Environmental Product Declaration

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

[*SolaX X3 MEGA 40-60K invertors*]

from

[SolaX Power Network Technology (Zhejiang) Co., Ltd.]

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	EPD-IES-0015483
Publication date:	2024-07-23
Valid until:	2029-07-23
	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
	Multiple Products EPD: the EPD covers the following products：X3-MGA-40K-G2, X3-MGA-50K-G2, X3-MGA-60K-G2, X3-MGA-40K-G2(L), X3-MGA-50K-G2(L), X3-MGA-60K-G2(L), The worst-case scenario is applied.

光伏逆变器

X3-MEGA G2

General information

Programme information

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

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *Product Category Rules (PCR):* *C-PCR-024, PV components: invertors, battery energy storage systems, combiner boxes and tracker systems, UN CPC 461, 462, 463, 464 (SUBSETS), issued data 2024-04-30* *PCR 2019:14 Construction products Version 1.3.3, issued data 2024-03-01*
PCR review was conducted by: C-PCR-024 Chair of the PCR review: Gorka Benito Alonso, The review panel may be contacted via info@environdec.com. PCR 2019:14 The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com Chair of the PCR review: Claudia A. Peña, DDERE Research & Technology
Life Cycle Assessment (LCA)
LCA accountability: *<Jason Shen, SolaX Power Network Technology (Zhejiang) Co., Ltd.>*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *<Michael ZHU Jiang, TÜV Rheinland (China) Ltd.,*  > Approved by: The International EPD® System
OR

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

☐ EPD verification by accredited certification body

Third-party verification: <*name, organisation*> is an approved certification body accountable for the third-party verification

The certification body is accredited by: <*name of accreditation body & accreditation number, where applicable*>

OR

Independent third-party verification of the declaration and data, according to ISO 14025:2006 via:

☐ EPD verification by EPD Process Certification*

Internal auditor: <*name, organisation*>

Third-party verification: <*name, organisation*> is an approved certification body accountable for third-party verification

Third-party verifier is accredited by: <*name of accreditation body & accreditation number, where applicable*>

*For EPD Process Certification, an accredited certification body certifies and reviews the management process and verifies EPDs published on a regular basis. For details about third-party verification procedure of the EPDs, see GPI.

Procedure for follow-up of data during EPD validity involves third party verifier:

☐ Yes ☒ No

[Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

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

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same 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 equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD:
SolaX Power Network Technology (Zhejiang) Co., Ltd.

Contact:
Jason Shen, jason.shen@solaxpower.com

Description of the organisation:
Established in 2012, SolaX Power is a National High-tech Enterprise with robust R&D capabilities, integrating research, production, sales, and service. It has been granted over 100 national patents, including more than 40 invention patents. SolaX products have received more than 1100 international mainstream market certifications. As a pioneer in hybrid inverter technology in Asia and a global leader in solar solutions, SolaX envisions a clean and sustainable future powered by solar energy. Over a decade, SolaX has expanded into a multinational corporation with more than 2000 employees worldwide, headquartered in Hangzhou, China, and has branches in the Netherlands, Germany, the UK, Australia, Japan, and the US, serving over 80 countries.

Product-related or management system-related certifications:
ISO9001 ISO14001 ISO45001 ISO50001

Name and location of production site(s):
SolaX Power Network Technology (Zhejiang) Co., Ltd.
No.278, Shizhu Road, Chengnan Sub-district, Tonglu County, Hangzhou, Zhejiang, China

Product information

Product name: Three phase Invertor
Product identification: In total 6 products are grouped for a multi-products EPD. The products are grouped because they are produced through the same production line with highly similar components materials. The worst-`case scenario reporting criteria is followed.

