ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Epsilon Zero
Swegon Group AB

EPD HUB, HUB-7123
Published on 05.08.2026, last updated on 05.08.2026, valid until 04.08.2031

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.

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Swegon Group AB
Address	JA Wettergrens gata 7, 421 30, Västra Frölunda, Sweden
Contact details	info@swegon.com
Website	https://www.swegon.com/

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025
Sector	Construction 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	Dario Munari
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Yazan Badour as an authorized verifier for EPD Hub

This EPD is intended for business-to-business and/or business-to-consumer communication. 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	Epsilon Zero
Additional labels	-
Product reference	-
Place(s) of raw material origin	EU, Asia
Place of production	Cantarana di Cona (IT)
Place(s) of installation and use	World
Period for data	Calendar Year 2025
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 (%)	1,33

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 finished unit of Epsilon Zero Hi HP of size 24
Declared unit mass	212 kg
Mass of packaging	25,55 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	1090
GWP-total, A1-A3 ($kgCO_2e$)	1070
Secondary material, inputs (%)	39,1
Total energy use, A1-A3 (kWh)	4310
Net freshwater use, A1-A3 (m^3)	11,2

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

People spend most of their time indoors, which is why we need a sound indoor climate for our health, well-being, and happiness.

Swegon's ambition is to achieve the world's best indoor environment with the least possible impact on the external environment. Our business models, services, products, and systems are all designed to provide the right solution for each individual project.

Swegon Group AB, owned by Investment AB Latour, listed on the Stockholm Stock Exchange, is a market leading supplier in the field of indoor environment, offering solutions for ventilation, heating, cooling and climate optimization, as well as connected services and expert technical support.

Swegon has subsidiaries and distributors all over the world and production plants in Europe, North America and India.

PRODUCT DESCRIPTION

EPSILON Zero is a high-efficiency air-to-water reversible and non-reversible heat pump range designed for commercial and industrial applications requiring compact dimensions, operational flexibility, and reliable year-round performance.

This unit uses refrigerant R290, with an Ozone Depletion Potential (ODP) of 0 and a Global Warming Potential (GWP100) of 0.02 according to IPCC AR6. Compared with many hydrofluorocarbon (HFC) refrigerants, R290 is associated with substantially lower direct climate impact in the event of refrigerant leakage. The range is available in multiple configurations and capacity sizes from 14 to 45 kW of nominal heating capacity to meet a wide variety of application requirements. Depending on the selected configuration, the unit can provide efficient heating ("OH" version) or reversible heating and cooling operation ("Hi HP" version), ensuring high seasonal performance and energy efficiency in all operating conditions.

EPSILON Zero is designed to be connected to a three-phase 400V / 50Hz power supply. The units comply with relevant European Ecodesign requirements where applicable. While in EPD documentation a reference service life (RSL) of 15 years may typically be assumed, with proper maintenance the product can operate reliably well beyond this period.

The EPSILON Zero structure is made of weather-resistant materials, with a robust load-bearing frame suitable for outdoor installation. The unit incorporates hermetic compressors, combined with brazed plate heat exchangers optimized for high efficiency and reduced refrigerant charge. The design allows operation across an extended working range and supports a broad variety of comfort, heating, and process-cooling applications. The air-side section integrates high-efficiency axial fans and heat exchange surfaces designed to maximize performance while maintaining low sound emissions.

The refrigerant circuits are optimized and include key components such as charging valves, filters, electronic expansion valves, and safety devices. Depending on the selected configuration, the unit is available as a reversible or non-reversible heat pump capable of delivering hot water temperatures up to 60°C. Optional features include inverter-driven pumps (Flowzer system) and advanced supervision via Blueye®, enabling enhanced monitoring and energy management capabilities.

The EPSILON Zero units are factory assembled, tested, and supplied ready for installation, facilitating handling, commissioning, and integration on site.

