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ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

EPD HUB, HUB-7297

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LED porcelain luminaire series 4-12W

Ifö Electric AB



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.

GENERAL INFORMATION

MANUFACTURER AND SITE

Manufacturer	Ifö Electric AB
Address	Fågel Fenix väg 12, 295 31 Bromölla, Sverige
Contact details	info@ifoelectric.com
Website	https://ifoelectric.com/
Place(s) of raw material origin	Europe
Place of production	Bromölla, Sweden
Place(s) of installation and use	Sweden, Europe
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 1.2.1, 14 April 2026
Sector	Electrical product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to grave and module D (A, B, C and D)
EPD author	Isak Rehnberg and Jane Wigren
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☒ External verification
EPD verifier	Elena Antuña-Bernardo as an authorized verifier for EPD Hub

PRODUCT SPECIFICATION

The EPD covers several products, where the Opus 100/100 matt opal LED has been selected as the representative product on which the calculations are based.

Product name	Opus 100/100 matt opal LED
Product number / reference	8201-800-10
Averaging in EPD	No grouping
Variation in GWP-fossil for A1-A3 (%)	-
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	14,9

This EPD represent the following luminaire families manufactured by Ifö Electric:



Aton



Solenne



Contrast



Ohm



Opus



Classic glob

ABOUT THE MANUFACTURER

Ifö Electric is well known for its porcelain production in southern Sweden. The company's history began at the beginning of the 20th century near Ivön, where kaolin clay was mined. Throughout its history, the company has played an important role in Swedish industry through the production of fuses, junction boxes, and durable porcelain luminaires. Many of these lighting products have become Scandinavian classics and are recognised in homes and public environments.

Porcelain has always been the core material of Ifö Electric, valued not only for its aesthetic qualities but also for its technical performance. It is durable, resistant to heat, cold and weather exposure, easy to maintain, and has a long service life. A porcelain luminaire generates less than one kilogram of carbon dioxide equivalents during its production. The material is suitable for a wide range of applications, including outdoor and indoor lighting, sauna luminaires, wet rooms, exterior lighting, and task lighting.

All manufacturing takes place at the company's production facility in Bromölla, southern Sweden, which has been in operation since 1947 and is located on the shores of Lake Ivö. This facility remains the centre of production for porcelain luminaires and D-fuse links. Manufacturing is carried out by experienced personnel with a strong focus on craftsmanship, quality, and meeting customer requirements. This long-standing commitment to quality and local manufacturing has made Ifö Electric a well-established and trusted supplier for more than a century.

PRODUCT DESCRIPTION

The LED luminaires from Ifö Electric consist of components such as porcelain housings and glass covers. The materials are selected with consideration for mechanical durability, electrical performance, and suitability for indoor and outdoor environments. The luminaires are designed for residential, commercial, and industrial applications and are intended to provide energy-efficient lighting with low maintenance requirements and a long operational lifetime.

Ifö Electric has incorporated Smart Lighting solutions by adapting some of its luminaires to work with modern lighting control systems, such as dimming, sensor-based control, and connected lighting technologies. These developments allow the luminaires to be adjusted according to user needs, improving energy efficiency, comfort, and flexibility. By combining their traditional porcelain designs with smart lighting technology, Ifö Electric has improved the functionality of its products while maintaining their focus on durability, timeless design, and long service life.

PRODUCT CLASSIFICATION

Declared operating voltage, Volt	230
Light source colour temperature, Kelvin	2700
Protection index for water and dust (IP)	44
Impact resistance index (IK)	02
Luminous flux, Lumens	400
Electrical power, Watt	4
Luminous efficiency, Lm/W	100

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit of the luminaire Opus 100/100 matt opal LED
Declared unit mass	0,745 kg
Functional unit	Provide lighting with an outgoing luminous flux of 1000 lm during a reference service life of 35000 h.
Reference service life (hours)	50 000
Reference service life (years)	14
Mass of packaging	0,106 kg
GWP-fossil, A1-A3 (kgCO₂e)	1,98
GWP-total, A1-A3 (kgCO₂e)	2,26
Secondary material, inputs (%)	15,3 %
Secondary material, outputs (%)	32,1 %
Total energy use, A1-A3 (kWh)	9,6
Net freshwater use, A1-A3 (m³)	0,0433

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the production stage include the manufacturing of materials used during production, including packaging materials and other ancillary materials. In addition, this stage covers the fuels consumed by production machinery and the management of waste generated at the manufacturing facilities, including manufacturing waste and production losses..

Manufacturing takes place in Bromölla, Sweden, using a traditional pressed porcelain process. The production starts with porcelain clay, which is shaped in specially made press tools using a hydraulic press. The pressed parts are then dried, glazed, and fired at high temperatures to create a durable, heat-resistant porcelain surface. After firing, the components are assembled with the electrical parts and checked to meet quality standards. The process allows the products to be durable, repairable, and suitable for both indoor and outdoor environments.

All ancillary materials, except for lake water, were allocated to the product based on its share of the plant's total annual production mass for the reference year. As lake water is used during glazing, it was allocated based on the product's share of the plant's total annual production of glazed products.

The manufacturing plant uses electricity, district heat and propane as energy inputs. All energy inputs were allocated to the products based on their share of the plant's total annual production mass for the year 2025. A market-based approach is used in modelling the electricity mix utilized in the factory.

The packaging consists primarily of cardboard boxes, with smaller quantities of paper-based protective materials. All packaging was modelled as corrugated cardboard. This simplification was considered representative due to the majority of cardboard-based packaging materials.

All production waste, except glaze slurry, was allocated to the products based on their share of the plant's total annual production mass for the year. Glaze slurry was allocated based on each product's share of the plant's total annual production of glazed products. All reported waste streams are classified as non-hazardous. Paper waste generated from office activities was considered negligible and excluded.