Serial Number	Series	Model	Weight (kg/pcs)	Power (kW/pcs)	Max Efficiency (%)	Lifespan (years)
1	MEGA	X3-MGA-40K-G2	44.0	40	98.4	25
2	MEGA	X3-MGA-50K-G2	45.0	50	98.4	25
3	MEGA	X3-MGA-60K-G2	46.0	60	98.4	25
4	MEGA	X3-MGA-40K-G2(L)	44.0	40	98.4	25
5	MEGA	X3-MGA-50K-G2(L)	45.0	50	98.4	25
6	MEGA	X3-MGA-60K-G2(L)	46.0	60	98.4	25

Product description:
Invertors involved in this EPD are available in 40/50/60kW power ratings, the X3-MEGA G2 is specifically designed for medium and small-scale commercial photovoltaic systems. It features an optimized structural design that is more compact and lighter than comparable market inverters. With 1.5 times DC oversizing and 1.1 times AC continuous overload, it achieves a maximum efficiency of 98.4%. The X3-MEGA G2 also comes with IP66 protection, secondary surge protection, anti-reverse protection, and optional arc protection, enhancing electrical safety and reducing risks. Like the X3-FORTH, it supports

night-time reactive power compensation to improve grid efficiency and reduce operating costs, with 24-hour system monitoring and smart energy management via the SolaX cloud platform app, contributing to a greener future.

UN CPC code: 462 Electricity distribution and control apparatus, and parts thereof]

Geographical scope: China
A1-A5: China
B6:Europe
C1-C4: Europe

LCA information

Functional unit / declared unit:
The inverting functionality needed to be part of a reference PV system (with a service life of 25 years) that provides 1 kWh of AC energy output converted from DC energy generated from the panels

