ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Titan W Sky Hi HPW R0 3.1 Heat Pump
Swegon Group AB

EPD HUB, HUB-5920
Published on 03.04.2026, last updated on 03.04.2026, valid until 02.04.2031

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-A5, B1, B2, B6 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	Titan W Sky Hi HPW R0 3.1
Additional labels	-
Product reference	-
Place(s) of raw material origin	Multiple Countries
Place of production	Cantarana, province of Venice, Italy
Place(s) of installation and use	Europe
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 (%)	3,78

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 Titan W Sky Hi HPW R0 3.1
Declared unit mass	310 kg
Mass of packaging	4,3 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	1630
GWP-total, A1-A3 ($kgCO_2e$)	1620
Secondary material, inputs (%)	39,3
Secondary material, outputs (%)	75,9
Total energy use, A1-A3 (kWh)	6640
Net freshwater use, A1-A3 (m^3)	16,8

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

The Titan W SKY Hi HPW R0 is a high-efficiency reversible water-to-water heat pump equipped with full inverter reciprocating compressor.

This unit operates using natural refrigerant R290 (propane), which has GWP of 0.02 and ODP of 0 (as per IPCC's AR6). The nominal capacity of this unit is 30 kW, evaluated with inlet and outlet temperatures of secondary fluid at the user-side heat exchanger respectively of 36°C and 41°C, and emitting a total calculated sound power level of 69dB(A). Titan W Sky is designed to be connected to a three-phase, medium-voltage 480V power supply. Swegon's Cooling and Heating products are not designed to target a specific service life. Although in this EPD the RSL is assumed to be 15 years, with proper care the product can greatly outlast this value.

The Titan W SKY's structure is made of galvanized sheet-iron coated with polyester powder for weather resistance, with a load-bearing frame and sound-absorbing panels. Compressor is of the semi-hermetic reciprocating type, optimized for propane, with inverter modulation for precise load matching. The brazed plate heat exchangers are specifically designed to reduce weight and refrigerant charge. The refrigerant circuits are optimized and equipped with components that include shut-off valves, charging valves, sight glasses, dehydrating filters, electronically-controlled thermostatic expansion valves, and pressure switches, and are enclosed in compartments with ATEX certified leak sensors and extraction fans for safety. The electrical control panel, which features IP54 protection, adheres to regulatory standards to ensure reliable operation. The Titan W SKY is packaged for easy handling and installation. Each unit is factory-tested and ready for installation.

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

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	88,6	EU, Asia
Minerals	0	
Fossil materials	11,4	EU, Asia
Bio-based materials	0	

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 Titan W Sky Hi HPW R0 3.1
Mass per declared unit	310 kg
Functional unit	This unit provides a nominal heating and cooling capacity of 30 kW over the course of 15 years, by consuming a total of 171 248 kWh 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	1,89

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 prescriptions. 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 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 a green contract with the energy company (Enel).
The use of green energy in manufacturing 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.

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 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 European data (3% yearly leakage rate). 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) 2013/811, implementing the directive of the European Commission 2009/125/ec Ecodesign. SEER and SCOP parameters have been taken into account in the average European climate profiles. 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

