



# Environmental Product Declaration

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

## Fan Coils – Carisma CSS-ECM

From **Sabiana S.p.A.**

EPD of multiple products, based on a representative product.

Included products:

- 2 pipe: CSS-ECM 13, CSS-ECM 23, CSS-ECM 33
- 4 pipe: CSS-ECM 13+1, CSS-ECM 23+1, CSS-ECM 33+1

Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
Programme operator:	EPD International AB
Type of EPD:	EPD of multiple products from a company
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*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at [www.environdec.com](http://www.environdec.com)*

## General information

### Programme information

<b>Programme:</b>	The International EPD® System
<b>Address:</b>	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
<b>Website:</b>	<a href="http://www.environdec.com">www.environdec.com</a>
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<b>Accountabilities for PCR and independent, third-party verification</b>
<b>Product Category Rules (PCR)</b>
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): Construction Products, 2019:14, version 2.0.1 and c-PCR-027 Fan coils (c-PCR to PCR 2019:14)
PCR review was conducted by: Technical Committee of the International EPD® System. The review panel may be contacted via <a href="mailto:support@environdec.com">support@environdec.com</a> c-PCR review was conducted by: Gorka Benito Alonso
<b>Third-party verification</b>
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:
<input checked="" type="checkbox"/> EPD verification by individual verifier
Third-party verifier: Guido Croce
Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier:
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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## About Sabiana S.p.A

Sabiana is an Italian manufacturer of heating and air conditioning products, leader for hydronic terminal fan coil unit.

Sabiana headquarter is located in Corbetta (MI) and production facilities are all located nearby: two sites in Corbetta (MI) and two sites in Magenta (MI).

Sabiana's continuous innovation and quality enhancement strategy is pursued by the continuous R&D investments, with the adoption of advanced 3D design and simulations and modern laboratories for product testing and inspection, by continuous investments on advanced production equipment and new technologies and by the implementation of IoT across the organization.

Strong commitment to quality and sustainability is witnessed by the long-held ISO 9001 certification of the company and the ISO 14001 certification of the main production sites.

Sustainability and Circular Economy became pillars of the company strategy, with the main results<sup>1</sup> of:

- 96.6% of production material sourced from the European Union (of which 83.6% from Italian suppliers, most of them located in a short distance)
- Self-production of 60% of the overall electrical energy consumption, with the target of 80% in few years.
- Continuous increase of % of reusable and recyclable materials in production

## The Plants

### Name and location of production site(s):

Sabiana plants involved in the production process of fan coils are:

Sabiana 1: via Piave 53, 20011 Corbetta (MI), Italy

Sabiana 2 and 3: via Virgilio 2, 20013 Magenta (MI), Italy



*Aerial view of Sabiana headquarter*

## Product information

Product name: Fan Coils Carisma CSS-ECM

Product identification: Hydronic Fan Coil Unit

(FCU) is defined as a factory-made single assembly, which provides one or more of the functions of forced circulation of air, heating, cooling, dehumidification and filtering of air, but which does not include the source of

<sup>1</sup> Referred to 2022

heating or cooling. This device includes at least a liquid-to-air heat exchanger and a fan and may be designed for free or ducted intake air and/or for free or ducted delivery of supply air. (BS EN 1397:2021).

Geographical scope: A1-A2 Global, A3 Italian, A4-A5, B, C European

UN CPC code: UN CPC Code: 43912 and HS 2007 8415.83

Product description: CSS-ECM is a slim, low-height ducted fan coil range designed for high static pressure applications. The range has a lower power consumption compared to traditional ducted units.

It is equipped with 3 row coil and with the possibility to add a 1 row coil for 4 pipe systems. CSS-ECM has the ability to continuously vary the air flow, providing great regulation and control flexibility, ensuring at the same time excellent comfort conditions and extremely low electrical consumption.

The innovative synchronous electronic motor with permanent magnets, is controlled by an inverter board designed and developed in Italy. The air flow rate can be varied continuously by means of a 1-10 V signal generated by Sabiana controls or by independent control systems. Continuous air flow control improves the acoustic comfort and allows a quicker response to the variation of the thermal loads and a greater stability of the requested ambient temperature.

The fan motor high efficiency, also at low speed, makes it possible to greatly reduce electrical consumption under normal operating conditions.

Full compliance with the Electromagnetic Compatibility Directive and with the other severe Standards in force is certified by an independent institute.

The electric power supply required for the machine is therefore single-phase with voltage of 230 V and frequency of 50 - 60 Hz.



In line with innovative trends and modern industrial design, the Carisma CSS-ECM fan coil range meets today's demanding requirements of performance, size, acoustics,

low energy, ease of installation and maintenance.

The fan coil unit has been designed around a platform of models, versions and accessories.

All fan coils with centrifugal fans are equipped with electric motors which reduce electrical consumption.

The present EPD covers the 6 models of Fan Coils CSS-ECM shown in the following table. The assembly of the final product takes place in a single production site.

N°	Model	TYPE	TUBE SYSTEM
1	CSS-ECM 13	Ducted Fan Coil	2-pipe
2	<b>CSS-ECM 23</b>	<b>Ducted Fan Coil</b>	<b>2-pipe</b>

3	CSS-ECM 33	Ducted Fan Coil	2-pipe
4	CSS-ECM 13+1	Ducted Fan Coil	4-pipe
5	CSS-ECM 23+1	Ducted Fan Coil	4-pipe
6	CSS-ECM 33+1	Ducted Fan Coil	4-pipe

According to the General Programme Instruction (GPI) v. 5.0.1 and the PCR 2019:14 "Construction products" v.2.0.1, the results for each category of impact are represented for the product CSS-ECM 23, identified as representative. This product is the model of the CSS-ECM range estimated to have the highest sales volumes based on the historical performance of similar product ranges.

## Technical data

### 2-pipe units:

#### COOLING (summer mode)

Entering air temperature: +27°C d.b. +19°C w.b.  
Water temperature: +7°C E.W.T. +12°C L.W.T.

#### HEATING (winter mode)

Entering air temperature: +20°C  
Water temperature: +45 °C E.W.T. +40 °C L.W.T.