Transport of production waste to waste treatment facilities was modelled assuming an average transport distance of 100 km by lorry.

TRANSPORT AND INSTALLATION (A4-A5)

Impacts from transportation arise from the delivery of the final product to the place of installation. This module covers both the direct exhaust emissions from fuel combustion and the environmental impacts associated with fuel production.

The products are primarily distributed within Sweden and parts of Europe using lorry. Therefore, an average transport distance of 1500 km was used. The transport scenario includes both the weight of the product and its packaging materials.

No material losses during installation were assumed. The product can be installed using cordless power tools without significant energy consumption or additional materials. Therefore, the environmental impacts associated with installation activities are considered negligible, and the impacts reported for this module relate only to the waste treatment of the packaging.

PRODUCT USE AND MAINTENANCE (B1-B7)

The product consumes electricity during the use phase (B6). Since the largest market for the product is Sweden and parts of Europe, the Swedish electricity mix was used. The product has an effect of 4W and a reference service life of 50,000 hours, resulting in a total electricity consumption of approximately 200 kWh over the lifetime of the product. The LED modules are replaceable, but their expected lifetime is equal to the product's reference service life. Therefore, no replacements are accounted for in the assessment. Modules B1–B5 are excluded, as no additional energy, water, or material inputs are expected during this period. Module B7 is not applicable.

Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

The consumption of energy and natural resources during demolition is assumed to be negligible. It is assumed that the waste is separately collected and transported to the nearest appropriate waste treatment facility. A transport distance of 100 km by lorry is applied to represent regional collection and waste management within Europe (Module C2).

Module C3 includes the energy and resource inputs associated with the sorting and treatment of waste streams for material recycling and incineration with energy recovery. As no material losses are assumed during the use stage, dismantling, or transport, a collection rate of 100% is applied for all materials at end of life.

No losses during dismantling are assumed. Recyclable materials, including glass, metals and electronic components, are assumed to be separately collected and sent directly to recycling facilities. Losses during sorting are considered negligible and are therefore not included in the assessment.

Module C4 includes the final disposal of residual waste, including landfill operations where applicable.

Potential loads and benefits beyond the system boundary resulting from the recycling of waste treated in Module C3 are reported in Module D. Recovered materials are assumed to substitute equivalent primary materials. With the exception of electronics, a quality ratio of 100% is applied, meaning that recovered materials are assumed to provide the same functional performance as the substituted primary materials. For electronics, a lower quality ratio is applied as a conservative assumption to account for potential reductions in material quality.

Potential loads and benefits associated with energy recovery from waste incineration are also reported in Module D. Energy recovered during incineration is assumed to be exported as useful heat, while no credit is assigned for electricity generation. The energy recovery process is assumed to operate at an efficiency of 80%. The waste treatment and disposal scenario used is presented below.

Material	Recycling	Incineration	Landfill
Porcelain			100%
Glass	60%		40%
Aluminium	90%		10%
Stainless steel	100%		
Silicone		100%	
Electronics	100%		
Copper	100%		
Polymers		100%	
Mixed metals	100%		

LIFE-CYCLE ASSESSMENT

SYSTEM BOUNDARY

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

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

CUT-OFF CRITERIA

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

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.

This LCA study includes the provision of all materials, transportation, energy and emission flows, as well as end-of-life processing of the product. All relevant industrial processes are covered, from raw material acquisition and pre-processing to production, distribution, installation, use, repair, and end-of-life management. For modelling simplification and due to limited data availability, some constituents representing less than 0.1% of the total product mass are excluded. These consist of ancillary materials used in very small amounts and considered to have negligible environmental impact.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information. Upstream process calculations rely on generic data. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed using the LCA software SimaPro 10.4, 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, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging material	No allocation
Ancillary materials	Physical Properties
Manufacturing energy and waste	Physical Properties

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	0,048

PRODUCT & MANUFACTURING SITES GROUPING

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

There is no average result considered in this study since this EPD refers to one specific product produced in one production plant.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	17,1	Europe
Minerals	78,9	Europe
Fossil materials	2,3	Europe
Bio-based materials	-	-
Mixed/unspecified (PCB + terminal block)	1,7	Global

