

ACS880-x7

PRODUCT ENVIRONMENTAL PROFILE

Environmental Product Declaration

VARIABLE SPEED DRIVE ACS880-x7 250 TO 3 200 kW



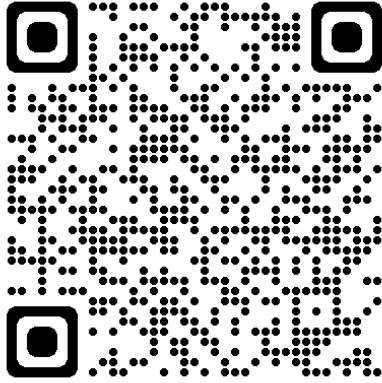
ORGANIZATION		WEBSITE			
ABB System Drives		new.abb.com/fi			
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ABB Purpose & Embedding Sustainability

ABB is demonstrating their commitment to sustainability by making themselves sustainable. Across their own operations and value chain, aspiring to become a role model for others to follow. With **ABB Purpose** ABB is focusing on reducing harmful emissions, preserving natural resources and championing ethical and humane behavior to achieve this.

ABB has also taken part of the **The Ellen MacArthur Foundation's**.



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Abbreviations

APOS	Allocation at point of substitution
CTU	Comparative Toxic Unit
DOL	Direct on Line
EoL	End of Life
GWP	Global warming potential
HVAC-R	Heating, Ventilation, Air conditioning and refrigeration
LCA	Life Cycle Assessment
LCIA	Life Cycle Impact Assessment
PC	Polycarbonate
PCBA	Printed circuit board assembly
PCR	Product Category Rules
PE	Polyethylene
PEP	Product Environmental Profile
PET	Polyethylene terephthalate
PSR	Product-Specific Rules
PVC	Polyvinyl chloride
R factors	Proportions of recyclable materials
VSD	Variable Speed Drive
WEEE	Waste from Electric and Electronic Equipment

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General Information

Reference product	ACS880-07-2860A-7
Description of the product	<p>Variable speed drive (VSD) is used to control the speed and torque of (three phase) electrical motors (e.g asynchronous, permanent magnet and synchronous reluctance motors), which are used in compressors, conveyors, mixers, pumps, centrifuges, fans and many other variable and constant torque applications in different industries.</p> <p>The benefits of VSD control are gained because of precise process control, which leads to significant energy savings through optimal speed control.</p>
Functional unit	<p>To control the speed and torque of a three phase motors (Asynchronous and Permanent Magnet motors) in energy management for machines application. Calculation of the environmental impacts is based on 15 years of product service lifetime. The usage profile considered is according to EN50598-3:2015.</p> <p>The usage profile considered is 11.4% uptime in use phase at 100% loading rate, 40.0% uptime in use phase at 50% loading rate, 5.7% uptime in standby phase and 42.9% in OFF phase.</p>

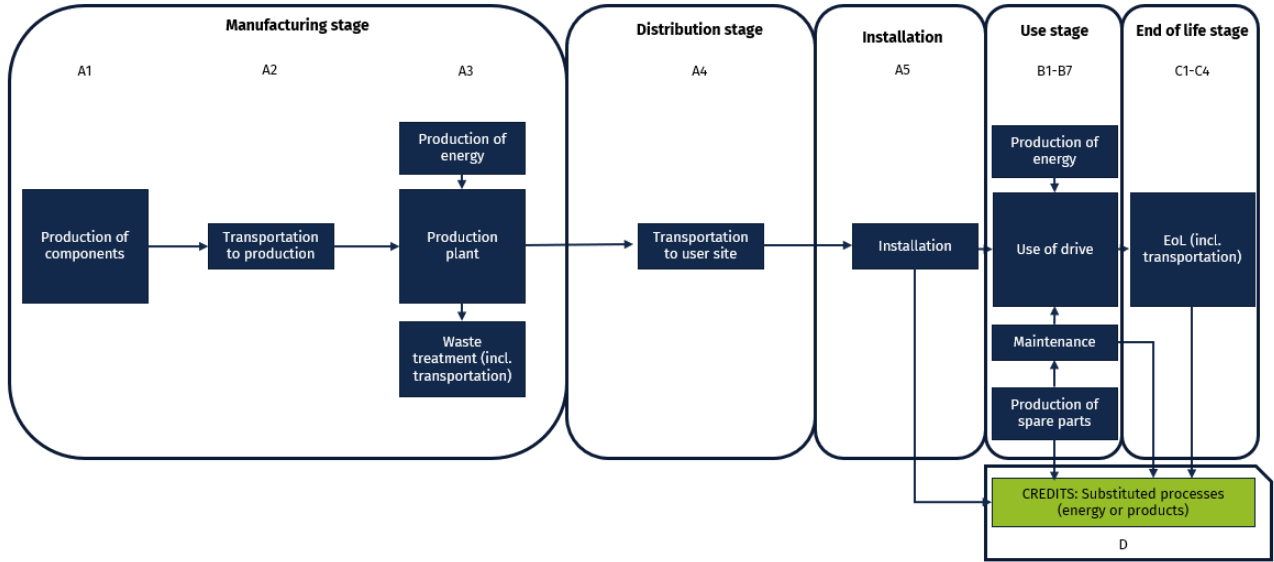
This PEP covers the following products of the same product family