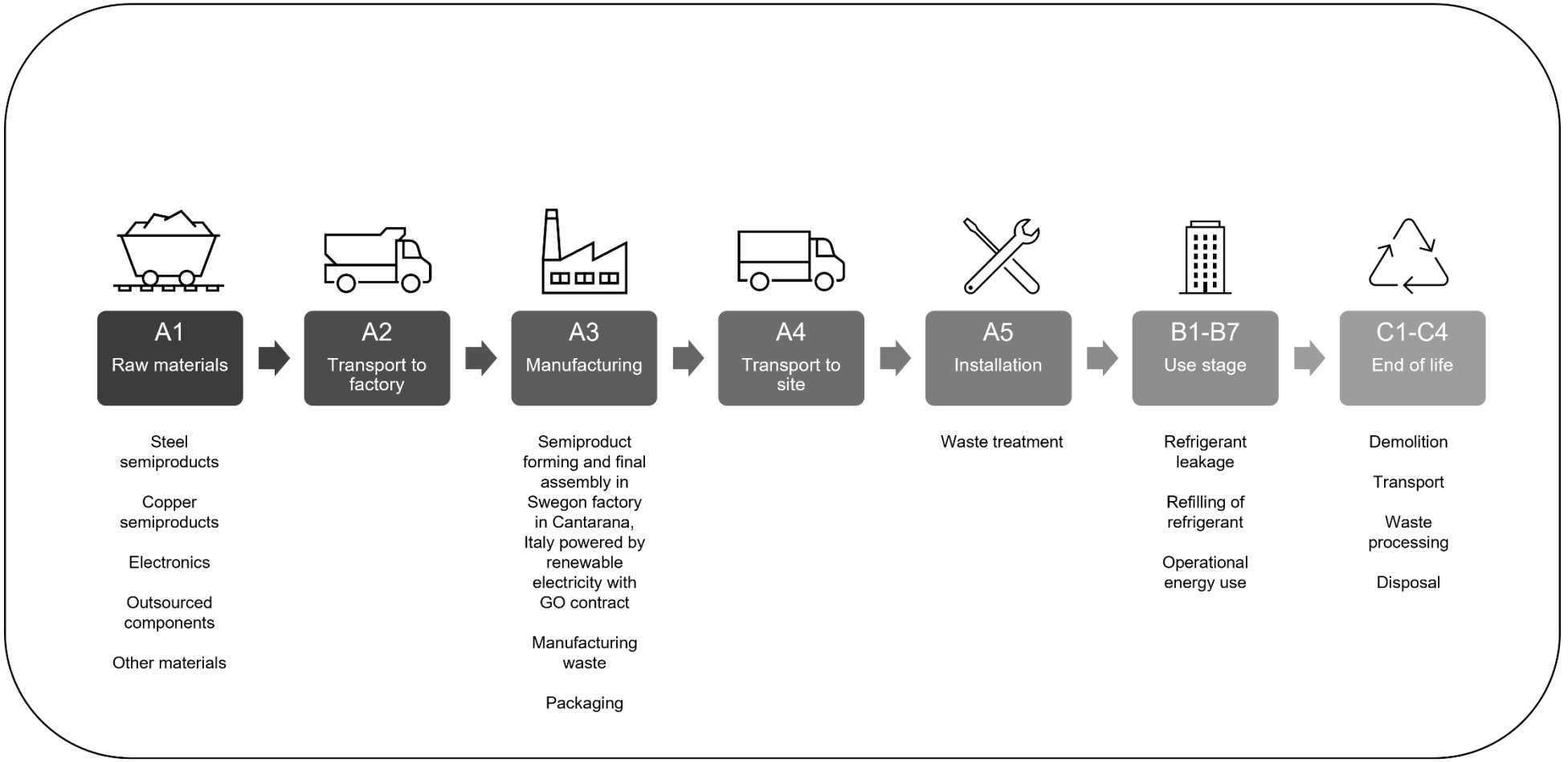
comply with regulations for the EoL treatment of electrical and electronic products, including heating, cooling, and ventilation systems.

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.

SYSTEM 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 waste

PRODUCT & MANUFACTURING SITES GROUPING

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

This EPD is product and factory specific.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.4. 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'.

