



FAGERHULT

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

EPD HUB, HUB-3633

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Notor 65 Beta Opti Direct/Indirect
Fagerhults Belysning AB



MANUFACTURER AND SITE

Manufacturer	Fagerhults Belysning AB
Address	Åvägen 1, 566 80 Habo, Sweden
Contact details	info@fagerhult.se
Website	www.fagerhult.com
Place of production	Habo, Sweden
Place(s) of raw material origin	Global, mainly EU
Place(s) of installation and use	Global
Period for data	2024

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN15804:2012+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR Version 1.1, 5 Dec 2023
Sector	Electrical product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-B7, and modules C1-C4, D
EPD author	Josefin Carlsson, Fagerhults Belysning AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☒ External verification
EPD verifier	Imane Uald Lamkaddam as an authorized verifier for EPD Hub

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 1.1 (5 Decr 2023) 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



Created with One Click LCA

PRODUCT SPECIFICATION

Product name	Notor 65 Beta Opti Direct/Indirect
Product number / reference	Beta Opti Direct/Indirect
Product description	Notor 65, with the cross-section 65x65 mm, is ideal for use in workplaces, schools or as decorative lines in communication areas. The EPD represents a Notor 65 with the louvre option Beta Opti and direct/indirect light distribution, with the module length of 1200 mm.
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	43,9

PRODUCT CLASSIFICATION

Declared operating voltage, Volt	220
Light source color temperature, Kelvin	3000
Protection index for water and dust (IP)	20
Impact resistance index (IK)	-
Luminous flux, Lumen	4666
Electrical power, Watt	37
Luminous efficiency, Lm/W	134
Additional characteristic	Light control: Organic Response For more information, please go to our website www.fagerhult.com

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 two manufacturing sites and eleven sales companies located around Europe.

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit
Declared unit mass, kg	3
Mass of packaging, kg	0,35
Functional unit	Provide lighting that delivers an outgoing artificial luminous flux of 1,000 lumens during a reference lifetime of 35,000 hours, see appendix for details
Reference service life (hours)	100000
Assigned lifetime (hours)	100000
GWP-total, A1-A3 (kg CO ₂ e)	25,0
GWP-fossil, A1-A3 (kg CO ₂ e)	25,1
Secondary material, inputs (%)	49
Secondary material, outputs (%)	71,7
Total energy use, A1-A3 (kWh)	124
Net freshwater use, A1-A3 (m ³)	0,730

LIFE CYCLE ASSESSMENT

SYSTEM BOUNDARY

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

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

Modules not declared = MND.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. There is no neglected unit process more than 1% of total mass or energy flows. The module-specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

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

VALIDATION OF DATA

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

ALLOCATION, ESTIMATES AND ASSUMPTIONS

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 materials	No allocation
Ancillary materials	No allocation
Manufacturing energy and waste	Allocated by volume

PRODUCT & MANUFACTURING SITES GROUPING

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

This EPD is product and factory specific.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	83	Global, mainly EU
Minerals	0	-
Fossil materials	3	Global, mainly EU
Bio-based materials	0	-
Electronic parts	14	Global, mainly EU

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	0,1633

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

The LCA and EPD have been prepared according to the reference standards, EN 50693, and ISO 14040/14044. Ecoinvent v3.10.1 and One Click LCA databases were used as sources of environmental data. Allocation used in Ecoinvent 3.10.1 environmental data sources follow the methodology 'allocation, cut-off, EN 15804+A2'.

PRODUCT LIFE CYCLE

MANUFACTURING (A1-A3)

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

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

The product is made of metals, plastics, and electronic components, including driver. All components are transported to the production facility, where the main manufacturing processes are associated with assembly of different parts and components. The product is packaged with EPS supports and shrink plastic. The product is being sent to the installation site on a wooden pallet wrapped in plastic film.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation distances from manufacturing sites to customer locations are based on sales volume-based weighted averages. In the absence of exact data, conservative assumptions are made (A4). Environmental impacts from installation include waste packaging materials (A5). The impacts of energy consumption and the used ancillary materials during installation are considered negligible.

