PRODUCT ENVIRONMENTAL PROFILE

PRODUCT FAMILY DECLARATION

CLIV-00002-V01.01-EN | PEP ECOPASSPORT®

CLIVETPack [3i]
Reference product: CSNX-iY 20.2
Packaged high efficiency direct expansion Rooftop air conditioner for high attendance buildings

General information

Product information

- Product name: Clivetpack[3i]
- Product Type: thermodynamic generators with electric compression
- Product sub-category: Rooftop
- Product identification:
  - Technology: air/air
  - Reversible
  - Heating and cooling capacity: see table 2
  - SCOP and SEER: see table 2
  - Refrigerant used: R32
  - Refill threshold: 90%

Standard LCA

The LCA study complies with recognized EU and international standards, including:

- ISO 14040:2006+AMD1:2020 Environmental management - Life cycle assessment - Principles and reference framework;
- ISO 14044:2006+AMD1:2017+AMD2:2020 Environmental management - Life cycle assessment - Requirements and guidelines;
- EN 50639:2019 Product category rules for life cycle assessments of electronic and electrical products and systems
- Product category rule from “PEP ecopassport program”:
  - General rule for electrical products, electronical and HVAC-R: PCR-ed4-EN-2021 09 06
  - Specific rule for product category on the scope of the study: PSR-0013-ed3.0-EN-2023-06-06

Functional unit

To produce 1 kW of heating or 1 kW of cooling according to the appropriate usage scenario defined in the EN 14825 standard and during the 22 years reference lifetime of the product.

Declared unit

To produce heating or cooling thanks to Rooftop of 24.5 kW (heating capacity) and 40.1 kW (cooling capacity) according to the appropriate usage scenario and during the 22-year reference lifetime of the product.

System boundaries

Cradle to Grave approach.
According to these stages:

- Manufacturing stage: from the extraction of natural resources to product and packaging manufacturing and their delivery to the manufacturer’s last logistics platform;
- Distribution stage: transportation from the last manufacturer’s logistics platform to the arrival of the product at the place of use and production of reconditioning packaging;
- Installation stage: installation of the product at the place of use;
- Use stage: use of the product and maintenance necessary to ensure the ability for use;
- End-of-life stage: removal, dismantling and transportation of the end-of-life product to a treatment centre or landfill site, and the end-of-life treatment;
- Net benefits and loads beyond the system boundaries stage: potential for reuse, recovery and/or recycling, expressed as net benefits and impacts. This stage is optional and not considered into this LCA study.

Technical data

Reference product	**-**	**CSNX-iY 20.2**
Power of reference product [Prev]	kW	29.2
Prated,h	kW	24.5
SCOP	-	3.53
Equivalent active mode hours in heating	h	1400
Prated,c	kW	40.1
SEER	-	4.69
Equivalent active mode hours in cooling	h	600
EN 14825:2022 + regulation 2016/2281		
Refrigerant charge	kg	15.0
Total weight (with packaging)	kg	995 (30.7)

Life cycle inventory

Data collection

- Software: SimaPro 9.6.0.1
- Database for secondary data: Ecoinvent 3.10 (allocation, cut-off by classification – unit)
- Electricity energy mix for manufacturing and use phase: Electricity, medium voltage {IT}| market for | Cut-off, U – year of the dataset 2018
- Geographical representativeness: Global, with product manufacturing and use phase as Italy
- Time representativeness: 2023 for primary data
- Technological representativeness: Clivet specific technological process for product manufacturing; industrial average technologies for raw material production

Manufacturing stage

- Production and assembly site: Via Camp Lonc 25, Z.I. Villapaiera 32032 - Feltre (BL) - Italy
- Primary data: bill of material, factory energy consumption, factory processing
- Secondary data: raw material and semi-finished product dataset, transport, waste

Distribution stage

- Distribution scenario: transport from factory to installation site
- Primary data: distribution location based on sales
- Secondary data: transport vehicle consumptions

Installation stage

- Installation activity: transport for people and accessories for average installation process, use of a crane to move the unit in the installation place
- No additional refrigerant charge has been taken into account during installation phase
- Installation scenario: both ground with concrete slab or on roof
- Waste scenario for the end of life for the packaging is based on 2019 Eurostat data
- Primary data: -
- Secondary data: transport vehicle consumptions, waste scenario

Use stage

- Use scenario: EN 14825:2022 + regulation 2016/2281
- Cooling mode: Comfort (outdoor air / Recycled air)
- Heating mode: Comfort (outdoor air / Recycled air)
- Primary data: unit efficiency
- Secondary data: electricity energy mix

