Environmental Product Declaration

EPD of multiple products, based on representative product
In accordance with ISO 14025:2006, ISO 21930:2017 and EN 15804:2012+A2:2019/AC:2021 for:

ASW LT-G3 Series （Three phase inverters 25 to 40 kW）

ASW25K-LT-G3, ASW27K-LT-G3, ASW30K-LT-G3, ASW33K-LT-G3, SW36K-LT-G3, ASW40K-LT-G3
from

AISWEI Technology Co.Ltd.

Programme:	The International EPD® System, www.environdec.com
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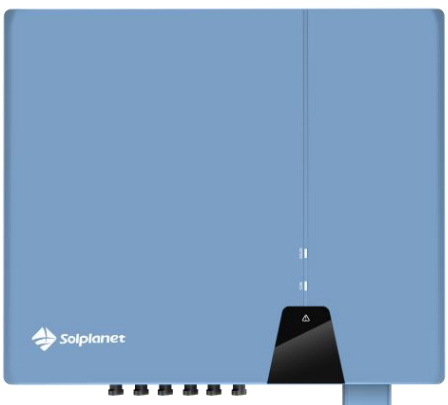
An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



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 and ISO 21930 serves as the Core Product Category Rules (PCR)	
Product Category Rules (PCR): **PCR 2019:14** Construction products Version 1.3.4 [valid until: 2025-06-20] **C-PCR-024** PV components: invertors, battery energy storage systems, combiner boxes and tracker systems, PRODUCT GROUP CLASSIFICATION: UN CPC UN CPC 461, 462, 463, 464 (SUBSETS) 2024-04-30 [valid until: 2025-06-20]	
PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.	
Life Cycle Assessment (LCA)	
LCA accountability: Si Huang, IVL Swedish Environmental Research Institute	ivl Swedish Environmental Research Institute
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: Matthew Fishwick, Fishwick Environmental Ltd Approved by: The International EPD® System	
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No	

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

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same version number up to the first two digits) 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.

The results of the end-of-life stage (module C) should be considered when using the results of the production stage (modules A1-A3).

This EPD also follows additional requirements for construction products considered as Electronic or Electric Equipment.

Company information

Owner of the EPD: AISWEI Technology Co.Ltd.
Contact: Jessica, ir@aiswei-tech.com
Address: No.18,Lane 600, Nanchezhan Road,Shanghai,China, 200011

Description of the organisation:
AISWEI Technology Co.Ltd., formerly known as SMA's China subsidiary, is a leading R&D and manufacturing company focusing on clean energy and delivers a broad portfolio of photovoltaic inverter products, hybrid inverter products, EV charger and smart energy management system. Founded in 2009, AISWEI headquarters in Shanghai, China, and has R&D centers in Suzhou, Jiangsu Province, Shanghai, and Xian, Shaanxi Province respectively, and a manufacturing base in Yangzhong, Jiangsu Province. With offices in Asia, Europe, South America, Africa, and Oceania, AISWEI serves customers in many countries and regions across the globe.

AISWEI is driven by a simple idea: solar for everybody. To this end, AISWEI is committed to technology innovation and providing high-quality and reliable products and service worldwide.

Product-related or management system-related certifications:
ISO9001

ISO14001

ISO45001

ISO50001

IECQ

SA 8000:2014

Name and location of production site:
Name: AISWEI New Energy Technology (Yangzhong) Co., Ltd. (hereinafter Yangzhong factory)
Location: No.588, Gangxing Road,Economic Development Zone, Yangzhong City, Zhenjiang City, Jiangsu Province, China.

Product information

Product name: ASW LT-G3 Series (Three phase inverters 25 to 40 kW)

