGP502	BGP502 LED75-4S/740 DM32	6608	41.9	157.7	0.668	0.668	0.501	0.501	0.368	1378.5	1033.9	1033.9	758.2
61	BGP502	BGP502 LED75-4S/740 DM32	6562	42.6	154.0	0.679	0.679	0.510	0.510	0.374	1401.5	1051.2	1051.2	770.8
62	BGP502	BGP502 LED80-4S/740 DM32	7035	44.8	157.0	0.715	0.715	0.536	0.536	0.393	1473.9	1105.4	1105.4	810.7
63	BGP502	BGP502 LED90/740 DM32P	8350	46.4	180.0	0.740	0.740	0.555	0.555	0.407	1526.6	1144.9	1144.9	839.6
64	BGP502	BGP502 LED90-4S/740 DM32	7798	48.6	160.5	0.775	0.775	0.581	0.581	0.426	1598.9	1199.2	1199.2	879.4
65	BGP502	BGP502 LED100/740 DM32P	9128	49.5	184.4	0.789	0.789	0.592	0.592	0.434	1628.6	1221.4	1221.4	895.7
66	BGP502	BGP502 LED100/740 DM32P	9259	51.5	179.8	0.821	0.821	0.616	0.616	0.452	1694.4	1270.8	1270.8	931.9
67	BGP502	BGP502 LED100-4S/740 DM32	8647	54.1	159.8	0.863	0.863	0.647	0.647	0.475	1779.9	1334.9	1334.9	978.9
68	BGP502	BGP502 LED100-4S/740 DM32	8704	56.5	154.1	0.901	0.901	0.676	0.676	0.496	1858.9	1394.1	1394.1	1022.4

69	BGP502	BGP502 LED120/740 DM32P	10909	59.5	183.3	0.949	0.949	0.712	0.712	0.522	1957.6	1468.2	1468.2	1076.7
70	BGP502	BGP502 LED110-4S/740 DM32	9506	62.3	152.6	0.994	0.994	0.745	0.745	0.546	2049.7	1537.3	1537.3	1127.3
71	BGP502	BGP502 LED120-4S/740 DM32	10324	65.2	158.3	1.040	1.040	0.780	0.780	0.572	2145.1	1608.8	1608.8	1179.8
72	BGP502	BGP502 LED140/740 DM32P	12701	70.1	181.2	1.118	1.118	0.839	0.839	0.615	2306.3	1729.7	1729.7	1268.5
73	BGP502	BGP502 LED130-4S/740 DM32	11038	75.0	147.2	1.196	1.196	0.897	0.897	0.658	2467.5	1850.6	1850.6	1357.1
74	BGP502	BGP502 LED150/740 DM32P	13692	78.4	174.6	1.250	1.250	0.938	0.938	0.688	2579.4	1934.5	1934.5	1418.6
75	BGP502	BGP502 LED150-4S/740 DM32	12788	82.9	154.3	1.322	1.322	0.992	0.992	0.727	2727.4	2045.6	2045.6	1500.1
76	BGP502	BGP502 LED160-4S/740 DM32	13585	88.9	152.8	1.418	1.418	1.063	1.063	0.780	2924.8	2193.6	2193.6	1608.6
77	BGP502	BGP502 LED170-4S/740 DM32	14359	95.1	151.0	1.517	1.517	1.138	1.138	0.834	3128.8	2346.6	2346.6	1720.8
78	BGP502	BGP502 LED6-4S/830 DM32	533	5.3	100.6	0.085	0.085	0.063	0.063	0.046	174.4	130.8	130.8	95.9
79	BGP502	BGP502 LED10-4S/830 DM32	887	8.1	109.5	0.129	0.129	0.097	0.097	0.071	266.5	199.9	199.9	146.6
80	BGP502	BGP502 LED14-4S/830 DM32	1242	10.4	119.4	0.166	0.166	0.124	0.124	0.091	342.2	256.6	256.6	188.2