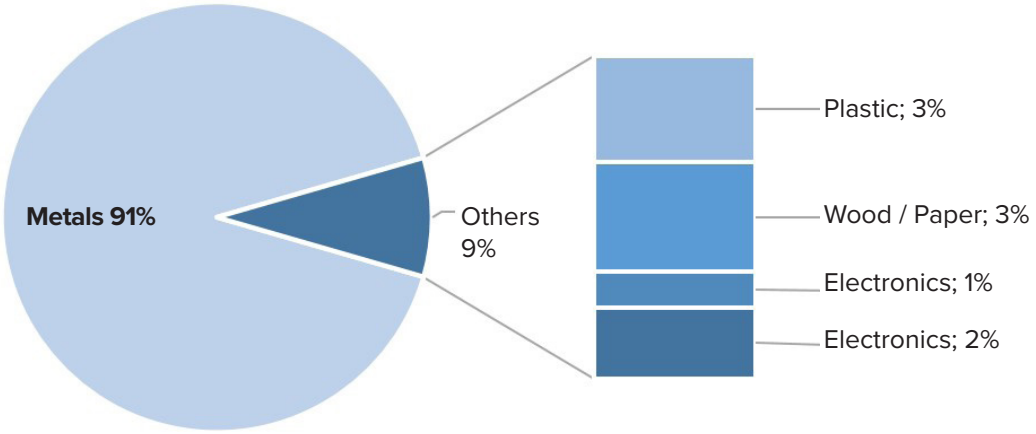
End of life stage

- Waste scenario: standard EN 50639:2020 scenario is used with reference year 2019.
- Primary data: unit constituent materials
- Secondary data: waste treatment and transport

Constituent materials

Categories	Materials	Weight	Mass [kg]
Metals	Steel	72.1%	717.6
Metals	Aluminium	7.1%	70.5
Metals	Copper	5.6%	56.0
Metals	Electric motor	4.8%	48.2
Wood / Paper	Wood	3.0%	30.0 (30.0)
Miscellaneous	Refrigerant	1.5%	15.0
Electronics	Electronic Board	1.3%	13.1
Plastics	ABS	1.3%	13.1
Plastics	Polyester	0.8%	7.5
Metals	Others	0.7%	7.0
Plastics	Polyurethane foam	0.6%	5.5
Miscellaneous	Compressor oil	0.5%	4.6
Plastics	Others	0.4%	4.0 (0.7)
Plastics	Paint	0.3%	2.9
	Total	100%	995.0 (30.7)

Total weight of the unit (within bracket the portion weight of packaging)