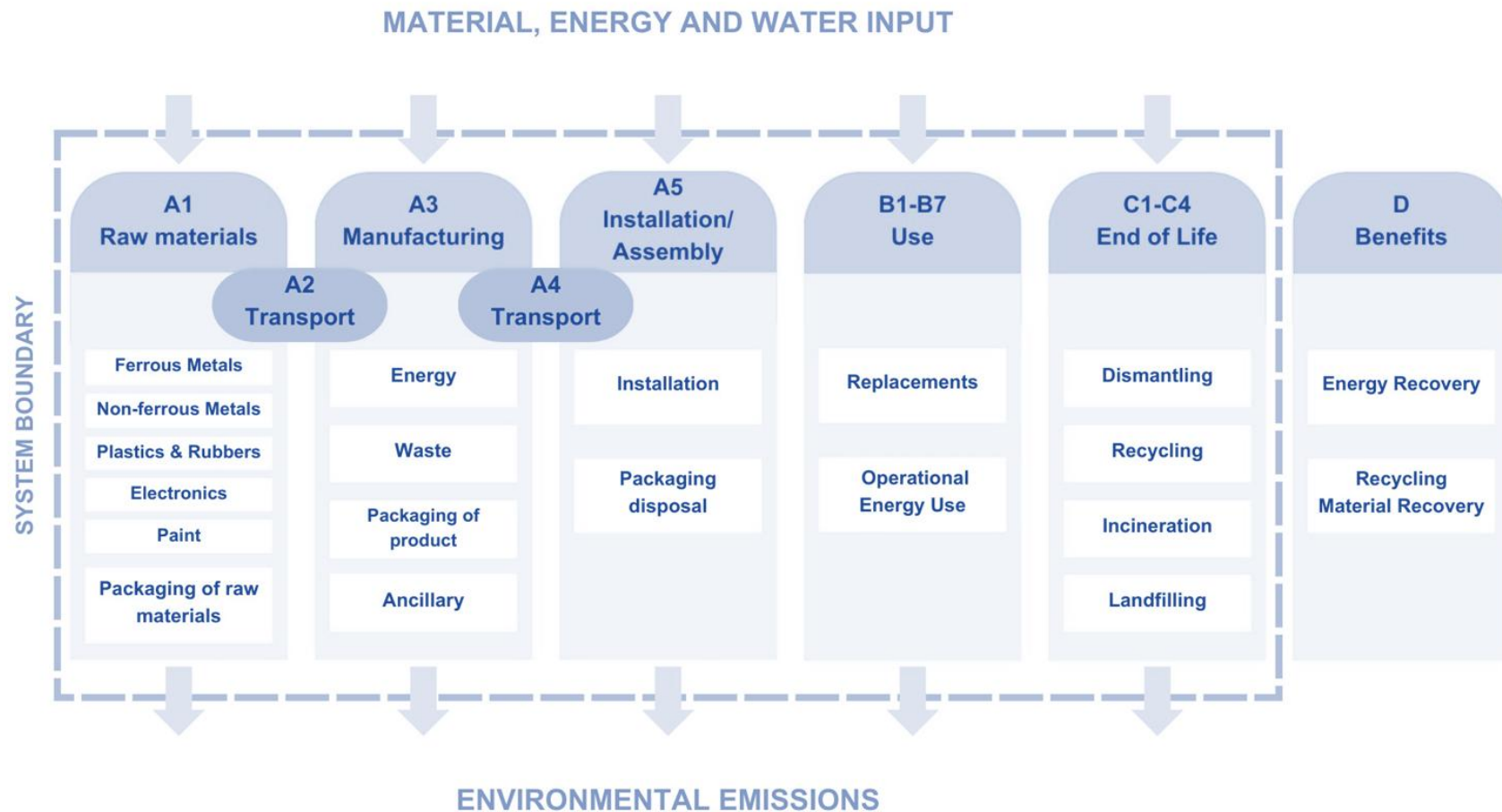
PRODUCT USE AND MAINTENANCE (B1-B7)

The product consume electricity during use phase and the scenario in this study is based on the Swedish electricity grid mix (B6). No energy savings due to controls are included in the scenario. The reference service life time is 100 000 hours and outgoing artificial luminous flux is 4666 lumens. A reference flow of 35 000 hours and 1000 lumens is presented as an appendix in this EPD. Impacts due to electricity production include direct emissions to air, transformation, and transmission losses.

PRODUCT END OF LIFE (C1-C4, D)

Consumption of energy and natural resources in demolition process is assumed to be negligible. It is assumed that the waste is collected separately and transported to the waste treatment centre. The transport distance is 150 km while the transportation method is assumed to be lorry (C2). According to EN 50693:2019, the sequence of treatment operations occurring to the product shall include de-pollution, fractions separation and preparation (dismantling, crushing, shredding, sorting), recycling, other material recovery, energy recovery and disposal. In this study, the default values from table G.4 of EN 50693 is used for treating materials in different waste treatment methods. Due to the material and energy recovery potential of parts in the lighting system, the end-of-life product is converted into recycled raw materials, while the energy recovered from incineration displaces electricity and heat production (D). The benefits and loads of incineration and recycling are included in Module D.