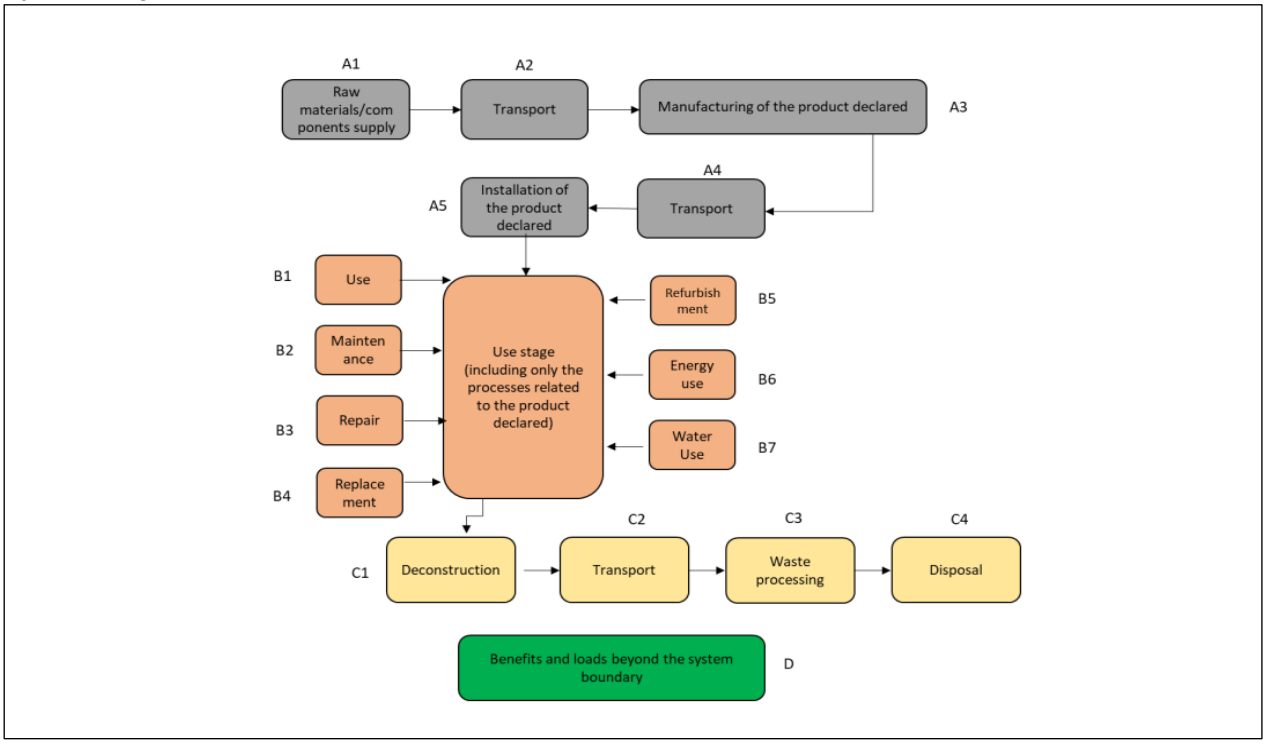
Reference service life: 25 years

Time representativeness: 2023-01-01~2023-12-31

Database(s) and LCA software used: Simapro 9.5, Ecoinvent 3.9.1

Description of system boundaries:
c) Cradle to grave and module D (A + B + C + D)
Modules B1-B5 and B7 contains no activities and are therefore not declared in the result tables.

System diagram:



More information:

Cut-off rule

The PCR 014, 1.3.4 specifies cut-off rules for the Life Cycle Inventory as follows:

1. **Inclusion of Data**: At least 95% of the total inflows (both mass and energy) per module must be included in the LCI data. This encompasses modules such as A1-A3, A4-A5, B1-B5, B6-B7, C1-C4, and module D.
2. **Use of Proxy Data**: If less than 100% of the inflows or environmental impacts are covered, proxy data or extrapolations should be used to fill in the gaps and achieve complete data coverage.
3. **Documentation**: Any inflows not included in the LCA must be documented in the EPD.

According to this criteria, Inclusion of Data: no specific materials have been cut-off in this specific LCA. All materials provided by the manufacturer are properly modelled.
Use of proxy data: proxy data are applied when the materials are not covered by the ecoinvent dataset. The applied and selected dataset are provided in the supplementary excel file.
Exclusion inflows: The following steps/stages are not included in the system boundary for the reason that the elements below are considered irrelevant or can be omitted according to the PCR

- Production and disposal of the infrastructure and capital equipment (buildings, machines, transport media, roads, etc.) during products manufacturing, installation, and maintenance;
- The intermediate packaging materials are included
- Storage phases and sales of inverters
- All process data, as well as product loss during abnormal accident periods such as natural disasters or fires, should be excluded from data collection and life cycle assessment
- The recycling process of defective products as it is reused internally for the manufacturing process;
- Handling operations at the distribution center and retail outlet due to small contribution and negligible impact.

Data quality requirements

Steps were taken to ensure that the LCI data were reliable and representative. The data type used is clearly stated in the Inventory analysis, measured or calculated from primary sources or whether data are from the LCI databases. In this study, the data quality requirements were as follows. The comprehensive data quality analysis ensures that the LCA of SolaX inverters is robust, reliable, and suitable for supporting environmental decision-making both within the company and among external stakeholders. This detailed focus on data quality enhances the credibility of the environmental claims made in the SolaX EPD and fosters trust with customers, regulators, and the industry at large.

Table 1: Data quality assessment

Requirement	Details	Quality assessment
General Requirements	Follow the guidelines in PCR 2019:14 and EN 15804. Specific data shall be collected on site for processes and activities upstream in the supply chain if under the EPD owner's direct management control.	The PCR 2019:14 is followed. A general quality assessment is appended. Specific data are collected for the mass composition, manufacturing and raw materials transport.
Modules A1-A2	Main parts, packaging, or main auxiliaries data should be provided by the contractor as specific data. Transport data for main parts and components along the supply chain to the manufacturing plant/place of service provision should be specific, based on actual	The complete list of components, packaging and auxiliary materials are provided by the manufacturer.