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	1,52E+03	1,63E+01	3,96E+01	1,57E+03	3,77E-02	9,75E+01	1,04E-02	3,96E-01	ND	ND	ND	1,25E+05	ND	9,24E+01	2,76E+00	8,37E+01	4,08E+01	-7,10E+01
GWP – fossil	kg CO_2e	1,56E+03	1,62E+01	1,36E+01	1,59E+03	3,77E-02	9,06E+01	1,04E-02	3,96E-01	ND	ND	ND	1,24E+05	ND	9,24E+01	2,76E+00	8,34E+01	3,33E+01	-6,43E+01
GWP – biogenic	kg CO_2e	-4,26E+01	3,25E-03	2,60E+01	-1,66E+01	7,94E-06	6,93E+00	0,00E+00	2,62E-04	ND	ND	ND	1,88E+02	ND	1,26E-02	6,06E-04	1,34E-01	7,42E+00	-6,65E+00
GWP – LULUC	kg CO_2e	4,01E+00	7,77E-03	1,75E-02	4,03E+00	1,42E-05	9,29E-03	0,00E+00	2,70E-04	ND	ND	ND	2,47E+02	ND	1,37E-02	1,22E-03	9,59E-02	9,55E-04	-1,23E-02
Ozone depletion pot.	kg CFC_{-11}e	2,21E-05	2,40E-07	2,82E-07	2,26E-05	7,58E-10	1,38E-06	0,00E+00	2,60E-08	ND	ND	ND	8,63E-04	ND	1,40E-06	3,89E-08	5,96E-07	3,92E-08	-3,08E-07
Acidification potential	mol H^+e	1,69E+01	2,08E-01	1,24E-01	1,72E+01	1,22E-04	8,14E-01	0,00E+00	1,59E-03	ND	ND	ND	6,45E+02	ND	8,25E-01	9,23E-03	2,83E+00	2,83E-02	-2,53E-01
EP-freshwater[2)]	kg Pe	5,02E+00	9,86E-04	9,52E-03	5,03E+00	2,54E-06	2,63E-03	0,00E+00	7,32E-05	ND	ND	ND	5,64E+01	ND	3,62E-03	2,15E-04	1,29E-01	2,94E-03	-2,16E-02
EP-marine	kg Ne	3,16E+00	5,45E-02	1,59E-02	3,23E+00	4,13E-05	3,78E-01	0,00E+00	3,32E-04	ND	ND	ND	1,22E+02	ND	3,80E-01	3,00E-03	1,92E-01	6,07E-02	-3,90E-02
EP-terrestrial	mol Ne	4,04E+01	6,03E-01	1,54E-01	4,12E+01	4,49E-04	4,13E+00	0,00E+00	3,50E-03	ND	ND	ND	1,24E+03	ND	4,15E+00	3,26E-02	2,34E+00	1,38E-01	-6,24E-01
POCP ("smog")[3)]	kg NMVOCe	1,05E+01	1,81E-01	5,31E-02	1,08E+01	1,98E-04	1,23E+00	1,54E-01	2,65E-03	ND	ND	ND	3,69E+02	ND	1,24E+00	1,29E-02	7,74E-01	4,06E-02	-1,97E-01
ADP-minerals & metals[4)]	kg Sbe	6,48E+02	3,49E-05	1,39E-03	6,48E+02	1,04E-07	3,25E-05	0,00E+00	3,13E-06	ND	ND	ND	7,10E-01	ND	4,52E-05	8,91E-06	3,30E-02	4,63E-06	-8,88E-04
ADP-fossil resources	MJ	1,93E+04	2,22E+02	1,16E+02	1,96E+04	5,46E-01	1,18E+03	0,00E+00	2,02E+01	ND	ND	ND	1,61E+06	ND	1,21E+03	3,89E+01	9,00E+02	2,90E+01	-6,67E+02
Water use[5)]	m^3e depr.	6,28E+02	9,43E-01	4,89E+01	6,78E+02	2,80E-03	3,01E+00	0,00E+00	4,43E-02	ND	ND	ND	3,14E+04	ND	3,51E+00	1,82E-01	2,99E+01	1,95E+00	6,84E+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	1,65E-04	1,20E-06	7,03E-07	1,66E-04	3,75E-09	2,31E-05	0,00E+00	1,68E-08	ND	ND	ND	5,53E-03	ND	2,32E-05	2,26E-07	1,21E-05	2,12E-07	-4,67E-06