81	BGP502	BGP502 LED16-4S/830 DM32	1408	12.5	112.6	0.199	0.199	0.150	0.150	0.110	411.3	308.4	308.4	226.2
82	BGP502	BGP502 LED18-4S/830 DM32	1578	14.1	111.9	0.225	0.225	0.169	0.169	0.124	463.9	347.9	347.9	255.1
83	BGP502	BGP502 LED20-4S/830 DM32	1771	14.7	120.5	0.234	0.234	0.176	0.176	0.129	483.6	362.7	362.7	266.0

84	BGP502	BGP502 LED27/830 DM32P	2525	16.3	154.9	0.260	0.260	0.195	0.195	0.143	536.3	402.2	402.2	294.9
85	BGP502	BGP502 LED30/830 DM32P	2803	17.9	156.6	0.285	0.285	0.214	0.214	0.157	588.9	441.7	441.7	323.9
86	BGP502	BGP502 LED35/830 DM32P	3270	20.5	159.5	0.327	0.327	0.245	0.245	0.180	674.5	505.8	505.8	370.9
87	BGP502	BGP502 LED35/830 DM32P	3214	21.5	149.5	0.343	0.343	0.257	0.257	0.189	707.4	530.5	530.5	389.0
88	BGP502	BGP502 LED40/830 DM32P	3673	24.4	150.5	0.389	0.389	0.292	0.292	0.214	802.8	602.1	602.1	441.5
89	BGP502	BGP502 LED45/830 DM32P	4200	26.0	161.5	0.415	0.415	0.311	0.311	0.228	855.4	641.6	641.6	470.5
90	BGP502	BGP502 LED40-4S/830 DM32	3539	28.0	126.4	0.447	0.447	0.335	0.335	0.246	921.2	690.9	690.9	506.7
91	BGP502	BGP502 LED50/830 DM32P	4587	29.8	153.9	0.475	0.475	0.356	0.356	0.261	980.4	735.3	735.3	539.2
92	BGP502	BGP502 LED45-4S/830 DM32	3969	31.5	126.0	0.502	0.502	0.377	0.377	0.276	1036.4	777.3	777.3	570.0
93	BGP502	BGP502 LED50-4S/830 DM32	4423	33.7	131.2	0.537	0.537	0.403	0.403	0.296	1108.7	831.5	831.5	609.8
94	BGP502	BGP502 LED60/830 DM32P	5499	35.1	156.7	0.560	0.560	0.420	0.420	0.308	1154.8	866.1	866.1	635.1
95	BGP502	BGP502 LED55-4S/830 DM32	4856	37.0	131.2	0.590	0.590	0.443	0.443	0.325	1217.3	913.0	913.0	669.5
96	BGP502	BGP502 LED55-4S/830 DM32	4817	39.1	123.2	0.624	0.624	0.468	0.468	0.343	1286.4	964.8	964.8	707.5
97	BGP502	BGP502 LED70/830 DM32P	6415	39.9	160.8	0.636	0.636	0.477	0.477	0.350	1312.7	984.5	984.5	722.0
98	BGP502	BGP502 LED75/830 DM32P	6860	42.2	162.6	0.673	0.673	0.505	0.505	0.370	1388.4	1041.3	1041.3	763.6

99	BGP502	BGP502 LED60-4S/830 DM32	5228	43.0	121.6	0.686	0.686	0.514	0.514	0.377	1414.7	1061.0	1061.0	778.1
100	BGP502	BGP502 LED80/830 DM32P	7309	45.1	162.1	0.719	0.719	0.539	0.539	0.396	1483.8	1112.8	1112.8	816.1

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	BGP502	BGP502 LED12-4S/730 DM32	1066	8.1	131.6	0.129	0.042	0.032	0.032	0.023	87.5	65.6	65.6	48.1