	transportation mode, distance from the supplier, and vehicle load.	The transport mode and distance are based on the specific data.
Module A3	Data on processes and activities shall be specific.	The manufacturing consumption, mainly the electricity consumption is collected by the manufacturer.
Modules A4-A5	Usually based on scenarios, but specific data should be used when available and relevant. Transport-specific data from the manufacturing site to the intended location (e.g., construction site or market relevant for the product) should be estimated based on information from the manufacturer and justified in the LCA report. Default travel distance for domestic production is 500 km, and for imported products, it includes the distance from the manufacturing site to storage plus an additional 500 km if not specified.	Specific transport data are provided for the product.
Modules B1-B7	Based on scenarios but specific data should be used when available. Maintenance, repair, replacement, and refurbishment scenarios provided by the manufacturer and relevant for the intended market. For module B4, the production of the replacing product/component and the end-of-life of the replaced product/component should be included if replacement is needed during the reference PV system's RSL of 25 years. For module B6, energy consumption shall be modeled as energy loss percentage of the total produced energy by the PV system, documented with evidence.	B1-B7 are based on the scenarios.
Modules C1-C4	Based on manufacturer-provided information and relevant for the intended market. Default transport distance to waste processing is 50 km unless otherwise justified.	C1-C4 are modeled based on the WEEE treatment in European.
Examples of Databases for Generic Data	Ecoinvent database, World Steel Association database, Gabi database.	The Ecoinvent database is applied.

The "good" label indicates that the collected data fulfill the requirement of the specification listed in the PCR. The "fair" label indicates that the collected data partially fulfill the requirement of the specification. And "the poor" indicator designates that the data quality requirement is not met.

Allocation

Since the inverter models are produced from the same production line. Therefore, a multi-output allocation strategy is applied for the A3 phase to the specific PV modules. In this study, the parameter of producing time is referred as the allocation reference to partition the environmental impact for the PV modules. The details are given in the following:

$$E = \frac{Time_{specific\ model}}{Time_{total}} \quad (1)$$

Where $Time_{specific\ model}$ stands for the specific production time for the Mega or Forth models over the reference period. $Time_{toatal}$ is the total producing time of all inverters over the reference period. E is the allocation factor for the specific model for electricity, compressed air allocation.
The allocation strategy for the EoL process per PCR follows the same strategy listed in the EN15804. Thus, the "cut-off" strategy is applied. This scenario allocates the entire environmental impacts of waste treatment procedures (from deconstruction to the waste processing) to the producer. The recycled materials, on the other hand, are burden-free. An important note is that when materials have reached a so-called "end-of-waste" state, the coverage of the waste processing is thus terminated. Any inputs/flows related to refine gross recycled materials for actual applications are beyond the product system boundary and is accounted in Module D

Electricity profile

The electricity used in the manufacturing of SolaX inverters is sourced from the Zhejiang provincial grid. The energy mix of this region is critical in determining the associated greenhouse gas (GHG) emissions.

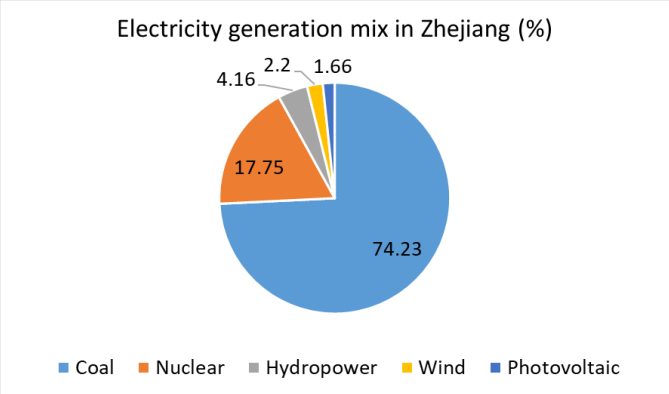


Figure 1: the electricity production mix for Zhejiang province at 2022

Grid Loss Rate: As reported in the Chinese Energy Yearbook 2023, the average grid loss for Zhejiang province is calculated at 3.17%. This percentage represents the average energy lost in transmission and distribution processes.
Application in LCA: The grid loss is factored into the calculation of the net energy consumed by the SolaX production facilities. Adjusting for grid losses ensures that the energy consumption data is as close to actual usage as possible.
GWP-GHG Indicator: The GWP-GHG indicator for the Zhejiang grid, with the correction for grid loss, is 0.827 kg CO2e / kWh.