LIFE CYCLE FLOW DIAGRAM



ENVIRONMENTAL IMPACT DATA, RESULTS PER DECLARED UNIT

The following results refers to one unit of Notor 65 Beta Opti Direct/Indirect, with 4666 lumens for 100 000 hours. For reference flow of 1000 lumens for 35 000 hours, see appendix.

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

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

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	2,37E+01	5,93E-01	6,76E-01	2,50E+01	2,81E-01	8,65E-01	MNR	MNR	MNR	MNR	MNR	1,38E+02	MNR	0,00E+00	1,07E-01	2,31E-01	8,60E-02	2,75E+01
GWP – fossil	kg CO ₂ e	2,36E+01	5,93E-01	9,25E-01	2,51E+01	2,81E-01	1,54E-01	MNR	MNR	MNR	MNR	MNR	1,22E+02	MNR	0,00E+00	1,07E-01	2,31E-01	8,60E-02	-3,15E+00
GWP – biogenic	kg CO ₂ e	-1,51E-02	5,77E-05	-6,97E-01	-7,12E-01	5,91E-05	7,11E-01	MNR	MNR	MNR	MNR	MNR	2,22E+00	MNR	0,00E+00	2,34E-05	-2,93E-04	-3,97E-05	3,06E+01
GWP – LULUC	kg CO ₂ e	1,10E-01	7,84E-05	4,47E-01	5,58E-01	1,06E-04	1,33E-05	MNR	MNR	MNR	MNR	MNR	1,37E+01	MNR	0,00E+00	4,75E-05	1,74E-04	3,87E-05	-2,00E-02
Ozone depletion pot.	kg CFC-11e	1,18E-06	9,32E-09	3,10E-08	1,22E-06	5,65E-09	2,70E-10	MNR	MNR	MNR	MNR	MNR	3,66E-06	MNR	0,00E+00	1,50E-09	1,04E-09	5,11E-10	-4,00E-08
Acidification potential	mol H ⁺ e	3,06E-01	2,40E-03	8,07E-03	3,17E-01	9,81E-04	1,01E-04	MNR	MNR	MNR	MNR	MNR	1,50E+00	MNR	0,00E+00	3,57E-04	9,51E-04	1,79E-04	-2,71E-01
EP-freshwater ²⁾	kg Pe	1,14E-02	1,43E-05	2,11E-04	1,16E-02	1,89E-05	3,74E-06	MNR	MNR	MNR	MNR	MNR	1,08E-01	MNR	0,00E+00	8,34E-06	5,68E-05	4,37E-06	-1,52E-02
EP-marine	kg Ne	2,84E-02	9,35E-04	3,69E-03	3,30E-02	3,26E-04	1,43E-04	MNR	MNR	MNR	MNR	MNR	2,21E-01	MNR	0,00E+00	1,16E-04	2,09E-04	1,27E-04	-1,14E-02
EP-terrestrial	mol Ne	3,23E-01	1,02E-02	2,97E-02	3,63E-01	3,55E-03	4,05E-04	MNR	MNR	MNR	MNR	MNR	2,26E+00	MNR	0,00E+00	1,26E-03	2,29E-03	7,62E-04	-1,61E-01
POCP ("smog") ³⁾	kg NMVOCe	1,09E-01	3,41E-03	6,04E-03	1,19E-01	1,53E-03	1,28E-04	MNR	MNR	MNR	MNR	MNR	6,01E-01	MNR	0,00E+00	4,98E-04	6,62E-04	2,38E-04	-5,32E-02
ADP-minerals & metals ⁴⁾	kg Sbe	3,11E-03	3,97E-07	6,34E-06	3,11E-03	7,72E-07	8,40E-08	MNR	MNR	MNR	MNR	MNR	1,47E-02	MNR	0,00E+00	3,52E-07	3,96E-06	7,11E-08	-4,31E-03
ADP-fossil resources	MJ	3,15E+02	7,99E+00	1,78E+01	3,41E+02	4,07E+00	2,47E-01	MNR	MNR	MNR	MNR	MNR	1,64E+04	MNR	0,00E+00	1,50E+00	1,40E+00	4,51E-01	-4,38E+01
Water use ⁵⁾	m ³ e depr.	9,28E+00	1,64E-02	1,49E+01	2,42E+01	2,08E-02	1,30E-02	MNR	MNR	MNR	MNR	MNR	9,03E+02	MNR	0,00E+00	6,98E-03	3,20E-02	9,46E-03	-2,19E+00

1) GWP = Global Warming Potential. 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO₄e. 3) POCP = Photochemical ozone formation. 4) ADP = Abiotic depletion potential.