Product description:
The photovoltaic grid-connected inverters in this EPD are mainly used in solar photovoltaic power generation systems to convert the DC energy of photovoltaic cells into the AC energy required by the power grid. The products are used in residential rooftops: Home users can install photovoltaic systems on their roofs, and inverters convert solar energy into household electricity; commercial buildings: Industrial and commercial users can install photovoltaic systems on the roofs of commercial buildings such as factories and work buildings to reduce electricity bills; public facilities: schools, hospitals, stations and other public facilities can also use photovoltaic systems to generate electricity, reducing dependence on the grid; agricultural applications : In the field of agriculture, inverters can be used in scenarios such as greenhouses and farms to provide clean energy.
Key Features:
Reliable: The ASW 25-40K-LT-G3 series was designed in accordance with international quality and safety standards and is a robust family of extremely reliable solar inverters. The IP66 certification rating also means these inverters will maintain their reliability in a wide range of environmental

conditions. From a purely technical angle, the DC reverse polarity protection, AC sensitive residual current monitoring, and built-in surge protection functions ensure reliable and safe long-term operation. Powerful: ASW 25-40K-LT-G3 series solar inverters are designed for power. A maximum DC input of 40A and up to 3 MPPTs with wide voltage ranges ensure highly optimised energy performance for bi-facial and large-area PV modules. These dynamic solar inverters also allow for up to 150% oversizing of the attached PV array, making them perfect for residential rooftop solar installations that vary greatly in their design, scale, and purpose.
Installation & Monitoring: The ASW 25-40K-LT-G3 series is designed to be installed quickly and easily with standard tools and the Phoenix Contact DC connectors make these inverters compatible with a wide range of solar panels. Optional Plug & Play and 4G dongles connect them to the internet and allow up to five to be monitored by Solplanet's user-friendly mobile application. Users can view real-time solar installation data, configure their inverters, and receive system alerts, right in the palm of their hand.

The products in this group differ only in active power, but the raw material, manufacturing process, appearance and main function are all the same. Figure 1 shows the picture of this series products.

Figure 1. Picture of the ASW 25-40K-LT-G3 Series

This EPD is an EPD of multiple products, based on representative product. ASW 30K-LT-G3 is selected as the representative product, because the sales demand of the products of this product is the largest among all products in this EPD (around 29%). The performance of all the products included is shown in the table below.

Table 1 Technical performance of the product group

	Technical Datasheet	ASW 25K-LT-G3	ASW 27K-LT-G3	ASW 30K-LT-G3 (representative)	ASW 33K-LT-G3	ASW 36K-LT-G3	ASW 40K-LT-G3
Input (DC)	Max. PV array power	37500 Wp STC	40500 Wp STC	45000 Wp STC	49500 Wp STC	54000 Wp STC	60000 Wp STC
	Max. input voltage	1100 V					
	MPP voltage range / rated input voltage	180 V - 1000 V / 630 V					
	Min. input voltage	160 V					
	Initial. feed-in voltage	200 V					
Output	Rated active power	25000W	27000W	30000W	33000W	36000W	40000W
	Rated apparent power	25000 VA	27000 VA	30000 VA	33000 VA	36000 VA	40000 VA
	Max. apparent power	25000VA	27000VA	30000VA	33000VA	36000VA	40000VA

	AC nominal voltage	220 V / 380 V 230 V / 400 V 240 V / 415 V					
	AC voltage range	180 V to 305 V / 312 V to 528V					
	AC grid frequency / range	50 Hz / 45 Hz to 55 Hz 60 Hz / 55 Hz to 65 Hz					
	Max. output current	39.9A	43.0A	47.8A	52.6A	57.4A	63.8A
	Harmonic distortion (THD) at rated output	< 3%					
Efficiency	Max. efficiency / European efficiency	98.4% / 98.2%					
General data	Dimensions (W / H / D)	543 / 520 / 235 mm					
	Weight	29 kg	29 kg	29 kg	30 kg	30 kg	30 kg
	Operating temperature range	-25°C … +60°C					
	Self-consumption (at night)	< 1 W					
	Max. operating altitude	3000 m					
Features	DC connection	Plug-in connector					
	AC connection	Plug-in connector					
	Mounting type	Wall-mount bracket					
	Country of manufacture	China					
	Certificates and approvals (more available on request)	CE, EN50549 ,IEC62109, IEC62116, IEC61727, IEC61000, NB/T 32004					

UN CPC code:
46132

Geographical scope:
A1-A3 China, A4 from China to GLO, A5-D GLO.

LCA information

Functional unit:
According to the c-PCR, the functional unit is defined as: 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.
The result per FU was calculated by dividing the result of one unit of representative product by the amount of electricity converted through the product for 25 years. The amount of electricity converted by one unit of representative inverter is calculated as: output rated AC active power*average sunshine hours per year*efficiency*RSL.