MODEL		CSS-ECM 13			CSS-ECM 23			CSS-ECM 33		
		2 MIN	4,7 MED	6,5 MAX	1,8 MIN	4,5 MED	5,7 MAX	2 MIN	4,9 MED	6,7 MAX
Speed										
Air flow	m³/h	62	168	236	107	307	399	138	385	537
Available pressure	Pa	7	50	99	6	50	83	7	50	97
Cooling total capacity	kW	0,48	1,22	1,66	0,74	2,10	2,64	0,97	2,88	3,81
Cooling sensible capacity	kW	0,37	0,91	1,25	0,55	1,53	1,97	0,73	2,04	2,76
Heating capacity	kW	0,48	1,32	1,79	0,79	2,23	2,77	1,04	3,00	4,01
Fan Power input	W	4,5	12	25	7,5	20	35	8,5	25	51

#### 4-pipe units:

COOLING (summer mode)

Entering air temperature: +27°C d.b. +19°C w.b.

Water temperature: +7°C E.W.T. +12°C L.W.T.

HEATING (winter mode)

Entering air temperature: +20°C

Water temperature: +65°C E.W.T. +55°C L.W.T.

MODEL		CSS-ECM 13+1			CSS-ECM 23+1			CSS-ECM 33+1		
Speed		2 MIN	4,7 MED	6,5 MAX	1,8 MIN	4,5 MED	5,7 MAX	2 MIN	4,9 MED	6,7 MAX
Air flow	m <sup>3</sup> /h	61	163	229	99	285	368	131	371	519
Available pressure	Pa	7	50	98	6	50	84	7	50	97
Cooling total capacity	kW	0,47	1,18	1,62	0,71	2,04	2,58	0,94	2,79	3,74
Cooling sensible capacity	kW	0,35	0,88	1,21	0,52	1,50	1,93	0,69	1,98	2,69
Heating capacity	kW	0,48	1,15	1,44	0,78	1,89	2,21	1,04	2,41	2,97
Fan Power input	W	4,5	14	26	8	21	36	8,5	25	53

Fan Coils are sold in cardboard boxes placed on wood pallets and wrapped in plastic film. The following table shows the conversion factors to

determine the weight of the of the various fan coil models compared to the representative model CSS-ECM 23.

MODEL	DIMENSIONS	UNPACKED UNIT	PACKED UNIT	UNPACKED UNIT	PACKED UNIT
	mm	WEIGHT (kg)		CONVERSION FACTORS	
CSS-ECM 13	670x175x950	15,9	17,8	0,75	0,76
<b>CSS-ECM 23</b>	<b>670x175x1160</b>	<b>21,3</b>	<b>23,5</b>	<b>1,00</b>	<b>1,00</b>
CSS-ECM 33	670x175x1380	25,5	27,9	1,20	1,19
CSS-ECM 13+1	670x175x950	16,9	18,8	0,79	0,80
CSS-ECM 23+1	670x175x1160	22,4	24,6	1,05	1,05
CSS-ECM 33+1	670x175x1380	26,7	29,1	1,25	1,24

Note: Compared to the declared nominal weight (21,3 kg), the actual weight reported in the bill of materials is 21,5 kg. The deviation, equal to 0,2 kg (around 0,9%), is considered minimal and not significant for the purposes of calculating the conversion factor.

## Content information

The ranges of products from Sabiana Spa comply with the requirements of the "RoHS" Directive (EU) 2015/863 of 31 March 2015 and 2011/65/EU of 8 June 2011.

Sabiana S.p.A fulfils the requirements of "Regulation (EC) No 1907/2006 - Registration,

Evaluation, Authorisation and Restriction Chemicals (REACH)". Detailed declaration of the SVHC substances that may be present above a concentration of 0.1% (w/w) in the individual articles is available.

Product components (unit)	Weight, kg	Pre-consumer material, weight-%	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Sheet metal (steel)	14,5230	0	0	0
Copper	2,0417	0,90	24,39	0
Aluminium	1,7356	5,27	19,75	0
Nylon	1,2358	0	0	0
Steel	0,7697	0	0	0
PP	0,3391	0	0	0
Brass	0,2434	0	0	0
Iron	0,1825	0	0	0
PE	0,1613	0	0	0
Electronic	0,1056	0	0	0
ABS	0,0868	0	0	0
PVC	0,0560	0	0	0
Fiberglass	0,0146	0	0	0
Rubber	0,0070	0	0	0
Paper	0,0040	0	0	0
Polyurethane	0,0031	0	0	0
Mylar	0,0010	0	0	0
<b>TOTAL</b>	<b>21,5100</b>	<b>0,51</b>	<b>3,91</b>	<b>0</b>
Packaging materials	Weight, kg	Weight-% (versus the product)		Weight biogenic carbon, kg C/kg
Cardboard	2,0300	9,44%		0,1523
Wood (pallet)	0,6667	3,10%		0,0568
LDPE	0,0333	0,15%		0
Paper	0,0207	0,10%		0,0016
<b>TOTAL</b>	<b>2,7507</b>	<b>12,79%</b>		<b>0,2106</b>

Data referred to a single unit of the representative product Carisma CSS-ECM 23.

## LCA information

**Methodology:** The quantification of the environmental performance was carried out in accordance with the Life Cycle Assessment (LCA - Life Cycle Assessment) methodology regulated by the ISO 14040, ISO 14044 and ISO 14025 standards and following the specific product requirements PCR 2019: 14 Construction Products Version 2.0.1 and c-PCR 027 Fan coils.

The LCA methodology allows you to determine the environmental impacts of a product or service in terms of resource consumption and emissions into the environment, as well as waste production, from a life cycle perspective.

**Functional unit:** The functional unit is 1 kWh of thermal energy exchanged with the air of the

room in cooling and/or heating mode by a heating/cooling equipment using small scale HVAC as defined in CPC 43912 and HS 8415.83 and, specifically, using a Hydronic Fan Coil Unit as defined into EN1397. The environmental impacts are given per functional unit.

**Reference service life:** The lifetime for fan coil is considered to be 20 years.

**Time representativeness:** The LCA study is conducted in 2026 with data relating to 2024.

**Database and LCA software:** The Ecoinvent database v.3.10 ([www.ecoinvent.org](http://www.ecoinvent.org)) provides the life cycle inventory data for the raw and

process materials obtained from the background system. LCA software used is SimaPro 10.02.03.

Cut-off rules: 1% cut-off is applied. According to PCR 2019:14 v.2.0.1, data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included, and also a 95% of total inflows (mass and energy) per life-cycle stages have been included.

Quality data: Primary data are used for electricity and average distances and means of transport in modules A1-A3.

Secondary data derived from the Ecoinvent v.3.10 database are used for the following phases: production of raw materials, fuels and water consumption. Data quality assessment is compliant with Annex E of EN 15804:2012+A2:2019, taking into account geographical, technological and temporal representativeness.