2	BGP502	BGP502 LED14-4S/730 DM32	1242	9.7	128.0	0.155	0.044	0.033	0.033	0.024	89.9	67.4	67.4	49.5
3	BGP502	BGP502 LED18-4S/730 DM32	1599	11.6	137.8	0.185	0.040	0.030	0.030	0.022	83.5	62.7	62.7	45.9
4	BGP502	BGP502 LED24/730 DM32P	2245	13.9	161.5	0.222	0.035	0.026	0.026	0.019	71.3	53.5	53.5	39.2
5	BGP502	BGP502 LED24-4S/730 DM32	2132	14.9	143.1	0.238	0.039	0.029	0.029	0.021	80.5	60.4	60.4	44.3
6	BGP502	BGP502 LED30/730 DM32P	2806	16.7	168.0	0.266	0.033	0.025	0.025	0.018	68.5	51.4	51.4	37.7
7	BGP502	BGP502 LED30-4S/730 DM32	2665	18.5	144.1	0.295	0.039	0.029	0.029	0.021	79.9	60.0	60.0	44.0
8	BGP502	BGP502 LED35/730 DM32P	3214	20.0	160.7	0.3	0.0	0.0	0.0	0.0	71.7	53.7	53.7	39.4
9	BGP502	BGP502 LED35-4S/730 DM32	3109	21.9	142.0	0.3	0.0	0.0	0.0	0.0	81.1	60.8	60.8	44.6
10	BGP502	BGP502 LED40-4S/730 DM32	3549	24.6	144.3	0.4	0.0	0.0	0.0	0.0	79.8	59.9	59.9	43.9
11	BGP502	BGP502 LED50/730 DM32P	4667	26.6	175.5	0.4	0.0	0.0	0.0	0.0	65.6	49.2	49.2	36.1
12	BGP502	BGP502 LED50/730 DM32P	4587	27.8	165.0	0.4	0.0	0.0	0.0	0.0	69.8	52.3	52.3	38.4

13	BGP502	BGP502 LED50-4S/730 DM32	4437	29.6	149.9	0.5	0.0	0.0	0.0	0.0	76.8	57.6	57.6	42.3
14	BGP502	BGP502 LED50-4S/730 DM32	4423	31.0	142.7	0.5	0.0	0.0	0.0	0.0	80.7	60.5	60.5	44.4
15	BGP502	BGP502 LED60/730 DM32P	5504	32.7	168.3	0.5	0.0	0.0	0.0	0.0	68.4	51.3	51.3	37.6
16	BGP502	BGP502 LED55-4S/730 DM32	4846	34.3	141.3	0.5	0.0	0.0	0.0	0.0	81.5	61.1	61.1	44.8
17	BGP502	BGP502 LED60-4S/730 DM32	5287	36.7	144.1	0.6	0.0	0.0	0.0	0.0	79.9	59.9	59.9	44.0
18	BGP502	BGP502 LED60-4S/730 DM32	5271	37.7	139.8	0.6	0.0	0.0	0.0	0.0	82.4	61.8	61.8	45.3
19	BGP502	BGP502 LED65-4S/730 DM32	5710	39.5	144.6	0.6	0.0	0.0	0.0	0.0	79.7	59.7	59.7	43.8
20	BGP502	BGP502 LED65-4S/730 DM32	5687	41.2	138.0	0.7	0.0	0.0	0.0	0.0	83.4	62.6	62.6	45.9
21	BGP502	BGP502 LED80/730 DM32P	7437	42.1	176.7	0.7	0.0	0.0	0.0	0.0	65.2	48.9	48.9	35.9
22	BGP502	BGP502 LED85/730 DM32P	7774	44.2	175.9	0.7	0.0	0.0	0.0	0.0	65.5	49.1	49.1	36.0
23	BGP502	BGP502 LED80-4S/730 DM32	6939	45.8	151.5	0.7	0.0	0.0	0.0	0.0	76.0	57.0	57.0	41.8
24	BGP502	BGP502 LED80-4S/730 DM32	7020	47.7	147.2	0.8	0.0	0.0	0.0	0.0	78.2	58.7	58.7	43.0
25	BGP502	BGP502 LED80-4S/730 DM32	6956	48.8	142.5	0.8	0.0	0.0	0.0	0.0	80.8	60.6	60.6	44.4
26	BGP502	BGP502 LED95/730 DM32P	8796	51.5	170.8	0.8	0.0	0.0	0.0	0.0	67.4	50.6	50.6	37.1