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

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	94,2	Eu, Asia
Minerals	0	\
Fossil materials	5,8	Eu, Asia
Bio-based materials	0	\

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 finished unit of Epsilon Zero Hi HP of size 24
Mass per declared unit	212 kg
Functional unit	This unit provides a nominal heating and cooling capacity of 25 kW over the course of 15 years, by consuming a total of 167.067 kWh of electrical energy, under the “average” climate scenario from EN 14825.
Reference service life	15 years

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	9,8

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	x	x	ND	ND	ND	x	ND	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

Not declared = ND.

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. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

The reference product consists of one monobloc unit of the indicated size. The unit is manufactured in Cantarana di Cona (VE), Italy. The most relevant components were modelled based on primary data from the supplier, while some other less relevant components were modelled with proxy data. Transportation of raw material to the manufacturing site is accounted based both on actual distance and mode of transport and on generic datasets. For each unit packaging materials such as wood pallets, etc. is included.

The production process of a Swegon heat pump, chiller or rooftop is composed of the following phases: first, the components are taken into the warehouse, and moved by electrical forklifts. The packaging is removed, and handled according to ISO 14001 requirements. Next, the components are then moved towards the production lines, where the unit is assembled step-by-step. Assembly begins with steel structure, which is manually assembled by line operators; the refrigerant circuit is built from pre-made parts with joints brazed using H-O gas generated on-site from electrolysis of water; the final part of structure is assembled; the electrical components are manually installed and connected to the rest of the internal components. The refrigerant circuit is then pressure-tested and consequently filled with the nominal charge of refrigerant. The final stage is represented by the stress-test, which every unit must pass before being shipped. Finally, the unit is manually packaged and shipped to the customer.

The production process is mostly an assembly of precisely designed components, thus no waste flows are generated by design other than the packaging of components. For the processing of packaging waste, specialized companies collect the materials, assuming a conservative distance of 50km with transportation by truck.

To quantify the energy consumed during the process, production engineers tracked the duration of assembly operations which has been then multiplied

by the nominal power absorbed by the instruments used. For the brazing operation, the electricity and water consumption has been calculated from nominal flow rates of the torches, typical duration of the operation and nominal efficiency of the electrolytic generators.

The manufacturing energy mix considered is based on 100% renewable electricity as proved by the supply contract with the energy company (Enel). This is demonstrated through contractual instruments (GO contract), and its use is ensured throughout the validity period of this EPD. A market-based approach is used in modelling the renewable electricity mix utilized in the factory, along with the grid losses, based on data from institutional sources (IEA, ARERA, MEDREG). Data sources on emissions related to the generation with regards to each renewable generation technology are from Ecoinvent 3.10.1.

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

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.

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 chosen distance represents the weighted average of the shipping distance of all the units sold since it was launched on the European market. For installation of the product (A5), virtually no ancillary materials are required, as the product only needs to be manually attached to the water and electricity connections of the building. The product needs to be unloaded from a truck and placed in the chosen site; conservative assumptions on time and fuel consumption have been used to model this process.

PRODUCT USE AND MAINTENANCE (B1-B7)

The impacts of refrigerant leakage, equipment maintenance and refrigerant refilling have been considered from average industry data (3% yearly leakage rate) provided by ASHRAE. This is a very conservative assumption as the monobloc unit is thoroughly leak-tested with sensitive sniffers after assembly and should not be subject to any further modifications by the installer.

Partial refill is assumed for the refrigerant and the number of refilling is calculated as 1 time over the reference service life (RSL) of 15 years of the product. To model this, a trip of 100km (each way) for a technician over the RSL has been evaluated.

Energy consumption during the use phase has been calculated based on the European Commission Regulation (EU) 813/2013 and European Commission Regulation (EU) 2016/2281, implementing the directive of the European Commission 2009/125/ec Ecodesign. SEER and SCOP parameters have been evaluated using the methods from EN 14511 and EN 14825, considering the *average* climate profile. Data regarding SEER and SCOP is available on the Swegon website.

PRODUCT END OF LIFE (C1-C4, D)

The End of Life (EoL) is the stage accounted for at the end of life of the product and of the refrigerant. The EoL of the product is modelled according to the PCR.

The decommissioning phase (C1) consists in the removal of the product prior

to the decommissioning of the entire building. Given the absence of standardized practices across the industry, a conservative assumption has been adopted regarding energy consumption during this phase.