Reference service life:
25 years.

Time representativeness:
2023 (January to December).

Database(s) and LCA software used:

Ecoinvent 3.9.1, SimaPro version 9.6.0.1, EF3.1.

Description of system boundaries:
The scope of the EPD generated corresponds to “Cradle to grave and module D (A+B+C+D)” which serves type (c) EPD, assessing the potential environmental impacts associated with the studied product. The information module included in the study is A1-A3, A4, A5, B1-B7, C1-C4, and D, no processes are omitted or excluded in this study.

A1-A3:
The products are manufactured in Jiangsu province, China. All environmentally relevant flows of energy and materials crossing the system boundaries have been accounted for (e.g., energy, material resources, wastes and emissions). AISWEI treats air emission to meet the requirements of discharging after treatment. AISWEI doesn’t have wastewater generation during the manufacturing processes. For the solid waste (industrial waste including waste paper and waste plastic), it is sent to the third party (certified disposal companies) for treatment, so the waste treatment of the waste generated during the manufacturing process was included in the system boundary.
A4:
The products are sent to and used in Germany (86%), Poland (6%), Brazil (3%), Pakistan (2%). For the A4 module, the specific data of the transportation information from the manufacturing factory to the departure port and from the departure port to the destination port was provided by AISWEI, which is 330 km and 11 114 km (weighted average) by truck and boat respectively. The distance between the destination port and the downstream central warehouses of different destination cities overseas was provided by AISWEI’s downstream clients, which is 550 km by truck. In addition, the transport packaging is assumed to become waste in this stage and is treated to end-of-life state. The transport packaging wasted here includes 0.67 kg wooden pallet and 0.09 kg PE film. The biogenic CO_2 stored in transport packaging was balanced out in A4 stage.
A5:
With regard to the A5 stage, the installation requires energy, which was assumed to be 1kWh because of no specific data available. There is no water use as well as any other resource use during this stage. No product loss was generated in this stage. Also, according to the information provided by AISWEI, the product packaging is assumed to become waste in this stage and is treated to end-of-life state. The product packaging wasted here includes 0.046 kg printed paper, 4.76 kg corrugated board, and 1.31 kg plastic bag. The biogenic CO_2 stored in product packaging was balanced out in A5 stage.
B:
In module B, the product in this study only consume energy, and does not generate emission or consume water during the whole use phase. In addition, according to AISWEI, under normal conditions (no damage to the building due to unpredictable disasters such as earthquakes), there is no need for maintenance, repairs, replacements, and refurbishment during the life cycle until the building is scrapped. So the environmental burdens from Module B1-B5 and B7 were assumed to be zero.
For Module B6, the following formula is used to calculate the electricity converted and consumed during the service life of the representative product:
The electricity converted through the product:
E1[kWh]=output rated AC active power*average local annual sunshine*RSL=30kW*1 623h*25year
The electricity loss when work:
E2[kWh]= E1*(1-energy efficiency)=30kW*1 623h*25year*(1-0.982).
E3[kWh]=product standby power(kW) * Standby hours per year * RSL=0.001kW*7 137h* 25year
Total electricity consumption in 25 years= E2[kWh]+ E3[kWh]
Total electricity converted after loss in 25 years is=E1[kWh]- E2[kWh].