Environmental impacts

Total impacts per declared unit

Impact category	Unit	Module	Manufac.	Distrib.	Instal.	Use	End of life
		Total	A1-A3	A4	A5	B1 B2 B3 B4 B5 B6 B7	C1 C2 C3 C4
Environmental impact indicators							
Climate change	kg CO_2 eq	1.45E+05	1.30E+04	4.96E+01	5.70E+01	1.30E+05	1.65E+03
Climate change - Biogenic	kg CO_2 eq	1.10E+04	2.23E+02	1.21E-02	1.46E+01	1.08E+04	4.85E+00
Climate change - Fossil	kg CO_2 eq	1.34E+05	1.28E+04	4.95E+01	4.24E+01	1.19E+05	1.65E+03
Climate change - Land use and LU change	kg CO_2 eq	2.92E+01	1.32E+01	1.50E-02	2.08E-02	1.54E+01	4.71E-01
Ozone depletion	kg CFC11 eq	5.61E-03	3.02E-03	7.28E-07	8.11E-07	2.59E-03	4.74E-06
Acidification	mol H^+ eq	5.37E+02	1.22E+02	1.67E-01	1.91E-01	4.13E+02	1.65E+00
Eutrophication. freshwater	kg P eq	3.08E+01	1.15E+01	3.29E-03	5.42E-03	1.91E+01	1.90E-01
Eutrophication. marine	kg N eq	8.57E+01	1.59E+01	5.62E-02	6.79E-02	6.92E+01	4.00E-01
Eutrophication. terrestrial	mol N eq	9.18E+02	1.69E+02	6.12E-01	6.97E-01	7.44E+02	3.77E+00
Photochemical ozone formation	kg NMVOC eq	3.89E+02	5.61E+01	2.51E-01	2.80E-01	3.31E+02	1.22E+00
Resource use. minerals and metals	kg Sb eq	2.25E+00	2.02E+00	8.09E-05	3.36E-04	2.20E-01	1.92E-03
Resource use. fossils	MJ	2.09E+06	1.49E+05	7.16E+02	5.88E+02	1.93E+06	5.13E+03
Water use	m^3 depriv.	8.90E+04	3.28E+03	3.18E+00	2.97E+00	8.56E+04	1.73E+02
Total use of primary energy during the life cycle	MJ	2.76E+06	1.66E+05	7.24E+02	6.06E+02	2.59E+06	5.93E+03
Particulate matter	disease inc.	3.01E-03	8.93E-04	5.26E-06	4.20E-06	2.07E-03	3.58E-05
Ionizing radiation	kBq U-235 eq	1.55E+04	9.47E+02	5.72E-01	1.64E+00	1.44E+04	8.26E+01
Ecotoxicity. freshwater - part 1	CTUe	2.59E+05	1.25E+05	9.86E+01	9.84E+01	1.31E+05	2.90E+03
Ecotoxicity. freshwater - part 2	CTUe	2.46E+05	1.41E+05	4.44E+01	4.50E+01	1.04E+05	6.30E+02
Ecotoxicity. freshwater - inorganics	CTUe	3.48E+05	2.09E+05	9.80E+01	9.19E+01	1.36E+05	2.61E+03
Ecotoxicity. freshwater - organics - p.1	CTUe	1.19E+05	5.44E+04	4.12E+01	4.78E+01	6.42E+04	7.54E+02
Ecotoxicity. freshwater - organics - p.2	CTUe	3.76E+04	2.47E+03	3.75E+00	3.71E+00	3.50E+04	1.65E+02
Human toxicity. cancer	CTUh	5.10E-04	2.48E-04	1.70E-07	2.47E-07	2.57E-04	4.74E-06
Human toxicity. cancer - inorganics	CTUh	1.69E-05	9.14E-06	2.92E-09	4.48E-09	6.26E-06	1.45E-06
Human toxicity. cancer - organics	CTUh	4.93E-04	2.38E-04	1.67E-07	2.43E-07	2.51E-04	3.29E-06
Human toxicity. non-cancer	CTUh	1.31E-03	8.01E-04	4.50E-07	3.65E-07	5.04E-04	3.50E-06
Human toxicity. non-cancer - inorganics	CTUh	1.23E-03	7.55E-04	4.23E-07	3.35E-07	4.69E-04	3.34E-06
Human toxicity. non-cancer - organics	CTUh	8.16E-05	4.57E-05	2.73E-08	2.92E-08	3.56E-05	1.69E-07
Land use	Pt	4.15E+05	7.16E+04	7.41E+02	2.49E+02	3.41E+05	1.94E+03

Impact category	Unit	Module	Manufac.	Distrib.	Instal.	Use	End of life
		Total	A1-A3	A4	A5	B1 B2 B3 B4 B5 B6 B7	C1 C2 C3 C4
Inventory flows indicator							
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	6.73E+05	1.66E+04	7.97E+00	1.87E+01	6.56E+05	8.04E+02
Use of renewable primary energy resources used as raw materials	MJ	1.17E+03	1.17E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	6.75E+05	1.78E+04	7.97E+00	1.87E+01	6.56E+05	8.04E+02
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	2.09E+06	1.47E+05	7.16E+02	5.88E+02	1.93E+06	5.13E+03
Use of non-renewable primary energy resources used as raw materials	MJ	1.23E+03	1.23E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	2.09E+06	1.49E+05	7.16E+02	5.88E+02	1.93E+06	5.13E+03
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hazardous waste	kg	1.04E+01	3.17E+00	4.68E-03	1.31E-02	7.22E+00	2.27E-02
Bulk waste	kg	5.67E+03	9.75E+02	6.30E+01	2.90E+01	4.55E+03	4.57E+01
Radioactive waste	kg	4.09E+00	2.40E-01	1.40E-04	4.16E-04	3.82E+00	2.12E-02
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	7.09E+02	0.00E+00	0.00E+00	9.60E+00	0.00E+00	6.99E+02
Materials for energy recovery	kg	3.98E+01	0.00E+00	0.00E+00	9.60E+00	0.00E+00	3.02E+01
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the product	kg C	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg C	1.36E+01	1.36E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Use stage impacts per declared unit