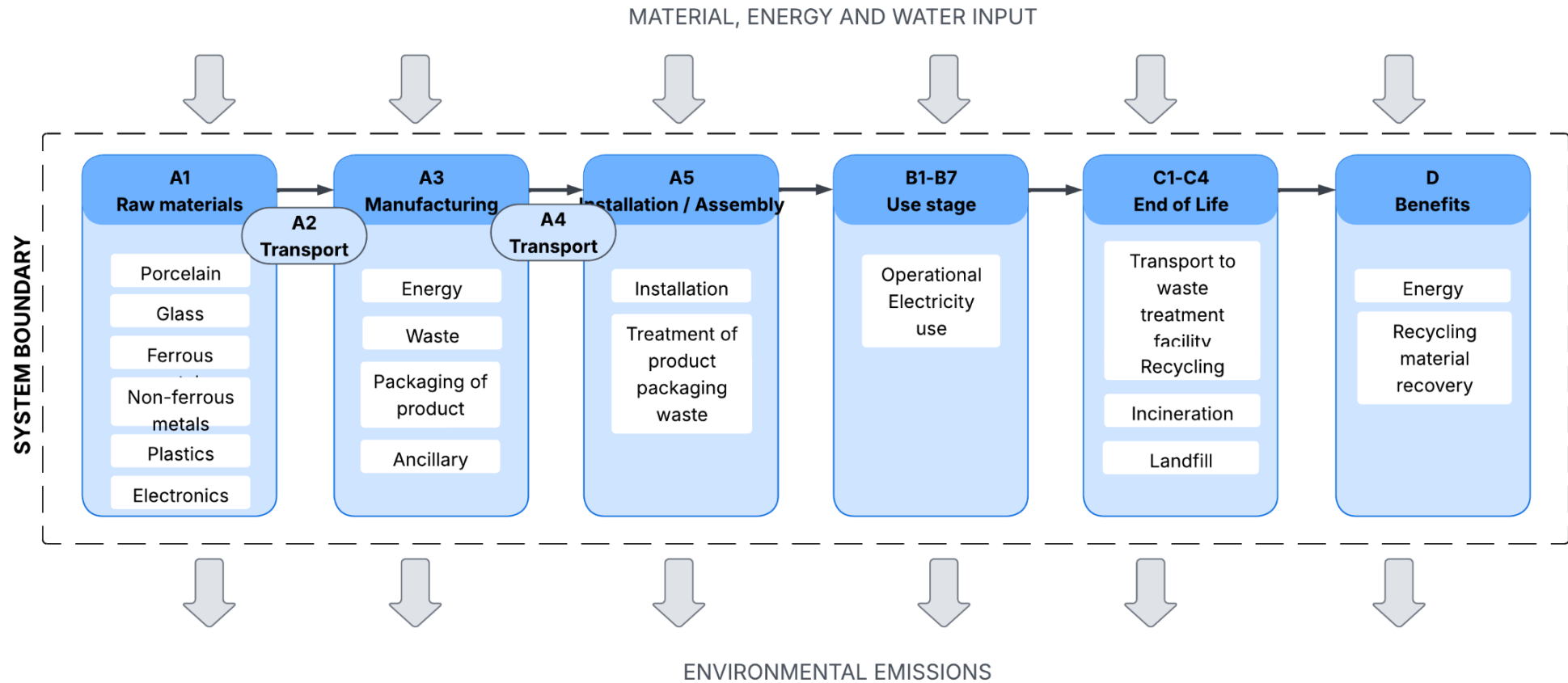
SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using LCA software SimaPro 10.4 for EPD Hub V3 and EPD Process Certification v3.2.5. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11/3.12 and SimaPro 10.4 databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11/3.12 environmental data sources follow the methodology 'allocation, Cut-off, EN 15804+A2'.

SYSTEM DIAGRAM



ENVIRONMENTAL IMPACT DATA, PER DECLARED UNIT

All results are for a representative luminaire product “Opus 100/100 matt opal LED”, for other luminaire products, see conversion factors under APPENDIX 1.

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

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO ₂ eq.	1,41E+00	1,08E-01	5,80E-01	2,09E+00	2,09E-01	1,87E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,02E+00	0,00E+00	0,00E+00	2,09E-02	5,45E-02	2,20E-01	-2,30E-01
GWP – fossil	kg CO ₂ eq.	1,40E+00	1,08E-01	4,39E-01	1,94E+00	2,09E-01	1,95E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,09E+00	0,00E+00	0,00E+00	2,09E-02	5,45E-02	2,84E-02	-2,23E-01
GWP – biogenic	kg CO ₂ eq.	7,38E-03	5,42E-05	8,59E-02	9,33E-02	1,30E-04	1,68E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,25E-01	0,00E+00	0,00E+00	1,30E-05	1,08E-05	1,92E-01	-6,39E-03
GWP – LULUC	kg CO ₂ eq.	2,18E-03	4,04E-05	5,49E-02	5,72E-02	6,85E-05	2,68E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,07E-01	0,00E+00	0,00E+00	6,85E-06	1,79E-06	1,58E-05	-2,20E-04
ODP	kg CFC-11 eq.	6,40E-07	2,31E-09	9,80E-09	6,52E-07	4,72E-09	3,82E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,65E-07	0,00E+00	0,00E+00	4,72E-10	5,49E-11	1,90E-10	-9,86E-09
AP	mol H ⁺ eq.	1,54E-02	4,79E-04	1,79E-03	1,77E-02	4,33E-04	1,10E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,86E-02	0,00E+00	0,00E+00	4,33E-05	2,13E-05	8,53E-05	-5,77E-03
EP – freshwater	kg P eq.	1,76E-03	7,17E-06	8,96E-05	1,86E-03	1,47E-05	7,83E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,28E-03	0,00E+00	0,00E+00	1,47E-06	3,71E-07	3,10E-05	-4,99E-04
EP – marine	kg N eq.	2,08E-03	1,67E-04	9,94E-04	3,24E-03	1,11E-04	5,23E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,38E-02	0,00E+00	0,00E+00	1,11E-05	1,00E-05	1,23E-03	-4,98E-04
EP – terrestrial	mol N eq.	2,34E-02	1,84E-03	6,87E-03	3,21E-02	1,19E-03	5,30E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,47E-01	0,00E+00	0,00E+00	1,19E-04	9,29E-05	2,67E-04	-6,30E-03
POCP	kg NMVOC eq.	6,72E-03	6,71E-04	2,52E-03	9,91E-03	7,31E-04	1,96E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,76E-02	0,00E+00	0,00E+00	7,31E-05	2,70E-05	1,24E-04	-1,73E-03
ADP – minerals & metals	kg Sb eq.	4,05E-04	3,45E-07	7,15E-07	4,06E-04	7,22E-07	2,01E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,17E-04	0,00E+00	0,00E+00	7,22E-08	7,20E-09	1,38E-08	-1,03E-04
ADP – fossil resources	MJ	1,81E+01	1,50E+00	5,95E+00	2,56E+01	2,95E+00	2,30E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,21E+02	0,00E+00	0,00E+00	2,95E-01	3,68E-02	1,39E-01	-2,85E+00
WDP	m ³	5,73E-01	7,15E-03	1,13E+00	1,71E+00	1,49E-02	5,63E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,38E+01	0,00E+00	0,00E+00	1,49E-03	2,69E-03	-2,47E-02	-1,14E-01