Allocation rules: No allocation was made in the A1-A2 modules. The materials and weights were extracted from the BoM. For each material, the type of packaging with which it

arrives at the Sabiana plant has been identified and the amount of packaging allocated to the individual material has been calculated. Raw material transports were calculated based on manufacturer/supplier distances. For module A4 an allocation was made based on the number of pieces to determine the specific consumes of a fan coil. In particular, in the Sabiana 1 plant, where the production of the batteries takes place (fan coil component), where possible, we tried to avoid allocation otherwise the total consumption of the battery department was allocated by number of batteries produced. In the Sabiana 2 and Sabiana 3 plants, all consumption and outputs was allocated on the basis of the parts produced and the pieces handled respectively.

Environmental impact method: EN 15804 + A2 based on EF 3.1 characterisation factors ([JRC Website](#))

Description of the system boundaries: Cradle to grave and module D (A + B + C + D).

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

	Product stage			Construction process stage			Use stage							End of life stage			Resource recovery stage
	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	X	X	ND	X	X	X	ND	X	ND	X	X	X	X	X
Geography	GLO	GLO	IT	EU	EU	-	EU	EU	EU	-	EU	-	EU	EU	EU	EU	EU
Primary data used	2,50% (see table below)			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-12%/+39%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X=Declared module, ND= Non declared, EU=European, GLO=Global, IT=Italy. For module B. only B2 and B6 are applicable for fan coils usage (according to c-PCR-027 Fan coils).

The following table shows the range of variability for each module and for each category of impact. These values are required

by PCR 2019:14 v.2.0.1 for EPD of multiple products with variances greater than 10%.

Module	A1-A3	A4, A5	B6	C.D
GWP-GWP	-12%/+39%	-12%/+40%	-9%/+40%	-12%/+40%
GWP-total	-12%/+40%	-12%/+40%	-9%/+40%	-12%/+40%
ODP	-11%/+38%	-12%/+40%	-9%/+40%	-12%/+40%
AP	-11%/+38%	-12%/+40%	-9%/+40%	-12%/+40%
EP-freshwater	-11%/+38%	-12%/+40%	-9%/+40%	-12%/+40%
EP-marine	-11%/+38%	-12%/+40%	-9%/+40%	-12%/+40%
EP-terrestrial	-11%/+38%	-12%/+40%	-9%/+40%	-12%/+40%
POCP	-11%/+39%	-12%/+40%	-9%/+40%	-12%/+40%
ADP-minerals&metals	-12%/+38%	-12%/+40%	-9%/+40%	-12%/+40%
ADP-fossil	-12%/+39%	-12%/+40%	-9%/+40%	-12%/+40%
WDP	-12%/+39%	-12%/+40%	-9%/+40%	-12%/+40%

The following table shows the details of the determination of primary data. According to PCR, the declaration of share of primary data is

required only for the total GWP-GHG results of modules A1-A3.

Process name	Source Type	Source	Reference year	Data category	Share of primary data, of GWP GHG results for A1 A3
(A1) Electricity and heat generation	Database	Ecoinvent 3.10	2024, 2025	Primary data	1,04%
(A2) Transport of raw materials to manufacturing site	Database	Ecoinvent 3.10	2025	Primary data	1,44%
(A3) Manufactory of product	Database	Ecoinvent 3.10	2024	Primary data	0,02%
<b>Total share of primary data, of GWP GHG results for A1-A3</b>					<b>2,50 %</b>

Process name	Geographical Representativeness	Temporal Representativeness	Technological Representativeness
(A1) Electricity and heat generation	Good (Database are selected based on the geographical representativeness of the suppliers)	Very Good (all the processes considered are under validity)	Good
(A2) Transport of raw materials to manufacturing site	Good (Database are selected based on the geographical representativeness of the suppliers)	Very Good (all the processes considered are under validity)	Good
(A3) Manufactory of product	Good (Database are selected based on the geographical representativeness of the suppliers)	Very Good (all the processes considered are under validity)	Good

## Life Cycle Stages

**A1, raw material supply.** This includes the extraction and processing of all raw materials and energy which occur upstream from the manufacturing process.

The electrical mix used to model the electrical consumption at medium voltage is based on the Italian Residual Mix 2024 (Source: AIB, "European Residual Mixes -Results of the calculation of Residual Mixes for the calendar year 2024", 0,746 kg CO<sub>2</sub>eq/ kWh).

**A2, transport to the manufacturer.** The raw materials are transported to the manufacturing site. The modelling includes road and boat transportations of each raw material. For each component/material, the distance from the production country to the Sabiana plant has been calculated. For non-European materials, the transportation from the production plants to the port of origin has been deemed irrelevant compared to the distance that the product needs to travel by ship. For the components/materials coming from countries outside Europe but unknown, a distance on ship of 10000 km and a distance of 165 km on road (from the port of Genoa to Sabiana) have been assumed.

**A3, manufacturing.** This module includes the manufacture/assembling of product at the Sabiana' plants and the manufacture of packaging. The production of packaging material is taken into account at this stage. The processing of any waste arising from this stage is also included. The 28,6% of the electricity used for the production of the Carisma CSS-ECM 23 fan coil at Sabiana plants is self-produced by photovoltaic panels. The remaining amount of electricity is supplied by the national grid. The electrical mix used to model the electrical consumption at medium voltage is based on the Italian Residual Mix 2024 (Source: AIB, "European Residual Mixes - Results of the calculation of Residual Mixes for the calendar year 2024", 0,746 kg CO<sub>2</sub>eq/ kWh). The end-of-life scenario for raw material packaging was modelled according to CONAI 2023 data (Italian Packaging Consortium).

**A4, transport to the building site.** This module includes transport from the production gate to the installation site. The average distribution distance is calculated based on the sales of the product Carisma CRSL-ECM in the year 2023. Specifically, the following distribution is considered: 48% of the product is sold in Italy and 52% in other European countries (it was considered the specific distance for each state). Shipments to Italy and Europe took place by truck, with some distances also covered by train (for the United Kingdom and Ireland) and by ship (to Sicily and Ireland).

**A5, installation into the building.** This module includes all material and energy inputs and outputs required for the installation of the fan coil. The installation starts manually without the use of energy. Specifically, this module includes the end of life of the product packaging and the consumption of water for battery recharge. The end-of-life scenario for packaging was modelled for a European scenario according to Eurostat scenarios for packaging waste (2023).

**B1, use.** This module includes the use of the installed product in terms of any emissions released into the environment during its lifetime (not covered by B2-B7). According to the PCR, this module is not declared as it is not relevant for the product.

**B2, maintenance, B3, repair, B4, replacement.** As indicated by the manufacturer, no maintenance, repair, replacement action is required during the lifetime of 20 years. Any exceptional events are not considered in this study.

