ENVIRONMENTAL PRODUCT DECLARATION

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

FLIGHT VITALITY FVWQ9Y34KEP

WHITECROFT LIGHTING LTD

GENERAL INFORMATION

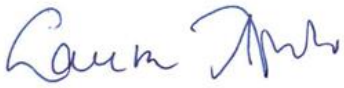
MANUFACTURER INFORMATION

Manufacturer	Whitecroft Lighting Ltd
Address	Burlington Street, Ashton-under-Lyne, Lancashire OL7 0AX United Kingdom
Contact details	Tim Bowes Head of Lighting Application Tim.Bowes@whitecroftlight.com +44 (0)7720 097289
Website	https://www.whitecroftlighting.com/

PRODUCT IDENTIFICATION

Product name	Flight Vitality
Product number	FVWQ9Y34KEP
Place of production	Lancashire, United Kingdom

Jessica Karhu
RTS EPD Committee secretary



Laura Apilo
Managing Director

EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	The Building Information Foundation RTS sr
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 / ISO 21930 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the RTS PCR (English version, 26.8.2020) is used.
EPD author	Kaushik Narasimhan Andakudi Kesavan, One Click LCA Ltd, Suvilahdenkatu 10B 00500 Helsinki, Finland https://www.oneclicklca.com/
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Verification date	17.6.2021
EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD number	RTS_136_21
ECO Platform nr.	-
Publishing date	8.7.2021
EPD valid until	8.7.2026

PRODUCT INFORMATION

PRODUCT DESCRIPTION

Flight is a new generation of standalone LED highbay, developed from Whitecroft's years of experience in industrial lighting. Suitable for new building or renovation projects, Flight offers a durable installation with low cost of ownership. Flight is constructed from high quality, sustainable materials and the lightweight body with first fix brackets and plug-in connections ensure a quick yet safe, one-person installation. High efficacy, long life LEDs with high transmission optics combine to deliver an energy efficient scheme with minimal maintenance. Whitecroft's commitment to the Circular Economy includes Cradle to Cradle™ independent accreditation in Flight Vitality versions. Due to the presence of an integrated lighting control sensor on-board, the operating energy consumption of the product is reduced by 25% on average.

PRODUCT APPLICATION

The Flight Vitality family is available in a wide range of outputs and distributions to suit multiple applications and tasks. In addition Flight Vitality includes integrated emergency, and lighting control solutions. The product can be used for the following typical lighting applications:

- Industrial
- Sports Halls
- Mid/High Bay Applications

TECHNICAL SPECIFICATIONS

Luminaire Efficacy: 169llm/w;
LED Life: >L90@53K Hours;
3 Macadam Steps;
Ra80;
Flicker compliant with IEEE1789.

PRODUCT STANDARDS

All luminaires to be UKCA & CE marked.

Compliant to Low Voltage Directive (BSEN60598-1):

- BSEN60598-2 – Luminaires

Compliant to EMC Directives and relevant BS Standards.

All photometric data:

- BSEN62717: LED modules for general lighting. Performance requirements.
- LM79-08: Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products
- BSEN 62722-2-1 – Luminaire Performance. Particular requirements for LED luminaires
- LM80-08 – Measuring Lumen Maintenance of LED Light Sources

Control Gear;

IEE1789 – Practices for modulating current in high-brightness LEDs for mitigating health risks to viewers.

PHYSICAL PROPERTIES OF THE PRODUCT

Length = 585mm, Width = 285mm, Height = 75mm;
Weight = 4.856 kg.

PRODUCT RAW MATERIAL COMPOSITION

Raw Materials	Weight [kg]	Post-consumer [%]	Renewable [%]	Material origin
Ferrous metals (rolled steel, stainless steel, Zinc plated steel, Nickel plated steel)	1.2706	30%	-	United Kingdom (UK), Germany (DE)
Non-ferrous metals (Aluminium, copper, brass)	1.4637	-	-	UK, Germany, Netherlands (NL), Italy (IT)
Plastics & rubbers (thermoplastics, synthetic rubbers)	0.6740	38%	-	UK, Germany, Netherlands, Finland (FI), Italy
Electronic and electrical equipment (PCB assembly, LED, driver, sensor, battery, inverter)	1.2313	-	-	Netherlands, UK, Germany, Poland (PL), South Korea (KR)
Paint	0.1530	-	-	UK
Packaging (LDPE, Cardboard)	0.346	-	-	UK

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	>68%	UK, DE, NL, IT
Minerals	>7%	UK, PL, KR
Fossil materials	24%	UK, DE, NL, FI, IT
Bio-based materials	-	-

SUBSTANCES, REACH - VERY HIGH CONCERN

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

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at https://www.whitecroftlighting.com/.