GWP = Global Warming Potential; LULUC = land use and land use change; ODP = Ozone depletion potential; AP = Acidification potential; 0020EP = Eutrophication potential; POCP = Photochemical ozone formation potential; ADP = Abiotic depletion potential; WDP = Water deprivation potential

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
PM	Incidence	9,90E-08	7,31E-09	2,50E-08	1,31E-07	1,56E-08	2,25E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,74E-07	0,00E+00	0,00E+00	1,56E-09	2,12E-10	9,66E-10	-2,28E-08
IRP	kBq U235 eq.	1,22E-01	1,60E-03	1,40E-02	1,38E-01	3,41E-03	1,38E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,57E+01	0,00E+00	0,00E+00	3,41E-04	8,60E-05	1,36E-03	-2,10E-02
ETP – freshwater	CTUe	5,12E+01	2,20E-01	1,93E+00	5,34E+01	4,43E-01	2,50E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,35E+01	0,00E+00	0,00E+00	4,43E-02	1,15E-01	2,29E+00	-8,95E+00
HTP – cancer	CTUh	1,38E-09	1,84E-11	9,30E-11	1,49E-09	3,35E-11	1,01E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,17E-08	0,00E+00	0,00E+00	3,35E-12	8,35E-12	5,95E-12	-4,77E-10
HTP – noncancer	CTUh	8,54E-08	8,50E-10	3,03E-09	8,93E-08	1,81E-09	4,27E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,09E-07	0,00E+00	0,00E+00	1,81E-10	1,63E-10	8,87E-10	-4,69E-08
SQP	Pt	7,63E+00	8,01E-01	7,25E+00	1,57E+01	1,78E+00	4,01E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,54E+02	0,00E+00	0,00E+00	1,78E-01	1,99E-02	2,65E-01	-2,12E+00

PM = Particulate matter; IRP = Ionizing radiation human health potential; EPT = Eco-toxicity potential; HTP = Human toxicity potential; SQP = Land use related impacts/Soil quality

USE OF NATURAL RESOURCES

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	2,07E+00	2,34E-02	5,40E+00	7,49E+00	4,92E-02	1,39E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,04E+02	0,00E+00	0,00E+00	4,92E-03	1,49E-03	1,29E-02	-3,78E-01
PERM	MJ	0,00E+00	0,00E+00	1,36E+00	1,36E+00	0,00E+00	-1,36E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,07E+00	2,34E-02	6,76E+00	8,86E+00	4,92E-02	2,37E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,04E+02	0,00E+00	0,00E+00	4,92E-03	1,49E-03	1,29E-02	-3,78E-01
PENRE	MJ	1,76E+01	1,50E+00	5,95E+00	2,51E+01	2,95E+00	2,30E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,21E+02	0,00E+00	0,00E+00	2,95E-01	5,09E-01	1,39E-01	-2,85E+00
PENRM	MJ	4,72E-01	0,00E+00	0,00E+00	4,72E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-4,72E-01	0,00E+00	0,00E+00
PENRT	MJ	1,81E+01	1,50E+00	5,95E+00	2,56E+01	2,95E+00	2,30E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,21E+02	0,00E+00	0,00E+00	2,95E-01	3,68E-02	1,39E-01	-2,85E+00
SM	kg	1,25E-01	7,05E-04	1,10E-01	2,36E-01	1,34E-03	7,07E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,84E-01	0,00E+00	0,00E+00	1,34E-04	2,54E-01	4,07E-05	1,09E-01
RSF	MJ	2,36E-04	8,03E-06	9,85E-03	1,01E-02	1,77E-05	1,06E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,05E-03	0,00E+00	0,00E+00	1,77E-06	4,68E-07	6,81E-07	-9,03E-05
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	1,43E-02	1,76E-04	2,88E-02	4,33E-02	3,67E-04	1,32E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,50E-01	0,00E+00	0,00E+00	3,67E-05	6,35E-05	-5,68E-04	-2,79E-03

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

END OF LIFE – WASTE

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	6,19E+00	9,19E-03	4,31E-02	6,24E+00	1,83E-02	2,63E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,19E+01	0,00E+00	0,00E+00	1,83E-03	2,46E-03	6,98E-04	-2,07E+00
Non-hazardous waste disposed	kg	5,45E+00	1,11E-01	7,63E+00	1,32E+01	2,41E-01	1,19E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,76E+01	0,00E+00	0,00E+00	2,41E-02	2,87E-02	1,15E+00	-1,63E+00
Radioactive waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

END OF LIFE – OUTPUT FLOWS

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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-02	3,75E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,39E-01	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,06E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,18E-02	0,00E+00	0,00E+00
Exported energy	MJ	3,90E-02	5,85E-04	2,38E+00	2,42E+00	1,29E-03	4,48E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,09E+01	0,00E+00	0,00E+00	1,29E-04	3,26E-05	6,40E-04	-1,40E+00
Exported energy – electricity	MJ	1,53E-02	2,59E-04	2,51E-03	1,80E-02	5,63E-04	2,08E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,09E+01	0,00E+00	0,00E+00	5,63E-05	1,45E-05	5,32E-04	-2,03E-03
Exported energy – thermal	MJ	2,38E-02	3,26E-04	2,38E+00	2,40E+00	7,24E-04	2,41E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,91E-02	0,00E+00	0,00E+00	7,24E-05	1,81E-05	1,08E-04	-1,40E+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	kg CO ₂ e	1,40E+00	1,08E-01	4,94E-01	2,00E+00	2,09E-01	1,95E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,80E+00	0,00E+00	0,00E+00	2,09E-02	5,45E-02	2,84E-02	-2,23E-01