Product	PN (kW)	IN (A)	UN (V)	Enclosure class
ACS880-07-2860A-7 (Representative product)	2800	2860	690	IP22
ACS880-07, 6-pulse	630 - 2800	1070 - 2860	300, 500, 690	IP22
ACS880-07, 12-pulse	560 – 2800	990 - 2860	300, 500, 690	IP22
ACS880-17	250 – 3200	420 - 3310	300, 500, 690	IP22
ACS880-37	250 – 3200	420 - 3310	300, 500, 690	IP22

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System boundary

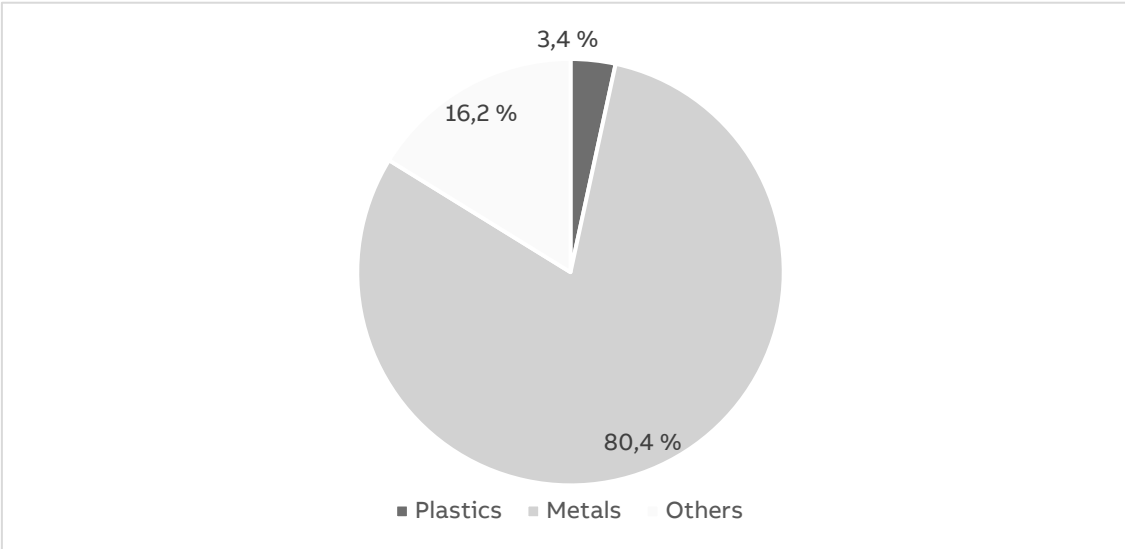


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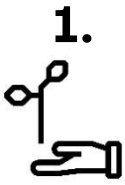


Constituent materials

Total weight of Reference product 2 918.84 kg including the product and its packaging.