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

The product is made of a mixture of virgin and recycled metals, plastics and electronic components. The materials are manufactured by various suppliers around the world. The main manufacturing processes involved are hot extrusion of Aluminium; cold rolled, punched and folded Steel; plastic injection moulding, and surface mounted electronics. They are transported to Whitecroft Lighting (at Ashton-under-Lyne,UK), where the different parts are processed further using CNC manufacturing, and undergo manual and robotic assembly (A1 & A2). Certified renewable electricity and natural gas are consumed during manufacturing. The study considers the losses of main raw materials occurring during the manufacturing process.

The finished product leaves the facility packaged in cardboard and polyethylene (A3).

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

The Flight Vitality product is transported to the customers premises by an average lorry from Ashton-under-Lyne. A specific transportation scenario to a customer based in Northampton, UK is chosen for this study (A4). Transportation impacts that occur from delivery of the product cover direct exhaust emissions of fuel, environmental impacts of fuel production, as well as related infrastructure emissions.

Environmental impacts from installation into the building include waste packaging materials (A5). The impacts of energy consumption and the used ancillary materials during installation are negligible.

PRODUCT USE AND MAINTENANCE (B1-B7)

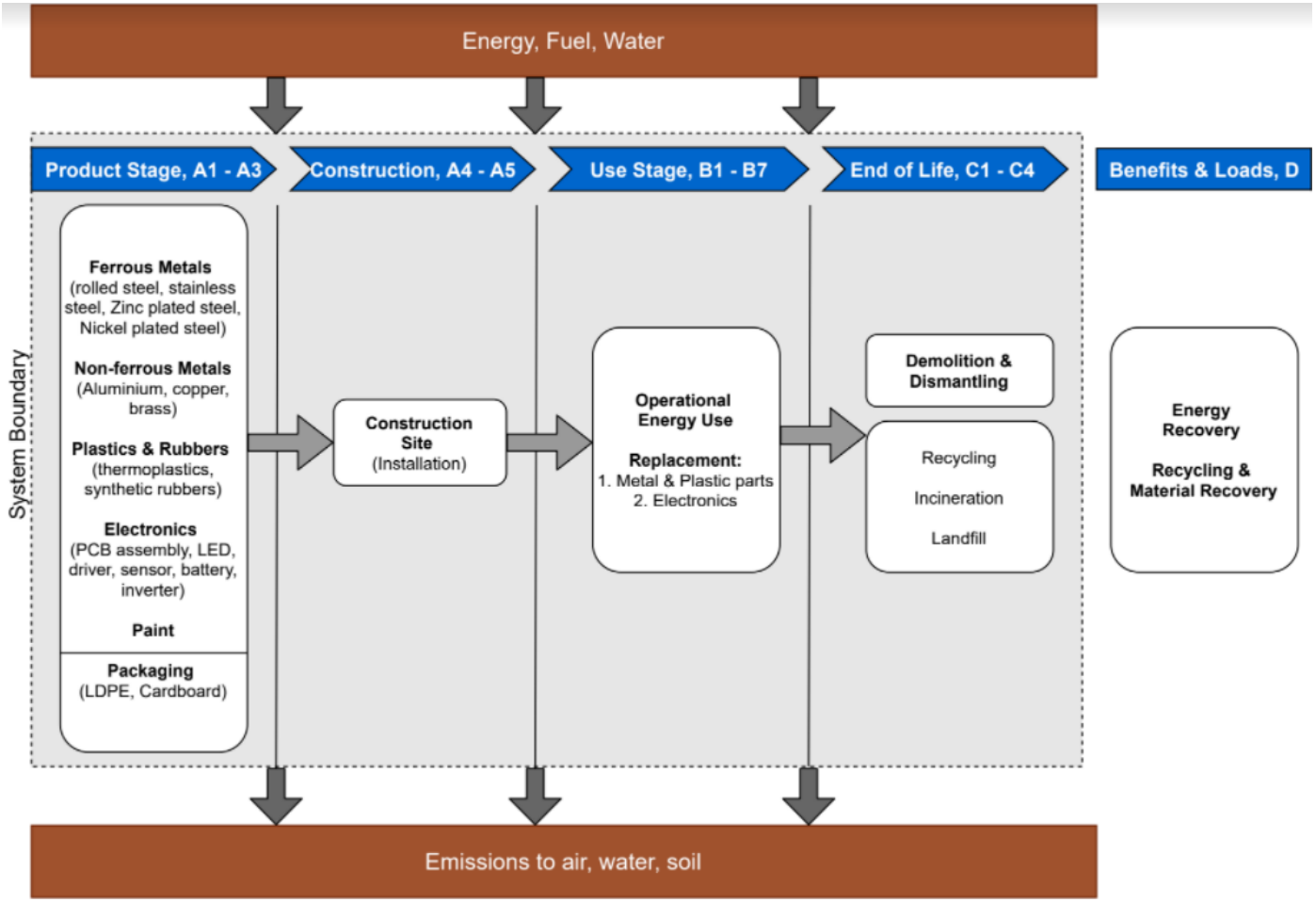
The product is assumed to function for 40 years, with replacement of selected components occurring in stipulated intervals (5-10 years) to ensure functionality of the product (B4). Transportation of the product to Whitecroft's facilities in Ashton-under-Lyne, UK for replacement is also included. During the use phase, the lighting system consumes power from the UK electricity mix (B6). Due to the presence of an integrated lighting control sensor on-board, a control factor of 0.75 is assumed in accordance with The Government of UK (2013), resulting in a 25% reduction in energy consumption. Impacts due to electricity production include direct emissions to air, transformation and transmission losses. The non-functional parts that are replaced are disposed and sent to end-of-life waste handling.