**B5, refurbishment.** According to the PCR, this module is not declared as it is not relevant for the product.

**B6, operational energy use.** This module includes the energy consumption from the operation of the fan coil unit. The total electrical energy consumption along FCU lifetime is been calculated according to the Technical Certification Rules Of The Eurovent Certified

Performance Mark with the following hypotheses:

- 1100 hours in summer 65% (LS) 30% (MS) 5% (HS)
- 1500 hours in winter 70% (LS) 25% (MS) 5% (HS)

where:

LS=Low Speed

MS=Medium Speed

HS=High Speed

An average European electric mix (*Electricity, low voltage {RER}| market group for electricity, low voltage | Cut-off, U, 0,303 kg CO<sub>2</sub>eq/ kWh*), was considered in the modelling as the product is mainly sold in Europe and the sales distribution from country to country varies significantly from year to year. In the "Additional environmental information" section, the B6 module is reported for different scenarios.

**B7, operational water use.** This module includes water consumption during the use phase. According to the PCR, this module is not declared as it is not relevant for the product.

**C1, de-construction.** This stage includes the impacts during the dismantling of the CRC-ECM fan coil from the building. It is assumed

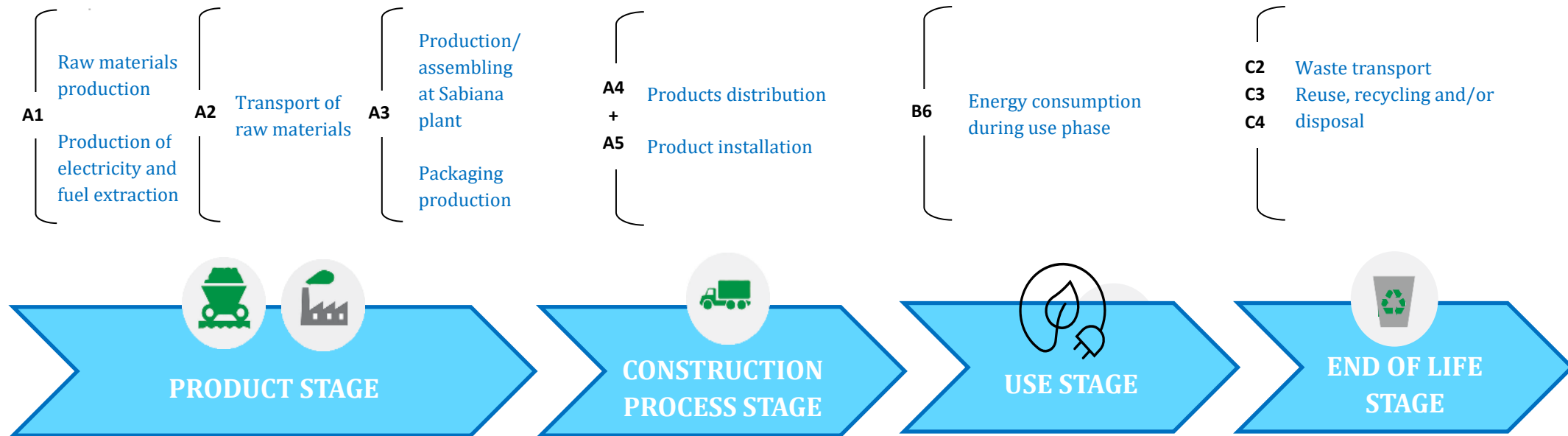
that no energy and additional material are needed for the dismantling of the product. This module has a contribution of 0 to all environmental indicators.

**C2, waste transport.** This stage includes the transportation of discarded products to the waste processing/disposal area. 50 km distance by trucks is assumed.

**C3, waste processing.** This module includes the collection of waste fractions from the deconstruction and waste processing of material flows intended for reuse, recycling and energy recovery. For Europe, it is assumed a material recycling rate of 50% according to PCR Part A for Building-Related Products and Services v.4 of UL Environment framework.

**C4, waste disposal.** Waste disposal including physical pre-treatment and management of the disposal site. According to PCR Part A for Building-Related Products and Services v.4 of UL Environment framework, for Europe it is assumed the following scenario: a 37% in landfill and 13% in incineration. No energy recovery is considered.

**D, reuse, recycling and energy recovery potentials.** Materials that are recycled are assumed to substitute the use of virgin metals. Benefits of heat recovery from the incineration are excluded



## ENVIRONMENTAL PERFORMANCE

### LCA results of the product - main environmental performance results<sup>2</sup>

#### Mandatory impact category indicators according to EN 15804

Results referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 23, representative model)													
Indicator	Unit	A1-A3	A4	A5	B2	B3	B4	B6	C1	C2	C3	C4	D
<b>GWP-fossil</b>	kg CO <sub>2</sub> eq.	1,71E-03	4,74E-05	9,84E-07	0	0	0	2,97E-03	0	3,33E-06	8,58E-07	1,18E-05	-4,51E-04
<b>GWP-biogenic</b>	kg CO <sub>2</sub> eq.	2,96E-05	1,57E-08	5,33E-05	0	0	0	1,17E-04	0	1,08E-09	2,04E-10	6,36E-07	2,24E-05
<b>GWP-luluc</b>	kg CO <sub>2</sub> eq.	5,23E-06	1,17E-09	3,38E-11	0	0	0	9,42E-06	0	8,10E-11	2,14E-11	1,14E-10	-1,66E-06
<b>GWP-total</b>	kg CO <sub>2</sub> eq.	1,74E-03	4,75E-05	5,43E-05	0	0	0	3,09E-03	0	3,33E-06	8,58E-07	1,24E-05	-4,31E-04
<b>ODP</b>	kg CFC 11 eq.	2,59E-11	9,66E-13	1,11E-14	0	0	0	4,68E-11	0	6,73E-14	5,34E-16	2,63E-14	-8,24E-12
<b>AP</b>	mol H <sup>+</sup> eq.	2,50E-05	1,23E-07	2,37E-09	0	0	0	1,49E-05	0	7,97E-09	2,94E-10	1,01E-08	-7,47E-06
<b>EP-freshwater</b>	kg P eq.	1,51E-07	3,98E-11	1,56E-12	0	0	0	2,89E-07	0	2,76E-12	7,70E-13	8,88E-12	-4,31E-08
<b>EP-marine</b>	kg N eq.	2,27E-06	4,64E-08	1,10E-09	0	0	0	1,92E-06	0	3,02E-09	1,32E-10	5,29E-09	-6,15E-07
<b>EP-terrestrial</b>	mol N eq.	2,79E-05	5,08E-07	1,10E-08	0	0	0	2,16E-05	0	3,31E-08	1,34E-09	4,75E-08	-7,62E-06
<b>POCP</b>	kg NMVOC eq.	8,95E-06	2,09E-07	3,65E-09	0	0	0	7,20E-06	0	1,40E-08	3,48E-10	1,45E-08	-2,49E-06
<b>ADP-minerals&amp;metals*</b>	kg Sb eq.	3,11E-07	1,57E-12	6,01E-14	0	0	0	1,86E-10	0	1,09E-13	1,07E-14	2,31E-13	-9,64E-08
<b>ADP-fossil*</b>	MJ	1,06E-02	7,11E-06	2,14E-07	0	0	0	5,23E-02	0	4,36E-07	1,26E-07	1,16E-06	-2,68E-03
<b>WDP*</b>	m <sup>3</sup> eq	7,43E-04	2,68E-07	1,06E-06	0	0	0	7,81E-04	0	1,85E-08	2,83E-08	-1,82E-06	-1,85E-04
<b>Acronyms</b>	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 of these results are high or as there is limited experience with the indicator.