Impact category	Unit	Module	Use	Maint.	Repair	Replac.	Rehabil.	Energy	Water
		Total	B1	B2	B3	B4	B5	B6	B7
Environmental impact indicators									
Climate change	kg CO_2 eq	1.30E+05	0.00E+00	2.05E+01	0.00E+00	0.00E+00	0.00E+00	1.30E+05	0.00E+00
Climate change - Biogenic	kg CO_2 eq	1.08E+04	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	1.08E+04	0.00E+00
Climate change - Fossil	kg CO_2 eq	1.19E+05	0.00E+00	2.05E+01	0.00E+00	0.00E+00	0.00E+00	1.19E+05	0.00E+00
Climate change - Land use and LU change	kg CO_2 eq	1.54E+01	0.00E+00	1.02E-02	0.00E+00	0.00E+00	0.00E+00	1.54E+01	0.00E+00
Ozone depletion	kg CFC11 eq	2.59E-03	0.00E+00	3.99E-07	0.00E+00	0.00E+00	0.00E+00	2.59E-03	0.00E+00
Acidification	mol H+ eq	4.13E+02	0.00E+00	9.35E-02	0.00E+00	0.00E+00	0.00E+00	4.12E+02	0.00E+00
Eutrophication. freshwater	kg P eq	1.91E+01	0.00E+00	2.62E-03	0.00E+00	0.00E+00	0.00E+00	1.91E+01	0.00E+00
Eutrophication. marine	kg N eq	6.92E+01	0.00E+00	3.09E-02	0.00E+00	0.00E+00	0.00E+00	6.92E+01	0.00E+00
Eutrophication. terrestrial	mol N eq	7.44E+02	0.00E+00	3.40E-01	0.00E+00	0.00E+00	0.00E+00	7.43E+02	0.00E+00
Photochemical ozone formation	kg NMVOC eq	3.31E+02	0.00E+00	1.37E-01	0.00E+00	0.00E+00	0.00E+00	3.31E+02	0.00E+00
Resource use. minerals and metals	kg Sb eq	2.20E-01	0.00E+00	1.67E-04	0.00E+00	0.00E+00	0.00E+00	2.20E-01	0.00E+00
Resource use. fossils	MJ	1.93E+06	0.00E+00	2.88E+02	0.00E+00	0.00E+00	0.00E+00	1.93E+06	0.00E+00
Water use	m^3 depriv.	8.56E+04	0.00E+00	1.49E+00	0.00E+00	0.00E+00	0.00E+00	8.56E+04	0.00E+00
Total use of primary energy during the life cycle	MJ	2.59E+06	0.00E+00	2.97E+02	0.00E+00	0.00E+00	0.00E+00	2.59E+06	0.00E+00
Particulate matter	disease inc.	2.07E-03	0.00E+00	2.06E-06	0.00E+00	0.00E+00	0.00E+00	2.07E-03	0.00E+00
Ionizing radiation	kBq U-235 eq	1.44E+04	0.00E+00	7.91E-01	0.00E+00	0.00E+00	0.00E+00	1.44E+04	0.00E+00
Ecotoxicity. freshwater - part 1	CTUe	1.31E+05	0.00E+00	4.67E+01	0.00E+00	0.00E+00	0.00E+00	1.31E+05	0.00E+00
Ecotoxicity. freshwater - part 2	CTUe	1.04E+05	0.00E+00	2.21E+01	0.00E+00	0.00E+00	0.00E+00	1.04E+05	0.00E+00
Ecotoxicity. freshwater - inorganics	CTUe	1.36E+05	0.00E+00	4.37E+01	0.00E+00	0.00E+00	0.00E+00	1.36E+05	0.00E+00
Ecotoxicity. freshwater - organics - p.1	CTUe	6.42E+04	0.00E+00	2.33E+01	0.00E+00	0.00E+00	0.00E+00	6.42E+04	0.00E+00
Ecotoxicity. freshwater - organics - p.2	CTUe	3.50E+04	0.00E+00	1.81E+00	0.00E+00	0.00E+00	0.00E+00	3.50E+04	0.00E+00
Human toxicity. cancer	CTUh	2.57E-04	0.00E+00	1.21E-07	0.00E+00	0.00E+00	0.00E+00	2.57E-04	0.00E+00
Human toxicity. cancer - inorganics	CTUh	6.26E-06	0.00E+00	2.21E-09	0.00E+00	0.00E+00	0.00E+00	6.26E-06	0.00E+00
Human toxicity. cancer - organics	CTUh	2.51E-04	0.00E+00	1.19E-07	0.00E+00	0.00E+00	0.00E+00	2.50E-04	0.00E+00
Human toxicity. non-cancer	CTUh	5.04E-04	0.00E+00	1.79E-07	0.00E+00	0.00E+00	0.00E+00	5.04E-04	0.00E+00
Human toxicity. non-cancer - inorganics	CTUh	4.69E-04	0.00E+00	1.65E-07	0.00E+00	0.00E+00	0.00E+00	4.69E-04	0.00E+00
Human toxicity. non-cancer - organics	CTUh	3.56E-05	0.00E+00	1.38E-08	0.00E+00	0.00E+00	0.00E+00	3.56E-05	0.00E+00
Land use	Pt	3.41E+05	0.00E+00	1.18E+02	0.00E+00	0.00E+00	0.00E+00	3.41E+05	0.00E+00