Transport of the decommissioned product to a waste management facility is modelled (C2), assuming transportation by truck to a processing center for a distance of 50km.

HVAC products are subject to country-specific regulations regarding their post-decommissioning processes (C3 and C4). For example, in the EU the European Commission directive 2012/19 requires every member country to comply with regulations for the EoL treatment of electrical and electronic products, including heating, cooling, and ventilation systems.

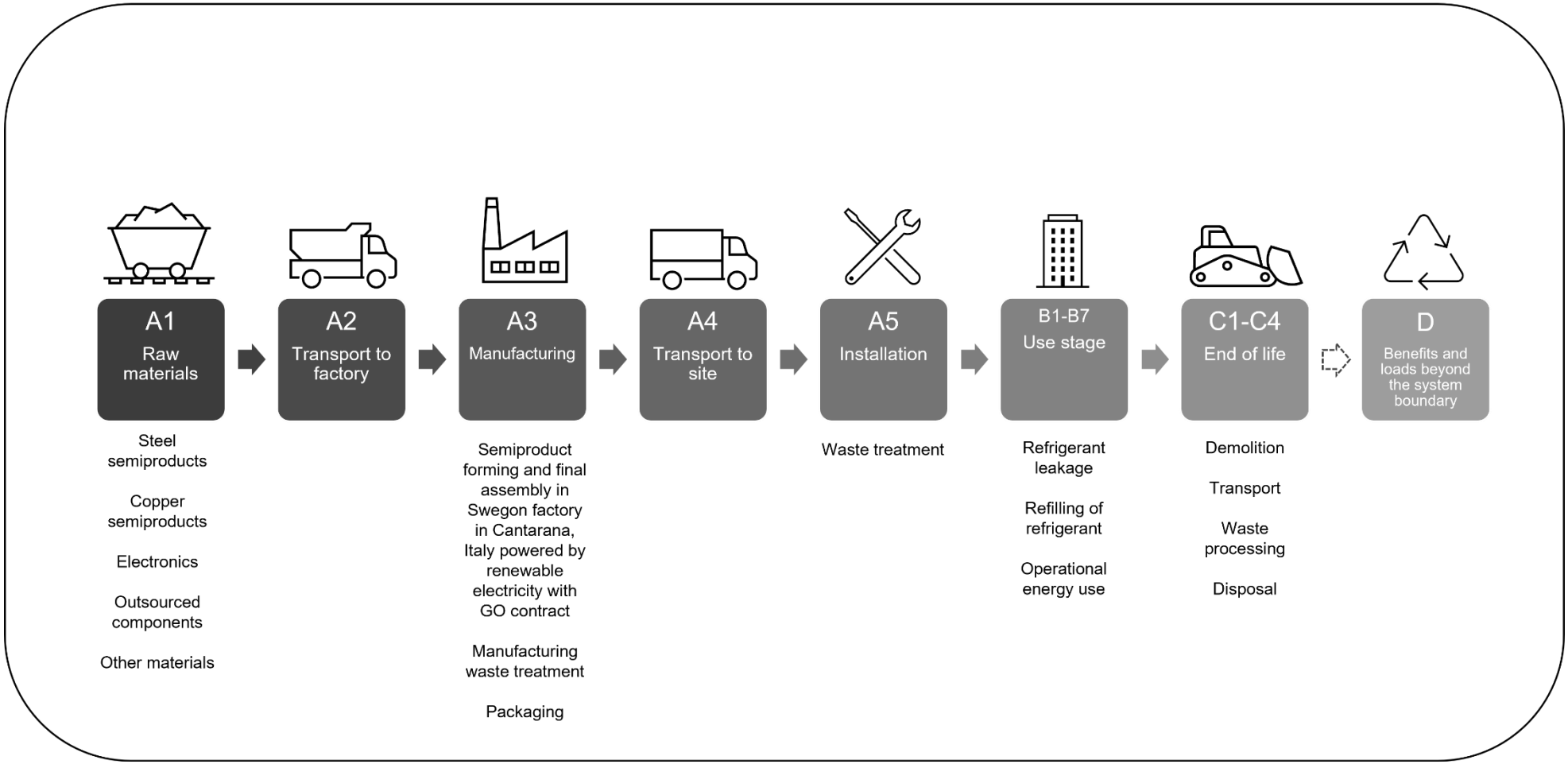
Since a specific scenario for every country cannot be accurately modelled, a generic scenario has been developed. This assumes that the product is manually disassembled by a specialized company, and the resulting waste is managed through typical waste management routes. The distribution percentages for recycling, landfilling, or incineration are derived from reports published by accredited sources, including the Bureau of International Recycling (BIR), the European Recycling Industries' Confederation (EuRIC), UNITAR, the International Copper Association, and VinylPlus.