PRODUCT END OF LIFE (C1-C4, D)

A realistic assumption is made about the whole lighting system being collected separately and transported to Whitecroft Lighting or a designated material recovery business (C2). Here, the product is dismantled into metals, plastics and electronics, following which the electronics are shredded and sorted again into plastics and metals (WRAP, 2018). At this stage, an assumption is made that 95% of all metals are recycled; 95% of the plastics are divided into 2 equal streams, with half being recycled and the other half incinerated for energy recovery

(C3) due to the presence of flame retardants (Arduin et al. 2017). Since 100% recovery of materials or energy is not feasible, 5% of materials from the end-of-life product are disposed of in a landfill (C4). 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).

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	Year 2020

DECLARED AND FUNCTIONAL UNIT

Declared unit	1 unit of Flight Vitality FVWQ9Y34KEP
Mass per declared unit	4.856 kg
Functional unit	Operating Flight Vitality FVWQ9Y34KEP for 5000 hours per year consuming 143 Watts for 40 years, while including a control factor of 0.75 and necessary replacements to maintain the correct level of illumination for task.

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	0.1563

SYSTEM BOUNDARY

The scope of the EPD is "cradle to grave with modules A1-A3, A4, A5, B1-B7, C1-C4 and D"; The following modules are included:

A1 (Raw material supply), A2 (Transport), A3 (Manufacturing), A4 (Transport), A5 (Assembly), B4 (Replacement), B6 (Operational Energy Use) as well as C2 (Transport at end-of-life), C3 (Waste processing), C4 (Disposal) and module D (Benefits and loads beyond the system boundary).

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	D	D
x	x	x	x	x	MNR	MNR	MNR	x	MNR	x	MNR	MNR	x	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not relevant = MNR.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804 A1:2012+A2:2019 and RTS PCR, 26.8.2020. The study does not exclude any hazardous substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes for which data is available are included in the calculation. In cases where data is unavailable, assumptions are made to model materials/processes as close to reality as possible. There is no neglected unit process more than 1% of total mass and energy flows. The total neglected input and output flows also do not exceed 5% of energy usage or mass. As a cradle-to-grave study, the analysis includes all industrial processes from raw material acquisition to production, distribution, use phase and end-of-life stages.