Impact category	Unit	Module	Use	Maint.	Repair	Replac.	Rehabil.	Energy	Water
		Total	B1	B2	B3	B4	B5	B6	B7
Inventory flows indicator									
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	6.56E+05	0.00E+00	9.03E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+05	0.00E+00
Use of renewable primary energy resources used as raw materials	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
Total use of renewable primary energy resources	MJ	6.56E+05	0.00E+00	9.03E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+05	0.00E+00
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	1.93E+06	0.00E+00	2.88E+02	0.00E+00	0.00E+00	0.00E+00	1.93E+06	0.00E+00
Use of non-renewable primary energy resources used as raw materials	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
Total use of non-renewable primary energy resources	MJ	1.93E+06	0.00E+00	2.88E+02	0.00E+00	0.00E+00	0.00E+00	1.93E+06	0.00E+00
Use of secondary material	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
Use of renewable 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
Use of non-renewable 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
Net use of fresh water	m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hazardous waste	kg	7.22E+00	0.00E+00	6.52E-03	0.00E+00	0.00E+00	0.00E+00	7.22E+00	0.00E+00
Bulk waste	kg	4.55E+03	0.00E+00	8.45E+00	0.00E+00	0.00E+00	0.00E+00	4.55E+03	0.00E+00
Radioactive waste	kg	3.82E+00	0.00E+00	2.01E-04	0.00E+00	0.00E+00	0.00E+00	3.82E+00	0.00E+00
Components for reuse	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
Materials for recycling	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
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	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
Biogenic carbon content of the product	kg C	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg C	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Total impacts per kW corresponding to the functional unit

Impact category	Unit	Module	Manufac.	Distrib.	Instal.	Use	End of life
		Total	A1-A3	A4	A5	B1 B2 B3 B4 B5 B6 B7	C1 C2 C3 C4
Environmental impact indicators							
Climate change	kg CO_2 eq	4.95E+03	4.46E+02	1.70E+00	1.95E+00	4.45E+03	5.67E+01
Climate change - Biogenic	kg CO_2 eq	3.78E+02	7.63E+00	4.15E-04	5.02E-01	3.69E+02	1.66E-01
Climate change - Fossil	kg CO_2 eq	4.58E+03	4.38E+02	1.70E+00	1.45E+00	4.08E+03	5.65E+01
Climate change - Land use and LU change	kg CO_2 eq	1.00E+00	4.54E-01	5.13E-04	7.14E-04	5.29E-01	1.62E-02
Ozone depletion	kg CFC11 eq	1.92E-04	1.04E-04	2.50E-08	2.78E-08	8.87E-05	1.63E-07
Acidification	mol H+ eq	1.84E+01	4.19E+00	5.73E-03	6.55E-03	1.41E+01	5.65E-02
Eutrophication. freshwater	kg P eq	1.06E+00	3.93E-01	1.13E-04	1.86E-04	6.56E-01	6.52E-03
Eutrophication. marine	kg N eq	2.94E+00	5.46E-01	1.93E-03	2.33E-03	2.37E+00	1.37E-02
Eutrophication. terrestrial	mol N eq	3.15E+01	5.80E+00	2.10E-02	2.39E-02	2.55E+01	1.29E-01
Photochemical ozone formation	kg NMVOC eq	1.33E+01	1.92E+00	8.59E-03	9.60E-03	1.13E+01	4.18E-02
Resource use. minerals and metals	kg Sb eq	7.70E-02	6.93E-02	2.77E-06	1.15E-05	7.55E-03	6.56E-05
Resource use. fossils	MJ	7.16E+04	5.09E+03	2.45E+01	2.01E+01	6.63E+04	1.76E+02
Water use	m^3 depriv.	3.05E+03	1.13E+02	1.09E-01	1.02E-01	2.93E+03	5.94E+00
Total use of primary energy during the life cycle	MJ	9.47E+04	5.70E+03	2.48E+01	2.08E+01	8.87E+04	2.03E+02
Particulate matter	disease inc.	1.03E-04	3.06E-05	1.80E-07	1.44E-07	7.10E-05	1.23E-06
Ionizing radiation	kBq U-235 eq	5.30E+02	3.24E+01	1.96E-02	5.61E-02	4.95E+02	2.83E+00
Ecotoxicity. freshwater - part 1	CTUe	8.88E+03	4.29E+03	3.38E+00	3.37E+00	4.48E+03	9.93E+01
Ecotoxicity. freshwater - part 2	CTUe	8.42E+03	4.82E+03	1.52E+00	1.54E+00	3.57E+03	2.16E+01
Ecotoxicity. freshwater - inorganics	CTUe	1.19E+04	7.16E+03	3.36E+00	3.15E+00	4.66E+03	8.94E+01
Ecotoxicity. freshwater - organics - p.1	CTUe	4.09E+03	1.86E+03	1.41E+00	1.64E+00	2.20E+03	2.58E+01
Ecotoxicity. freshwater - organics - p.2	CTUe	1.29E+03	8.47E+01	1.29E-01	1.27E-01	1.20E+03	5.66E+00
Human toxicity. cancer	CTUh	1.75E-05	8.49E-06	5.82E-09	8.47E-09	8.80E-06	1.62E-07
Human toxicity. cancer - inorganics	CTUh	5.78E-07	3.13E-07	1.00E-10	1.53E-10	2.15E-07	4.98E-08
Human toxicity. cancer - organics	CTUh	1.69E-05	8.17E-06	5.72E-09	8.31E-09	8.59E-06	1.13E-07
Human toxicity. non-cancer	CTUh	4.49E-05	2.74E-05	1.54E-08	1.25E-08	1.73E-05	1.20E-07
Human toxicity. non-cancer - inorganics	CTUh	4.21E-05	2.59E-05	1.45E-08	1.15E-08	1.61E-05	1.14E-07
Human toxicity. non-cancer - organics	CTUh	2.80E-06	1.57E-06	9.36E-10	9.99E-10	1.22E-06	5.79E-09
Land use	Pt	1.42E+04	2.45E+03	2.54E+01	8.53E+00	1.17E+04	6.64E+01

