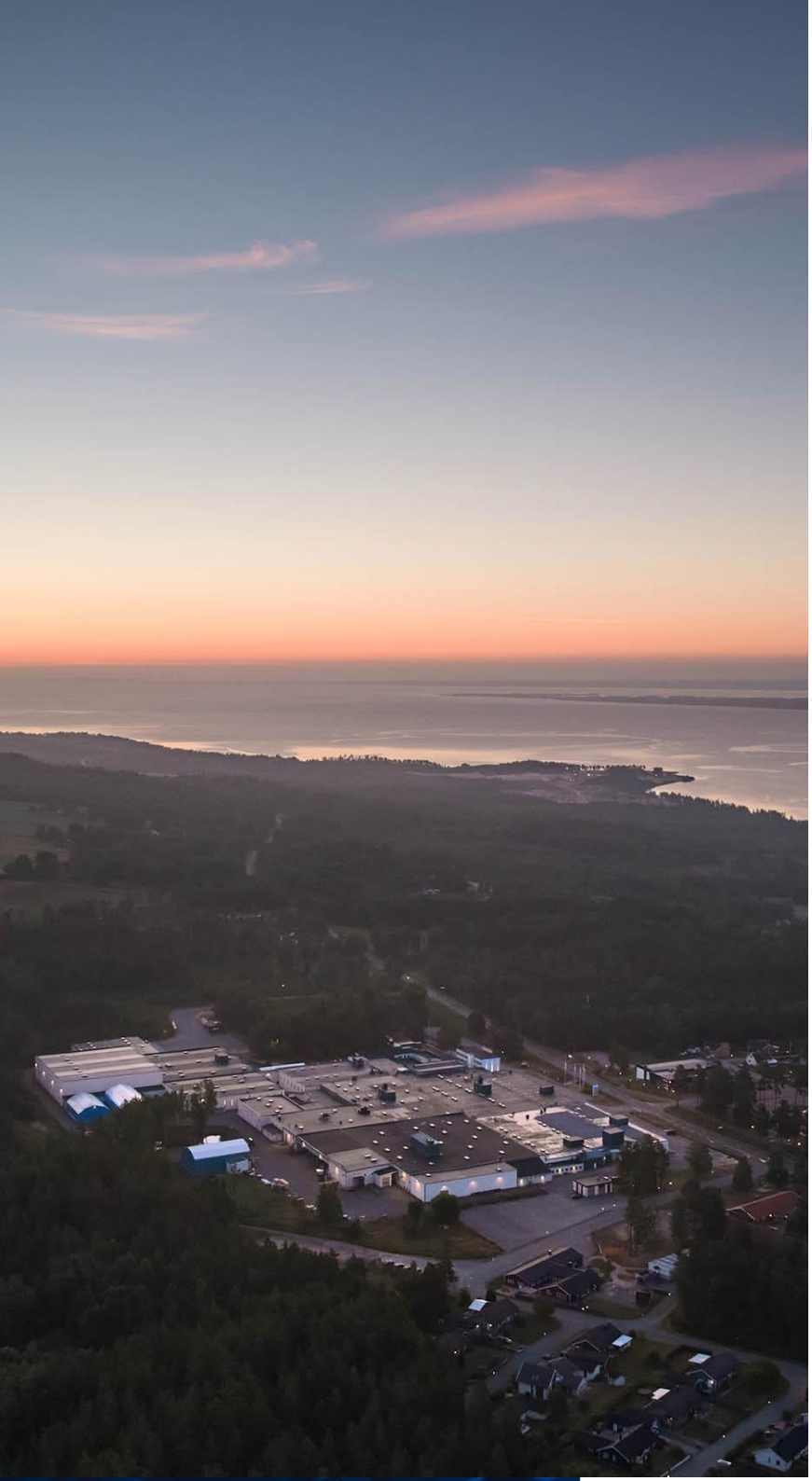

ENVIRONMENTAL PRODUCT DECLARATION

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

Pleiad G4

Fagerhults Belysning AB

EPD HUB, HUB-0413

Publishing date 30 April 2023, last updated on 30 April 2023, valid until 30 April 2028

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Fagerhults Belysning AB
Address	Åvägen 1, 566 80 Habo, Sweden
Contact details	info@fagerhult.se
Website	www.fagerhult.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to grave, A1-C4 and D
EPD author	Josefin Carlsson
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	H.N, as an authorized verifier acting for EPD Hub Limited