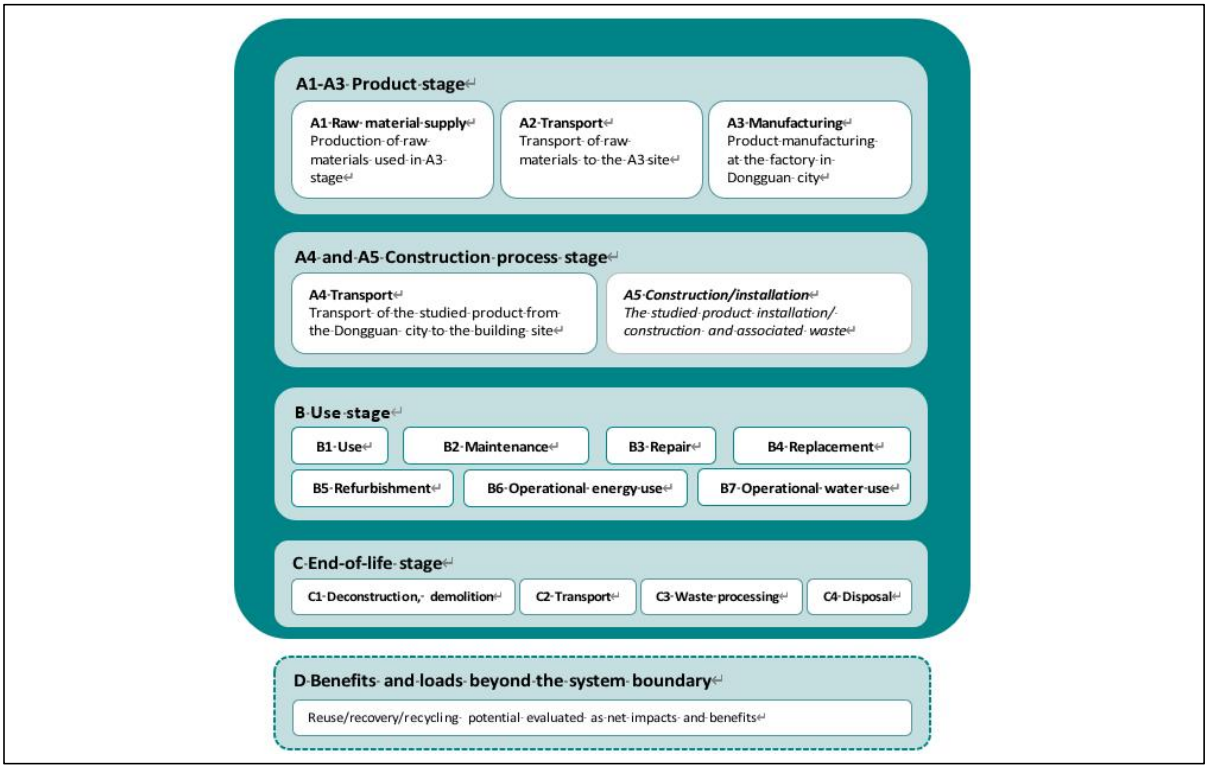
According to c-PCR (Page 13), application of other method to calculate the total produced electricity for the reference PV system and the energy consumption of the covered product are possible if justified, for example by reference to technical standards or research papers. Since AISWEI is not involved in the designing, building, and operating of a PV system, they don't have the capacity to calculate the produced electricity for a whole PV plant. The focus of the study is on one piece inverter, it is easier to calculate the produced electricity through the kW of the inverter combined its efficiency.This method is also used widely by some similar studies (https://ske-solar.com/wp-content/uploads/2021/01/Zertifikat-Product-Carbon-Footprint-Report-f%C3%BCr-HUAWEI-SUN2000-6KTL-L1-Wechselrichter.pdf; https://understandsolar.com/solar-inverter-efficiency/). In addition, power loss calculation method for electronic products can also be found in in basic electrical engineering textbooks and resources such as (https://www.epditaly.it/en/wp-content/uploads/2016/12/EPD-report-EPDItaly-ZCS-003.pdf).

C1-C4:

The modelling of the C1 module is the hypothesis based on the A5 module, it is assumed that the consumption of energy in the deconstruction stage is the same as it is in A5 module. For the C2 module, conservative assumptions have been made that the waste product would be transported for 1 000 km by truck. For the waste processing C3 module, disposal C4 module, and D module (benefits and loads beyond the system boundary), the default value of material recovery rate, energy recovery rate and disposal rate is referred to EN 50693. The total waste product is 31.23 kg, among which 10.89 kg is for material recovery, 1.38 kg is for energy recovery, and 18.96 kg goes to landfill.

Note that the scenarios included are currently in use and are representative for one of the most probable alternatives. Additional declaration of representative mixes for the relevant region is permissible.

System diagram:



Manufacturing processes:

As the manufacturing process is important to understand the whole studied system, the description of the main manufacturing processes for producing the studied product is explained as below. A flow chart of product manufacturing is shown below.

Figure 2. The main production process of studied products.