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.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is based on annual production rate and made with high accuracy and precision. The values for 1 unit of the produced product which is used within this study are calculated by considering the total production per annual production.

In the production plants, several kinds of products are produced; since the production processes of these products are similar, the annual production rates are taken into consideration for allocation. According to the ratio of the annual production of the declared product to the total annual production at the factory, the annual total energy consumption per the declared product and generated by-product is allocated.

This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs. All estimations and assumptions are given below.

- Module A2, A4 & C2: Vehicle capacity utilization volume factor is assumed to be 1 which means full load. It may vary but as the role of transportation emission in total results is small, the variety in load is assumed to be negligible. Empty returns are not considered as it is assumed that return trip is used by transportation companies to serve the needs of other clients.
- Module A4: Transportation does not cause losses as products are packaged properly. Also, volume capacity utilisation factor is assumed to be 1 for the nested packaged products. Additionally, transportation distances are assumed based on a particular scenario of customer's premises in Northampton, UK and a lorry is the assumed vehicle type used.
- Module B4 & B6: The product is assumed to undergo replacement of selected components in stipulated intervals of time (5-10 years) based on the lifespan of parts and components. This is to ensure that the product is functional for 40 years. The necessary electricity consumption for 40 years is included assuming the lighting system is operated annually for 5000 hours. As this product includes a sensor, a control factor of 0.75 is assumed in accordance with The Government of UK (2013), resulting in a 25% reduction in energy consumption.
- Module C2: Transportation distance to Whitecroft's designated material/energy recovery business is estimated as 50 km and the transportation method is assumed as lorry.
- Module C3, C4, D: The product undergoes dismantling, and the parts are divided into metals, plastics and electronics. The electronics are shredded and further sorted into plastics and metals (WRAP, 2018). An assumption is made that 95% of all metals are recycled, while 95% of the plastics are divided into 2 equal streams, with half being recycled and the other half incinerated for energy recovery due to the presence of flame retardants (Arduin et al. 2017). Hence, 5% of materials from the end-of-life product are assumed to be disposed of in a landfill. Ash from recycling processes is negligible. The recycled end-of-life materials are assumed to serve as secondary raw materials in manufacturing.

AVERAGES AND VARIABILITY

Any average and variation are not considered since this EPD refers to one specific product produced in one production plant.