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

Product name	Pleiad G4
Additional labels	Pleiad G4 125, Pleiad G4 165, Pleiad G4 205
Product reference	Pleiad G4 165
Place of production	Habo, Sweden
Period for data	2022
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3	-21 % / +19 %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit of Pleiad G4 165
Declared unit mass	0.67 kg
GWP-fossil, A1-A3 (kgCO2e)	12.6
GWP-total, A1-A3 (kgCO2e)	12.9
Secondary material, inputs (%)	25.4
Secondary material, outputs (%)	71.6
Total energy use, A1-A3 (kWh)	72.4
Total water use, A1-A3 (m3e)	70.3

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Fagerhult creates premium lighting solutions that enhance human well-being in professional and public environments. With sustainability and connectivity at heart, we focus on office, education, healthcare, retail and outdoor applications. We work closely with customers and partners in the European market and provide lighting solutions globally – with tailor-made solutions for our customers. The Fagerhult brand includes both the product company Fagerhults Belysning AB (based in Fagerhult, Sweden) and 13 sales companies located around Europe.

PRODUCT DESCRIPTION

The Pleiad G4 series includes recessed and surface-mounted downlights in different diameters. Pleiad G4 simplifies and streamlines advanced lighting planning for entire projects by using one and the same luminaire type. The combination of the different luminaire models and an ambitious range of lumen packages and reflectors makes it possible to plan functional, comfortable and energy-efficient lighting environments for any situation, regardless of ceiling height and configuration.

Pleiad G4 meets the requirements for office work with monitors, making the luminaire ideal for flexible and activity-based office environments where you switch between different workplaces depending on the task.

The installation between the luminaire and the driver is done using a quick connector, which provides an extremely secure installation and eliminates the risk of handling errors. Installation in the ceilings is carried out without tools, using an innovative spring design.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	65	Global, mainly EU
Minerals	0	-
Fossil materials	35	Global, mainly EU
Bio-based materials	0	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate.

Biogenic carbon content in product, kg C	
Biogenic carbon content in packaging, kg C	0.08

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 unit of Pleiad G4 165
Mass per declared unit	0.67 kg
Functional unit	-
Reference service life	20 years

SUBSTANCES, REACH - VERY HIGH CONCERN

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

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

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

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	MNR	MNR	MNR	MNR	MNR	x	MNR	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 declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Fuels and electricity used by machines, and treatment of material losses occurring during the manufacturing processes are included in this stage.

The product contains components made of metals and plastics. All materials and components are transported to Fagerhults production facility in Habo, Sweden, where the product is being assembled and packaged. Production losses of components that are designed inhouse and contributes to a significant share of the product's mass are considered. Electricity and district heating needed for the manufacturing processes are included in the study. The energy supply at Fagerhults facility in Habo is 100 % renewable. Ancillary materials needed within the assembly and manufacturing process are considered neglected. The product is packaged in a cardboard box with packaging interiors of corrugated board and plastic. The product is being sent to the installation site on a wooden pallet wrapped in plastic film.

TRANSPORT AND INSTALLATION (A4-A5)

The transportation distance from production facility in Habo to the installation site is assumed as an average distance to existing markets based on market share. The calculated average transportation distance is 417 km for road transportation and 13 km for sea transportation. Vehicle capacity utilization factor may vary in reality, but as the emissions caused by transports are relatively small in relation to the total results, the variety in load is assumed to be neglected and full load is assumed. Return trip is assumed to be used by the transportation company to serve the needs of other clients, therefore are empty returns not taken into account. 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 include waste packaging materials from wood pallet, cardboard box and plastic film. The impacts of energy consumption during installation are included, however used ancillary materials during installation are considered negligible.

PRODUCT USE AND MAINTENANCE (B1-B7)

The product consume electricity during use and a Swedish electricity grid mix is assumed (B6). Impacts due to electricity production include direct emissions to air, transformation and transmission losses. The product is most often used in offices as application area with an annual operating of 2500 hours according to the European standard EN 15193-1. The reference service life is assumed to be 20 years.