ENVIRONMENTAL IMPACT DATA, 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

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO ₂ eq.	2,46E+00	1,89E-01	1,01E+00	3,66E+00	3,66E-01	3,28E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,40E+01	0,00E+00	0,00E+00	3,66E-02	9,54E-02	3,86E-01	-4,02E-01
GWP – fossil	kg CO ₂ eq.	2,44E+00	1,89E-01	7,68E-01	3,40E+00	3,65E-01	3,42E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,24E+01	0,00E+00	0,00E+00	3,65E-02	9,54E-02	4,96E-02	-3,91E-01
GWP – biogenic	kg CO ₂ eq.	1,29E-02	9,49E-05	1,50E-01	1,63E-01	2,27E-04	2,93E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,93E-01	0,00E+00	0,00E+00	2,27E-05	1,88E-05	3,36E-01	-1,12E-02
GWP – LULUC	kg CO ₂ eq.	3,82E-03	7,07E-05	9,62E-02	1,00E-01	1,20E-04	4,70E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,24E+00	0,00E+00	0,00E+00	1,20E-05	3,12E-06	2,76E-05	-3,85E-04
ODP	kg CFC-11 eq.	1,12E-06	4,05E-09	1,71E-08	1,14E-06	8,26E-09	6,68E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,64E-07	0,00E+00	0,00E+00	8,26E-10	9,62E-11	3,33E-10	-1,73E-08
AP	mol H ⁺ eq.	2,69E-02	8,38E-04	3,13E-03	3,09E-02	7,57E-04	1,92E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,55E-01	0,00E+00	0,00E+00	7,57E-05	3,72E-05	1,49E-04	-1,01E-02
EP – freshwater	kg P eq.	3,08E-03	1,26E-05	1,57E-04	3,25E-03	2,58E-05	1,37E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,10E-02	0,00E+00	0,00E+00	2,58E-06	6,49E-07	5,42E-05	-8,73E-04
EP – marine	kg N eq.	3,64E-03	2,93E-04	1,74E-03	5,67E-03	1,94E-04	9,15E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,41E-02	0,00E+00	0,00E+00	1,94E-05	1,75E-05	2,15E-03	-8,72E-04
EP – terrestrial	mol N eq.	4,10E-02	3,22E-03	1,20E-02	5,62E-02	2,08E-03	9,28E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,57E-01	0,00E+00	0,00E+00	2,08E-04	1,63E-04	4,67E-04	-1,10E-02
POCP	kg NMVOC eq.	1,18E-02	1,17E-03	4,41E-03	1,73E-02	1,28E-03	3,43E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,59E-02	0,00E+00	0,00E+00	1,28E-04	4,72E-05	2,17E-04	-3,04E-03
ADP – minerals & metals	kg Sb eq.	7,09E-04	6,03E-07	1,25E-06	7,10E-04	1,26E-06	3,52E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,43E-03	0,00E+00	0,00E+00	1,26E-07	1,26E-08	2,42E-08	-1,81E-04
ADP – fossil resources	MJ	3,17E+01	2,62E+00	1,04E+01	4,47E+01	5,16E+00	4,02E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,61E+03	0,00E+00	0,00E+00	5,16E-01	6,44E-02	2,43E-01	-5,00E+00
WDP	m ³	1,00E+00	1,25E-02	1,98E+00	2,99E+00	2,60E-02	9,85E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,17E+01	0,00E+00	0,00E+00	2,60E-03	4,70E-03	-4,33E-02	-1,99E-01

GWP = Global Warming Potential; LULUC = land use and land use change; ODP = Ozone depletion potential; AP = Acidification potential; 0020EP = Eutrophication potential; POCP = Photochemical ozone formation potential; ADP = Abiotic depletion potential; WDP = Water deprivation potential

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
PM	Incidence	1,73E-07	1,28E-08	4,38E-08	2,30E-07	2,74E-08	3,95E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,35E-06	0,00E+00	0,00E+00	2,74E-09	3,70E-10	1,69E-09	-3,99E-08
IRP	kBq U235 eq.	2,14E-01	2,79E-03	2,44E-02	2,41E-01	5,97E-03	2,42E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,15E+02	0,00E+00	0,00E+00	5,97E-04	1,51E-04	2,37E-03	-3,68E-02
ETP – freshwater	CTUe	8,96E+01	3,85E-01	3,37E+00	9,34E+01	7,75E-01	4,38E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,64E+02	0,00E+00	0,00E+00	7,75E-02	2,01E-01	4,02E+00	-1,57E+01
HTP – cancer	CTUh	2,42E-09	3,22E-11	1,63E-10	2,61E-09	5,87E-11	1,77E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,04E-08	0,00E+00	0,00E+00	5,87E-12	1,46E-11	1,04E-11	-8,35E-10
HTP – noncancer	CTUh	1,49E-07	1,49E-09	5,31E-09	1,56E-07	3,16E-09	7,47E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,24E-06	0,00E+00	0,00E+00	3,16E-10	2,85E-10	1,55E-09	-8,20E-08
SQP	Pt	1,34E+01	1,40E+00	1,27E+01	2,75E+01	3,12E+00	7,02E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,45E+02	0,00E+00	0,00E+00	3,12E-01	3,47E-02	4,63E-01	-3,71E+00

PM = Particulate matter; IRP = Ionizing radiation human health potential; EPT = Eco-toxicity potential; HTP = Human toxicity potential; SQP = Land use related impacts/Soil quality