Impact category	Unit	Module	Manufac.	Distrib.	Instal.	Use	End of life
		Total	A1-A3	A4	A5	B1 B2 B3 B4 B5 B6 B7	C1 C2 C3 C4
Inventory flows indicator							
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	2.31E+04	5.70E+02	2.73E-01	6.42E-01	2.25E+04	2.76E+01
Use of renewable primary energy resources used as raw materials	MJ	4.01E+01	4.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.31E+04	6.10E+02	2.73E-01	6.42E-01	2.25E+04	2.76E+01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	7.15E+04	5.05E+03	2.45E+01	2.01E+01	6.63E+04	1.76E+02
Use of non-renewable primary energy resources used as raw materials	MJ	4.21E+01	4.21E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	7.16E+04	5.09E+03	2.45E+01	2.01E+01	6.63E+04	1.76E+02
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hazardous waste	kg	3.58E-01	1.09E-01	1.60E-04	4.49E-04	2.48E-01	7.77E-04
Bulk waste	kg	1.94E+02	3.34E+01	2.16E+00	9.94E-01	1.56E+02	1.57E+00
Radioactive waste	kg	1.40E-01	8.21E-03	4.78E-06	1.43E-05	1.31E-01	7.25E-04
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	2.43E+01	0.00E+00	0.00E+00	3.29E-01	0.00E+00	2.40E+01
Materials for energy recovery	kg	1.36E+00	0.00E+00	0.00E+00	3.29E-01	0.00E+00	1.03E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the product	kg C	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg C	4.66E-01	4.66E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Use stage impacts per kW corresponding to the functional unit