PRODUCT END OF LIFE (C1-C4, D)

Consumption of energy are considered in the deconstruction process, but consumption of natural resources are assumed to be negligible. It is assumed that the waste is collected separately and transported to a waste treatment centre. Distance and transportation method to waste treatment is assumed to be 50 km with 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. Module C3 accounts for energy and resource inputs for sorting and treating these waste streams for recycling and incineration with energy recovery.

Due to the material and energy recovery potential of parts, the end-of-life product is converted into recycled raw materials, or energy recovered from incineration that also displaces electricity and heat production (D). The rates of waste treatment for materials included in the product are based on statistics presented by agencies mainly in Scandinavia. Materials being recycled are 95 % of the metals (World Steel Association), 74 % of the electrical and electronic waste (Elkretsen) and 10 % of the plastics (Naturvårdsverket). The wooden pallet used during transportation is also incinerated for energy recovery. The benefits and loads of incineration and recycling of the packaging materials are included in Module D.

MANUFACTURING PROCESS

DESIGN & PREPERATION

RAW MATERIAL & COMPONENTS

PRODUCTION

ASSEMBLY

PACKAGING & DELIVERY

LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

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

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways.

Data type	Allocation
Raw materials	Allocated by mass or volume
Packaging materials	Allocated by mass or volume
Ancillary materials	Not applicable
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	Multiple products
Averaging method	Averaged by shares of total volume
Variation in GWP-fossil for A1-A3	-21 % / +19 %

This is an average EPD of multiple products from the manufacturer Fagerhults Belysning AB. The average EPD includes three models that are all included in the same product family, Pleiad G4. The models are Pleiad G4 125, Pleiad G4 165 and Pleiad G4 205, where Pleiad G4 165 is the representative product based on sales. All the three models are recessed and differ mainly in size. The application area for the models are the same, as well as the reference service life time. Pleiad G4 125 represents a best case, Pleiad G4 205 represents a worst case and Pleiad G4 165 is an estimated average case. The difference in GWP fossil A1-A3 between average case and best case is -21 %, and +19 % between average case to worst case.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. Ecoinvent and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	1,21E1	6,08E-2	7,43E-1	1,29E1	3,88E-2	7,16E-1	MND	MND	MND	MND	MND	5,31E1	MND	2,57E-3	3,03E-3	3,53E-1	3,6E-3	-1,03E0
GWP – fossil	kg CO_2e	1,21E1	6,07E-2	5,03E-1	1,26E1	3,91E-2	4,34E-2	MND	MND	MND	MND	MND	4,81E1	MND	2,32E-3	3,03E-3	3,52E-1	3,59E-3	-1,14E0
GWP – biogenic	kg CO_2e	5,56E-3	3,91E-5	-1,98E-1	-1,92E-1	2,7E-5	6,73E-1	MND	MND	MND	MND	MND	1,9E0	MND	9,37E-5	2,2E-6	4,23E-4	3,46E-6	1,08E-1
GWP – LULUC	kg CO_2e	4,64E-2	1,88E-5	4,37E-1	4,84E-1	1,22E-5	1,62E-4	MND	MND	MND	MND	MND	3,12E0	MND	1,57E-4	9,11E-7	2,94E-5	1,88E-7	-4,52E-4
Ozone depletion pot.	kg CFC_{-11}e	9,85E-7	1,41E-8	8,24E-8	1,08E-6	9,15E-9	3,04E-9	MND	MND	MND	MND	MND	2,36E-5	MND	1,17E-9	7,12E-10	2,26E-9	1,22E-10	-4,11E-8
Acidification potential	mol H^+e	1,02E-1	3,57E-4	4,04E-3	1,07E-1	2,05E-4	1,15E-4	MND	MND	MND	MND	MND	3,13E-1	MND	1,11E-5	1,27E-5	2,24E-4	3,34E-6	-6,54E-3
EP-freshwater[2)]	kg Pe	1,85E-3	4,62E-7	5,44E-5	1,9E-3	3,13E-7	3,34E-7	MND	MND	MND	MND	MND	4,19E-3	MND	1,73E-7	2,46E-8	1,15E-6	9,15E-9	-6,16E-5
EP-marine	kg Ne	1,46E-2	1,03E-4	1,12E-3	1,58E-2	5,93E-5	5,28E-5	MND	MND	MND	MND	MND	5,36E-2	MND	2,44E-6	3,83E-6	6,94E-5	7,56E-6	-1,07E-3
EP-terrestrial	mol Ne	1,72E-1	1,13E-3	1,52E-2	1,89E-1	6,56E-4	4,71E-4	MND	MND	MND	MND	MND	7,02E-1	MND	3,17E-5	4,23E-5	7,37E-4	1,25E-5	-1,21E-2
POCP ("smog")[3)]	kg NMVOCe	4,83E-2	3,41E-4	3,25E-3	5,19E-2	2,03E-4	1,38E-4	MND	MND	MND	MND	MND	1,6E-1	MND	7E-6	1,36E-5	1,9E-4	4,28E-6	-5,04E-3
ADP-minerals & metals[4)]	kg Sbe	2,15E-3	2,96E-6	7,68E-6	2,16E-3	6,53E-7	2,3E-7	MND	MND	MND	MND	MND	1,93E-3	MND	3,89E-8	5,17E-8	8,02E-7	3,85E-9	-8,41E-6
ADP-fossil resources	MJ	1,55E2	2,76E0	7,01E0	1,65E2	6,04E-1	4,28E-1	MND	MND	MND	MND	MND	5,64E3	MND	2,82E-1	4,71E-2	3,08E-1	9,01E-3	-1,99E1
Water use[5)]	m^3e depr.	4,19E0	3,26E-3	1,57E0	5,76E0	2,22E-3	2,48E-3	MND	MND	MND	MND	MND	7,38E1	MND	3,61E-3	1,75E-4	6,32E-3	4,05E-4	-6,51E-1