The EoL scenario of the refrigerant is based on average European data. It is assumed that 80% of the refrigerant is recovered at EoL, while 20% is considered direct emissions. Of the recovered refrigerant, 100% is regenerated for reuse.

The net benefits and loads beyond the system boundaries are also included in the EPD. The net benefits and loads beyond the system boundaries are calculated using formulas described in Annex D of the EN 15804. The benefits are claimed with respect to recyclable materials of: packaging, refrigerant, steel structure, plate heat exchanger. For the insulation of tubes and structural panels, which is assumed to be incinerated, benefits are claimed.

The recycled content in raw materials has been subtracted before evaluating the net benefits according to Annex D of EN 15804.

LIFE CYCLE FLOW DIAGRAM



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

VALIDATION OF DATA

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

ALLOCATION, ESTIMATES AND ASSUMPTIONS

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

Data type	Allocation
Raw materials	No allocation
Packaging material	No allocation
Ancillary materials	No allocation
Manufacturing energy and waste	Allocation only for manufacturing waste via physical properties

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	No grouping
Grouping method	-
Variation in GWP-fossil for A1-A3, %	-

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator 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 One Click LCA 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'. Sources for the LCA include supplier data, scientific publications & institutional sources

ENVIRONMENTAL IMPACT DATA

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_2e	1,05E+03	1,24E+01	7,41E+00	1,07E+03	3,47E+01	1,23E+02	2,78E-02	5,66E-01	ND	ND	ND	1,15E+05	ND	9,16E+01	1,67E+00	5,75E+01	3,24E+00	-2,72E+02
GWP – fossil	kg CO_2e	1,07E+03	1,24E+01	1,47E+01	1,09E+03	3,46E+01	9,19E+01	2,78E-02	5,65E-01	ND	ND	ND	1,14E+05	ND	9,16E+01	1,67E+00	5,73E+01	7,64E-01	-2,68E+02
GWP – biogenic	kg CO_2e	-2,20E+01	2,19E-03	-7,33E+00	-2,93E+01	7,46E-03	3,16E+01	0,00E+00	3,75E-04	ND	ND	ND	4,91E+02	ND	1,54E-02	3,69E-04	8,60E-02	2,47E+00	-3,58E+00
GWP – LULUC	kg CO_2e	3,77E+00	6,24E-03	3,73E-02	3,82E+00	1,37E-02	1,02E-02	0,00E+00	3,86E-04	ND	ND	ND	2,34E+02	ND	1,22E-02	7,43E-04	6,65E-02	2,91E-04	-8,61E-02
Ozone depletion pot.	kg $CFC\text{-}_{11}$e	1,35E-05	1,83E-07	3,28E-07	1,40E-05	7,12E-07	1,36E-06	0,00E+00	3,72E-08	ND	ND	ND	8,22E-04	ND	1,39E-06	2,37E-08	3,97E-07	8,62E-09	-1,17E-06
Acidification potential	mol H^+e	1,26E+01	2,47E-01	1,11E-01	1,29E+01	1,28E-01	8,14E-01	0,00E+00	2,28E-03	ND	ND	ND	6,12E+02	ND	8,21E-01	5,61E-03	2,03E+00	3,39E-03	-2,60E+00
EP-freshwater[2)]	kg Pe	3,01E+00	5,92E-04	7,51E-03	3,02E+00	2,35E-03	3,18E-03	0,00E+00	1,05E-04	ND	ND	ND	5,68E+01	ND	3,32E-03	1,33E-04	9,24E-02	7,94E-04	-1,47E+00
EP-marine	kg Ne	2,05E+00	6,26E-02	2,00E-02	2,13E+00	3,29E-02	3,86E-01	0,00E+00	4,74E-04	ND	ND	ND	1,19E+02	ND	3,79E-01	1,83E-03	1,33E-01	1,52E-02	-7,60E-01
EP-terrestrial	mol Ne	2,58E+01	6,94E-01	1,98E-01	2,67E+01	3,60E-01	4,14E+00	0,00E+00	5,00E-03	ND	ND	ND	1,20E+03	ND	4,15E+00	1,99E-02	1,63E+00	1,25E-02	-1,03E+01
POCP ("smog")[3)]	kg NMVOCe	6,89E+00	1,96E-01	7,87E-02	7,17E+00	1,73E-01	1,24E+00	4,13E-01	3,79E-03	ND	ND	ND	3,48E+02	ND	1,24E+00	7,93E-03	6,96E-01	5,82E-03	-2,20E+00
ADP-minerals & metals[4)]	kg Sbe	1,41E-01	2,03E-05	9,36E-04	1,42E-01	9,59E-05	3,53E-05	0,00E+00	4,46E-06	ND	ND	ND	7,11E-01	ND	4,13E-05	5,29E-06	2,38E-02	6,84E-07	-1,11E-02
ADP-fossil resources	MJ	1,30E+04	1,62E+02	1,86E+02	1,33E+04	5,15E+02	1,20E+03	0,00E+00	2,88E+01	ND	ND	ND	1,53E+06	ND	1,20E+03	2,37E+01	6,18E+02	7,75E+00	-2,69E+03
Water use[5)]	m^3e depr.	4,58E+02	5,93E-01	2,98E+01	4,88E+02	2,59E+00	3,14E+00	0,00E+00	6,33E-02	ND	ND	ND	2,95E+04	ND	3,32E+00	1,13E-01	2,07E+01	5,38E-02	-2,93E+01