Plastics as % of weight		Metals as % of weight		Other as % of weight	
Name	Weight-%	Name	Weight-%	Name	Weight-%
Nylon	1.0%	Steel	54.5%	Electronic components	8.6%
PC plastic	0.9%	Copper	18.7%	Wood	5.7%
		Aluminium	6.9%	Others	3.7%



1. Environmental Information

<p>Manufacturing</p>	<p>Manufacturing includes life cycle stages from cradle-to-gate, including material acquisition, component manufacturing, assembly of products and transportation between these facilities.</p> <p>Component manufacturing is fully modelled with secondary data since supplier-specific data was not available. Some of the components are modelled with component specific average data (e.g. Capacitors) and the rest of the components with material specific (e.g. PC plastic part) secondary data. Component specific data was used whenever it was available in Ecoinvent database. For components manufactured within Europe, European average datasets were used whenever available. Otherwise, global average datasets for component manufacturing were used. Thus, the energy model is either average Europe or Global.</p> <p>Manufacturing at ABB site</p> <p>Data about the energy consumption was obtained at annual stage for Helsinki and Jüri plants and used for all plants. Data was allocated between production lines by floor area. Energy model for manufacturing at ABB site is based on local electricity market mix and supplier specific district heat for Helsinki and natural gas district heat for other sites. Waste flows from manufacturing were obtained for Helsinki site and used for all sites.</p>
<p>Distribution</p>	<p>Based on primary data of the year 2022 these products are sold globally, so the PCR global default distances were used. Weight of packaging is 166 kg.</p>
<p>Installation</p>	<p>Installation stage considers only waste management of packing materials of the product. Energy consumption in installation is negligible and is excluded.</p>
<p>Use</p>	<p>The usage profile considered is according to EN50598-3:2015: 11.4% uptime in use phase at 100% loading rate, 40.0% uptime in use phase at 50% loading rate, 5.7% uptime in standby phase and 42.9% in OFF phase for a reference service life of 15 years. Supply voltage is according to unit nominal voltage and default switching frequency is used. Use stage energy model is based on a global market mix from (of year 2018) from Ecoinvent. Thus, the use stage related environmental impacts are likely to be different at the user site depending on the origin of energy consumed. More information about ABB products load points at https://ecodesign.drivesmotors.abb.com/drive.</p> <p>Production of replacement parts and waste treatment of removed parts is considered in the use stage.</p>
<p>End of life</p>	<p>EoL treatment of the product is modelled based on the ABB recycling instructions. R factors of the PCR requirements are applied for EoL modelling to estimate the share of materials directed for material and energy recovery and landfilling after manual dismantling and mechanical treatment of WEEE waste. Mainly global energy models are used in the datasets used for EoL.</p>
<p>Software and data-base used</p>	<p>Simapro 9.5.0.1 and Ecoinvent 3.8 (APOS system model)</p>
<p>Standards</p>	<p>ISO14040:2006, ISO14044:2006, PEP Ecopassport PCR-ed4-EN-2021 09 06</p>