5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	1,72E-06	1,55E-08	9,30E-08	1,83E-06	2,78E-08	1,55E-09	MNR	MNR	MNR	MNR	MNR	1,25E-05	MNR	0,00E+00	8,51E-09	1,16E-08	3,59E-09	-5,35E-07
Ionizing radiation ⁶⁾	kBq U235e	2,71E+00	3,28E-03	5,23E-02	2,77E+00	4,88E-03	7,32E-04	MNR	MNR	MNR	MNR	MNR	1,17E+03	MNR	0,00E+00	1,22E-03	9,50E-03	5,89E-04	-3,79E-01
Ecotoxicity (freshwater)	CTUe	1,26E+03	4,94E-01	2,67E+01	1,29E+03	4,78E-01	4,40E-01	MNR	MNR	MNR	MNR	MNR	2,05E+03	MNR	0,00E+00	2,38E-01	8,15E-01	5,62E+01	-2,43E+02
Human toxicity, cancer	CTUh	4,08E-08	4,78E-11	1,00E-09	4,18E-08	4,65E-11	1,98E-11	MNR	MNR	MNR	MNR	MNR	2,41E-07	MNR	0,00E+00	1,82E-11	7,57E-11	9,04E-11	-3,73E-08
Human tox. non-cancer	CTUh	1,12E-06	5,93E-09	2,36E-08	1,15E-06	2,63E-09	7,79E-10	MNR	MNR	MNR	MNR	MNR	1,26E-05	MNR	0,00E+00	9,42E-10	5,02E-09	4,61E-09	-3,82E-06
SQP ⁷⁾	-	1,04E+02	2,01E+00	1,01E+02	2,07E+02	4,07E+00	2,19E-01	MNR	MNR	MNR	MNR	MNR	3,86E+03	MNR	0,00E+00	8,98E-01	1,53E+00	7,01E-01	-1,49E+03

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on the 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. 7) SQP = Land use related impacts/soil quality.

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	5,75E+01	4,49E-02	5,96E+01	1,17E+02	6,60E-02	-2,43E+00	MNR	MNR	MNR	MNR	MNR	1,12E+04	MNR	0,00E+00	2,06E-02	2,07E-01	9,67E-03	-1,60E+02
Renew. PER as material	MJ	0,00E+00	0,00E+00	5,25E+00	5,25E+00	0,00E+00	-5,25E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	5,75E+01	4,49E-02	6,49E+01	1,22E+02	6,60E-02	-7,68E+00	MNR	MNR	MNR	MNR	MNR	1,12E+04	MNR	0,00E+00	2,06E-02	2,07E-01	9,67E-03	-1,60E+02
Non-re. PER as energy	MJ	3,11E+02	7,99E+00	1,14E+01	3,30E+02	4,07E+00	-5,40E+00	MNR	MNR	MNR	MNR	MNR	1,64E+04	MNR	0,00E+00	1,50E+00	-3,99E-01	-1,35E+00	-4,19E+01
Non-re. PER as material	MJ	2,90E+00	0,00E+00	6,29E+00	9,19E+00	0,00E+00	-6,29E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	-1,44E+00	-1,46E+00	0,00E+00
Total use of non-re. PER	MJ	3,14E+02	7,99E+00	1,77E+01	3,40E+02	4,07E+00	-1,17E+01	MNR	MNR	MNR	MNR	MNR	1,64E+04	MNR	0,00E+00	1,50E+00	-1,84E+00	-2,81E+00	-4,19E+01
Secondary materials	kg	1,47E+00	0,00E+00	0,00E+00	1,47E+00	0,00E+00	0,00E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Renew. secondary fuels	MJ	9,47E-03	1,12E-05	1,80E-01	1,90E-01	2,21E-05	3,40E-06	MNR	MNR	MNR	MNR	MNR	1,45E-02	MNR	0,00E+00	8,60E-06	6,79E-05	6,46E-06	-2,49E-03
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	3,84E-01	5,18E-04	3,45E-01	7,30E-01	5,98E-04	-2,11E-04	MNR	MNR	MNR	MNR	MNR	2,15E+01	MNR	0,00E+00	1,99E-04	8,09E-04	-9,85E-04	-1,14E-01