Key assumptions and limitations

The key assumptions of this LCA study are as follows：

Table 2: The applied assumptions in this LCA

Categories	Items	Type	Assumptions
Transportation stage (A2, and A4)	Transportation vehicle type	Assumption	A vehicle load of 16-32 ton capacity is used
Installation stage (A5)	Inverter installation	Assumption	No construction waste is considered. Energy consumption for the construction process is sourced from the Ecoinvent dataset "electric installation for 570kWp

			module, open ground{GLO}|market for photovoltaics, electric installation for 570kWp module, open ground"
Use & Maintenance	B1	Assumption	The use stage requires no external inputs of electricity and water. All losses are attributed to PV panel generation.
	B2-B5	Assumption	No replacement for the module as the module has RSL>25 years. No operational water and energy are needed for the inverters
	B6,B7	Scenario according to Peer reviewed literature	No operational water is needed. Operational energy stems from the PV generation. The reference radiation is 1104 kWh/kW, and the PR ratio for the PV is 0.74[1].
End-of-life (C1-C4)	Inputs for de-installation	Assumption	The de-construction of inverter is assumed to be done by manual labour.
	Waste transport distance	Scenario according to PCR	Waste transportation distance from the de-installation plant to the waste treatment facilities is assumed to be 50 km according to the PCR
	Inputs for disassembly the Inverters	Scenario according to the Peer reviewed Literature	The WEEE directive is applied 85% of inverters are collected and mechanical dismentaled for recycling. 15% of the inverters are assumed to be directly landfilled.
	Waste treatment scenarios for dissembled inverters	Assumption	For residual mixture after sorting, 55%/45% for incineration and landfill is assumed.
Module D	Exported energy		For incineration with the energy recovery, net energy production: 3.93MJ/kg electric energy and 7.66MJ/kg thermal energy.[2]

Limitations：

The broad scope of analyzing a product's whole life cycle and the comprehensive approach can only be achieved at the expense of simplifying other aspects. Thus, the following limitations should be considered:

- LCA does not address localized aspects. It is not a local risk assessment tool
- LCA is typically a steady state rather than a dynamic approach
- LCA does not include market mechanisms or secondary effects on technological development

1 Johannes Schardt, Henrik te Heesen, Performance of roof-top PV systems in selected European countries from 2012 to 2019, Solar Energy, Volume 217, 2021, Pages 235-244,
2 https://ecoquery.ecoinvent.org/3.9.1/cutoff/dataset/12531/export

- LCA regards processes as linear, both in the economy and in the environment
- LCA focuses on environmental aspects and says nothing about social, economic, and other characteristics
- LCA involves several technical assumptions and value choices that are not purely science-based

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	ND	ND	ND	ND	X	ND	X	X	X	X	X
Geography	CN	CN	CN	GLO	EU	ND	ND	ND	ND	ND	EU	ND	EU	EU	EU	EU	EU
Specific data used	5.5%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	33.1%					-	-	-	-	-	-	-	-	-	-	-	-

Content information

X3-MGA-40K-G2(L) is found to be the worst-case scenario. Thus its information are applied. According to the PCR, the content should be declared as the purchased product. One piece of the X3-MGA-40K-G2(L) product is applied as the reference.

Product components	Weight, kg	Content variation	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Electronics	2.08E+01	2.08E+01 ~ 2.08E+01	0	0
Cables	3.22E+00	0	0	0
Steel	1.82E+00	0	0	0
Aluminium	1.23E+01	0	0	0
Copper	5.08E-02	0	0	0
Plastics	5.94E-01	0	0	0
Others	6.26E+00	0	0	0
TOTAL	4.50E+01	4.50E+01~ 4.50E+01	0	0
Packaging materials	**Weight, kg**		**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Paper	4.06E+00	0	9.0	1.83E+00
EPE	1.79E+00	0	4.0	
Steel	2.52E-02	0	0.1	
PV connector	7.45E-01		1.7	
TOTAL	6.62E+00	0	14.7	

No SVHC in product of X3-MGA-40K-G2

Results of the environmental performance indicators

The results section presents the environmental impact for the worst case scenario among the peer products: X3-MGA-40K-G2, X3-MGA-50K-G2, X3-MGA-60K-G2, X3-MGA-40K-G2(L), X3-MGA-50K-G2(L), X3-MGA-60K-G2(L). The variations for environmental impact categories are supplied. The variation is defined as the ratio between the distance of max and min results over the maximum results.