As shown in Figure 2, some of the components such as PCB, cable and resistors are bought from upstream suppliers and assembled in the manufacturing factory. The assembly process mainly involves soldering various devices and PCBs together by melting solder paste. The assembled products will pass a number of inspections in turn, and then packaged into the warehouse.

Since the studied products are produced in Jiangsu province, China, the grid mix data on electricity for the production site was based on grid mix of east China, so the datasets of East China Power Grid "CN-ECGC: market for electricity, low voltage" was selected, with the GWP-GHG of 0.886 kg CO_2 eq/kWh.

Note that the Guarantees of Origin market in China represents an extremely small proportion of production and consumption, and therefore the consumption mix is effectively the same as the residual mix.

Allocation:

No co-product allocation has been applied in this study i.e. all burdens are allocated to the final studied products. During data collection, allocation according to physical properties were applied. To specify, the energy use, auxiliary materials consumption, and waste generation for per functional unit of the product is calculated by dividing the total amount of these values by the yield amount of all products. For the allocation of waste, this study strictly follows the PCR. Specifically, the waste allocation is based on the polluter pays principle. For environmental burden from the waste generated from the manufacturing process, it is allocated to the studied product. For the environmental burden of the end-of-life stage, it is allocated to the studied product.

Cut-off rules:

The cut-off criteria established by the PCR is that data for elementary flows to and from the product system contributing to a minimum of 95% of the declared environmental impacts shall be included (not including processes that are explicitly outside the system boundary). This study strictly follows the cut-off rules and no flows are cut off.

For this EPD, the infrastructure and capital goods are not included in the analysis for modules A1-A5, C and D since they are used plenty of times for several years for the product. However, we have included infrastructure and capital goods for module B6 in relation to the PV modules used to generate electricity to power the invertor, to adopt a conservative approach as this was seen to be more directly attributable to the product system.

All results in this report are calculated by the EN 15804+A2. The "EN 15804 reference package" is calculated based on EF 3.1.

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	X	X	X	X	X	X	X	X	X	X	X	X
Geography	CN	CN	CN	CN to GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO
Specific data used	3%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – product	3%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

(1) Modules included in the EPD (X) and the modules not declared (ND).

In general, time representation of the dataset's selection is good for the studied products, the technical representation is OK, the geographical representation is fair or good.

Content Declaration

Table 2 Product content per unit of the representative product

Product components	Weight, kg	Post-consumer material, weight-% of total product	Biogenic material, kg C/product	Weight biogenic carbon, kg CO2/product
Steel	0.92	0.00%	0.00	0.00
Copper	0.19	0.00%	0.00	0.00
Aluminum	14.35	0.00%	0.00	0.00
Plastic	2.76	0.00%	0.00	0.00
Electronic components	13.02	0.00%	0.00	0.00
TOTAL	31.23	0.00%	0.00	0.00
Product Packaging and transportation materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/product**	**Weight biogenic carbon, kg CO2/product**
Wooden pallet	0.67	2.15%	0.40	1.47
Corrugated board	4.76	15.24%	2.14	7.85
Plastic	1.40	4.50%	0.00	0.00
Printed Paper	0.05	0.15%	0.00058	0.002
TOTAL	6.88	22.03%	2.54	9.31

Since all the products included in the study are the same except for active power, the content declaration of the rest products in the group are the same as the representative products.

At the time of data collection, no substance included in the Candidate List of Substances of Very High Concern (SVHC) for authorization under the REACH Regulations is present in the products covered by this LCA and EPD either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

Results of the environmental performance indicators

The functional unit is defined as: the inverting functionality is 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.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks. In the table below, marked with an asterisk, results of the following environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator: Abiotic depletion potential for non-fossil resources (ADP-minerals & metals), Abiotic depletion potential for fossil resources (ADP-fossil), Water (user) deprivation potential, deprivation-weighted, water consumption (WDP).

For the calculation of indicators PERM and PENRM, this EPD follows option A of the PCR.