<sup>2</sup> 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

Results referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 23, representative model)													
Indicator	Unit	A1-A3	A4	A5	B2	B3	B4	B6	C1	C2	C3	C4	D
<b>GWP-GHG<sup>3</sup></b>	kg CO <sub>2</sub> eq.	1,73E-03	4,74E-05	1,19E-06	0	0	0	2,98E-03	0	3,33E-06	8,58E-07	1,18E-05	-4,54E-04

## Resource use indicators

Results referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 23, representative model)													
Indicator	Unit	A1-A3	A4	A5	B2	B3	B4	B6	C1	C2	C3	C4	D
<b>PERE**</b>	MJ	2,57E-03	2,01E-06	7,25E-08	0	0	0	1,77E-02	0	1,35E-07	2,14E-08	6,29E-07	-6,83E-04
<b>PERM**</b>	MJ	1,60E-03	2,78E-07	2,83E-04	0	0	0	2,35E-03	0	1,90E-08	3,47E-09	1,42E-07	-4,46E-04
<b>PERT**</b>	MJ	4,17E-03	2,29E-06	2,83E-04	0	0	0	2,01E-02	0	1,54E-07	2,49E-08	7,70E-07	-1,13E-03
<b>PENRE</b>	MJ	1,06E-02	7,11E-06	-2,61E-05	0	0	0	5,23E-02	-2,88E-09	4,36E-07	1,26E-07	1,16E-06	-2,68E-03
<b>PENRM</b>	MJ	1,32E-05	0	2,63E-05	0	0	0	0	2,88E-09	0	0	1,38E-12	1,68E-13
<b>PENRT</b>	MJ	1,06E-02	7,11E-06	2,14E-07	0	0	0	5,23E-02	0	4,36E-07	1,26E-07	1,16E-06	-2,68E-03
<b>SM</b>	kg	3,50E-05	0	0	0	0	0	0	0	0	0	0	0
<b>RSF</b>	MJ	0	0	0	0	0	0	0	0	0	0	0	0
<b>NRSF</b>	MJ	0	0	0	0	0	0	0	0	0	0	0	0
<b>FW</b>	m <sup>3</sup>	2,37E-05	1,63E-08	1,32E-08	0	0	0	6,01E-05	0	1,12E-09	1,34E-09	-1,30E-07	-6,13E-06

**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

\*\* The indicators PERE, PERM and PERT were calculated according to method B of the Annex 3 (PCR 2019:14 v.2.0.1)

<sup>3</sup> 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<sub>2</sub> is set to zero.

## Waste indicators

Results referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 23, representative model)													
Indicator	Unit	A1-A3	A4	A5	B2	B3	B5	B6	C1	C2	C3	C4	D
Hazardous waste disposed	kg	4,23E-06	4,61E-09	7,04E-08	0	0	0	1,84E-06	0	0	3,21E-10	1,74E-08	2,83E-05
Non-hazardous waste disposed	kg	2,77E-05	1,86E-08	5,14E-06	0	0	0	3,97E-05	0	0	1,29E-09	3,79E-07	1,26E-04
Radioactive waste disposed	kg	2,96E-08	7,07E-11	1,88E-12	0	0	0	5,28E-07	0	0	4,09E-12	4,96E-13	9,48E-12

## Output flow indicators

Results referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 23, representative model)														
Indicator	Unit	A1-A3	A4	A5	B2	B3	B5	B6	C1	C2	C3	C4	D	
Components for re-use	kg	0	0	0	0	0	0	0	0	0	0	0	0	
Material for recycling	kg	4,56E-05	0	3,16E-05	0	0	0	0	0	0	1,71E-04	0	0	
Materials for energy recovery	kg	0	0	0	0	0	0	0	0	0	0	0	0	
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0	0	0	0	0	
Exported energy, thermal	MJ	0	0	0	0	0	0	0	0	0	0	0	0	

## Additional Environmental Information

### Different scenarios for module B6

The following tables show different scenarios for module B6. Specifically, the results are reported for the B6 module depending on the European country in which the CSS-ECM 23 is used for all its RSL.

Module B6: Results referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 23, representative model)														
Indicator	Unit	Albania	Austria	Belgium	Bulgaria	Croatia	Estonia	Finland	France	Germany	Greece	Ireland	Italy	Norway
<b>GWP - total</b>	kg CO <sub>2</sub> eq.	0,21	0,69	0,58	1,53	1,31	1,12	0,44	0,23	1,26	1,86	1,07	1,12	0,03
<b>GWP-GWP</b>	kg CO <sub>2</sub> eq.	0,22	0,67	0,59	1,58	1,30	1,14	0,45	0,23	1,18	1,91	1,09	1,07	0,03
<b>ODP</b>	kg CFC 11 eq.	0,13	0,93	1,52	0,43	1,26	1,10	0,40	0,46	0,68	3,31	4,59	1,41	0,01
<b>AP</b>	mol H <sup>+</sup> eq.	0,43	0,32	0,15	2,18	2,96	1,61	0,28	0,16	0,43	1,90	0,54	0,69	0,01
<b>EP-freshwater</b>	kg P eq.	0,40	0,74	0,06	3,62	1,63	0,17	0,14	0,03	1,79	2,86	0,07	0,19	0,00
<b>EP-marine</b>	kg N eq.	0,20	0,48	0,40	1,55	1,65	2,30	0,44	0,30	0,67	1,30	0,81	0,83	0,01
<b>EP-terrestrial</b>	mol N eq.	0,20	0,50	0,41	1,48	1,62	2,28	0,49	0,27	0,69	1,26	0,80	0,84	0,01
<b>POCP</b>	kg NMVOC eq.	0,21	0,53	0,39	1,44	1,72	2,29	0,43	0,29	0,67	1,73	0,80	1,17	0,01
<b>ADP-minerals&amp;metals</b>	kg Sb eq.	0,09	0,38	1,06	1,82	0,82	0,67	1,09	1,93	0,80	0,67	0,15	0,25	0,02
<b>ADP-fossil</b>	MJ	0,08	0,76	0,99	1,95	0,61	0,65	0,89	1,74	1,10	0,48	0,14	0,25	0,02
<b>WDP</b>	m <sup>3</sup> eq	-3,41	0,33	0,85	1,52	1,67	0,71	0,92	0,34	0,14	1,99	0,50	2,99	0,25