Mandatory impact category indicators according to EN 15804

Indicator	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	Variation
GWP-fossil	kg CO_2 eq.	1.93e-03	3.53e-05	3.67e-06	2.43e-09	0.00e+00	6.21e-07	2.08e-05	7.40e-05	-1.49e-04	33.1%
GWP-biogenic	kg CO_2 eq.	4.84e-06	1.28e-08	7.88e-07	9.29e-12	0.00e+00	5.62e-10	6.73e-10	8.20e-08	-1.12e-06	33.1%
GWP-luluc	kg CO_2 eq.	3.98e-06	2.21e-08	4.98e-10	5.00e-12	0.00e+00	3.02e-10	7.31e-09	3.34e-09	-3.09e-06	33.1%
GWP-total	kg CO_2 eq.	1.93e-03	3.53e-05	4.46e-06	2.45e-09	0.00e+00	6.22e-07	2.08e-05	7.41e-05	-1.53e-04	33.1%
ODP	kg CFC 11 eq.	1.13e-05	6.54e-13	3.84e-09	1.76e-16	0.00e+00	1.35e-14	3.61e-14	7.71e-14	-4.68e-12	33.3%
AP	mol H^+ eq.	1.72e-05	5.72e-07	3.83e-14	1.58e-11	0.00e+00	2.03e-09	2.31e-08	4.30e-08	-9.20e-07	33.2%
EP-freshwater	kg P eq.	1.53e-06	1.84e-09	8.10e-11	1.23e-12	0.00e+00	4.35e-11	1.72e-09	2.78e-09	-8.69e-08	33.2%
EP-marine	kg N eq.	2.48e-06	1.48e-07	2.92e-09	2.73e-12	0.00e+00	6.97e-10	6.64e-09	7.74e-08	-1.33e-07	33.1%
EP-terrestrial	mol N eq.	2.66e-05	1.63e-06	1.49e-08	2.92e-11	0.00e+00	7.36e-09	6.30e-08	1.73e-07	-1.22e-06	33.2%
POCP	kg NMVOC eq.	2.40e-02	4.71e-07	5.53e-09	1.05e-11	0.00e+00	3.03e-09	1.73e-08	1.62e-14	-5.29e-07	33.2%
ADP-minerals&metals*	kg Sb eq.	4.32e-04	7.46e-11	3.20e-12	1.02e-13	0.00e+00	1.99e-12	3.01e-11	4.65e-08	-3.77e-10	33.3%
ADP-fossil*	MJ	2.89e-04	4.67e-04	1.34e-05	2.99e-08	0.00e+00	8.81e-06	4.69e-05	2.27e-11	-2.34e-03	33.1%
WDP*	m^3	4.41e-04	1.52e-06	8.68e-08	2.27e-09	0.00e+00	3.59e-08	8.65e-07	6.24e-05	-1.54e-05	33.3%
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 of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators

Indicator	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	Variation

GWP-GHG[3]	kg CO_2 eq.	1.98e-03	3.54e-05	4.46e-06	2.53e-09	0.00e+00	6.25e-07	2.10e-05	7.41e-05	-1.55e-04	33.1%
Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017											

Resource use indicators

Indicator	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	Vairation
PENRT	MJ	2.43e-02	4.67e-04	1.34e-05	2.99e-08	0.00e+00	8.81e-06	4.69e-05	6.24e-05	-2.34e-03	33.1%
PENRE	MJ	2.42e-02	4.67e-04	1.34e-05	2.99e-08	0.00e+00	8.81e-06	4.69e-05	6.24e-05	-2.34e-03	0%
PENRM	MJ	1.54e-04	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0%
PERT	MJ	2.76e-03	5.47e-06	2.66e-07	9.95e-08	0.00e+00	1.37e-07	5.52e-06	2.28e-06	-8.59e-04	0%
PERE	MJ	2.69e-03	5.47e-06	2.66e-07	9.95e-08	0.00e+00	1.37e-07	5.52e-06	2.28e-06	-8.59e-04	0%
PERM	MJ	7.83e-05	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0%
SM	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	0.00e+00	0%
RSF	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	0.00e+00	0%
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	0.00e+00	0%
FW	m3	1.63e-05	5.34e-08	3.69e-09	8.38e-11	0.00e+00	1.25e-09	3.27e-08	6.27e-08	-5.87e-06	0%
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