Ionizing radiation[6)]	kBq U235e	1,08E+02	1,66E-01	6,62E-01	1,09E+02	6,58E-04	5,29E-01	0,00E+00	1,35E-02	ND	ND	ND	1,70E+04	ND	8,29E-01	3,18E-02	4,53E+00	4,24E-02	-1,45E+00
Ecotoxicity (freshwater)	CTUe	6,74E+04	2,65E+01	1,94E+02	6,76E+04	6,44E-02	6,54E+01	1,70E-03	1,23E+00	ND	ND	ND	3,31E+05	ND	7,09E+01	6,07E+00	2,06E+03	3,63E+02	3,42E+02
Human toxicity, cancer	CTUh	2,04E-06	2,96E-09	2,10E-08	2,06E-06	6,20E-12	9,33E-09	0,00E+00	1,09E-10	ND	ND	ND	2,21E-05	ND	9,67E-09	4,68E-10	3,45E-07	4,05E-09	2,57E-08
Human tox. non-cancer	CTUh	9,34E-05	1,15E-07	1,08E-06	9,46E-05	3,55E-10	1,51E-07	4,35E-10	3,64E-09	ND	ND	ND	1,20E-03	ND	1,68E-07	2,45E-08	3,35E-05	2,40E-07	4,25E-06
SQP[7)]	-	1,50E+04	1,54E+02	9,29E+02	1,60E+04	5,50E-01	8,41E+01	0,00E+00	1,16E+00	ND	ND	ND	2,90E+05	ND	8,79E+01	2,52E+01	1,01E+03	3,14E+01	-1,09E+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	3,93E+03	2,64E+00	2,69E+02	4,21E+03	8,89E-03	-3,92E+01	0,00E+00	2,50E-01	ND	ND	ND	2,43E+05	ND	1,19E+01	5,33E-01	1,39E+02	-2,80E+02	-2,21E+02
Renew. PER as material	MJ	3,18E+02	0,00E+00	-2,28E+02	9,01E+01	0,00E+00	-6,05E+01	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-5,86E+00	-2,37E+01	4,22E+01
Total use of renew. PER	MJ	4,25E+03	2,64E+00	4,06E+01	4,30E+03	8,89E-03	-9,98E+01	0,00E+00	2,50E-01	ND	ND	ND	2,43E+05	ND	1,19E+01	5,33E-01	1,33E+02	-3,04E+02	-1,79E+02
Non-re. PER as energy	MJ	1,89E+04	2,22E+02	-9,09E+01	1,91E+04	5,46E-01	1,17E+03	0,00E+00	3,94E+00	ND	ND	ND	1,61E+06	ND	1,21E+03	3,89E+01	8,44E+02	-5,30E+02	-6,30E+02
Non-re. PER as material	MJ	9,76E+02	0,00E+00	-8,80E+01	8,88E+02	0,00E+00	-1,67E+01	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-1,70E+02	-7,01E+02	4,96E+01
Total use of non-re. PER	MJ	1,99E+04	2,22E+02	-1,79E+02	2,00E+04	5,46E-01	1,15E+03	0,00E+00	3,94E+00	ND	ND	ND	1,61E+06	ND	1,21E+03	3,89E+01	6,74E+02	-1,23E+03	-5,80E+02
Secondary materials	kg	1,18E+02	9,85E-02	4,14E-01	1,18E+02	2,36E-04	4,91E-01	0,00E+00	3,35E-03	ND	ND	ND	2,31E+02	ND	4,94E-01	1,74E-02	3,47E+01	1,20E-02	3,87E+01
Renew. secondary fuels	MJ	7,12E+00	8,90E-04	2,05E+00	9,18E+00	2,98E-06	1,29E-03	0,00E+00	4,43E-05	ND	ND	ND	1,46E+00	ND	1,31E-03	2,21E-04	2,73E-02	2,71E-04	-9,09E-03
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	1,54E+01	2,70E-02	1,12E+00	1,66E+01	8,06E-05	7,26E-02	0,00E+00	1,22E-03	ND	ND	ND	8,80E+02	ND	9,39E-02	5,23E-03	1,07E+00	-7,50E-02	-1,89E+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	4,49E+02	3,48E-01	1,21E+00	4,51E+02	7,90E-04	1,33E+00	0,00E+00	2,15E-02	ND	ND	ND	1,08E+04	ND	1,51E+00	6,76E-02	1,49E+01	1,41E+00	-3,33E+01