USE OF NATURAL RESOURCES

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	3,63E+00	4,10E-02	9,44E+00	1,31E+01	8,61E-02	2,43E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,06E+03	0,00E+00	0,00E+00	8,61E-03	2,61E-03	2,26E-02	-6,62E-01
PERM	MJ	0,00E+00	0,00E+00	2,39E+00	2,39E+00	0,00E+00	-2,39E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,63E+00	4,10E-02	1,18E+01	1,55E+01	8,61E-02	4,14E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,06E+03	0,00E+00	0,00E+00	8,61E-03	2,61E-03	2,26E-02	-6,62E-01
PENRE	MJ	3,09E+01	2,62E+00	1,04E+01	4,39E+01	5,16E+00	4,02E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,61E+03	0,00E+00	0,00E+00	5,16E-01	8,91E-01	2,43E-01	-5,00E+00
PENRM	MJ	8,26E-01	0,00E+00	0,00E+00	8,26E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,26E-01	0,00E+00	0,00E+00
PENRT	MJ	3,17E+01	2,62E+00	1,04E+01	4,48E+01	5,16E+00	4,02E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,61E+03	0,00E+00	0,00E+00	5,16E-01	6,44E-02	2,43E-01	-5,00E+00
SM	kg	2,19E-01	1,23E-03	1,93E-01	4,13E-01	2,35E-03	1,24E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,22E-01	0,00E+00	0,00E+00	2,35E-04	4,44E-01	7,12E-05	1,91E-01
RSF	MJ	4,13E-04	1,41E-05	1,72E-02	1,77E-02	3,09E-05	1,85E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,84E-03	0,00E+00	0,00E+00	3,09E-06	8,20E-07	1,19E-06	-1,58E-04
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	2,49E-02	3,09E-04	5,05E-02	7,57E-02	6,42E-04	2,31E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,66E+00	0,00E+00	0,00E+00	6,42E-05	1,11E-04	-9,94E-04	-4,89E-03

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

END OF LIFE – WASTE

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1,08E+01	1,61E-02	7,54E-02	1,09E+01	3,20E-02	4,60E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,83E+01	0,00E+00	0,00E+00	3,20E-03	4,31E-03	1,22E-03	-3,62E+00
Non-hazardous waste disposed	kg	9,54E+00	1,94E-01	1,34E+01	2,31E+01	4,21E-01	2,09E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,58E+01	0,00E+00	0,00E+00	4,21E-02	5,02E-02	2,02E+00	-2,85E+00
Radioactive waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

END OF LIFE – OUTPUT FLOWS

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	6,56E-02	6,56E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,19E-01	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,86E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,82E-02	0,00E+00	0,00E+00
Exported energy	MJ	6,83E-02	1,02E-03	4,17E+00	4,24E+00	2,25E-03	7,85E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,66E+01	0,00E+00	0,00E+00	2,25E-04	5,70E-05	1,12E-03	-2,44E+00
Exported energy – electricity	MJ	2,67E-02	4,52E-04	4,39E-03	3,15E-02	9,86E-04	3,64E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,65E+01	0,00E+00	0,00E+00	9,86E-05	2,54E-05	9,31E-04	-3,56E-03
Exported energy – thermal	MJ	4,16E-02	5,71E-04	4,16E+00	4,20E+00	1,27E-03	4,21E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,10E-02	0,00E+00	0,00E+00	1,27E-04	3,16E-05	1,89E-04	-2,44E+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	kg CO ₂ e	2,45E+00	1,89E-01	8,64E-01	3,50E+00	3,66E-01	3,42E-02	ND	ND	ND	ND	ND	1,36E+01	ND	0,00E+00	3,66E-02	9,54E-02	4,97E-02	-3,91E-01

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation A3 (Energy data source)

1. Electricity, high voltage {SE}| electricity production, hydro, reservoir, non-alpine region | Cut-off, S, 0,0512 kg CO2 eq/kWh
2. Electricity, high voltage {SE}| electricity production, wind, 1-3MW turbine, onshore | Cut-off, S, 0,017 kg CO2 eq/kWh
3. Electricity, low voltage {SE}| electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted | Cut-off, S, 0,0982 kg CO2 eq/kWh
4. Heat, district or industrial, other than natural gas {RoW}| heat production, propane, at industrial furnace >100kW | Cut-off, S, 0,306 CO2 eq/kWh
5. Heat, district or industrial, other than natural gas {CH}| heat, from municipal waste incineration to generic market for heat, district or industrial, other than natural gas | Cut-off, U, 0,0132 kg CO2 eq/kWh
6. Heat, district or industrial, other than natural gas {SE}| heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014 | Cut-off, U, 0,00943 kg CO2 eq/kWh
7. Heat, district or industrial, other than natural gas {SE}| heat and power co-generation, oil | Cut-off, U, 0,165 kg CO2 eq/kWh

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

1. Electricity, low voltage {SE}| market for electricity, low voltage | Cut-off, S, 0,0401 kg CO2 eq/kWh

Transport scenario documentation - A4

1. Transport, freight, lorry, 16-32 metric ton, diesel, EURO 6 {RER}| transport, freight, lorry, 16-32 metric ton, diesel, EURO 6 | Cut-off, S., 1500km

Installation scenario documentation - A5 (Waste materials data source)

1. Waste paperboard {SE}| market for waste paperboard | Cut-off, S, 0,106 kg

TRANSPORT SCENARIO DOCUMENTATION – A4

Scenario parameter	Value
Capacity utilization (including empty return) %	100%
Bulk density of transported products (kg/m ³)	278
Volume capacity utilization factor	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 OPERATIONAL ENERGY AND WATER USE

Scenario parameter	Value
Ancillary materials specified by material / kg or units as appropriate	Not applicable
Net fresh water consumption / m ³	0
Power output of equipment / W	4
Characteristic performance, e.g., energy efficiency, emissions, variation of performance with capacity utilization, etc. / Units as appropriate	Emit 400 lumen during a reference lifetime of 50 000 hours

END OF LIFE SCENARIO DOCUMENTATION - C1-C4

Scenario information	Value
Collection process – kg collected separately	0,745
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	0,239355
Recovery process – kg for energy recovery	0,0218
Disposal (total) – kg for final deposition	0,483645
Scenario assumptions e.g. transportation	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 6, 150km

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.