Module B6: Results referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 23, representative model)													
Indicator	Unit	Lithuania	Netherlands	Poland	Portugal	United Kingdom	Czech Republic	Russia	Serbia	Spain	Switzerland	Hungary	
<b>GWP - total</b>	kg CO <sub>2</sub> eq.	1,21	1,13	2,91	0,79	0,75	1,97	2,25	3,41	0,58	0,10	0,07	
<b>GWP-GWP</b>	kg CO <sub>2</sub> eq.	1,20	1,16	2,99	0,82	0,78	2,02	2,34	3,54	0,60	0,05	0,07	
<b>ODP</b>	kg CFC 11 eq.	1,58	2,41	0,71	1,06	2,41	0,71	0,98	0,19	0,62	0,08	0,03	
<b>AP</b>	mol H <sup>+</sup> eq.	0,83	0,33	4,25	0,74	0,37	1,59	1,98	10,80	0,47	0,03	0,04	
<b>EP-freshwater</b>	kg P eq.	0,24	0,32	4,03	0,14	0,09	3,32	1,48	9,59	0,08	0,00	0,02	
<b>EP-marine</b>	kg N eq.	1,44	0,78	3,56	0,86	0,81	1,89	2,08	3,80	0,75	0,06	0,11	
<b>EP-terrestrial</b>	mol N eq.	1,43	0,83	3,55	0,88	0,89	1,85	2,03	3,67	0,74	0,07	0,12	
<b>POCP</b>	kg NMVOC eq.	1,73	0,78	3,08	1,05	0,72	1,61	2,62	3,93	0,82	0,06	0,08	
<b>ADP-minerals&amp;metals</b>	kg Sb eq.	0,34	0,32	1,70	0,24	0,66	1,75	1,17	2,03	0,81	0,50	0,79	
<b>ADP-fossil</b>	MJ	0,36	0,33	1,01	0,21	0,64	4,63	0,71	0,61	0,74	0,45	0,70	
<b>WDP</b>	m <sup>3</sup> eq	0,74	0,58	1,52	2,32	0,10	1,28	2,23	1,80	2,41	0,25	0,71	

### GWP-GHG results of the “Best-Case Product”

The following table shows the GWP-GHG indicator for the CSS-ECM 33 model, the best-case product.

Results referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 33, best-case product)													
Indicator	Unit	A1-A3	A4	A5	B2	B3	B5	B6	C1	C2	C3	C4	D
GWP-GHG	kg CO <sub>2</sub> eq.	1,53E-03	4,19E-05	1,05E-06	0	0	0	2,72E-03	0	2,94E-06	7,57E-07	1,04E-05	-4,00E-04

### GWP-GHG results of the “Worst-Case Product”

The following table shows the GWP- GHG indicator for the CSS-ECM 13+1 model, the worst-case product.

Results referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 13+1, best-case product)													
Indicator	Unit	A1-A3	A4	A5	B2	B3	B4	B6	C1	C2	C3	C4	D
GWP-GHG	kg CO <sub>2</sub> eq.	2,40E-03	6,62E-05	1,65E-06	0	0	0	3,46E-03	0	4,64E-06	1,20E-06	1,64E-05	-6,33E-04

## Different scenarios for module C1-C4 and D

Below, as indicated by the PCR, are the impacts associated with different waste management scenarios: 100% landfilling, 100% recycling, and 100% incineration. Results are referred to 1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode (CSS-ECM 23, representative model).

### 100% recycling

Indicator	Unit	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq.	0	3,33E-06	1,72E-06	0	-1,28E-03
GWP-biogenic	kg CO <sub>2</sub> eq.	0	1,08E-09	4,07E-10	0	1,91E-05
GWP-luluc	kg CO <sub>2</sub> eq.	0	8,10E-11	4,28E-11	0	-4,49E-06
GWP-total	kg CO <sub>2</sub> eq.	0	3,33E-06	1,72E-06	0	-1,26E-03
ODP	kg CFC 11 eq.	0	6,73E-14	1,07E-15	0	-1,48E-11
AP	mol H <sup>+</sup> eq.	0	7,97E-09	5,89E-10	0	-2,09E-05
EP-freshwater	kg P eq.	0	2,76E-12	1,54E-12	0	-1,18E-07
EP-marine	kg N eq.	0	3,02E-09	2,64E-10	0	-1,68E-06
EP-terrestrial	mol N eq.	0	3,31E-08	2,69E-09	0	-2,11E-05
POCP	kg NMVOC eq.	0	1,40E-08	6,95E-10	0	-6,81E-06
ADP-minerals&metals	kg Sb eq.	0	1,09E-13	2,14E-14	0	-2,53E-07
ADP-fossil*	MJ	0	4,36E-07	2,52E-07	0	-8,10E-03
WDP*	m <sup>3</sup> eq	0	1,85E-08	5,66E-08	0	-4,95E-04
<b>Acronyms</b>	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					

Indicator	Unit	C1	C2	C3	C4	D
GWP-GHG <sup>4</sup>	kg CO <sub>2</sub> eq.	0	3,33E-06	1,72E-06	0	-1,28E-03

<sup>4</sup> 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<sub>2</sub> is set to zero.