Results per functional or declared unit											
Indicator	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D	Variation
Hazardous waste disposed	kg	1.39e-06	9.04e-09	2.40e-08	3.17e-11	0.00e+00	2.18e-10	1.22e-06	4.57e-06	-6.25e-08	0%
Non-hazardous waste disposed	kg	2.64e-04	1.30e-05	1.92e-06	4.37e-10	0.00e+00	4.30e-07	9.17e-07	4.74e-05	-4.08e-05	0%

[3] 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.

Radioactive waste disposed	kg	4.95e-08	1.06e-10	5.44e-12	4.85e-14	0.00e+00	2.86e-12	1.06e-10	2.55e-11	-1.09e-08	0%

Output flow indicators

Results per functional or declared unit											
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**	**Vairation**
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	0.00e+00	0%
Material for recycling	kg	0.00e+00	0.00e+00	5.86e-06	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0%
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	0.00e+00	0%
Exported energy, electricity	MJ	0.00e+00	0.00e+00	4.76e-06	0.00e+00	0.00e+00	0.00e+00	0.00e+00	9.34e-05	0.00e+00	0%
Exported energy, thermal	MJ	0.00e+00	0.00e+00	9.67e-06	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.85e-04	0.00e+00	0%

Other environmental performance indicators

Results per functional or declared unit											
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**	**Variation**
Particulate matter	disease inc.	1.29e-10	1.94e-12	7.85e-14	1.77e-16	0.00e+00	4.95e-14	2.05e-13	2.09e-06	-1.05e-11	33.3%
Ionising radiation	kBq U-235 eq	1.97e-04	4.44e-07	2.21e-08	1.93e-10	0.00e+00	1.18e-08	4.34e-07	3.44e-13	-4.11e-05	33.1%
Ecotoxicity, freshwater	CTUe	2.68e-02	2.30e-04	1.44e-05	1.98e-08	0.00e+00	4.35e-06	1.99e-04	1.03e-07	0.00e+00	33.3%
Human toxicity, cancer	CTUh	2.09e-12	1.56e-14	1.09e-15	3.38e-18	0.00e+00	2.82e-16	4.18e-15	7.29e-04	-4.71e-13	33.3%
Human toxicity, non-cancer	CTUh	8.35e-11	2.41e-13	1.35e-14	9.55e-17	0.00e+00	6.20e-15	5.30e-13	1.62e-14	-5.22e-12	32.9%
Land use	Pt	2.29e-04	1.68e-04	8.22e-06	3.64e-07	0.00e+00	5.24e-06	1.63e-05	1.84e-12	-2.04e-04	33.2%

Additional environmental information

The management information will be added.
No information is available at present

Additional social and economic information

None

Information related to Sector EPD

This is a not a sector EPD

Differences versus previous versions

This is a new submission

References

General Programme Instructions of the International EPD® System. Version 4.
EPD International PCR - Construction products (2019:14, Version 1.3.3)
C-PCR-024: PV components: inverters, battery energy storage systems, combiner boxes and tracker systems (2023-01-02)
ISO 14040: Environmental management -- Life cycle assessment -- Principles and framework (2006)
ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures (2006)
ISO 14020: Environmental statements and programmes for products Principles and general requirements (2022)
EN 15804:2012+A2:2019 : Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
EN 50693:2019, Product category rules for life cycle assessments of electronic and electrical products and systems.
PEP Ecopassport PROGRAM PCR-Product Category Rules for Electrical, Electronic and HVAC-R Products (PCR-ed4-EN-2021)

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