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	1,04E-04	6,80E-07	9,64E-07	1,06E-04	3,26E-06	2,32E-05	0,00E+00	2,40E-08	ND	ND	ND	5,47E-03	ND	2,32E-05	1,41E-07	8,47E-06	6,30E-08	-2,59E-05
Ionizing radiation[6)]	kBq U235e	7,20E+01	1,03E-01	9,49E-01	7,30E+01	6,05E-01	5,26E-01	0,00E+00	1,93E-02	ND	ND	ND	1,53E+04	ND	7,16E-01	1,95E-02	3,16E+00	1,14E-02	-1,17E+01
Ecotoxicity (freshwater)	CTUe	3,92E+04	1,62E+01	2,04E+02	3,94E+04	5,98E+01	6,78E+02	4,55E-03	1,76E+00	ND	ND	ND	3,40E+05	ND	6,92E+01	3,72E+00	1,45E+03	1,78E+02	-1,60E+04
Human toxicity, cancer	CTUh	1,55E-06	2,42E-09	4,35E-08	1,59E-06	5,85E-09	9,48E-09	0,00E+00	1,55E-10	ND	ND	ND	1,98E-05	ND	9,52E-09	2,82E-10	2,49E-07	1,09E-09	4,75E-08
Human tox. non-cancer	CTUh	7,31E-05	6,57E-08	8,16E-07	7,40E-05	3,25E-07	1,59E-07	1,16E-09	5,21E-09	ND	ND	ND	1,13E-03	ND	1,61E-07	1,49E-08	2,42E-05	8,09E-08	1,49E-05
SQP[7)]	-	8,58E+03	7,25E+01	2,93E+03	1,16E+04	4,99E+02	1,01E+02	0,00E+00	1,66E+00	ND	ND	ND	2,80E+05	ND	8,62E+01	1,67E+01	7,27E+02	1,75E+01	-1,52E+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 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	2,63E+03	1,65E+00	2,52E+02	2,88E+03	8,21E+00	-3,90E+02	0,00E+00	3,57E-01	ND	ND	ND	2,46E+05	ND	1,06E+01	3,25E-01	9,80E+01	-9,34E+01	-3,80E+02
Renew. PER as material	MJ	2,17E+02	0,00E+00	1,03E+02	3,20E+02	0,00E+00	-3,14E+02	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	-5,87E+00	3,01E+01
Total use of renew. PER	MJ	2,84E+03	1,65E+00	3,55E+02	3,20E+03	8,21E+00	-7,04E+02	0,00E+00	3,57E-01	ND	ND	ND	2,46E+05	ND	1,06E+01	3,25E-01	9,80E+01	-9,92E+01	-3,50E+02
Non-re. PER as energy	MJ	1,24E+04	1,62E+02	2,82E+01	1,26E+04	5,15E+02	1,17E+03	0,00E+00	5,63E+00	ND	ND	ND	1,53E+06	ND	1,20E+03	2,37E+01	5,82E+02	-6,22E+01	-2,69E+03
Non-re. PER as material	MJ	5,75E+02	0,00E+00	-8,35E+01	4,92E+02	0,00E+00	-4,41E+01	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-1,87E+02	-2,61E+02	2,17E+01
Total use of non-re. PER	MJ	1,30E+04	1,62E+02	-5,53E+01	1,31E+04	5,15E+02	1,13E+03	0,00E+00	5,63E+00	ND	ND	ND	1,53E+06	ND	1,20E+03	2,37E+01	3,95E+02	-3,23E+02	-2,66E+03
Secondary materials	kg	8,29E+01	7,39E-02	1,50E+00	8,45E+01	2,24E-01	4,95E-01	0,00E+00	4,79E-03	ND	ND	ND	2,28E+02	ND	4,93E-01	1,05E-02	2,52E+01	2,39E-03	4,67E+01
Renew. secondary fuels	MJ	6,01E+00	4,54E-04	1,06E+01	1,66E+01	2,72E-03	1,38E-03	0,00E+00	6,33E-05	ND	ND	ND	1,68E+00	ND	1,30E-03	1,33E-04	1,96E-02	4,08E-05	-3,98E-02
Non-ren. secondary fuels	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	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	1,05E+01	1,62E-02	6,74E-01	1,12E+01	7,44E-02	-2,63E-03	0,00E+00	1,74E-03	ND	ND	ND	6,92E+02	ND	8,67E-02	3,22E-03	7,36E-01	-3,71E-02	-2,15E+00