Indicator	Unit	C1	C2	C3	C4	D
PERE**	MJ	0	1,35E-07	4,28E-08	0	-1,96E-03
PERM**	MJ	0	1,90E-08	6,94E-09	0	-5,24E-04
PERT**	MJ	0	1,54E-07	4,97E-08	0	-2,48E-03
PENRE	MJ	-2,88E-09	4,36E-07	2,52E-07	0	-8,10E-03
PENRM	MJ	2,88E-09	0	1,91E-18	0	-5,03E-14
PENRT	MJ	0	4,36E-07	2,52E-07	0	-8,10E-03
SM	kg	0	0	0	0	0
RSF	MJ	0	0	0	0	0
NRSF	MJ	0	0	0	0	0
FW	m <sup>3</sup>	0	1,12E-09	2,67E-09	0	-1,66E-05

**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

Indicator	Unit	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0	0	3,48E-08	0	-3,98E-07
Non-hazardous waste disposed	kg	0	0	7,57E-07	0	-2,04E-05
Radioactive waste disposed	kg	0	0	9,91E-13	0	-1,83E-08

Indicator	Unit	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0
Material for recycling	kg	0	0	3,41E-04	0	0
Materials for energy recovery	kg	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0

## 100% incineration

Indicator	Unit	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq.	0	3,33E-06	0	7,20E-05	1,24E-04
GWP-biogenic	kg CO <sub>2</sub> eq.	0	1,08E-09	0	4,56E-06	2,46E-05
GWP-luluc	kg CO <sub>2</sub> eq.	0	8,10E-11	0	2,50E-10	1,08E-06
GWP-total	kg CO <sub>2</sub> eq.	0	3,33E-06	0	7,66E-05	1,50E-04
ODP	kg CFC 11 eq.	0	6,73E-14	0	6,77E-14	-2,78E-12
AP	mol H <sup>+</sup> eq.	0	7,97E-09	0	3,50E-08	4,28E-06
EP-freshwater	kg P eq.	0	2,76E-12	0	1,75E-11	1,87E-08
EP-marine	kg N eq.	0	3,02E-09	0	1,70E-08	2,35E-07
EP-terrestrial	mol N eq.	0	1,31E-08	0	1,82E-07	3,25E-06
POCP	kg NMVOC eq.	0	1,40E-08	0	4,91E-08	9,65E-07
ADP-minerals&metals	kg Sb eq.	0	1,09E-13	0	4,60E-13	4,82E-08
ADP-fossil*	MJ	0	0	0	1,76E-06	8,47E-04
WDP*	m <sup>3</sup> eq	0	0	0	4,10E-07	6,47E-05
<b>Acronyms</b>	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					

Indicator	Unit	C1	C2	C3	C4	D
GWP-GHG <sup>5</sup>	kg CO <sub>2</sub> eq.	0	3,33E-06	0	7,20E-05	1,25E-04

Indicator	Unit	C1	C2	C3	C4	D
PERE**	MJ	0	1,35E-07	0	6,99E-07	3,97E-04
PERM**	MJ	0	1,90E-08	0	2,32E-07	-3,95E-04
PERT**	MJ	0	1,54E-07	0	9,31E-07	2,28E-06
PENRE	MJ	-2,88E-09	4,36E-07	0	1,76E-06	8,47E-04
PENRM	MJ	2,88E-09	0	0	1,38E-10	4,66E-08
PENRT	MJ	0	4,36E-07	0	1,76E-06	8,47E-04
SM	kg	0	0	0	0	0
RSF	MJ	0	0	0	0	0
NRSF	MJ	0	0	0	0	0
FW	m <sup>3</sup>	0	1,12E-09	0	8,22E-08	2,68E-06

<sup>5</sup> 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<sub>2</sub> is set to zero.

<b>Acronyms</b>	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
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Indicator	Unit	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0	0	0	2,15E-04	2,20E-09
Non-hazardous waste disposed	kg	0	0	0	4,83E-07	2,84E-06
Radioactive waste disposed	kg	0	0	0	1,34E-11	2,82E-09

Indicator	Unit	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0
Material for recycling	kg	0	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0

### 100% disposal

Indicator	Unit	C1	C2	C3	C4	D
<b>GWP-fossil</b>	kg CO <sub>2</sub> eq.	0	3,33E-06	0	4,15E-06	1,24E-04
<b>GWP-biogenic</b>	kg CO <sub>2</sub> eq.	0	1,08E-09	0	1,18E-07	2,46E-05
<b>GWP-luluc</b>	kg CO <sub>2</sub> eq.	0	8,10E-11	0	1,62E-10	1,08E-06
<b>GWP-total</b>	kg CO <sub>2</sub> eq.	0	3,33E-06	0	4,26E-06	1,50E-04
<b>ODP</b>	kg CFC 11 eq.	0	6,73E-14	0	4,57E-14	-2,78E-12
<b>AP</b>	mol H <sup>+</sup> eq.	0	7,97E-09	0	1,42E-08	4,28E-06
<b>EP-freshwater</b>	kg P eq.	0	2,76E-12	0	1,58E-11	1,87E-08
<b>EP-marine</b>	kg N eq.	0	3,02E-09	0	7,96E-09	2,35E-07
<b>EP-terrestrial</b>	mol N eq.	0	3,31E-08	0	6,09E-08	3,25E-06
<b>POCP</b>	kg NMVOC eq.	0	1,40E-08	0	2,10E-08	9,65E-07
<b>ADP-fossil*</b>	MJ	0	4,36E-07	0	2,18E-06	8,47E-04
<b>WDP*</b>	m <sup>3</sup> eq.	0	1,85E-08	0	-5,13E-06	6,47E-05
<b>Acronyms</b>	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					

Indicator	Unit	C1	C2	C3	C4	D
<b>GWP-GHG<sup>6</sup></b>	kg CO <sub>2</sub> eq.	0	3,33E-06	0	4,22E-06	1,25E-04

Indicator	Unit	C1	C2	C3	C4	D
<b>PERE**</b>	MJ	0	1,35E-07	0	1,40E-06	3,97E-04
<b>PERM**</b>	MJ	0	1,90E-08	0	2,92E-07	-3,95E-04
<b>PERT**</b>	MJ	0	1,54E-07	0	1,69E-06	2,28E-06
<b>PENRE</b>	MJ	-2,88E-09	4,36E-07	0	2,18E-06	8,47E-04
<b>PENRM</b>	MJ	2,88E-09	0	0	7,92E-12	4,66E-08
<b>PENRT</b>	MJ	0	4,36E-07	0	2,18E-06	8,47E-04
<b>SM</b>	kg	0	0	0	0	0
<b>RSF</b>	MJ	0	0	0	0	0
<b>NRSF</b>	MJ	0	0	0	0	0
<b>FW</b>	m <sup>3</sup>	0	1,12E-09	0	-3,85E-07	2,68E-06

<sup>6</sup> 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<sub>2</sub> is set to zero.

