Environmental Product Declaration

Type III Environmental Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Control Valves

Covered products:

R2..-S.. DN50

All products are specified on page 3

from

Belimo Automation AG

Program:	The International EPD® System, www.environdec.com
Program operator:	EPD International AB
Version date:	2026-09-16
Validity date:	2031-09-15
Version:	1.0 (original version of the EPD)
EPD reg. number:	EPD-IES-0034957:001
EPD type:	EPD of multiple products, based on worst-case results of product group

An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com

GENERAL INFORMATION

Program Information	
Program:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	support@environdec.com

Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *PCR 2019:14 Construction Products, Version 2.0.1, 2025-06-05 (valid until 2030-04-07)*
PCR review was conducted by The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/contact

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ **Individual EPD verification without a pre-verified LCA/EPD tool** Third-party verifier: *Prof. Ing. Silvia Vilčeková, SILCERT, s.r.o.* Approved by: International EPD System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but published in different EPD programs, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterization factors); and be valid at the time of comparison.

For further information about comparability, see EN 15804 and ISO 14025.

Version history:

Version 1, 2026-09-16, Original version of the EPD

INFORMATION ABOUT THE DECLARANT

Owner of Declaration:

Belimo Automation AG

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LCA practitioner:

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LCA/EPD Specialist

Description of the organization:

Belimo develops, produces, and markets field devices for the energy-efficient control of heating, ventilation, and air-conditioning (HVAC) systems worldwide. The focus of its core business is on damper actuators, control valves, sensors and meters. Belimo actuators control air dampers and valve positioning in HVAC systems, ensuring precise airflow and temperature control. The Company provides a wide range of control valves (e.g., pressure-independent valves) used for heating and cooling systems. Its sensors monitor air quality, temperature, humidity, and pressure, and are crucial for modern building automation. With decades of experience, Belimo is recognized as a leading innovator in HVAC control solutions with numerous patents and several industry-first proprietary technologies introduced to the market over the past 50 years. Belimo's product portfolio is designed to improve energy efficiency and longevity and is continuously optimized to this end.

Belimo's main markets are: Americas, EMEA (Europe, Middle East, and Africa) and Asia-Pacific.

Product / management system-related certifications:

Belimo is committed to maintaining its certifications in accordance with the international standards for environmental management (ISO 14001), quality management (ISO 9001), and occupational health and safety (ISO 45001). Belimo sites undergo regular audits from the Swiss Association for Quality and Management Systems (SQS) and the China Quality Certification Center (CQC) in China.

PRODUCT INFORMATION

Product name:

This Environmental Declaration contains information for the **worst-case** representative of models from the **R2..-S.. DN50** product family, including the following (the declared product is in bold):

R2050-25-S4
R2050-40-S4
R2050-S4

Image of product:

R2..-S.. DN50 product family members are similar in physical appearance. Example of a model from the product family:

Product description:

The Belimo control valve product portfolio comprises a comprehensive range of valves designed for the precise control of fluid flow in HVAC and building automation systems. These products are used in heating, ventilation, and cooling applications to ensure reliable system operation, energy efficiency, and optimal performance under a wide range of operating conditions.

All control valves are engineered for long service life, energy-efficient operation, and maintenance-free functionality, thereby minimizing service requirements and reducing lifecycle costs. Their design, in combination with a suitable valve actuator, enables reliable and accurate flow control, contributing to enhanced system stability, responsiveness, and energy management.

Manufactured in accordance with applicable industry and environmental standards, Belimo control valves deliver consistent, high-quality performance. They support the requirements of engineers, sustainability specialists, and regulatory professionals involved in the design, assessment, and optimization of building systems.

Open/close ball valve, 2-way, Internal thread
• For open and closed water systems
• For shut-off functions on the water side and open/close controls in air handling systems and heating systems.
• Air-bubble tight

More information about the product can be found on our website www.belimo.com and the belonging technical data sheets.

Name and location of production site(s):

Belimo Switzerland in Hinwil, Switzerland
Belimo Germany in Großröhrsdorf, Germany (Customizing Center) – at least one of the declared products

CONTENT DECLARATION

The mass (weight) of one unit of a product, as purchased or per declared unit:

1,364 g

Content of the product in the form of a list of materials and substances, and their mass:

Product content	Mass, g	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, g C/product or declared unit
Brass	1,356.8	0.0	0.0	0.0
Plastic (ETFE/PTFE)	5.1	0.0	0.0	0.0
Steel (stainless)	2.0	0.0	0.0	0.0
Total	**1,364.0**	**0.0**	**0.0**	**0.0**

Packaging materials	Mass, g	Mass-% (versus the product)	Biogenic material, g C/product or declared unit
Cardboard box	44.0	3.2	22.0
Kraft paper	13.2	1.0	6.6
PE pallet	18.2	1.3	0.0
Total	**75.4**	**5.5**	**28.6**

1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO_2.