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: Magaly Gonzalez Vazquez

Tool verification validity: 27 March 2025 - 26 March 2028

Elena Antuña-Bernardo as an authorized verifier for EPD Hub Limited
21.08.2026



APPENDIX 1

This appendix provides indicative environmental impact information for selected product variants within the same product family. The information is intended for comparative purposes only and is based on the same LCA model, system boundaries, and assumptions as the reference product described in this EPD.

The product variants presented in this annex are not separately verified EPDs. The scaling factors presented may be used to estimate other environmental impact categories for the declared product variants.

To determine the impacts of the following modules, distinct calculation methods were applied.

Scaling factor at the declared unit level (A1-A5 and C1-C4)

For each product variant, the GWP-fossil impact category for modules A1–A3 was calculated individually. A scaling factor was then determined using the following formula:

$$\text{Scaling factor} = \frac{\text{GWP-fossil [A1-A3]}_{\text{concerned product}} (\text{kg CO}_2 \text{ eq.})}{\text{GWP-fossil [A1-A3]}_{\text{reference product}} (\text{kg CO}_2 \text{ eq.})}$$

The GWP-fossil impact category was selected as the basis for extrapolation because the differences between product variants are primarily driven by variations in product mass and amount of electronics.

Scaling factor at the declared unit level (B6):

The scaling of the environmental impacts generated by electricity consumption in module B6 is correlated to the total electrical power of the luminaire and the light management function, according to the formula:

$$\text{Scaling factor} = \left(\frac{\text{Power}_{\text{concerned product}}}{\text{Power}_{\text{reference product}}} \right) \times \left(\frac{\text{CSF}_{\text{concerned product}}}{\text{CSF}_{\text{reference product}}} \right)$$

The control scaling factor (CSF) is determined according to the applicable control scenario (e.g. whether the luminaire is equipped with a daylight-dependent control system). The control factor values presented in Table 33 are based on BS EN 15193-1:2017. As lighting control functions are optional features that can be selected for each luminaire, the CSF coefficient shall be adjusted accordingly.

Scenario	Abbreviation	CSF
No control	NC	1
Daylight dependency system	DDS	0,75
Presence sensing system	PSS	0,75
Daylight dependency system + presence sensing systems	DDS + PSS	0,55

Coefficient at the functional unit (FU) level

To relate all products in the series to the functional unit (providing lighting with an outgoing luminous flux of 1000 lm over a reference service life of 35,000 h), a functional unit coefficient has been calculated for each product. This coefficient can be used together with the scaling factors. As all products have the same reference service life, the coefficient varies only with the outgoing luminous flux. The functional unit coefficient for each product is calculated using the following formula:

$$\text{Functional unit coefficient} = \frac{(\text{reference service life}_{\text{FU}} (\text{hours}) \times \text{lighting output}_{\text{FU}} (\text{lumen}))}{(\text{reference service life}_{\text{concerned product}} (\text{hours}) \times \text{lighting output}_{\text{concerned product}} (\text{lumen}))}$$

Extrapolation

The following table lists all articles included in the product series at the time this EPD was developed. For each article, the corresponding scaling factors and functional unit coefficients are provided, calculated using the formulas presented above. These values can be used to calculate the environmental indicators for a specific article. Note that the last digit of the article number (marked X) indicates the colour of the porcelain. As differences in colour are considered insignificant to the results, the same article number may be used for scaling regardless of its last digit. The highlighted article is the reference product.