ENVIRONMENTAL IMPACT DATA

The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Note: "ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930" and "ENVIRONMENTAL IMPACTS - TRACI 2.1" are presented in ANNEX-1 and ANNEX-2 respectively.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Climate change – total	kg CO2e	1.49E+02	1.84E-01	3.97E-01	1.50E+02	1.06E-01	1.90E-01	MNR	MNR	MNR	3.73E+02	MNR	8.29E+03	MNR	MNR	2.18E-02	2.01E+00	3.76E-01	-2.40E+01
Climate change – fossil	kg CO2e	1.48E+02	1.83E-01	3.89E-01	1.49E+02	1.07E-01	1.95E-02	MNR	MNR	MNR	3.71E+02	MNR	8.27E+03	MNR	MNR	2.18E-02	2.02E+00	3.76E-01	-2.37E+01
Climate change – biogenic	kg CO2e	4.86E-01	1.05E-04	5.27E-03	4.92E-01	7.76E-05	1.71E-01	MNR	MNR	MNR	1.50E+00	MNR	5.96E+00	MNR	MNR	1.58E-05	-5.67E-03	2.55E-05	1.06E-01
Climate change – LULUC	kg CO2e	5.05E-01	6.57E-05	2.00E-03	5.07E-01	3.21E-05	1.22E-05	MNR	MNR	MNR	6.60E-01	MNR	1.08E+01	MNR	MNR	6.56E-06	3.35E-04	1.56E-06	-3.29E-01
Ozone depletion	kg CFC11e	1.13E-05	4.22E-08	4.86E-08	1.14E-05	2.51E-08	3.74E-09	MNR	MNR	MNR	2.82E-05	MNR	8.42E-04	MNR	MNR	5.12E-09	3.16E-08	1.24E-09	-1.81E-06
Acidification	mol H+e	1.11E+00	1.54E-03	1.95E-03	1.12E+00	4.49E-04	1.66E-04	MNR	MNR	MNR	2.81E+00	MNR	3.19E+01	MNR	MNR	9.15E-05	2.31E-03	5.43E-05	-2.38E-01
Eutrophication. aquatic freshwater [1]	kg Pe	2.44E-02	1.39E-06	2.30E-05	2.44E-02	8.69E-07	2.82E-07	MNR	MNR	MNR	6.81E-02	MNR	2.69E-01	MNR	MNR	1.77E-07	1.27E-05	8.14E-08	-1.20E-03
Eutrophication. aquatic marine	kg Ne	1.77E-01	4.16E-04	7.53E-04	1.78E-01	1.35E-04	8.34E-05	MNR	MNR	MNR	4.59E-01	MNR	5.82E+00	MNR	MNR	2.76E-05	6.49E-04	3.68E-05	-2.76E-02
Eutrophication. terrestrial	mol Ne	2.03E+00	4.61E-03	6.96E-03	2.04E+00	1.49E-03	6.21E-04	MNR	MNR	MNR	5.27E+00	MNR	6.89E+01	MNR	MNR	3.05E-04	7.08E-03	2.42E-04	-3.34E-01
Photochemical ozone formation	kg NMVOCe	5.51E-01	1.33E-03	1.58E-03	5.54E-01	4.80E-04	2.16E-04	MNR	MNR	MNR	1.38E+00	MNR	1.75E+01	MNR	MNR	9.80E-05	1.93E-03	6.48E-05	-1.07E-01
Abiotic depletion. minerals & metals [2]	kg Sbe	4.14E-02	2.87E-06	4.72E-06	4.14E-02	1.82E-06	3.41E-07	MNR	MNR	MNR	1.18E-01	MNR	6.06E-02	MNR	MNR	3.72E-07	9.19E-06	5.34E-08	-3.16E-03
Abiotic depletion of fossil resources [2]	MJ	1.83E+03	2.78E+00	5.19E+00	1.84E+03	1.66E+00	2.75E-01	MNR	MNR	MNR	4.65E+03	MNR	2.01E+05	MNR	MNR	3.39E-01	4.16E+00	9.41E-02	-2.89E+02
Water use [2]	m3e deprived	4.59E+01	9.77E-03	1.21E-01	4.60E+01	6.18E-03	1.91E-03	MNR	MNR	MNR	1.11E+02	MNR	4.09E+02	MNR	MNR	1.26E-03	1.02E-01	2.98E-03	-1.27E+01

[1] Required characterisation method and data are in kg P-eq. Multiply by 3.07 to get PO4e.

[2] EN 15804+A2 Disclaimer: 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 experienced with the indicator.

Reading Example: 1.00E-03 = $1.00 \times 10^{-3} = 0.001$
1.00E+03 = $1.00 \times 10^{+3} = 1000$

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

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	8.22E-06	1.50E-08	3.36E-08	8.27E-06	9.66E-09	7.13E-09	MND	MNR	MNR	1.86E-05	MNR	1.03E-04	MNR	MNR	1.97E-09	2.62E-08	6.80E-10	-2.23E-06
Ionizing radiation. human health [3]	kBq U235e	7.25E+00	1.21E-02	1.70E-02	7.28E+00	7.26E-03	1.16E-03	MND	MNR	MNR	1.81E+01	MNR	3.33E+03	MNR	MNR	1.48E-03	1.53E-02	3.21E-04	-1.05E+00
Eco-toxicity (freshwater) [2]	CTUe	1.09E+04	2.07E+00	4.51E+01	1.10E+04	1.27E+00	3.55E-01	MND	MNR	MNR	2.97E+04	MNR	1.24E+05	MNR	MNR	2.59E-01	1.52E+01	1.95E-01	-1.85E+03
Human toxicity. cancer effects [2]	CTUh	1.81E-07	6.29E-11	1.87E-10	1.81E-07	3.25E-11	9.40E-11	MND	MNR	MNR	3.14E-07	MNR	2.67E-06	MNR	MNR	6.63E-12	5.71E-10	4.71E-10	-7.89E-08
Human toxicity. non-cancer effects [2]	CTUh	6.37E-06	2.38E-09	5.83E-09	6.38E-06	1.50E-09	9.11E-10	MND	MNR	MNR	1.58E-05	MNR	9.11E-05	MNR	MNR	3.07E-10	4.89E-08	1.48E-09	-2.34E-06
Land use related impacts/soil quality [2]	-	5.18E+02	3.68E+00	2.34E+00	5.24E+02	2.51E+00	2.61E-01	MND	MNR	MNR	1.42E+03	MNR	5.49E+03	MNR	MNR	5.12E-01	1.64E+00	1.46E-01	-3.48E+01

[2] EN 15804+A2 Disclaimer: "The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator."