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	3,45E+02	2,36E-01	1,57E+01	3,61E+02	7,43E-01	1,36E+00	0,00E+00	3,08E-02	ND	ND	ND	2,89E+04	ND	1,68E+00	4,65E-02	1,04E+01	1,94E+00	-7,63E+01
Non-hazardous waste	kg	4,56E+03	3,75E+00	7,97E+01	4,65E+03	1,47E+01	1,28E+02	0,00E+00	5,37E-01	ND	ND	ND	2,80E+05	ND	2,14E+01	8,76E-01	6,27E+02	5,57E+01	4,94E+02
Radioactive waste	kg	1,78E-02	2,52E-05	2,41E-04	1,81E-02	1,50E-04	1,29E-04	0,00E+00	4,68E-06	ND	ND	ND	3,70E+00	ND	1,75E-04	4,77E-06	8,09E-04	2,78E-06	-2,81E-03

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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	8,53E+00	8,53E+00	0,00E+00	3,80E+00	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,55E+02	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	8,00E-02	8,00E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	6,90E-01	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	3,46E+01	3,46E+01	0,00E+00	9,80E-01	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,71E+00	0,00E+00	0,00E+00
Exported energy – Electricity	MJ	0,00E+00	0,00E+00	1,46E+01	1,46E+01	0,00E+00	4,10E-01	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	4,10E-01	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	2,00E+01	2,00E+01	0,00E+00	5,70E-01	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,30E+00	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,06E+03	1,23E+01	1,53E+01	1,09E+03	3,44E+01	9,26E+01	0,00E+00	5,54E-01	ND	ND	ND	1,14E+05	ND	9,11E+01	1,66E+00	5,73E+01	5,97E+00	-2,66E+02
Ozone depletion Pot.	kg $CFC_{-11}e$	1,24E-05	1,45E-07	2,76E-07	1,29E-05	5,66E-07	1,09E-06	0,00E+00	2,99E-08	ND	ND	ND	7,16E-04	ND	1,10E-06	1,89E-08	3,33E-07	6,88E-09	-1,06E-06
Acidification	kg SO_2e	1,02E+01	1,97E-01	9,21E-02	1,05E+01	1,02E-01	5,72E-01	0,00E+00	1,87E-03	ND	ND	ND	5,09E+02	ND	5,79E-01	4,30E-03	1,78E+00	2,53E-03	-1,84E+00
Eutrophication	kg PO_4^3e	2,56E+00	2,31E-02	2,97E-01	2,88E+00	1,98E-02	1,36E-01	0,00E+00	3,21E-04	ND	ND	ND	6,30E+01	ND	1,34E-01	1,05E-03	8,87E-02	9,19E-03	-5,31E-01
POCP (“smog”)	kg C_2H_4e	6,86E-01	1,02E-02	8,39E-03	7,04E-01	8,28E-03	4,33E-02	2,45E-01	1,67E-04	ND	ND	ND	2,69E+01	ND	4,32E-02	3,84E-04	1,97E-01	1,38E-03	-1,36E-01
ADP-elements	kg Sbe	1,41E-01	1,99E-05	9,33E-04	1,41E-01	9,36E-05	3,43E-05	0,00E+00	4,37E-06	ND	ND	ND	7,07E-01	ND	4,04E-05	5,16E-06	2,38E-02	6,68E-07	-1,10E-02