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	6,81E-7	5,02E-9	5,52E-8	7,41E-7	3,45E-9	3,06E-9	MND	MND	MND	MND	MND	2,26E-6	MND	8,87E-11	2,74E-10	2,04E-9	6,23E-11	-8,61E-8
Ionizing radiation[6)]	kBq U235e	6,12E-1	4,06E-3	2,57E-2	6,42E-1	2,64E-3	1,02E-2	MND	MND	MND	MND	MND	1,93E2	MND	9,68E-3	2,06E-4	1,18E-3	3,58E-5	-4,77E-2
Ecotoxicity (freshwater)	CTUe	9,95E2	6,94E-1	4,3E1	1,04E3	4,59E-1	3,28E-1	MND	MND	MND	MND	MND	2,96E3	MND	1,04E-1	3,6E-2	1,49E0	2,95E-2	-4,82E1
Human toxicity, cancer	CTUh	1,85E-8	1,87E-11	6,69E-10	1,91E-8	1,22E-11	4,65E-11	MND	MND	MND	MND	MND	8,43E-8	MND	2,27E-12	9,2E-13	4,51E-11	3,16E-13	-3,19E-9
Human tox. non-cancer	CTUh	6,87E-7	8,22E-10	1,62E-8	7,04E-7	5,4E-10	9,58E-10	MND	MND	MND	MND	MND	2,08E-6	MND	5,18E-11	4,26E-11	4,57E-9	1,16E-11	6,24E-8
SQP[7)]	-	4,43E1	1,27E0	1,42E0	4,7E1	8,85E-1	1,31E-1	MND	MND	MND	MND	MND	9,56E1	MND	4,18E-3	7,11E-2	7,98E-2	2,76E-2	-1,46E0

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	2,78E1	3,4E-2	6,22E1	9E1	7,49E-3	1,39E-1	MND	MND	MND	MND	MND	2,71E3	MND	1,35E-1	5,93E-4	3,27E-2	1,45E-4	-4,52E0
Renew. PER as material	MJ	0E0	0E0	2,83E0	2,83E0	0E0	-4,43E0	MND	MND	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	1,09E0
Total use of renew. PER	MJ	2,78E1	3,4E-2	6,5E1	9,29E1	7,49E-3	-4,29E0	MND	MND	MND	MND	MND	2,71E3	MND	1,35E-1	5,93E-4	3,27E-2	1,45E-4	-3,43E0
Non-re. PER as energy	MJ	1,61E2	2,76E0	6,68E0	1,71E2	6,04E-1	4,28E-1	MND	MND	MND	MND	MND	5,64E3	MND	2,82E-1	4,71E-2	3,08E-1	9,01E-3	-1,13E1
Non-re. PER as material	MJ	6,94E0	0E0	3,3E-1	7,27E0	0E0	7,48E-1	MND	MND	MND	MND	MND	0E0	MND	0E0	0E0	-7,52E0	-5,16E-1	-5,18E0
Total use of non-re. PER	MJ	1,68E2	2,76E0	7,01E0	1,78E2	6,04E-1	1,18E0	MND	MND	MND	MND	MND	5,64E3	MND	2,82E-1	4,71E-2	-7,21E0	-5,07E-1	-1,64E1
Secondary materials	kg	1,6E-1	0E0	9,71E-3	1,7E-1	0E0	0E0	MND	MND	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	4,94E-1
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	7,03E1	5,64E-4	5,89E-3	7,03E1	1,24E-4	1,68E-4	MND	MND	MND	MND	MND	1,5E0	MND	7,32E-5	9,8E-6	2,29E-4	1E-5	-6,58E-3