27	BGP502	BGP502 LED85-4S/730 DM32	7353	52.2	140.9	0.8	0.0	0.0	0.0	0.0	81.7	61.3	61.3	45.0

28	BGP502	BGP502 LED95-4S/730 DM32	8215	54.5	150.7	0.9	0.0	0.0	0.0	0.0	76.4	57.3	57.3	42.0
29	BGP502	BGP502 LED110/730 DM32P	10010	57.4	174.4	0.9	0.0	0.0	0.0	0.0	66.0	49.5	49.5	36.3
30	BGP502	BGP502 LED110/730 DM32P	10144	59.7	169.9	1.0	0.0	0.0	0.0	0.0	67.8	50.8	50.8	37.3
31	<u>BGP502</u>	<u>BGP502 LED120/730 DM32P</u>	<u>10887</u>	<u>62.7</u>	173.6	1.0	0.0	0.0	0.0	0.0	66.3	49.7	49.7	36.5
32	BGP502	BGP502 LED110-4S/730 DM32	9457	66.6	142.0	1.1	0.0	0.0	0.0	0.0	81.1	60.8	60.8	44.6
33	BGP502	BGP502 LED130/730 DM32P	11915	71.1	167.6	1.1	0.0	0.0	0.0	0.0	68.7	51.5	51.5	37.8
34	BGP502	BGP502 LED130-4S/730 DM32	11128	75.7	147.0	1.2	0.0	0.0	0.0	0.0	78.3	58.7	58.7	43.1
35	BGP502	BGP502 LED130-4S/730 DM32	10934	80.1	136.5	1.3	0.0	0.0	0.0	0.0	84.4	63.3	63.3	46.4
36	BGP502	BGP502 LED160/730 DM32P	14442	85.0	169.9	1.4	0.0	0.0	0.0	0.0	67.8	50.8	50.8	37.3
37	BGP502	BGP502 LED160-4S/730 DM32	13529	95.0	142.4	1.5	0.0	0.0	0.0	0.0	80.9	60.6	60.6	44.5
38	BGP502	BGP502 LED170-4S/730 DM32	14285	101.8	140.3	1.6	0.0	0.0	0.0	0.0	82.1	61.5	61.5	45.1
39	BGP502	BGP502 LED8-4S/740 DM32	711	5.7	124.7	0.1	0.0	0.0	0.0	0.0	92.3	69.2	69.2	50.8
40	BGP502	BGP502 LED12-4S/740 DM32	1066	8.0	133.3	0.1	0.0	0.0	0.0	0.0	86.4	64.8	64.8	47.5
41	BGP502	BGP502 LED16-4S/740 DM32	1421	9.8	145.0	0.2	0.0	0.0	0.0	0.0	79.4	59.6	59.6	43.7
42	BGP502	BGP502 LED18-4S/740 DM32	1591	11.7	136.0	0.2	0.0	0.0	0.0	0.0	84.7	63.5	63.5	46.6

43	BGP502	BGP502 LED22-4S/740 DM32	1952	13.4	145.7	0.2	0.0	0.0	0.0	0.0	79.0	59.3	59.3	43.5
44	BGP502	BGP502 LED27/740 DM32P	2525	14.6	172.9	0.2	0.0	0.0	0.0	0.0	66.6	49.9	49.9	36.6
45	BGP502	BGP502 LED30/740 DM32P	2806	15.9	176.5	0.3	0.0	0.0	0.0	0.0	65.2	48.9	48.9	35.9
46	BGP502	BGP502 LED35/740 DM32P	3270	18.3	178.7	0.3	0.0	0.0	0.0	0.0	64.4	48.3	48.3	35.4
47	BGP502	BGP502 LED40/740 DM32P	3737	20.5	182.3	0.3	0.0	0.0	0.0	0.0	63.2	47.4	47.4	34.7
48	BGP502	BGP502 LED45/740 DM32P	4200	23.0	182.6	0.4	0.0	0.0	0.0	0.0	63.1	47.3	47.3	34.7
49	BGP502	BGP502 LED45/740 DM32P	4132	24.1	171.5	0.4	0.0	0.0	0.0	0.0	67.2	50.4	50.4	36.9
50	BGP502	BGP502 LED45-4S/740 DM32	3993	26.4	151.3	0.4	0.0	0.0	0.0	0.0	76.1	57.1	57.1	41.9