Mandatory impact category indicators according to EN 15804

Results per functional unit of representative product (30K)

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	7.18 E-04	9.02 E-06	3.23 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.76 E-03	0.00 E+00	3.79 E-07	5.03 E-06	3.49 E-06	1.25 E-05	-1.82 E-04
GWP-biogenic	kg CO_2 eq.	-4.61 E-06	1.22 E-06	6.58 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	8.08 E-06	0.00 E+00	6.28 E-09	1.44 E-09	1.56 E-07	1.91 E-10	1.02 E-06
GWP-luluc	kg CO_2 eq.	1.48 E-06	5.47 E-09	1.71 E-09	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	3.36 E-06	0.00 E+00	1.60 E-09	2.59 E-09	1.62 E-09	3.48 E-11	-3.29 E-08
GWP-total	kg CO_2 eq.	7.15 E-04	1.02 E-05	9.81 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.77 E-03	0.00 E+00	3.87 E-07	5.03 E-06	3.65 E-06	1.25 E-05	-1.81 E-04
ODP	kg CFC 11 eq.	1.61 E-11	1.33 E-13	1.39 E-14	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.30 E-10	0.00 E+00	4.32 E-15	7.51 E-14	1.30 E-14	3.50 E-15	-1.40 E-12
AP	mol H^+ eq.	1.13 E-05	1.26 E-07	3.43 E-09	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.38 E-05	0.00 E+00	1.38 E-09	1.78 E-08	6.53 E-09	1.34 E-08	-1.84 E-06
EP-freshwater	kg P eq.	4.77 E-07	5.49 E-10	5.47 E-10	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.19 E-06	0.00 E+00	5.16 E-10	4.08 E-10	1.73 E-10	1.02 E-11	-1.02 E-07
EP-marine	kg N eq.	9.71 E-07	3.30 E-08	1.34 E-09	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.06 E-06	0.00 E+00	3.08 E-10	5.84 E-09	1.99 E-09	6.02 E-09	-2.34 E-07
EP-terrestrial	mol N eq.	1.07 E-05	3.62 E-07	1.16 E-08	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.15 E-05	0.00 E+00	2.48 E-09	6.19 E-08	2.39 E-08	6.51 E-08	-2.40 E-06
POCP	kg NMVOC eq.	4.81 E-06	1.05 E-07	3.20 E-09	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	7.83 E-06	0.00 E+00	7.17 E-10	2.39 E-08	5.80 E-09	5.87 E-08	-7.28 E-07
ADP-minerals& metals*	kg Sb eq.	7.28 E-08	2.01 E-11	4.64 E-12	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.22 E-07	0.00 E+00	3.95 E-12	1.60 E-11	9.00 E-12	1.64 E-13	-7.82 E-10
ADP-fossil*	MJ	9.50 E-03	1.18 E-04	8.28 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.22 E-02	0.00 E+00	5.50 E-06	7.07 E-05	9.32 E-06	1.09 E-06	-1.84 E-03

WDP*	m^3	1.46 E-04	4.29 E-07	3.35 E-07	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.67 E-03	0.00 E+00	7.03 E-08	3.13 E-07	2.38 E-07	1.50 E-07	-1.80 E-05
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

Results per functional unit of representative product (30K)

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	7.23 E-04	9.02 E-06	3.24 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.77 E-03	0.00 E+00	3.87 E-07	5.03 E-06	3.65 E-06	1.25 E-05	-1.81 E-04

Resource use indicators

Results per functional unit of representative product (30K)

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	9.55 E-04	9.79 E-06	5.35 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	7.29 E-02	0.00 E+00	1.65 E-06	8.98 E-07	1.03 E-06	2.57 E-08	-3.32 E-05
PERM	MJ	6.03 E-05	-8.54 E-06	-5.18 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
PERT	MJ	1.02 E-03	1.25 E-06	1.73 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	7.29 E-02	0.00 E+00	1.65 E-06	8.98 E-07	1.03 E-06	2.57 E-08	-3.32 E-05
PENRE	MJ	9.38 E-03	1.21 E-04	5.51 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.22 E-02	0.00 E+00	5.50 E-06	7.07 E-05	4.39 E-05	3.57 E-05	-1.84 E-03
PENRM	MJ	1.19 E-04	-3.13 E-06	-4.68 E-05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	-3.46 E-05	-3.46 E-05	0.00 E+00
PENRT	MJ	9.50 E-03	1.18 E-04	8.28 E-06	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.22 E-02	0.00 E+00	5.50 E-06	7.07 E-05	9.32 E-06	1.09 E-06	-1.84 E-03
SM	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
RSF	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
NRSF	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
FW	m^3	5.24 E-06	1.40 E-08	1.38 E-08	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	6.18 E-05	0.00 E+00	5.09 E-09	9.86 E-09	7.68 E-09	4.56 E-09	-4.95 E-07

[1] 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.