Impact category	Unit	Module	Use	Maint.	Repair	Replac.	Rehabil.	Energy	Water
		Total	B1	B2	B3	B4	B5	B6	B7
Environmental impact indicators									
Climate change	kg CO_2 eq	4.45E+03	0.00E+00	7.04E-01	0.00E+00	0.00E+00	0.00E+00	4.45E+03	0.00E+00
Climate change - Biogenic	kg CO_2 eq	3.69E+02	0.00E+00	1.24E-03	0.00E+00	0.00E+00	0.00E+00	3.69E+02	0.00E+00
Climate change - Fossil	kg CO_2 eq	4.08E+03	0.00E+00	7.02E-01	0.00E+00	0.00E+00	0.00E+00	4.08E+03	0.00E+00
Climate change - Land use and LU change	kg CO_2 eq	5.29E-01	0.00E+00	3.50E-04	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00
Ozone depletion	kg CFC11 eq	8.87E-05	0.00E+00	1.37E-08	0.00E+00	0.00E+00	0.00E+00	8.86E-05	0.00E+00
Acidification	mol H+ eq	1.41E+01	0.00E+00	3.20E-03	0.00E+00	0.00E+00	0.00E+00	1.41E+01	0.00E+00
Eutrophication. freshwater	kg P eq	6.56E-01	0.00E+00	8.98E-05	0.00E+00	0.00E+00	0.00E+00	6.56E-01	0.00E+00
Eutrophication. marine	kg N eq	2.37E+00	0.00E+00	1.06E-03	0.00E+00	0.00E+00	0.00E+00	2.37E+00	0.00E+00
Eutrophication. terrestrial	mol N eq	2.55E+01	0.00E+00	1.17E-02	0.00E+00	0.00E+00	0.00E+00	2.55E+01	0.00E+00
Photochemical ozone formation	kg NMVOC eq	1.13E+01	0.00E+00	4.70E-03	0.00E+00	0.00E+00	0.00E+00	1.13E+01	0.00E+00
Resource use. minerals and metals	kg Sb eq	7.55E-03	0.00E+00	5.73E-06	0.00E+00	0.00E+00	0.00E+00	7.54E-03	0.00E+00
Resource use. fossils	MJ	6.63E+04	0.00E+00	9.87E+00	0.00E+00	0.00E+00	0.00E+00	6.62E+04	0.00E+00
Water use	m^3 depriv.	2.93E+03	0.00E+00	5.10E-02	0.00E+00	0.00E+00	0.00E+00	2.93E+03	0.00E+00
Total use of primary energy during the life cycle	MJ	8.87E+04	0.00E+00	1.02E+01	0.00E+00	0.00E+00	0.00E+00	8.87E+04	0.00E+00
Particulate matter	disease inc.	7.10E-05	0.00E+00	7.07E-08	0.00E+00	0.00E+00	0.00E+00	7.09E-05	0.00E+00
Ionizing radiation	kBq U-235 eq	4.95E+02	0.00E+00	2.71E-02	0.00E+00	0.00E+00	0.00E+00	4.95E+02	0.00E+00
Ecotoxicity. freshwater - part 1	CTUe	4.48E+03	0.00E+00	1.60E+00	0.00E+00	0.00E+00	0.00E+00	4.48E+03	0.00E+00
Ecotoxicity. freshwater - part 2	CTUe	3.57E+03	0.00E+00	7.59E-01	0.00E+00	0.00E+00	0.00E+00	3.57E+03	0.00E+00
Ecotoxicity. freshwater - inorganics	CTUe	4.66E+03	0.00E+00	1.50E+00	0.00E+00	0.00E+00	0.00E+00	4.65E+03	0.00E+00
Ecotoxicity. freshwater - organics - p.1	CTUe	2.20E+03	0.00E+00	8.00E-01	0.00E+00	0.00E+00	0.00E+00	2.20E+03	0.00E+00
Ecotoxicity. freshwater - organics - p.2	CTUe	1.20E+03	0.00E+00	6.21E-02	0.00E+00	0.00E+00	0.00E+00	1.20E+03	0.00E+00
Human toxicity. cancer	CTUh	8.80E-06	0.00E+00	4.15E-09	0.00E+00	0.00E+00	0.00E+00	8.80E-06	0.00E+00
Human toxicity. cancer - inorganics	CTUh	2.15E-07	0.00E+00	7.57E-11	0.00E+00	0.00E+00	0.00E+00	2.14E-07	0.00E+00
Human toxicity. cancer - organics	CTUh	8.59E-06	0.00E+00	4.07E-09	0.00E+00	0.00E+00	0.00E+00	8.58E-06	0.00E+00
Human toxicity. non-cancer	CTUh	1.73E-05	0.00E+00	6.12E-09	0.00E+00	0.00E+00	0.00E+00	1.73E-05	0.00E+00
Human toxicity. non-cancer - inorganics	CTUh	1.61E-05	0.00E+00	5.65E-09	0.00E+00	0.00E+00	0.00E+00	1.61E-05	0.00E+00
Human toxicity. non-cancer - organics	CTUh	1.22E-06	0.00E+00	4.72E-10	0.00E+00	0.00E+00	0.00E+00	1.22E-06	0.00E+00
Land use	Pt	1.17E+04	0.00E+00	4.05E+00	0.00E+00	0.00E+00	0.00E+00	1.17E+04	0.00E+00