### 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

Indicator	Unit	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0	0	0	7,25E-07	2,20E-09
Non-hazardous waste disposed	kg	0	0	0	3,39E-04	2,84E-06
Radioactive waste disposed	kg	0	0	0	1,96E-11	2,82E-09

Indicator	Unit	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0
Material for recycling	kg	0	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0

### Conversion factors

Conversion coefficients are given for the environmental impact of the functional unit, **1 kWh of thermal energy exchanged with the air of the room in cooling and/or heating mode**. For each module of the life cycle, the environmental impacts of the product concerned are calculated by

multiplying the impacts of the declaration corresponding to the reference product by the conversion coefficient. The "Total" column should be calculated by adding the environmental impacts of each stage of the life cycle.

Indicator	CSS-ECM 13				CSS-ECM 33				
	A1-A3	A4, A5	B6	C2, C3, C4, D	A1-A3	A4,A5	B6	C2, C3, C4, D	D
<b>GWP-GHG</b>	1,25	1,25	1,01	1,25	0,88	0,88	0,91	0,88	0,88
<b>ODP</b>	1,26	1,25	1,01	1,25	0,88	0,88	0,91	0,88	0,88
<b>AP</b>	1,24	1,25	1,01	1,25	0,89	0,88	0,91	0,88	0,88
<b>EP-freshwater</b>	1,24	1,25	1,01	1,25	0,89	0,88	0,91	0,88	0,88
<b>EP-marine</b>	1,24	1,25	1,01	1,25	0,89	0,88	0,91	0,88	0,88
<b>EP-terrestrial</b>	1,24	1,25	1,01	1,25	0,89	0,88	0,91	0,88	0,88
<b>POCP</b>	1,24	1,25	1,01	1,25	0,89	0,88	0,91	0,88	0,88
<b>ADP-minerals&amp;metals</b>	1,23	1,25	1,01	1,25	0,89	0,88	0,91	0,88	0,88
<b>ADP-fossil</b>	1,25	1,25	1,01	1,25	0,88	0,88	0,91	0,88	0,88
<b>WDP</b>	1,25	1,25	1,01	1,25	0,88	0,88	0,91	0,88	0,88

Indicator	CSS-ECM 13+1				CSS-ECM 23+1				CSS-ECM 33+1			
	A1-A3	A4, A5	B6	C2, C3, C4, D	A1-A3	A4, A5	B6	C2, C3, C4,D	A1-A3	A4, A5	B6	C2, C3, C4, D
<b>GWP-GHG</b>	1,39	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,00	1,00	1,00	1,00
<b>ODP</b>	1,40	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,00	1,00	1,00	1,00
<b>AP</b>	1,38	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,01	1,00	1,00	1,00
<b>EP-freshwater</b>	1,38	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,01	1,00	1,00	1,00
<b>EP-marine</b>	1,38	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,00	1,00	1,00	1,00
<b>EP-terrestrial</b>	1,38	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,01	1,00	1,00	1,00
<b>POCP</b>	1,39	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,00	1,00	1,00	1,00
<b>ADP-minerals&amp;metals</b>	1,38	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,01	1,00	1,00	1,00
<b>ADP-fossil</b>	1,39	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,00	1,00	1,00	1,00
<b>WDP</b>	1,39	1,40	1,16	1,40	1,13	1,13	1,13	1,13	1,00	1,00	1,00	1,00

## Additional Information

### Thermal/Electrical Energy Calculation

The total thermal energy provided/to subtracted from the air of the room and the total electrical energy consumption along fan coil lifetime is been calculated by the following formula (based on *Technical Certification Rules Of The Eurovent Certified Performance Mark – Fan Coil Unit – Rev 00 2021*):

$$\text{Total Thermal Energy (kWh)} = \text{Cooling Energy} + \text{Heating Energy}$$

where:

$$\text{Cooling Energy} = (5\% P (c)_{high} + 30\% P (c)_{med} + 65\% P (c)_{low}) * h_{cooling} * \text{Lifetime}$$

$$\text{Heating Energy} = (5\% P (h)_{high} + 25\% P (h)_{med} + 70\% P (h)_{low}) * h_{heating} * \text{Lifetime}$$

$$\text{Total Electrical Consumption (kWh)} = \text{Cooling Electrical Consumption} + \text{Heating Electrical Consumption}$$

where:

$$\text{Cooling Consumption} = (5\% Pe (c)_{high} + 30\% Pe (c)_{med} + 65\% Pe (c)_{low}) * h_{cooling} * \text{Lifetime}$$

$$\text{Heating Consumption} = (5\% Pe (h)_{high} + 25\% Pe (h)_{med} + 70\% Pe (h)_{low}) * h_{heating} * \text{Lifetime}$$

- $P (c)_{high} / P (c)_{med} / P (c)_{low}$  = Total Cooling Capacity (kW) at high/med/low speed in cooling mode at standard rating conditions, according to EN1397
- $Pe (c)_{high} / Pe (c)_{med} / Pe (c)_{low}$  = Total Electrical Power Input (kW) at high/med/low speed in cooling mode according to EN1397
- $P (h)_{high} / P (h)_{med} / P (h)_{low}$  = Heating Capacity (kW) at high/med/low speed in cooling mode at standard rating conditions, according to EN1397
- $Pe (h)_{high} / Pe (h)_{med} / Pe (h)_{low}$  = Total Electrical Power Input (kW) at high/med/low speed in heating mode according to EN1397
- Medium speed is the standard fan speed as defined in EN 1397 (having 0Pa at inlet of the unit and 50 Pa at outlet of the unit), low/high speed are the other two speeds measured according to EN 1397
- $h_{cooling}$  and  $h_{heating}$  are the yearly operational hours in cooling (1100hrs) and average heating (1500hrs) mode
- Lifetime= 20 years

Model	Total Thermal Energy (kWh)	Total Electrical Consumption (kWh)
CSS-ECM 13	39.407,00	393,05
CSS-ECM 23	64.816,00	637,75
CSS-ECM 33	87.425,00	785,15
CSS-ECM 13+1	37.156,00	423,85
CSS-ECM 23+1	60.325,00	672,10
CSS-ECM 33+1	80.340,00	790,35

## VERSION HISTORY

Version 1, 2026-04-28

- Original Version of the EPD

## Abbreviations

Abbreviation	Definition
EN	European Norm (Standard)
EF	Environmental Footprint
EPD	Environmental Product Declaration
GPI	General Programme Instructions
ISO	International Organization for Standardization
CEN	European Committee for Standardization
CPC	Central product classification
SVHC	Substances of Very High Concern
ND	Not Declared

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