[3] EN 15804+A2 Disclaimer: "This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator."

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
Renewable PER used as energy [4]	MJ	2.72E+02	3.29E-02	3.05E+00	2.75E+02	2.09E-02	6.50E-03	MNR	MNR	MNR	4.82E+02	MNR	3.76E+04	MNR	MNR	4.27E-03	3.73E-01	1.54E-03	-1.25E+02
Renewable PER used as materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	4.46E-01
Total use of renewable PER	MJ	2.72E+02	3.29E-02	3.05E+00	2.75E+02	2.09E-02	6.50E-03	MNR	MNR	MNR	4.82E+02	MNR	3.76E+04	MNR	MNR	4.27E-03	3.73E-01	1.54E-03	-1.25E+02
Non-renew. PER used as energy	MJ	1.82E+03	2.78E+00	5.10E+00	1.83E+03	1.66E+00	2.75E-01	MNR	MNR	MNR	4.62E+03	MNR	2.01E+05	MNR	MNR	3.39E-01	4.16E+00	9.41E-02	-2.36E+02
Non-renew. PER used as materials	MJ	1.61E+01	0.00E+00	9.56E-02	1.62E+01	0.00E+00	0.00E+00	MNR	MNR	MNR	2.75E+01	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	-5.26E+01
Total use of non-renewable PER	MJ	1.83E+03	2.78E+00	5.19E+00	1.84E+03	1.66E+00	2.75E-01	MNR	MNR	MNR	4.65E+03	MNR	2.01E+05	MNR	MNR	3.39E-01	4.16E+00	9.41E-02	-2.89E+02
Use of secondary materials	kg	9.87E-01	0.00E+00	3.23E-05	9.87E-01	0.00E+00	0.00E+00	MNR	MNR	MNR	7.15E-02	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	1.74E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renew. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	1.90E+00	5.38E-04	1.01E-02	1.91E+00	3.46E-04	7.20E-05	MNR	MNR	MNR	5.15E+00	MNR	4.96E+01	MNR	MNR	7.06E-05	2.50E-03	1.69E-04	-1.78E-01

[4] PER abbreviation stands for 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	1.81E+01	2.77E-03	1.45E-02	1.82E+01	1.61E-03	6.93E-04	MNR	MNR	MNR	3.47E+01	MNR	5.95E+02	MNR	MNR	3.29E-04	0.00E+00	4.86E-03	-6.86E+00
Non-hazardous waste	Kg	8.02E+02	2.66E-01	5.98E-01	8.03E+02	1.79E-01	7.94E-02	MNR	MNR	MNR	2.22E+03	MNR	9.72E+03	MNR	MNR	3.64E-02	0.00E+00	5.34E-01	-7.23E+01
Radioactive waste	Kg	5.07E-03	1.91E-05	1.78E-05	5.11E-03	1.14E-05	1.72E-06	MNR	MNR	MNR	1.23E-02	MNR	1.55E+00	MNR	MNR	2.33E-06	0.00E+00	4.93E-07	-9.16E-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	MNR	MNR	MNR	0.00E+00	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	2.47E+00	MNR	0.00E+00	MNR	MNR	0.00E+00	3.70E+00	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	0.00E+00	MNR	MNR	MNR	8.05E-01	MNR	0.00E+00	MNR	MNR	0.00E+00	5.49E-01	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	MNR	MNR	MNR	1.06E+01	MNR	0.00E+00	MNR	MNR	0.00E+00	7.23E+00	0.00E+00	0.00E+00