Impact category	Unit	Module	Use	Maint.	Repair	Replac.	Rehabil.	Energy	Water
		Total	B1	B2	B3	B4	B5	B6	B7
Inventory flows indicator									
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	2.25E+04	0.00E+00	3.09E-01	0.00E+00	0.00E+00	0.00E+00	2.25E+04	0.00E+00
Use of renewable primary energy resources used as raw materials	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
Total use of renewable primary energy resources	MJ	2.25E+04	0.00E+00	3.09E-01	0.00E+00	0.00E+00	0.00E+00	2.25E+04	0.00E+00
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	6.63E+04	0.00E+00	9.87E+00	0.00E+00	0.00E+00	0.00E+00	6.62E+04	0.00E+00
Use of non-renewable primary energy resources used as raw materials	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
Total use of non-renewable primary energy resources	MJ	6.63E+04	0.00E+00	9.87E+00	0.00E+00	0.00E+00	0.00E+00	6.62E+04	0.00E+00
Use of secondary material	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
Use of renewable 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
Use of non-renewable 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
Net use of fresh water	m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hazardous waste	kg	2.48E-01	0.00E+00	2.23E-04	0.00E+00	0.00E+00	0.00E+00	2.47E-01	0.00E+00
Bulk waste	kg	1.56E+02	0.00E+00	2.90E-01	0.00E+00	0.00E+00	0.00E+00	1.56E+02	0.00E+00
Radioactive waste	kg	1.31E-01	0.00E+00	6.90E-06	0.00E+00	0.00E+00	0.00E+00	1.31E-01	0.00E+00
Components for reuse	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
Materials for recycling	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
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	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
Biogenic carbon content of the product	kg C	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	kg C	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Extrapolation rules

NO.	Product Type	Power	Manufact. Distrib co-eff.	Install. co-eff.	Use stage coefficient		End of life coeff.
		[kW]	A1...A4	A5	B2	B6	C1...C4
rev	**CSNX-iY 20.2**	**29.2**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
2	**CSNX-iY 28.2**	**55.2**	**0.61**	**0.53**	**1.00**	**0.91**	**0.61**
3	**CSNX-iY 40.4**	**86.8**	**0.60**	**0.34**	**1.00**	**0.97**	**0.61**
4	**CSRN-iY 20.2**	**43.7**	**0.75**	**0.67**	**1.00**	**0.92**	**0.75**
5	**CSRN-iY 28.2**	**58.1**	**0.61**	**0.50**	**1.00**	**0.96**	**0.62**
6	**CSRN-iY 40.4**	**85.5**	**0.59**	**0.34**	**1.00**	**0.94**	**0.60**
7	**CSRN-iY 56.4**	**116.1**	**0.59**	**0.25**	**1.00**	**0.95**	**0.60**

Extrapolation coefficients are given for the environmental impact of the functional unit, i.e. the emission of 1 kW heating power*. For each stage 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 extrapolation coefficient. The "Total" column should be calculated by adding the environmental impacts of each stage of the life cycle.

References

1. ISO 14040:2006+AMD1:2020 Environmental management - Life cycle assessment - Principles and reference framework;
2. ISO 14044:2006+AMD1:2017+AMD2:2020 Environmental management - Life cycle assessment – Requirements and guidelines;
3. EN 50639:2019 Product category rules for life cycle assessments of electronic and electrical products and systems
4. Product category rule from “PEP ecopassport program”:
5. General rule for electrical products, electronical and HVAC-R: PCR-ed4-EN-2021 09 06
6. Specific rule for product category on the scope of the study: PSR-0013-ed3.0-EN-2023-06-06
7. EN 14511:2018: Air conditioners, liquid chilling packages and heat pumps for Space heating and cooling and process chillers, with electrically driven compressors
8. EN 14511:2018: Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors for Space heating and cooling – Testing and rating at part load conditions and calculation of seasonal performance.
9. EN 378-2, Refrigerating systems and heat pumps – Safety and environmental requirements – Part 2: Design, construction, testing, marking and documentation.
10. SimaPro 9.6.0.1
11. Ecoinvent 3.10 database
12. “Clivetpack^{3i} LCA Report”, Clivet, 2024.

Registration number: **CLIV-00002-V01.01-EN**	Drafting rules: **"PCR-ed4-EN-2021 09 06 Supplemented by "PSR-0013-ed3.0-EN-2023 06 06"**
Verifier accreditation number: **VH50**	Information and reference documents: **www.pep-ecopassport.org**
Date of issue: 01-2025	Validity period: **5 years**
Independent verification of the declaration and data in compliance with ISO 14025: 2006	
Internal: ☐	**External:** ☒
The PCR review was conducted by a panel of experts chaired by Julie Orgelet (DDemain)	
PEPs are compliant with EN 50693:2019 The components of the present PEP may not be compared with components from any other program.	
Document complies with ISO 14025:2006 "Environmental labels and declarations. Type III environmental declarations"	

CP24M045GB-00

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