<p>STATUS Approved</p>	<p>SECURITY LEVEL Public</p>	<p>DOCUMENT ID. ABBG-00641-V01.01-EN</p>	<p>REV. A</p>	<p>LANG. en</p>	<p>PAGE 7/22</p>
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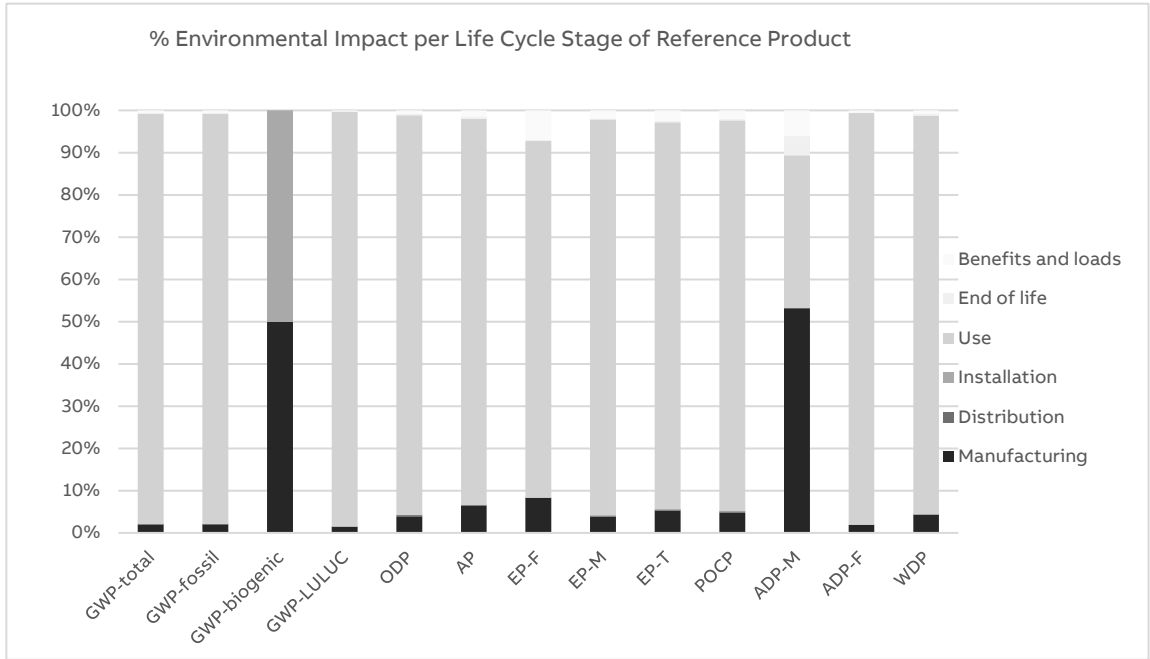


Environmental impacts

Reference lifetime	15 years			
Product category	Variable speed drives			
Installation elements	Installation elements vary depending on the use application and installation site and thus were excluded from this study. Reference the hardware manual for more details.			
Use scenario	See functional unit.			
Geographical representativeness	Components are sourced globally. Manufacturing is localized to Finland, Estonia, India and China. Use stage is modelled with a global market average representing the year 2018.			
Technological representativeness	<p>Primary data used in the modelling represents year 2022 for other data and 2023 for waste flows in manufacturing. Data for the assembly sites were received as primary data. Most components are modelled with secondary data, which is not specific to the actual components used by ABB.</p> <p>Technological representativeness otherwise is as good as possible based on data availability.</p>			
Energy model used	Manufacturing	Installation	Use	End of life
	Global / Europe	Global	Global	Global

Compulsory Indicators								
Impact indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Climate change - total (GWP-total)	kg CO2 eq.	1.46E+06	2.98E+04	7.95E+02	3.02E+02	1.42E+06	3.54E+03	-8.55E+03
Climate change - fossil (GWP-fossil)	kg CO2 eq.	1.46E+06	3.00E+04	7.95E+02	1.73E+01	1.42E+06	3.54E+03	-8.55E+03
Climate change - biogenic (GWP-biogenic)	kg CO2 eq.	0.00E+00	-2.85E+02	0.00E+00	2.85E+02	0.00E+00	0.00E+00	0.00E+00
Climate change - land use and land use change (GWP-LULUC)	kg CO2 eq.	2.95E+03	4.46E+01	4.42E-01	1.97E-02	2.90E+03	3.13E+00	-6.63E+00
Ozone depletion (ODP)	kg CFC-11 eq.	5.29E-02	2.12E-03	1.66E-04	2.86E-06	5.04E-02	2.01E-04	-4.00E-04
Acidification (AP)	mol H+ eq.	7.84E+03	5.17E+02	1.81E+01	9.21E-02	7.26E+03	4.14E+01	-1.16E+02
Eutrophication aquatic freshwater (EP-F)	kg P eq.	7.48E+02	6.73E+01	3.59E-02	7.12E-03	6.78E+02	2.32E+00	-5.59E+01
Eutrophication aquatic marine (EP-M)	kg N eq.	1.43E+03	5.65E+01	4.51E+00	2.82E-02	1.37E+03	3.30E+00	-2.79E+01
Eutrophication terrestrial (EP-T)	mol N eq.	1.46E+04	7.93E+02	5.00E+01	2.77E-01	1.37E+04	3.82E+01	-3.79E+02
Photochemical ozone formation (POCP)	kg NMVOC eq.	3.89E+03	1.94E+02	1.32E+01	7.93E-02	3.67E+03	1.13E+01	-8.19E+01
Depletion of abiotic resources – minerals and metals (ADP-M)	kg Sb eq.	1.75E+01	9.94E+00	1.29E-03	7.53E-05	6.69E+00	8.43E-01	-1.12E+00
Depletion of abiotic resources – fossil fuels (ADP-F)	MJ	1.90E+07	3.64E+05	1.08E+04	2.91E+02	1.86E+07	2.79E+04	-8.64E+04
Water use (WDP)	m3 world eq.	2.63E+05	1.17E+04	2.82E+01	2.65E+00	2.50E+05	1.23E+03	-2.11E+03