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Climate change – total	kg CO2e	3.07E+01	3.79E-02	8.18E-02	3.09E+01	2.18E-02	3.91E-02	MNR	MNR	MNR	7.68E+01	MNR	1.71E+03	MNR	MNR	4.49E-03	4.14E-01	7.74E-02	-4.94E+00
Abiotic depletion. minerals & metals [2]	kg Sbe	8.53E-03	5.91E-07	9.72E-07	8.53E-03	3.75E-07	7.02E-08	MNR	MNR	MNR	2.43E-02	MNR	1.25E-02	MNR	MNR	7.66E-08	1.89E-06	1.10E-08	-6.51E-04
Abiotic depletion of fossil resources [2]	MJ	3.77E+02	5.72E-01	1.07E+00	3.79E+02	3.42E-01	5.66E-02	MNR	MNR	MNR	9.58E+02	MNR	4.14E+04	MNR	MNR	6.98E-02	8.57E-01	1.94E-02	-5.95E+01
Water use [2]	m3e deprived	9.45E+00	2.01E-03	2.49E-02	9.47E+00	1.27E-03	3.93E-04	MNR	MNR	MNR	2.29E+01	MNR	8.42E+01	MNR	MNR	2.59E-04	2.10E-02	6.14E-04	-2.62E+00
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	0.00E+00	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content in product	kg C	N/A	N/A	0.00E+00	0.00E+00	N/A	N/A	MNR	MNR	MNR	N/A	MNR	N/A	MNR	MNR	N/A	N/A	N/A	N/A
Biogenic carbon content in packaging	kg C	N/A	N/A	3.22E-02	3.22E-02	N/A	N/A	MNR	MNR	MNR	N/A	MNR	N/A	MNR	MNR	N/A	N/A	N/A	N/A

[2] EN 15804+A2 Disclaimer: "The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator."

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity production. wind. 1-3mw turbine. onshore. United Kingdom. Ecoinvent 3.6. Year: 2019
Electricity CO2e/kWh	0.0122 kg CO2e / kWh
District heating data source and quality	Heat production. natural gas. at industrial furnace >100kw. United Kingdom. Ecoinvent 3.6. Year: 2019
District heating CO2e/kWh	0.2473 kg CO2e / kWh

Transport scenario documentation (A4)

Scenario parameter	Value
Specific transport CO2e emissions, kg CO2e / tkm	0.0901
Average transport distance, km	226.9
Volume capacity utilization factor	1

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	4.856
Collection process – kg collected with mixed waste	0.00
Recovery process – kg for re-use	0.00
Recovery process – kg for recycling	3.752
Recovery process – kg for energy recovery	0.557
Disposal (total) – kg for final deposition	0.546
Scenario assumptions e.g. transportation	End-of-life product is transported 50 km with an average lorry

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ABOUT THE MANUFACTURER

Whitecroft Lighting is one of the UK's largest manufacturers of commercial lighting. From our 10,000m2 design and manufacturing facility we provide tailored lighting solutions for commercial, industrial, healthcare and education applications.

From initial design to packaged product, the entire sales, support and manufacturing process is under one roof. Our manufacturing capability is upwards of 600,000 luminaires per year, and our continued investment in the latest technologies has brought LED manufacturing in-house, adding flexibility to the manufacturing process.

EPD AUTHOR AND CONTRIBUTORS

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EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD program operator	The Building Information Foundation RTS sr Malminkatu 16 A, 00100 Helsinki, Finland http://cer.rts.fi
Background data	This EPD is based on Ecoinvent 3.6 (cut-off).
LCA software	The LCA and EPD have been created using One Click LCA Flexible EPD Tool

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with EN 15804, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The background report (project report) for this EPD

Why does verification transparency matter? Read more online.

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD verification started on	16.6.2021
EPD verification completed on	17.6.2021
Approver of the EPD verifier	The Building Information Foundation RTS sr

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that. following detailed examination. I have not established any relevant deviations by the studied Environmental Product Declaration (EPD). its LCA and project report. in terms of

- the data collected and used in the LCA calculations.
- the way the LCA-based calculations have been carried out.
- the presentation of environmental data in the EPD. and
- other additional environmental information. as present

with respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products. this specific product category. the construction industry. relevant standards. and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Silvia Vilčeková, Silcert, s.r.o.