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	3,32E+00	4,97E-03	5,68E-02	3,38E+00	5,89E-03	3,57E-03	MNR	MNR	MNR	MNR	MNR	1,67E+01	MNR	0,00E+00	2,62E-03	1,24E-02	1,95E-01	-1,28E+00
Non-hazardous waste	kg	6,87E+01	9,12E-02	3,39E+00	7,22E+01	1,18E-01	7,12E-01	MNR	MNR	MNR	MNR	MNR	5,53E+02	MNR	0,00E+00	4,92E-02	3,27E-01	2,92E+00	-9,31E+01
Radioactive waste	kg	8,75E-04	7,99E-07	1,32E-05	8,89E-04	1,21E-06	1,86E-07	MNR	MNR	MNR	MNR	MNR	2,51E-01	MNR	0,00E+00	2,98E-07	2,33E-06	1,45E-07	-9,89E-05

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	1,32E+00	0,00E+00	5,59E-01	1,88E+00	0,00E+00	1,23E-01	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	2,15E+00	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	2,53E-02	0,00E+00	0,00E+00	2,53E-02	0,00E+00	9,43E-01	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	5,65E-01	0,00E+00	0,00E+00
Exported energy: Electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,67E-01	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	2,38E-01	0,00E+00	0,00E+00
Exported energy: Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,46E-01	MNR	MNR	MNR	MNR	MNR	0,00E+00	MNR	0,00E+00	0,00E+00	3,27E-01	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO ₂ e	2,34E+01	5,90E-01	1,43E+00	2,55E+01	2,79E-01	1,58E-01	MNR	MNR	MNR	MNR	MNR	1,37E+02	MNR	0,00E+00	1,07E-01	2,30E-01	8,58E-02	-3,16E+00
Ozone depletion Pot.	kg CFC ₁₁ e	9,64E-07	7,39E-09	3,16E-08	1,00E-06	4,49E-09	2,22E-10	MNR	MNR	MNR	MNR	MNR	3,17E-06	MNR	0,00E+00	1,20E-09	8,75E-10	4,11E-10	-3,33E-08
Acidification	kg SO ₂ e	2,71E-01	1,77E-03	5,50E-03	2,78E-01	7,48E-04	7,50E-05	MNR	MNR	MNR	MNR	MNR	1,25E+00	MNR	0,00E+00	2,74E-04	7,68E-04	1,31E-04	-2,40E-01
Eutrophication	kg PO ₄ ³ e	5,30E-02	3,63E-04	1,51E-02	6,85E-02	1,80E-04	2,70E-05	MNR	MNR	MNR	MNR	MNR	1,56E-01	MNR	0,00E+00	6,66E-05	1,12E-04	6,11E-05	-1,19E-02
POCP ("smog")	kg C ₂ H ₄ e	1,60E-02	1,33E-04	5,12E-04	1,67E-02	6,74E-05	7,62E-06	MNR	MNR	MNR	MNR	MNR	6,78E-02	MNR	0,00E+00	2,45E-05	4,47E-05	1,19E-05	-1,09E-02
ADP-elements	kg Sbe	3,11E-03	3,86E-07	6,26E-06	3,11E-03	7,54E-07	7,95E-08	MNR	MNR	MNR	MNR	MNR	1,47E-02	MNR	0,00E+00	3,44E-07	3,94E-06	6,70E-08	-4,30E-03
ADP-fossil	MJ	2,80E+02	7,94E+00	1,67E+01	3,04E+02	3,99E+00	2,35E-01	MNR	MNR	MNR	MNR	MNR	8,64E+02	MNR	0,00E+00	1,49E+00	1,25E+00	4,41E-01	-3,78E+01

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation – A3 (Energy data source)

1. Energy supply, electricity production, solar photovoltaic, Electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted, Sweden, ecoinvent 3.10.1, 0.10 kgCO₂e/kWh
2. Energy supply, electricity production, hydro, Electricity production, hydro, reservoir, non-alpine region, Sweden, ecoinvent 3.10.1, 0.0506 kgCO₂e/kWh
3. Manufacturing, coke and refined petroleum products, refined petroleum products, Esterification of rape oil, ecoinvent 3.10.1, -0.800003 kgCO₂e/kg
4. Energy supply, heat, steam and air conditioning, heat from wood fuel co-generation, Heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014, Sweden, ecoinvent 3.10.1, 0.0026 kgCO₂e/MJ