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	7,28E-1	2,66E-3	2,34E-2	7,54E-1	5,89E-4	2,25E-3	MND	MND	MND	MND	MND	4,57E0	MND	2,11E-4	4,58E-5	0E0	1,47E-5	-2,37E-1
Non-hazardous waste	kg	1,67E1	2,88E-1	7,65E-1	1,77E1	6,33E-2	2,46E-1	MND	MND	MND	MND	MND	1,73E2	MND	6,11E-3	5,06E-3	0E0	4,24E-2	-2,23E0
Radioactive waste	kg	5,49E-3	1,9E-5	3,3E-5	5,54E-3	4,15E-6	4,74E-6	MND	MND	MND	MND	MND	7,9E-2	MND	3,96E-6	3,23E-7	0E0	5,53E-8	-2,61E-5

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	4,83E-2	4,83E-2	0E0	1,22E-1	MND	MND	MND	MND	MND	0E0	MND	0E0	0E0	4,8E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	0E0	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	2,81E0	MND	MND	MND	MND	MND	0E0	MND	0E0	0E0	3,05E0	0E0	0E0

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

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,17E1	1,77E-1	9,79E-1	1,29E1	3,88E-2	6,99E-2	MND	MND	MND	MND	MND	5,04E1	MND	2,44E-3	3E-3	3,52E-1	2,6E-3	-1,07E0
Ozone depletion Pot.	kg CFC_{-11}e	3,04E-7	3,32E-8	7,08E-8	4,08E-7	7,27E-9	3,41E-9	MND	MND	MND	MND	MND	3,81E-5	MND	1,9E-9	5,66E-10	1,96E-9	9,68E-11	-3,72E-8
Acidification	kg SO_2e	7,9E-2	4,54E-4	2,71E-3	8,22E-2	1,14E-4	8,72E-5	MND	MND	MND	MND	MND	2,53E-1	MND	8,38E-6	6,16E-6	1,57E-4	2,56E-6	-5,56E-3
Eutrophication	kg PO_4^3e	1,56E-2	8,33E-5	1,05E-3	1,67E-2	1,97E-5	1,47E-4	MND	MND	MND	MND	MND	1,36E-1	MND	5,07E-6	1,24E-6	9,03E-5	5,15E-4	-2,01E-3
POCP (“smog”)	kg C_2H_4e	4,54E-3	2,48E-5	1,49E-4	4,71E-3	5,81E-6	1,23E-5	MND	MND	MND	MND	MND	1,08E-2	MND	3,77E-7	3,9E-7	5,95E-6	5,24E-7	-5,6E-4
ADP-elements	kg Sbe	2,15E-3	2,96E-6	7,68E-6	2,16E-3	6,53E-7	2,3E-7	MND	MND	MND	MND	MND	1,93E-3	MND	3,89E-8	5,17E-8	8,02E-7	3,85E-9	-8,41E-6
ADP-fossil	MJ	1,55E2	2,76E0	7,01E0	1,65E2	6,04E-1	4,28E-1	MND	MND	MND	MND	MND	5,64E3	MND	2,82E-1	4,71E-2	3,08E-1	9,01E-3	-1,99E1

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 reference standard, 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 digital background data for this EPD

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

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 reference standard.

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.

HaiHa Nguyen, as an authorized verifier acting for EPD Hub Limited
30.04.2023

VERIFIED ISO 14025