Non-hazardous waste	kg	5,74E+03	5,99E+00	8,83E+01	5,83E+03	1,58E-02	2,73E+01	0,00E+00	3,76E-01	ND	ND	ND	2,73E+05	ND	2,28E+01	1,27E+00	8,72E+02	1,68E+02	8,05E+02
Radioactive waste	kg	4,07E-02	4,07E-05	1,68E-04	4,09E-02	1,63E-07	1,30E-04	0,00E+00	3,28E-06	ND	ND	ND	4,14E+00	ND	2,03E-04	7,79E-06	1,16E-03	1,05E-05	-3,29E-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 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	8,45E+00	8,45E+00	0,00E+00	1,34E+00	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,26E+02	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	6,44E+00	6,44E+00	0,00E+00	1,37E+00	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,25E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	5,29E+01	5,29E+01	0,00E+00	1,66E+01	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	8,11E+00	0,00E+00	0,00E+00
Exported energy – Electricity	MJ	0,00E+00	0,00E+00	2,23E+01	2,23E+01	0,00E+00	2,52E+00	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,22E+00	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	3,06E+01	3,06E+01	0,00E+00	1,41E+01	0,00E+00	0,00E+00	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	6,89E+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	1,52E+03	1,62E+01	1,41E+01	1,55E+03	3,74E-02	9,02E+01	0,00E+00	3,88E-01	ND	ND	ND	1,24E+05	ND	9,19E+01	2,75E+00	8,32E+01	4,89E+01	-6,38E+01
Ozone depletion Pot.	kg CFC_{-11}e	2,06E-05	1,91E-07	2,48E-07	2,10E-05	6,03E-10	1,09E-06	0,00E+00	2,09E-08	ND	ND	ND	7,36E-04	ND	1,11E-06	3,11E-08	5,01E-07	3,25E-08	-2,82E-07
Acidification	kg SO_2e	1,31E+01	1,65E-01	1,06E-01	1,33E+01	9,22E-05	5,72E-01	0,00E+00	1,31E-03	ND	ND	ND	5,37E+02	ND	5,82E-01	7,07E-03	2,48E+00	2,00E-02	-2,03E-01
Eutrophication	kg PO_4^3e	3,79E+00	2,17E-02	7,47E-02	3,89E+00	2,33E-05	1,34E-01	0,00E+00	2,25E-04	ND	ND	ND	6,27E+01	ND	1,35E-01	1,72E-03	1,28E-01	3,36E-02	2,62E-02
POCP (“smog”)	kg C_2H_4e	9,48E-01	9,23E-03	6,26E-03	9,64E-01	8,67E-06	4,29E-02	9,15E-02	1,17E-04	ND	ND	ND	2,94E+01	ND	4,34E-02	6,33E-04	1,46E-01	4,78E-03	-3,96E-02
ADP-elements	kg Sbe	2,08E-01	3,41E-05	1,39E-03	2,10E-01	1,02E-07	3,16E-05	0,00E+00	3,06E-06	ND	ND	ND	7,07E-01	ND	4,42E-05	8,70E-06	3,30E-02	3,83E-06	-8,86E-04
ADP-fossil	MJ	1,75E+04	2,20E+02	1,05E+02	1,78E+04	5,35E-01	1,17E+03	0,00E+00	2,00E+01	ND	ND	ND	1,34E+06	ND	1,19E+03	3,84E+01	8,32E+02	2,84E+01	-6,45E+02