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 unit of representative product (30K)															
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7.82 E-07	7.50 E-09	5.98 E-08	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.94 E-05	0.00 E+00	4.39 E-10	1.77 E-09	3.02 E-08	2.44 E-08	-4.24 E-08
Non-hazardous waste disposed	kg	9.97 E-05	3.81 E-06	2.40 E-07	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.47 E-04	0.00 E+00	3.20 E-08	3.43 E-06	6.35 E-07	3.86 E-06	-3.19 E-05
Radioactive waste disposed	kg	1.77 E-08	1.98 E-11	2.38 E-11	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.07 E-08	0.00 E+00	2.28 E-11	1.43 E-11	5.56 E-12	3.43 E-13	-2.35 E-09

Output flow indicators

Results per functional unit of representative product (30K)															
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Material for recycling	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	9.11 E-06	0.00 E+00	0.00 E+00
Materials for energy recovery	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.16 E-06	0.00 E+00	0.00 E+00
Exported energy, electricity	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.53 E-06	0.00 E+00	0.00 E+00
Exported energy, thermal	MJ	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	8.86 E-06	0.00 E+00	0.00 E+00

Additional Information

This EPD covers the ASW 25-40K-LT-G3 series products and the result tables above show the results for the representative product (ASW 30K-LT-G3). The result variation for all products within this group are provided in the table below.

Variation between the representative product and other products in this EPD

LCA result of one functional unit product (A-C)	Min 25K	Representative 30K	Max 40K	Differ Min	Differ Max
1. Environmental impact indicators					
00 Global warming potential (GWP-GHG) [kg CO2 eq.]	2.68E-03	2.53E-03	2.35E-03	6%	7%
01 EN15804+A2 Climate Change - total [kg CO2 eq.]	2.68E-03	2.53E-03	2.35E-03	6%	7%
02 EN15804+A2 Climate Change, fossil [kg CO2 eq.]	2.66E-03	2.51E-03	2.34E-03	6%	7%
03 EN15804+A2 Climate Change, biogenic [kg CO2 eq.]	1.21E-05	1.14E-05	1.07E-05	6%	7%
04 EN15804+A2 Climate Change, land use and land use change [kg CO2 eq.]	5.16E-06	4.86E-06	4.51E-06	6%	7%
05 EN15804+A2 Ozone depletion [kg CFC-11 eq.]	1.50E-10	1.46E-10	1.42E-10	2%	3%
06 EN15804+A2 Acidification [Mole of H+ eq.]	2.75E-05	2.52E-05	2.30E-05	9%	9%
07 EN15804+A2 Eutrophication, freshwater [kg P eq.]	1.77E-06	1.67E-06	1.56E-06	6%	7%
08 EN15804+A2 Eutrophication, marine [kg N eq.]	3.29E-06	3.08E-06	2.85E-06	7%	8%
09 EN15804+A2 Eutrophication, terrestrial [Mole of N eq.]	3.50E-05	3.27E-05	3.01E-05	7%	8%
10 EN15804+A2 Photochemical ozone formation, human health [kg NMVOC eq.]	1.39E-05	1.28E-05	1.17E-05	8%	9%
11 EN15804+A2 Resource use, mineral and metals [kg Sb eq.]	2.09E-07	1.95E-07	1.78E-07	7%	9%
12 EN15804+A2 Resource use, fossils [MJ]	3.39E-02	3.19E-02	2.97E-02	6%	7%
13 EN15804+A2 Water use [m³ world equiv.]	1.84E-03	1.81E-03	1.78E-03	2%	2%

LCA result of one functional unit product (A1-A3)	Min 25K	Representative 30K	Max 40K	Differ-Min	Differ-Max
00 Global warming potential (GWP-GHG) [kg CO2 eq.] （A1-A3）	7.23E-04	7.23E-04	7.48E-04	0%	3%

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