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADP-fossil	MJ	1,18E+04	1,60E+02	1,70E+02	1,22E+04	5,05E+02	1,19E+03	0,00E+00	2,85E+01	ND	ND	ND	1,28E+06	ND	1,19E+03	2,33E+01	5,71E+02	7,57E+00	-2,49E+03

ENVIRONMENTAL IMPACTS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Radioactive waste, high	kg	5,15E-03	7,30E-06	6,59E-05	5,22E-03	3,84E-05	3,75E-05	0,00E+00	1,33E-06	ND	ND	ND	1,03E+00	ND	4,98E-05	1,41E-06	3,23E-04	7,91E-07	-7,49E-04
Radioactive waste, int/low	kg	1,27E-02	1,79E-05	1,75E-04	1,28E-02	1,11E-04	9,17E-05	0,00E+00	3,35E-06	ND	ND	ND	2,66E+00	ND	1,25E-04	3,36E-06	4,87E-04	1,98E-06	-2,06E-03

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[9)]	kg CO_2e	1,07E+03	1,24E+01	1,47E+01	1,10E+03	3,47E+01	9,19E+01	2,78E-02	5,65E-01	ND	ND	ND	1,15E+05	ND	9,16E+01	1,67E+00	5,74E+01	7,64E-01	-2,68E+02

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH4 fossil, CH4 biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO2 is set to zero

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Ecoinvent 3.10.1, hydroelectric: 36% Ecoinvent 3.10.1, photovoltaic: 33% Ecoinvent 3.10.1, wind: 25% Ecoinvent 3.10.1, geothermal: 6%
Electricity kg CO2e/kWh	0,045
District heating data source and quality	-
District heating kg CO2e/kWh	-

Transport scenario documentation - A4 (Transport resources)

Scenario parameter	Value
Fuel and vehicle type. Eg, electric truck, diesel powered truck	Transport, freight, lorry 16-32 metric ton, EURO6 Transport, freight, sea, container ship
Average transport distance, km	1340 km (lorry); 705 km (ship).
Capacity utilization (including empty return) %	50%
Bulk density of transported products	143
Volume capacity utilization factor	1

Installation at the building site (A5) - Scenario documentation

Scenario parameter	Value
Energy: type and consumption (MJ or kWh)	Diesel, burned in building machine, Ecoinvent: 250 kWh
Water use (m^3)	-
Ancillary materials: type and mass (kg)	-
Waste materials: type and mass (kg)	Wood pallets: 25kg; LD-PE film: 0,55 kg;
Waste materials: output routes	Wood pallets: Recycled 15%, Landfilled 85% Plastic packaging: Recycled 9%, Incinerated 12%, Landfilled 79% Steel inserts: Recycled 85%, Landfilled 15%.
Direct emissions (kg)	0