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Other Indicators

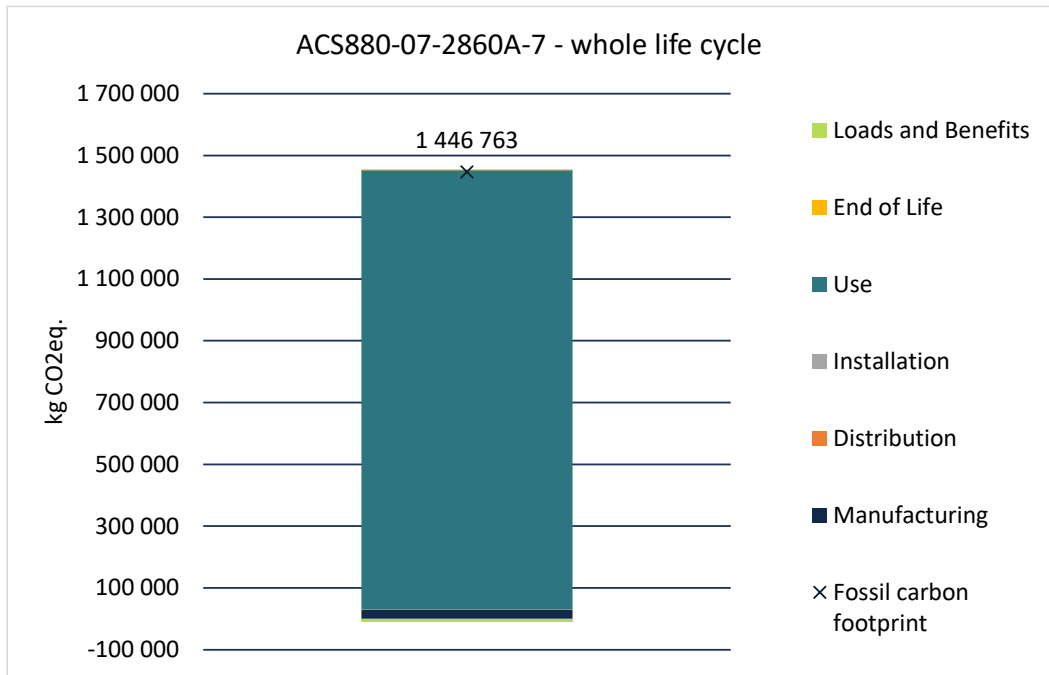
Optional Impact indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Particulate matter emissions	Disease incidence	5.78E-02	2.83E-03	4.81E-05	1.47E-06	5.47E-02	1.75E-04	-1.06E-03
Ionizing radiation, human health	kBq U235 eq.	2.23E+05	1.37E+04	4.98E+01	4.13E+00	2.09E+05	3.71E+02	-5.40E+02
Eco-toxicity (fresh water)	CTUe	3.36E+07	5.75E+06	7.57E+03	2.41E+02	2.75E+07	2.65E+05	-4.28E+06
Human toxicity, cancer effects	CTUh	6.43E-04	1.77E-04	3.74E-07	9.93E-09	4.17E-04	4.85E-05	-2.89E-05
Human toxicity, non-cancer effects	CTUh	2.12E-02	5.03E-03	6.21E-06	3.99E-07	1.52E-02	1.00E-03	-2.88E-04
Land use	-	3.61E+06	3.64E+05	5.61E+03	2.07E+02	3.22E+06	2.63E+04	-7.39E+04
Resource use indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	4.04E+05	1.31E+04	2.83E+01	4.75E+00	3.90E+05	1.26E+03	-3.89E+03
Use of renewable primary energy resources as raw materials	MJ	1.47E+03	1.44E+03	0.00E+00	0.00E+00	2.31E+01	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	4.06E+05	1.45E+04	2.83E+01	4.75E+00	3.90E+05	1.26E+03	-3.89E+03