51	BGP502	BGP502 LED50-4S/740 DM32	4441	27.9	159.2	0.4	0.0	0.0	0.0	0.0	72.3	54.3	54.3	39.8
52	BGP502	BGP502 LED50-4S/740 DM32	4428	29.2	151.6	0.5	0.0	0.0	0.0	0.0	75.9	57.0	57.0	41.8
53	BGP502	BGP502 LED60/740 DM32P	5504	31.2	176.4	0.5	0.0	0.0	0.0	0.0	65.3	49.0	49.0	35.9
54	BGP502	BGP502 LED65/740 DM32P	6061	32.5	186.5	0.5	0.0	0.0	0.0	0.0	61.7	46.3	46.3	34.0
55	BGP502	BGP502 LED60-4S/740 DM32	5292	34.8	152.1	0.6	0.0	0.0	0.0	0.0	75.7	56.8	56.8	41.6
56	BGP502	BGP502 LED70/740 DM32P	6415	35.8	179.2	0.6	0.0	0.0	0.0	0.0	64.3	48.2	48.2	35.3
57	BGP502	BGP502 LED75/740 DM32P	6987	37.5	186.3	0.6	0.0	0.0	0.0	0.0	61.8	46.4	46.4	34.0

58	BGP502	BGP502 LED70-4S/740 DM32	6180	39.0	158.5	0.6	0.0	0.0	0.0	0.0	72.7	54.5	54.5	40.0
59	BGP502	BGP502 LED70-4S/740 DM32	6143	40.0	153.6	0.6	0.0	0.0	0.0	0.0	75.0	56.2	56.2	41.2
60	BGP502	BGP502 LED75-4S/740 DM32	6608	41.9	157.7	0.7	0.0	0.0	0.0	0.0	73.0	54.8	54.8	40.2
61	BGP502	BGP502 LED75-4S/740 DM32	6562	42.6	154.0	0.7	0.0	0.0	0.0	0.0	74.8	56.1	56.1	41.1
62	BGP502	BGP502 LED80-4S/740 DM32	7035	44.8	157.0	0.7	0.0	0.0	0.0	0.0	73.3	55.0	55.0	40.3
63	BGP502	BGP502 LED90/740 DM32P	8350	46.4	180.0	0.7	0.0	0.0	0.0	0.0	64.0	48.0	48.0	35.2
64	BGP502	BGP502 LED90-4S/740 DM32	7798	48.6	160.5	0.8	0.0	0.0	0.0	0.0	71.8	53.8	53.8	39.5
65	BGP502	BGP502 LED100/740 DM32P	9128	49.5	184.4	0.8	0.0	0.0	0.0	0.0	62.4	46.8	46.8	34.3
66	BGP502	BGP502 LED100/740 DM32P	9259	51.5	179.8	0.8	0.0	0.0	0.0	0.0	64.0	48.0	48.0	35.2
67	BGP502	BGP502 LED100-4S/740 DM32	8647	54.1	159.8	0.9	0.0	0.0	0.0	0.0	72.0	54.0	54.0	39.6
68	BGP502	BGP502 LED100-4S/740 DM32	8704	56.5	154.1	0.9	0.0	0.0	0.0	0.0	74.7	56.1	56.1	41.1
69	BGP502	BGP502 LED120/740 DM32P	10909	59.5	183.3	0.9	0.0	0.0	0.0	0.0	62.8	47.1	47.1	34.5
70	BGP502	BGP502 LED110-4S/740 DM32	9506	62.3	152.6	1.0	0.0	0.0	0.0	0.0	75.5	56.6	56.6	41.5
71	BGP502	BGP502 LED120-4S/740 DM32	10324	65.2	158.3	1.0	0.0	0.0	0.0	0.0	72.7	54.5	54.5	40.0
72	BGP502	BGP502 LED140/740 DM32P	12701	70.1	181.2	1.1	0.0	0.0	0.0	0.0	63.6	47.7	47.7	35.0

73	BGP502	BGP502 LED130-4S/740 DM32	11038	75.0	147.2	1.2	0.0	0.0	0.0	0.0	78.2	58.7	58.7	43.0
74	BGP502	BGP502 LED150/740 DM32P	13692	78.4	174.6	1.3	0.0	0.0	0.0	0.0	65.9	49.5	49.5	36.3
75	BGP502	BGP502 LED150-4S/740 DM32	12788	82.9	154.3	1.3	0.0	0.0	0.0	0.0	74.6	56.0	56.0	41.1