CONTENT DECLARATION

The mass and the content of distribution and/or consumer packaging:

Displayed on the table above. The pallet is a one-way pallet as it is unknown where it ends downstream. Therefore, it is modelled as a single use in the LCA. It is assumed that 270 kg of products are transported on a 3.6 kg pallet.

The declared share of biogenic/recycled materials:

There is no biogenic content in the product. The product packaging is made of virtually 100% biogenic material neglecting the minor amount of tape and label. The packaging consists of corrugated cardboard box and kraft paper filler. There is no biogenic content in the plastic pallet. The biogenic content is declared in the content declaration table below.

Regarding the metals used in the product, no documentation on recycled content was possible to obtain from suppliers.

The content declaration applies for the average product which includes all relevant materials representative for the entire product group.

Information on the environmental and hazardous/toxic properties of substances contained in the product:

The following substances in the candidate list of Substances of Very High Concern (SVHCs), contained in the product, exceed the limits for registration with the European Chemicals Agency, by more than 0.1% of the weight of the declared unit.

http://echa.europa.eu/candidate-list-table

Hazardous substances from the candidate list of SVHC	EC No.	CAS No.	Mass-% per product or declared unit
Lead	231-100-4	7439-92-1	2.5 - 4.0

LCA INFORMATION

Declared unit:

1 piece of product

Conversion factor to mass:

1,364 g

Reference service life:

25 years

Time representativeness:

Primary data representing the manufacturing of the product were collected between March 2025 and April 2026. The assessed product is part of Belimo's existing product portfolio and has been commercially available for several years.

Geographical scope:

Purchased materials are sourced in Europe and globally, and manufacturing takes place in Switzerland. Baseline geographical scope for the use stage and end-of-life stages is defined as Global, to remain conservative. A European scenario is presented for the use-stage too.

Physical material properties of product:

Please refer to the table in chapter "Additional Environmental Information", as well as our website www.belimo.com and the belonging technical data sheets.

Variation:

No variation is calculated since the EPD type is a worst-case representation.

Database(s) and LCA software used:

The LCA was performed in SimaPro Craft v.10.2.0.2 using the Ecoinvent v.3.11 background database and the EN 15804 A2 reference package based on the EF 3.1 characterization method, in accordance with ISO 14040/44 principles.

Description of system boundaries:

The type of EPD is Cradle to gate (A1-A3) with options (A5 and B6), modules C1-C4, and module D. The system boundaries and modules are described below.
B6**, C1*, C2*, C3*, C4* and D* are introduced as scenarios attributed to European practice and are presented further below.