PRODUCT ENVIRONMENTAL PROFILE

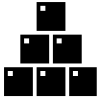
Use of non-renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	1.90E+07	3.42E+05	1.17E+04	2.91E+02	1.86E+07	2.79E+04	-8.63E+04
Use of non-renewable primary energy resources as raw materials	MJ	9.81E+03	9.03E+03	1.12E+01	0.00E+00	7.67E+02	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	1.90E+07	3.51E+05	1.17E+04	2.91E+02	1.86E+07	2.79E+04	-8.63E+04
Use of secondary materials	kg	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
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
Net use of fresh water	m ³	9.13E+03	2.91E+02	8.94E-01	1.59E-01	8.80E+03	3.13E+01	-5.60E+01
Waste category indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Hazardous waste disposed	kg	2.56E+03	4.15E+02	1.75E-02	6.77E-04	9.29E+00	2.13E+03	-2.40E-01
Non-hazardous waste disposed	kg	1.05E+05	7.29E+03	4.40E+02	1.24E+02	9.52E+04	1.87E+03	-2.87E+03
Radioactive waste disposed	kg	5.92E+01	1.17E+00	8.04E-02	1.97E-03	5.77E+01	1.93E-01	-2.53E-01
Output flow indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
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
Materials for recycling	kg	2.23E+03	4.10E+02	0.00E+00	0.00E+00	1.58E+01	1.80E+03	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

GWP fossil impacts of the studied product during the Reference service life.

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Extrapolation rules for the product family

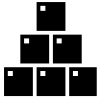
The ACS880-x7 product family includes a variety of variable speed drives with similar functions. According to the conducted LCA study, proportionality rules to evaluate the environmental impacts of other products from this product family have been defined. The products in this product family are made from similar modules. These modules and their environmental impacts are presented in additional environmental information.

For drive products covered by the PEP other than the Reference product, the environmental impacts for each phase of the lifecycle are obtained by multiplying the values of the Reference product by the extrapolation factors calculated from the following formulas:

Life Cycle Stage	Extrapolation rules
Manufacturing	$(0.000334 \cdot m + 0.00393) \cdot EI$
Installation	$(0.000334 \cdot m + 0.00393) \cdot EI$
Distribution	$(0.000334 \cdot m + 0.00393) \cdot EI$
Use	$\frac{\text{Energy losses in use of target product [kWh]}}{\text{Energy losses in use of reference product [kWh]}} \cdot EI$
End-of-Life	$(0.000334 \cdot m + 0.00393) \cdot EI$
Benefits and loads	$(0.000334 \cdot m + 0.00393) \cdot EI$

Where m=mass of target product with packaging [kg], and EI=Environmental impact of reference product for this life cycle stage. The extrapolation factors need to be applied to each environmental impact indicator in each life cycle stage of ACS880-07-2860A-7 results.

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Additional environmental information

The ACS880-07, ACS880-17 and ACS880-37 variable speed drives are all built from similar modules. The modules are also sold separately for other than ABB cabinet builds and applications. LCIA-results and calculation factors are presented for the modules included in the ACS880-x7 product series, to better understand the environmental impact of the different modules and for clients acquiring only the modules. The Frame sizes in parentheses are exceptions, where only a couple of these frame sizes modules are included in the ACS880-07, 12-pulse versions.