ANNEX 1 : ENVIRONMENTAL IMPACTS – EN 15804+A1. CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global warming potential	kg CO2e	1.43E02	1.82E-01	3.87E-01	1.44E02	1.06E-01	9.53E-02	MNR	MNR	MNR	3.59E+02	MNR	8.13E+03	MNR	MNR	2.16E-02	2.01E00	3.73E-01	-2.29E+01
Depletion of stratospheric ozone	kg CFC11e	1.29E-05	3.35E-08	4.09E-08	1.30E-05	2.00E-08	3.00E-09	MNR	MNR	MNR	3.29E-05	MNR	9.63E-04	MNR	MNR	4.07E-09	2.71E-08	1.02E-09	-1.72E-06
Acidification	kg SO2e	9.85E-01	1.03E-03	1.11E-03	9.87E-01	2.17E-04	1.37E-04	MNR	MNR	MNR	2.50E+00	MNR	2.68E+01	MNR	MNR	4.43E-05	1.55E-03	3.45E-05	-1.98E-01
Eutrophication	kg PO4 3e	5.97E-01	1.43E-04	7.76E-04	5.98E-01	4.39E-05	3.15E-04	MNR	MNR	MNR	1.62E+00	MNR	8.62E+00	MNR	MNR	8.96E-06	1.02E-03	1.28E-03	-6.20E-02
Photochemical ozone formation	kg C2H4e	4.56E-02	3.86E-05	6.76E-05	4.57E-02	1.38E-05	3.18E-05	MNR	MNR	MNR	1.03E-01	MNR	1.12E+00	MNR	MNR	2.81E-06	7.81E-05	2.26E-06	-1.40E-02
Abiotic depletion of non-fossil res.	kg Sbe	4.14E-02	2.87E-06	4.72E-06	4.14E-02	1.82E-06	3.41E-07	MNR	MNR	MNR	1.18E-01	MNR	6.06E-02	MNR	MNR	3.72E-07	9.19E-06	5.34E-08	-3.16E-03
Abiotic depletion of fossil resources	MJ	1.83E03	2.78E00	5.19E00	1.84E03	1.66E00	2.75E-01	MNR	MNR	MNR	4.65E+03	MNR	2.01E+05	MNR	MNR	3.39E-01	4.16E00	9.41E-02	-2.89E+02

ANNEX 2 : ENVIRONMENTAL IMPACTS – TRACI 2.1. / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global warming potential	kg CO2e	1.44E+02	1.82E-01	3.88E-01	1.44E+02	1.06E-01	1.04E-01	MNR	MNR	MNR	3.60E+02	MNR	8.15E+03	MNR	MNR	2.16E-02	2.01E+00	3.74E-01	-2.31E+01
Ozone depletion	kg CFC11e	1.36E-05	4.47E-08	5.31E-08	1.37E-05	2.66E-08	3.99E-09	MNR	MNR	MNR	3.42E-05	MNR	1.20E-03	MNR	MNR	5.43E-09	3.53E-08	1.31E-09	-2.04E-06
Acidification	kg SO2e	9.34E-01	1.33E-03	1.70E-03	9.37E-01	3.91E-04	1.69E-04	MNR	MNR	MNR	2.36E+00	MNR	2.69E+01	MNR	MNR	7.98E-05	2.01E-03	4.95E-05	-1.95E-01
Eutrophication	kg Ne	2.14E-01	1.14E-04	5.81E-04	2.15E-01	5.50E-05	5.18E-05	MNR	MNR	MNR	5.89E-01	MNR	2.76E+00	MNR	MNR	1.12E-05	2.85E-04	3.20E-05	-1.46E-02
Photochemical Smog Formation	kg O3e	1.06E+01	2.64E-02	3.14E-02	1.06E+01	8.57E-03	3.60E-03	MNR	MNR	MNR	2.72E+01	MNR	3.61E+02	MNR	MNR	1.75E-03	3.94E-02	1.39E-03	-1.71E+00
Depletion of non-renewable energy	MJ	1.23E+02	3.99E-01	6.29E-01	1.24E+02	2.38E-01	3.66E-02	MNR	MNR	MNR	3.04E+02	MNR	1.47E+04	MNR	MNR	4.86E-02	4.45E-01	1.31E-02	-2.65E+01