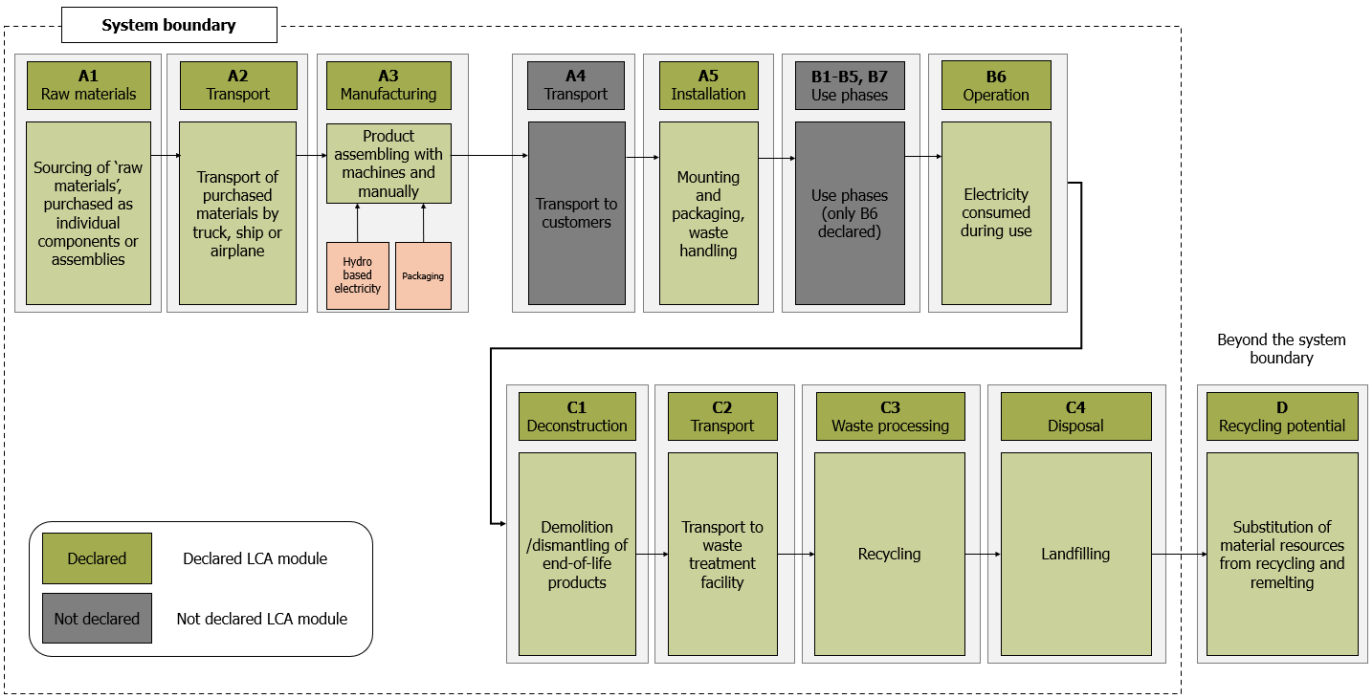
LCA INFORMATION

Modules declared, geographical scope, share of primary data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Distribution/ installation stage		Use stage							End-of-life stage				Beyond product life cycle
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	x	x	x	ND	x	ND	ND	ND	ND	ND	x	ND	x	x	x	x	x
Geography	GLO	GLO	CH	-	GLO	-	-	-	-	-	GLO	-	GLO	GLO	GLO	GLO	GLO
Share of primary data	2.1%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	N/A			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

"X" = Declared Modules. "ND" = Not Declared modules/processes/life-cycle stages

Process flow diagram:



LCA INFORMATION

Global scenario (default):

A1-A3 (Product stage):

Modules A1-A3 cover the supply of purchased materials, their transport to Belimo, and final manufacturing. Components are sourced globally and transported by road, sea, and air. Final assembly takes place at Belimo's production facility, mainly using manual labor and electricity certified as European hydropower (0.0124 kg CO_2e/kWh). Energy consumption (electricity and district heating) includes both production and office operations and is evenly allocated by unit (piece) over all products sold by Belimo. Products are packed, stacked on a one-way HDPE pallet, and prepared for shipment.

A5 (Construction stage):

Module A5 covers packaging waste generated during installation. Corrugated cardboard and kraft paper are assumed to be landfilled with construction waste, while the higher value plastic pallets are assumed to be recycled on the market. Related flows are reported in Module D. No environmental emissions from installation itself occur, as it is performed manually or with negligible-impact tools, such as a wrench.

B6 (Use stage):

No operating energy is consumed to operate the individual valves.

C1-C4 (End-of-life stage):

No incineration scenario is introduced as it is not relevant for the end-of-life treatment of such construction products. The waste management practice of Europe and other global markets (Americas, Africa, Middle East, Asia Pacific) may differ. Therefore, two scenarios are presented; European scenario as additional results and Global scenario as main results:

- **C1:** Demolition with heavy machinery. Belimo products are negligible relative to building mass. Thus, impacts are declared as 0
- **C2:** 50 km transport by 7.5-16 t EURO 5 lorry (50% load factor)
- **C3:** 0 (no recycling)
- **C4:** 100% landfill with mixed demolition waste

Both scenarios are declared separately. Users may apply either one or combine them into an average, depending on the regional context.

D (Benefits and loads beyond system boundary):

Declares net flows of energy and secondary materials leaving the product system and that fulfils the end-of-waste criteria

- **D:** credits from pallet recycling in A5 (*benefits*)

Credit calculation principle (for each material fraction):

- Virgin equivalent mass = recovered mass × (1 – recycled content)
- Substituted mass = virgin equivalent mass × substitution rate
- Credit = substituted mass × impact of virgin production
- Burden = recovered mass × processing burden
- Net credit = credit – burden

LCA INFORMATION

More information:

Recycled material is not used directly in Belimo's manufacturing. Production generates no co-products or notable waste. The only recycled input is partially recycled metal from the global market, whose burden is already included in the LCA.