Transport scenario documentation - A4

1. Transport, freight, sea, container ship, 82 km
2. Market for transport, freight, lorry >32 metric ton, EURO5, 776 km

Installation scenario documentation - A5 (Waste materials data source)

1. Packaging film production, low density polyethylene, 0.0125, kg
2. Packaging film production, low density polyethylene, 0.07, kg
3. Eur-flat pallet production, 0.0167, unit
4. Polystyrene production, expandable, 0.063, kg

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

1. Energy supply, electricity transformation and distribution, distribution low voltage, Market for electricity, low voltage, Sweden, 3700.0, kWh

TRANSPORT SCENARIO DOCUMENTATION - A4

Scenario parameter	Value
Capacity utilization (including empty return) %	50 %
Bulk density of transported products / kg/m ³	0
Volume capacity utilization factor (factor: =1 or <1 or ≥1 for compressed or nested packaged products)	1

INSTALLATION SCENARIO DOCUMENTATION - A5

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

END OF LIFE SCENARIO DOCUMENTATION

Scenario information	Value
Collection process – kg collected separately	3
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	2,15
Recovery process – kg for energy recovery	0
Disposal (total) – kg for final deposition	1,46
Scenario assumptions e.g. transportation	Lorry, 16-32 metric ton, EURO5; 150 km

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier and has been generated using an end-to-end verified tool.

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. EPD Hub confirms that it possesses sufficient knowledge and experience in construction products and the relevant standards to carry the verification.



Nemanja Nedic

Program Manager, EPD Hub

EPD Hub has performed a detailed examination of the end-to-end verified tool and underlying data to ensure that there are no deviations in the studied Environmental Product Declaration (EPD), its Life Cycle Assessment (LCA), and project report. The tool is implemented according to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules version 1.1 and General Program Instructions version 1.2.

Tool verifier: Hai Ha Nguyen & Nemanja Nedic

Tool verification validity: 11 July 2024 - 11 July 2027

EPD Hub has examined the company-specific data for plausibility and consistency. The declaration owner is responsible for ensuring its factual integrity and legal compliance.

APPENDIX

Notor 65 Beta Opti Direct/Indirect

The following methodology can be applied to compare environmental performance of different lighting solutions. According to IEC PAS 63629, the functional unit follows;

“Provide lighting that delivers an outgoing artificial luminous flux of 1,000 lumens during a reference lifetime of 35,000 hours”.

By converting the results to ensure the functional unit, a reference flow is used. The reference flow is calculated as following;

$(1,000 \text{ lumens} / \text{outgoing luminous flux of the declared unit}) \times (35,000 \text{ hours} / \text{lifetime in hours of the declared unit})$.

The declared unit delivers an outgoing artificial luminous flux of 4,666 lumens during a reference lifetime of 100,000 hours. The reference flow scaling factor is given by the following calculation;

$(1,000 / 4,666) \times (35,000 / 100,000) = 0,075$

The results of the reference flow is given by multiplying the scaling factor with the results based on the declared unit. Which gives the following results for GWP total in A1-A5, B6, C1-C4 and D;

Reference flow, GWP total

A1	A2	A3	A4	A5	B6	C1	C2	C3	C4	D
1,78E+00	4,45E-02	5,07E-02	2,11E-02	6,49E-02	1,04E+01	0,00E+00	8,03E-03	1,73E-02	6,45E-03	2,06E+00

The assigned life time of the luminaire is 100,000 h corresponds to an operational life time depending on the light operation hours in buildings according to EN15193;

Building type	Annual operating hours	Operational life time in years
Residential buildings	3500	29
Offices	2500	40
Education	2000	50
Hospitals	5000	20
Hotels	5000	20
Restaurants	2500	40
Sports facilities	4000	25
Wholesale and retail services	5000	20
Manufacturing factories	4000	25

As stated in the EPD, the calculations are based on a Swedish electricity grid mix on low voltage for year 2024. Be aware of this value depending on specific requirements.

Furthermore, the calculations does not include any energy saving from using controls. If a light management system is applicable, a reduction factor can be used. The factor should represent a relevant scenario for any project. The factors to be applied are presented in the table below according to IEC PAS 63629.

Light Management Function	Reduction	Factor
No controls	0	1,00
Daylight controls	25%	0,75
Presence controls	25%	0,75
Presence and daylight controls	45%	0,55
Luminaire capable of communicating with an external Light Management System	50%	0,50