Use stages scenario documentation - B2 Maintenance

Scenario information	Value
Maintenance process description	Technician travels to site with a work vehicle, manually empties the circuit, washes the residual oil, performs refilling using the refrigerant tank, refills the unit checking for pressure and leakages, and leaves the site.
Maintenance cycle (per RSL)	Assumed 1 per RSL
Energy use (kWh/cycle)	-
Water use (m3 or litres/cycle)	-
Ancillary materials (kg/cycle)	-
Waste materials (kg/cycle)	-

Use stages scenario documentation - B6-B7 Use of energy and use of water

Scenario information	Value
Type of energy, consumption (kWh)	Average GLO grid mix from Ecoinvent 3.10.1: 167068kWh
Freshwater consumption (m3)	-
Performance characteristics, E.g, Power rating, efficiency, capacity	SEER of 4,65 with Pcool of 21 kW; SCOP of 4,16 with Pdesign of 25 kW. Data measured according to EN 14511 and calculated according to EN 14825 for the <<Average>> climate profile.

End of life (C1-C4) - Scenario documentation

Scenario information	Value
Collection process: collected separately (kg)	212 kg
Collection process: Mixed waste (kg)	0
Recovery: re-use (kg)	0
Recovery: recycling (kg)	155
Recovery: energy recovery (kg)	0,69
Disposal (kg)	14,8
Scenario assumptions e.g. transportation (mode, km) & other	Transport, freight, lorry 16-32 metric ton, EURO5: 50km

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

Yazan Badour as an authorized verifier for EPD Hub Limited 05.08.2026

VERIFIED ISO 14025

ANNEX 1

PRODUCTS INCLUDED IN THIS EPD (SCALING COEFFICIENTS)

The Epsilon Sky line includes a multitude of sizes. **In this EPD, the declared impacts relate to size 24**, which sits roughly in the middle of the line. Provided below is a scaling table that allows the user of this EPD to scale the result tables to all the other sizes. This will provide a more convenient, "all-included" declaration for the user.

The following table shows the scaling coefficients that allow to extrapolate the values of **GWP-fossil** and **GWP-GHG** to the rest of the product line. Each size has been individually modelled in the LCA software. This scaling table is valid for both **Hi HP** and **Hi OH** versions.

The **scaling formula** employed in this table is:

$$scaling\ coefficient = \frac{GWP\ of\ analyzed\ size}{GWP\ of\ reference\ size}$$

Size	14	18	24	30	36	45
A1-A3 scaling coefficient	0,768	0,819	1,000	1,114	1,235	1,388

ANNEX 2

EXTRA USE PHASE SCENARIO (SCALING COEFFICIENTS)

The Epsilon Sky line is available as a reversible heat pump and chiller ("Hi HP" version) or as a non-reversible heat pump ("Hi OH" version). **In this EPD, the declared impacts relate to the reversible version**, which is the "worst case scenario" between the two in terms of use phase. To provide a more convenient declaration for the user, the use phase has been calculated also for the non-reversible heat pump.

The following table shows the scaling coefficients that allow to extrapolate the values of **GWP-fossil** and **GWP-GHG** to the "OH" version. Each size has been individually modelled in the LCA software. It is important to notice that **A1-A3 impacts are the same for the Hi HP and Hi OH versions of the same size.**

The **scaling formula** employed in this table is:

$$scaling\ coefficient = \frac{GWP\ of\ analyzed\ size\ (Hi\ OH\ version)}{GWP\ from\ the\ main\ result\ tables}$$

The use phase for the Hi OH version has been calculated under the following assumptions according to EN 14825:

- Temperature bins for ***average*** climate scenario
- **Medium temperature** application

Size of Epsilon Zero Hi OH	14	18	24	30	36	45
B6 scaling coefficient	0,705	0,942	1,235	1,682	2,040	2,581