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	7,72E-03	1,18E-05	5,12E-05	7,78E-03	4,17E-08	3,71E-05	0,00E+00	9,28E-07	ND	ND	ND	1,17E+00	ND	5,80E-05	2,31E-06	4,57E-04	2,97E-06	-4,63E-05
Radioactive waste, int/low	kg	1,89E-02	2,89E-05	1,17E-04	1,91E-02	1,21E-07	9,27E-05	0,00E+00	2,35E-06	ND	ND	ND	2,97E+00	ND	1,45E-04	5,47E-06	7,01E-04	7,51E-06	-2,83E-04

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	1,56E+03	1,63E+01	1,36E+01	1,59E+03	3,77E-02	9,06E+01	1,04E-02	3,96E-01	ND	ND	ND	1,25E+05	ND	9,24E+01	2,76E+00	8,35E+01	3,33E+01	-6,43E+01

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

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity production, hydro, reservoir, alpine region, Italy, Ecoinvent: 36% Electricity production, photovoltaic, 570kWp open ground installation, multi-Si, Italy, Ecoinvent: 33% Electricity production, wind, >3MW turbine, onshore, Italy, Ecoinvent: 25% Electricity production, deep geothermal, Italy, Ecoinvent: 6% Market for transmission network, electricity, high voltage, World, Ecoinvent Market for transmission network, electricity, medium voltage, World, Ecoinvent Market for transformer, high voltage use, World, Ecoinvent:
Electricity kg CO2e/kWh	0,045
District heating data source and quality	-
District heating kg CO2e/kWh	-

Transport scenario documentation - A4

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	1119 km
Capacity utilization (including empty return) %	50%
Bulk density of transported products	2,29E+02
Volume capacity utilization factor	1

Installation scenario documentation - A5

Scenario information	Value
Ancillary materials for installation (specified by material) / kg or other units as appropriate	-
Water use / m^3	-
Other resource use / kg	-
Quantitative description of energy type (regional mix) and consumption during the installation process / kWh or MJ	Diesel, burned in building machine, Ecoinvent: 250kWh
Waste materials on the building site before waste processing, generated by the product's installation (specified by type) / kg	Wood pallet: 4kg Plastic packaging (LD-PE film): 0,3kg

Output materials (specified by type) as result of waste processing at the building site e.g. collection for recycling, for energy recovery, disposal (specified by route) / kg	Wood pallets: Recycled 15% and Landfilled 85%. Plastic packaging: Recycled 9%, Incinerated 12% & Landfilled 79%.
Direct emissions to ambient air, soil and water / kg	0

Use stages scenario documentation - B2 Maintenance

Scenario information	Value
Maintenance process / Description or source where description can be found	Technician travels to site with a van, manually prepares the machine for refilling, performs refilling using the refrigerant tank, manually prepares the machine for normal function, and leaves the site.
Maintenance cycle / Number per RSL or year (Not applicable if only B2 is declared)	Assumed 1 per RSL

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

Scenario information	Value
Ancillary materials specified by material / kg or units as appropriate	-
Characteristic performance, e.g., energy efficiency, emissions, variation of performance with capacity utilization, etc.	SEER of 6.55 with Pcool of 28,3 kW; SCOP of 5.62 with Pdesign of 35,4 kW. Data measured according to EN 14511 and calculated according to EN 14825.
Further assumptions for scenario development, e.g., frequency and period of use, number of occupants	The climate profile has been chosen as "average" from EN 14825, which refers to the city of Strasbourg. Average European grid mix from Ecoinvent 3.10.1 has been used for B6 energy.

End-of-life scenario documentation

Scenario information	Value
Collection process – kg collected separately	310
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	233

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 03.04.2026

VERIFIED ISO 14025