European scenario:

B6** (Use stage):

No operating energy is consumed to operate the individual valves.

C1*-C4* (End-of-life stage):

- **C1*:** Selective dismantling with source separation, manually or with tools. Impacts negligible, thus declared as 0
- **C2*:** 50 km transport by 7.5-16 t EURO 5 lorry (50% load factor)
- **C3*:** Modern recycling facility
  - Metals (ferrous/non-ferrous): recovered 100% for recycling and remelting
  - Plastics/rubber: incinerated during remelting of entire valve (ashes are neglected)
- *Other minor complexes such as adhesive and lubricant are neglected*
- **C4*:** 0 (no landfill)

D* (Benefits and loads beyond system boundary):

- **D*:** credits from pallet recycling in A5 + material fractions recycling in C3* (*benefits*)
- **D*:** burden from metal remelting at smelting facility in C3* (*loads*)

Cut-off criteria:

All major raw material and energy inputs are included. All unit processes for which data exist are accounted for, and no single neglected flow exceeds 1% of total mass or energy. Overall omissions remain below 5%, meaning more than 95% of flows are covered. The LCA includes all processes from raw material extraction through production and end-of-life. Capital goods (equipment, buildings), staff transport, and personnel-related activities are excluded. Omitted processes include:

- landfilling of ashes from incineration or remelting
- minor inputs such as adhesives and lubricants
- end-of-life management of production and R&D waste

Allocation rules:

Allocation is avoided where possible. The only allocations applied in the LCA were:

- Electricity and heat consumption, allocated equally per product unit sold
- Pallet use, allocated among products on a mass basis according to load capacity

Data quality:

Data quality of primary and secondary data had been judged by its precision (measured, calculated, or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methodology applied), and representativeness (geographical, technological, and temporal). A data quality assessment compliant with EN 15941 and EN 15804 Annex E, Table E.2, was conducted and documented in the LCA report for each dataset. The selected datasets were generally rated as having good to very good geographical, temporal, and technological representativeness. Data were collected between March 2025 and April 2026. The table below indicates the difference of primary and secondary data used in the study, in accordance with PCR 2019:14.

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
A1: Purchase of materials	Collected data	Belimo	2025	Secondary data	0.0%
A2: Transport of materials to manufacturing site	Collected data	Belimo	2025	Primary data	1.3%
A3: Packaging use	Collected data	Belimo	2025	Primary data	0.6%
A3: Energy used in manufacturing	Collected data	Belimo / Certified supplier	2025	Primary data	0.2%
Total share of primary data, of GWP-GHG results for A1-A3					2.1%

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

ENVIRONMENTAL PERFORMANCE

Main/default results (Global scenario)

LCA results of the product(s) - main environmental performance results

Results are per declared unit

Mandatory impact category indicators according to EN 15804									
Indicator	**Unit**	**A1-A3**	**A5**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	8.65E+00	1.11E-01	0.00E+00	0.00E+00	2.76E-02	0.00E+00	8.54E-03	-4.07E-02
GWP-fossil	kg CO_2 eq.	8.60E+00	7.26E-03	0.00E+00	0.00E+00	2.76E-02	0.00E+00	8.53E-03	-4.05E-02
GWP-biogenic	kg CO_2 eq.	2.67E-02	1.03E-01	0.00E+00	0.00E+00	8.49E-06	0.00E+00	4.10E-06	-1.41E-04
GWP-luluc	kg CO_2 eq.	1.99E-02	7.70E-06	0.00E+00	0.00E+00	1.24E-05	0.00E+00	4.89E-06	-1.95E-05
ODP	kg CFC 11 eq.	1.81E-05	7.28E-11	0.00E+00	0.00E+00	3.49E-10	0.00E+00	2.38E-10	-2.03E-09
AP	mol H^+ eq.	5.48E-01	2.92E-05	0.00E+00	0.00E+00	9.42E-05	0.00E+00	5.98E-05	-1.13E-04
EP-freshwater	kg P eq.	4.44E-02	2.63E-06	0.00E+00	0.00E+00	3.02E-06	0.00E+00	7.47E-07	-6.43E-06
EP-marine	kg N eq.	2.94E-02	4.38E-05	0.00E+00	0.00E+00	2.98E-05	0.00E+00	2.29E-05	-2.47E-05
EP-terrestrial	mol N eq.	4.00E-01	5.98E-05	0.00E+00	0.00E+00	3.24E-04	0.00E+00	2.51E-04	-2.53E-04
POCP	kg NMVOC eq.	1.13E-01	4.62E-05	0.00E+00	0.00E+00	1.28E-04	0.00E+00	9.05E-05	-2.20E-04
ADP-minerals & metals*	kg Sb eq.	7.66E-03	3.65E-08	0.00E+00	0.00E+00	9.03E-08	0.00E+00	1.24E-08	-2.15E-07
ADP-fossil*	MJ	1.04E+02	7.70E-02	0.00E+00	0.00E+00	3.81E-01	0.00E+00	2.09E-01	-1.35E+00
WDP*	m^3	9.83E+00	-7.72E-03	0.00E+00	0.00E+00	2.16E-03	0.00E+00	9.28E-03	-8.57E-03
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption								

**Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

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

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Additional mandatory and voluntary impact category indicators									
Indicator	**Unit**	**A1-A3**	**A5**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG**	kg CO_2 eq.	8.62E+00	7.27E-03	0.00E+00	0.00E+00	2.76E-02	0.00E+00	8.54E-03	-8.10E-05

***This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.*

ENVIRONMENTAL PERFORMANCE

Resource Use indicators

Indicator	Unit	A1-A3	A5	B6	C1	C2	C3	C4	D
PERE	MJ	3.17E+01	1.46E-02	0.00E+00	0.00E+00	5.30E-03	0.00E+00	1.95E-03	-2.77E-02
PERM	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
PERT	MJ	3.17E+01	1.46E-02	0.00E+00	0.00E+00	5.30E-03	0.00E+00	1.95E-03	-2.77E-02
PENRE	MJ	1.04E+02	7.70E-02	0.00E+00	0.00E+00	3.81E-01	0.00E+00	2.09E-01	-1.35E+00
PENRM	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
PENRT	MJ	1.04E+02	7.70E-02	0.00E+00	0.00E+00	3.81E-01	0.00E+00	2.09E-01	-1.35E+00
SM	kg	4.20E-01	1.92E-05	0.00E+00	0.00E+00	1.68E-04	0.00E+00	5.20E-05	-1.96E-04
RSF	MJ	6.53E-03	3.37E-07	0.00E+00	0.00E+00	2.17E-06	0.00E+00	1.09E-06	-1.04E-06
NRSF	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
FW	m^3	2.44E-01	-1.75E-04	0.00E+00	0.00E+00	5.27E-05	0.00E+00	2.17E-04	-2.10E-04
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water								

Waste indicators

Indicator	Unit	A1-A3	A5	B6	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.66E+00	2.93E-04	0.00E+00	0.00E+00	8.73E-04	0.00E+00	2.38E-04	-1.19E-03
Non-hazardous waste disposed	kg	1.70E+02	1.71E-01	0.00E+00	0.00E+00	1.68E-02	0.00E+00	5.50E-03	-3.47E-01
Radioactive waste disposed	kg	2.68E-04	3.80E-07	0.00E+00	0.00E+00	7.53E-08	0.00E+00	3.05E-08	-7.15E-07

Output flow indicators

Indicator	Unit	A1-A3	A5	B6	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
Material for recycling	kg	0.00E+00	1.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	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

ENVIRONMENTAL PERFORMANCE

Additional results (European scenario)

LCA results of the product(s) - main environmental performance results

Results are per declared unit

Mandatory impact category indicators according to EN 15804							
Indicator	**Unit**	**B6****	**C1***	**C2***	**C3***	**C4***	**D***
GWP-total	kg CO_2 eq.	0.00E+00	0.00E+00	1.27E-02	9.92E-02	0.00E+00	2.93E-01
GWP-fossil	kg CO_2 eq.	0.00E+00	0.00E+00	1.27E-02	4.30E-02	0.00E+00	2.88E-01
GWP-biogenic	kg CO_2 eq.	0.00E+00	0.00E+00	8.50E-06	5.61E-02	0.00E+00	5.99E-03
GWP-luluc	kg CO_2 eq.	0.00E+00	0.00E+00	4.29E-06	3.25E-05	0.00E+00	-4.67E-04
ODP	kg CFC 11 eq.	0.00E+00	0.00E+00	2.77E-10	1.60E-10	0.00E+00	5.47E-10
AP	mol H^+ eq.	0.00E+00	0.00E+00	2.73E-05	1.83E-04	0.00E+00	-2.46E-02
EP-freshwater	kg P eq.	0.00E+00	0.00E+00	8.83E-07	1.29E-05	0.00E+00	-9.59E-04
EP-marine	kg N eq.	0.00E+00	0.00E+00	6.58E-06	8.78E-05	0.00E+00	-4.99E-04
EP-terrestrial	mol N eq.	0.00E+00	0.00E+00	7.11E-05	5.46E-04	0.00E+00	-8.38E-03
POCP	kg NMVOC eq.	0.00E+00	0.00E+00	4.34E-05	1.78E-04	0.00E+00	-2.91E-03
ADP-minerals & metals*	kg Sb eq.	0.00E+00	0.00E+00	4.36E-08	5.35E-07	0.00E+00	-4.00E-04
ADP-fossil*	MJ	0.00E+00	0.00E+00	1.81E-01	2.33E-01	0.00E+00	2.75E+00
WDP*	m^3	0.00E+00	0.00E+00	9.25E-04	4.91E-03	0.00E+00	-1.40E+00
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption						

**Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

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

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Additional mandatory and voluntary impact category indicators							
Indicator	**Unit**	**B6****	**C1***	**C2***	**C3***	**C4***	**D***
GWP-GHG**	kg CO_2 eq.	0.00E+00	0.00E+00	1.27E-02	4.31E-02	0.00E+00	2.87E-01

***This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.*

ENVIRONMENTAL PERFORMANCE

Resource Use indicators							
Indicator	**Unit**	**B6****	**C1***	**C2***	**C3***	**C4***	**D***
PERE	MJ	0.00E+00	0.00E+00	2.98E-03	3.27E-02	0.00E+00	-3.92E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	0.00E+00	0.00E+00	2.98E-03	3.27E-02	0.00E+00	-3.92E+00
PENRE	MJ	0.00E+00	0.00E+00	1.81E-01	2.33E-01	0.00E+00	2.75E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	0.00E+00	0.00E+00	1.81E-01	2.33E-01	0.00E+00	2.75E+00
SM	kg	0.00E+00	0.00E+00	8.20E-05	4.17E-04	0.00E+00	1.54E+00
RSF	MJ	0.00E+00	0.00E+00	1.08E-06	3.29E-05	0.00E+00	5.45E-05
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	0.00E+00	0.00E+00	2.29E-05	1.26E-04	0.00E+00	-3.24E-02
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

Waste indicators							
Indicator	**Unit**	**B6****	**C1***	**C2***	**C3***	**C4***	**D***
Hazardous waste disposed	kg	0.00E+00	0.00E+00	2.63E-04	2.70E-03	0.00E+00	3.74E-01
Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	5.64E-03	1.03E-01	0.00E+00	-1.13E+01
Radioactive waste disposed	kg	0.00E+00	0.00E+00	5.39E-08	2.96E-07	0.00E+00	1.70E-05

Output flow indicators							
Indicator	**Unit**	**B6****	**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
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	1.36E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.01E-02
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.47E-02

ABBREVIATIONS

General abbreviation	Definition
CAS No.	Chemical Abstracts Service number
CEN	European Committee for Standardization
CQC	China Quality Certification Center in China
EC No.	European Community number
EF	Environmental Footprint
EMEA	Europe, Middle East, and Africa
EN	European Norm (Standard)
HVAC	Heating, Ventilation and Air-Conditioning
ISO	International Organization for Standardization
ND	Not Declared
PCB	Printed Circuit Board
PCBA	Printed Circuit Board Assembly
PCR	Product Category Rule
SCIP	Substances of Concern In Products, European Chemicals Agency (ECHA) database
SQS	Swiss Association for Quality and Management Systems
SVHC	Substances of Very High Concern

REFERENCES

a) **Background database:** *Ecoinvent v. 3.11*
b) **Characterization and reference package:** *EN 15804 reference package based on Environmental Footprint (EF) 3.1 methodology*
c) **EN 15804:2012 + A2:2019/AC:2021** – *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*
d) **EN 15942:2011** – *Sustainability of construction works – Environmental product declarations – Communication format: business-to-business*
e) **General Program Instructions of the International EPD System**, Version 5.0.1
f) **ISO 14025:2006** – *Environmental labels and declarations – Type III environmental declarations – Principles and procedures*
g) **ISO 14040:2006** – *Environmental management – Life cycle assessment – Principles and framework*
h) **ISO 14044:2006** – *Environmental management – Life cycle assessment – Requirements and guidelines*
i) **LCA modelling software:** *SimaPro Craft v. 10.2.0.2*
j) **Product Category Rules (PCR):** *2019:14 Construction Products, Version 2.0.1*