Article number	Lumen [lm]	Weight [kg]	Power [W]	CSF coefficient				FU coefficient	A1-A5 scaling factor	B6 scaling factor	C1-C4 scaling factor
				NC	DDS	PSS	DDS + PSS				
8201-800-1X	400	0,75	4	1	0,75	0,75	0,55	1,75	1,000	1	1,000
8201-801-1X	400	0,75	4	1	0,75	0,75	0,55	1,75	1,000	1	1,000
8301-800-1X	400	0,79	4	1	0,75	0,75	0,55	1,75	1,000	1	1,000
8301-801-1X	400	0,79	4	1	0,75	0,75	0,55	1,75	1,000	1	1,000
8033-800-1X	800	0,85	8	1	0,75	0,75	0,55	0,88	1,217	2	1,217
8341-800-1X	800	0,9	8	1	0,75	0,75	0,55	0,88	1,132	2	1,132
8341-801-1X	800	0,9	8	1	0,75	0,75	0,55	0,88	1,132	2	1,132
8221-800-1X	800	0,87	8	1	0,75	0,75	0,55	0,88	1,036	2	1,036
8221-801-1X	800	0,87	8	1	0,75	0,75	0,55	0,88	1,036	2	1,036
8241-800-1X	800	1	8	1	0,75	0,75	0,55	0,88	1,130	2	1,130
8241-801-1X	800	1	8	1	0,75	0,75	0,55	0,88	1,130	2	1,130
7300-800-1X	800	0,9	8	1	0,75	0,75	0,55	0,88	1,196	2	1,196
7300-801-1X	800	0,9	8	1	0,75	0,75	0,55	0,88	1,196	2	1,196
7302-800-1X	800	1,25	8	1	0,75	0,75	0,55	0,88	1,417	2	1,417
6012-840-1X	800	0,98	8	1	0,75	0,75	0,55	0,88	1,176	2	1,176
6040-840-1X	800	0,98	8	1	0,75	0,75	0,55	0,88	1,176	2	1,176
6040-800-1X	800	0,98	8	1	0,75	0,75	0,55	0,88	1,244	2	1,244
6041-800-1X	800	1,18	8	1	0,75	0,75	0,55	0,88	1,462	2	1,462
6041-840-1X	800	1,18	8	1	0,75	0,75	0,55	0,88	1,462	2	1,462
8036-800-1X	800	0,9	8	1	0,75	0,75	0,55	0,88	1,243	2	1,243
6044-840-1X	800	0,98	8	1	0,75	0,75	0,55	0,88	1,201	2	1,201
6013-840-1X	800	0,98	8	1	0,75	0,75	0,55	0,88	1,201	2	1,201
6044-800-1X	800	0,98	8	1	0,75	0,75	0,55	0,88	1,272	2	1,272
6045-800-1X	800	1,18	8	1	0,75	0,75	0,55	0,88	1,489	2	1,489
6045-840-1X	800	1,18	8	1	0,75	0,75	0,55	0,88	1,489	2	1,489
8351-800-1X	1000	1,37	10	1	0,75	0,75	0,55	0,70	1,346	2,5	1,346
8351-801-1X	1000	1,37	10	1	0,75	0,75	0,55	0,70	1,346	2,5	1,346
8352-800-1X	1000	1,61	10	1	0,75	0,75	0,55	0,70	1,575	2,5	1,575
8352-801-1X	1000	1,61	10	1	0,75	0,75	0,55	0,70	1,575	2,5	1,575
8251-800-1X	1000	1,34	10	1	0,75	0,75	0,55	0,70	1,324	2,5	1,324
8251-801-1X	1000	1,34	10	1	0,75	0,75	0,55	0,70	1,324	2,5	1,324
8252-800-1X	1000	1,34	10	1	0,75	0,75	0,55	0,70	1,564	2,5	1,564
8252-801-1X	1000	1,34	10	1	0,75	0,75	0,55	0,70	1,564	2,5	1,564
6046-8401-1X	1200	1,59	10	1	0,75	0,75	0,55	0,58	1,817	2,5	1,817
6046-800-1X	1000	1,59	10	1	0,75	0,75	0,55	0,70	1,817	2,5	1,817
6046-840-1X	1000	1,59	10	1	0,75	0,75	0,55	0,70	1,817	2,5	1,817

Article number	Lumen [lm]	Weight [kg]	Power [W]	CSF coefficient				FU coefficient	A1-A5 scaling factor	B6 scaling factor	C1-C4 scaling factor
				NC	DDS	PSS	DDS + PSS				
8351-8001-1X	1200	1,37	10	1	0,75	0,75	0,55	0,58	2,820	2,5	2,820
8352-8001-1X	1200	1,61	10	1	0,75	0,75	0,55	0,58	3,049	2,5	3,049
8251-8001-1X	1200	1,34	10	1	0,75	0,75	0,55	0,58	2,783	2,5	2,783
8252-8001-1X	1200	1,34	10	1	0,75	0,75	0,55	0,58	3,029	2,5	3,029
6046-8001-1X	1200	1,59	10	1	0,75	0,75	0,55	0,58	3,262	2,5	3,262
8441-800-1X	1000	2,07	10	1	0,75	0,75	0,55	0,70	2,102	2,5	2,102
8441-8001-1X	1200	2,07	10	1	0,75	0,75	0,55	0,58	3,554	2,5	3,554
8265-800-1X	1350	1,94	12	1	0,75	0,75	0,55	0,52	6,855	3	6,855
8265-8001-1X	1350	1,94	12	1	0,75	0,75	0,55	0,52	6,855	3	6,855
8265-801-1X	1300	1,94	12	1	0,75	0,75	0,55	0,54	6,855	3	6,855
7306-800-1X	1350	2,3	12	1	0,75	0,75	0,55	0,52	7,245	3	7,245
7306-801-1X	1300	2,3	12	1	0,75	0,75	0,55	0,54	7,245	3	7,245
8262-800-1X	1350	2,3	12	1	0,75	0,75	0,55	0,52	7,028	3	7,028
8262-8001-1X	1350	2,3	12	1	0,75	0,75	0,55	0,52	7,028	3	7,028
8262-801-1X	1300	2,3	12	1	0,75	0,75	0,55	0,54	7,028	3	7,028
4091-800-1X	1350	2,42	12	1	0,75	0,75	0,55	0,52	6,881	3	6,881
4091-8001-1X	1350	2,42	12	1	0,75	0,75	0,55	0,52	6,881	3	6,881
8043-800-1X	1350	2,44	12	1	0,75	0,75	0,55	0,52	7,117	3	7,117
8043-8001-1X	1350	2,44	12	1	0,75	0,75	0,55	0,52	7,117	3	7,117
4095-800-1X	1350	3,04	12	1	0,75	0,75	0,55	0,52	7,717	3	7,717
4095-8001-1X	1350	3,04	12	1	0,75	0,75	0,55	0,52	7,717	3	7,717
8442-800-1X	1350	3,15	12	1	0,75	0,75	0,55	0,52	7,981	3	7,981
8442-8001-1X	1350	3,15	12	1	0,75	0,75	0,55	0,52	7,981	3	7,981
7305-800-1X	1350	3,66	12	1	0,75	0,75	0,55	0,52	7,969	3	7,969
7305-8001-1X	1350	3,66	12	1	0,75	0,75	0,55	0,52	7,969	3	7,969