76	BGP502	BGP502 LED160-4S/740 DM32	13585	88.9	152.8	1.4	0.0	0.0	0.0	0.0	75.4	56.5	56.5	41.4
77	BGP502	BGP502 LED170-4S/740 DM32	14359	95.1	151.0	1.5	0.0	0.0	0.0	0.0	76.3	57.2	57.2	41.9
78	BGP502	BGP502 LED6-4S/830 DM32	533	5.3	100.6	0.1	0.1	0.0	0.0	0.0	114.5	85.9	85.9	63.0
79	BGP502	BGP502 LED10-4S/830 DM32	887	8.1	109.5	0.1	0.1	0.0	0.0	0.0	105.2	78.9	78.9	57.8
80	BGP502	BGP502 LED14-4S/830 DM32	1242	10.4	119.4	0.2	0.0	0.0	0.0	0.0	96.4	72.3	72.3	53.0
81	BGP502	BGP502 LED16-4S/830 DM32	1408	12.5	112.6	0.2	0.0	0.0	0.0	0.0	102.2	76.7	76.7	56.2
82	BGP502	BGP502 LED18-4S/830 DM32	1578	14.1	111.9	0.2	0.0	0.0	0.0	0.0	102.9	77.2	77.2	56.6
83	BGP502	BGP502 LED20-4S/830 DM32	1771	14.7	120.5	0.2	0.0	0.0	0.0	0.0	95.6	71.7	71.7	52.6
84	BGP502	BGP502 LED27/830 DM32P	2525	16.3	154.9	0.3	0.0	0.0	0.0	0.0	74.3	55.8	55.8	40.9
85	BGP502	BGP502 LED30/830 DM32P	2803	17.9	156.6	0.3	0.0	0.0	0.0	0.0	73.5	55.2	55.2	40.4
86	BGP502	BGP502 LED35/830 DM32P	3270	20.5	159.5	0.3	0.0	0.0	0.0	0.0	72.2	54.1	54.1	39.7
87	BGP502	BGP502 LED35/830 DM32P	3214	21.5	149.5	0.3	0.0	0.0	0.0	0.0	77.0	57.8	57.8	42.4

88	BGP502	BGP502 LED40/830 DM32P	3673	24.4	150.5	0.4	0.0	0.0	0.0	0.0	76.5	57.4	57.4	42.1
89	BGP502	BGP502 LED45/830 DM32P	4200	26.0	161.5	0.4	0.0	0.0	0.0	0.0	71.3	53.5	53.5	39.2
90	BGP502	BGP502 LED40-4S/830 DM32	3539	28.0	126.4	0.4	0.0	0.0	0.0	0.0	91.1	68.3	68.3	50.1
91	BGP502	BGP502 LED50/830 DM32P	4587	29.8	153.9	0.5	0.0	0.0	0.0	0.0	74.8	56.1	56.1	41.1
92	BGP502	BGP502 LED45-4S/830 DM32	3969	31.5	126.0	0.5	0.0	0.0	0.0	0.0	91.4	68.5	68.5	50.3
93	BGP502	BGP502 LED50-4S/830 DM32	4423	33.7	131.2	0.5	0.0	0.0	0.0	0.0	87.7	65.8	65.8	48.3
94	BGP502	BGP502 LED60/830 DM32P	5499	35.1	156.7	0.6	0.0	0.0	0.0	0.0	73.5	55.1	55.1	40.4
95	BGP502	BGP502 LED55-4S/830 DM32	4856	37.0	131.2	0.6	0.0	0.0	0.0	0.0	87.7	65.8	65.8	48.3
96	BGP502	BGP502 LED55-4S/830 DM32	4817	39.1	123.2	0.6	0.0	0.0	0.0	0.0	93.5	70.1	70.1	51.4
97	BGP502	BGP502 LED70/830 DM32P	6415	39.9	160.8	0.6	0.0	0.0	0.0	0.0	71.6	53.7	53.7	39.4
98	BGP502	BGP502 LED75/830 DM32P	6860	42.2	162.6	0.7	0.0	0.0	0.0	0.0	70.8	53.1	53.1	39.0
99	BGP502	BGP502 LED60-4S/830 DM32	5228	43.0	121.6	0.7	0.0	0.0	0.0	0.0	94.7	71.0	71.0	52.1
100	BGP502	BGP502 LED80/830 DM32P	7309	45.1	162.1	0.7	0.0	0.0	0.0	0.0	71.1	53.3	53.3	39.1