Unit type	Model identifier	Frame sizes	Manufacturing site
Inverter unit (INU)	ACS880-104 -series	R8i, (R7i)	Finland, China, India
Diode supply unit (DSU)	ACS880-304 -series	D8T, (D7t)	Estonia
Supply unit (converter) (ISU)	ACS880-204 -series	R8i, (R7i)	Finland, China, India
LCL-line filter (BLCL)	ACS880-BLCL -series	BLCL-2x-x (BLCL-1x-x)	Estonia
Cabinet, with Controls and connections	Not sold separately. No results presented.	1xD8T + 2xR8i 2xD8T + 2xR8i 2xD8T + 3xR8i 3xD8T + 3xR8i 3xD8T + 4xR8i 4xD8T + 4xR8i 4xD8T + 5xR8i 1xR8i + 1xR8i 2xR8i + 2xR8i 3xR8i + 3xR8i 4xR8i + 4xR8i 6xR8i + 5xR8i 6xR8i + 6xR8i	Estonia, Finland

Inverter unit and Supply unit ACS880-104 / ACS880-204

Reference module ACS880-104-0600A-7

Compulsory Indicators								
Impact indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Climate change - total (GWP-total)	kg CO2 eq.	2.26E+05	2.57E+03	4.14E+01	5.15E+01	2.23E+05	1.82E+02	-6.52E+02
Climate change - fossil (GWP-fossil)	kg CO2 eq.	2.26E+05	2.61E+03	4.13E+01	4.70E+00	2.23E+05	1.82E+02	-6.52E+02
Climate change - biogenic (GWP-biogenic)	kg CO2 eq.	2.80E-15	-4.69E+01	0.00E+00	4.67E+01	0.00E+00	1.81E-01	0.00E+00
Climate change - land use and land use change (GWP-LULUC)	kg CO2 eq.	4.60E+02	3.85E+00	2.30E-02	3.28E-03	4.56E+02	1.48E-01	-3.20E-01
Ozone depletion (ODP)	kg CFC-11 eq.	8.10E-03	1.71E-04	8.64E-06	8.03E-07	7.91E-03	9.93E-06	-2.53E-05
Acidification (AP)	mol H+ eq.	1.17E+03	2.92E+01	9.40E-01	2.22E-02	1.14E+03	1.93E+00	-7.78E+00
Eutrophication aquatic freshwater (EP-F)	kg P eq.	1.09E+02	2.88E+00	1.87E-03	1.21E-03	1.06E+02	1.08E-01	-2.57E+00
Eutrophication aquatic marine (EP-M)	kg N eq.	2.19E+02	3.72E+00	2.35E-01	1.01E-02	2.15E+02	1.57E-01	-1.57E+00
Eutrophication terrestrial (EP-T)	mol N eq.	2.20E+03	4.44E+01	2.60E+00	7.65E-02	2.15E+03	1.81E+00	-1.99E+01
Photochemical ozone formation (POCP)	kg NMVOC eq.	5.91E+02	1.42E+01	6.85E-01	2.03E-02	5.76E+02	5.34E-01	-4.56E+00
Depletion of abiotic resources – minerals and metals (ADP-M)	kg Sb eq.	1.48E+00	4.12E-01	6.72E-05	2.10E-05	1.03E+00	3.95E-02	-4.71E-02
Depletion of abiotic resources – fossil fuels (ADP-F)	MJ	2.95E+06	3.16E+04	5.62E+02	6.70E+01	2.91E+06	1.32E+03	-6.55E+03
Water use (WDP)	m3 world eq.	4.00E+04	7.00E+02	1.47E+00	8.36E-01	3.93E+04	6.64E+01	-1.07E+02

Other Indicators								
Optional Impact indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Particulate matter emissions	Disease incidence	8.77E-03	1.78E-04	2.50E-06	4.05E-07	8.58E-03	8.15E-06	-6.12E-05
Ionizing radiation, human health	kBq U235 eq.	3.30E+04	2.59E+02	2.59E+00	4.52E-01	3.28E+04	1.57E+01	-4.10E+01
Eco-toxicity (fresh water)	CTUe	4.55E+06	2.19E+05	3.94E+02	7.64E+01	4.32E+06	1.66E+04	-1.89E+05
Human toxicity, cancer effects	CTUh	7.20E-05	4.92E-06	1.95E-08	2.99E-09	6.52E-05	1.86E-06	-1.44E-06
Human toxicity, non-cancer effects	CTUh	2.63E-03	1.99E-04	3.23E-07	1.02E-07	2.37E-03	5.49E-05	-1.77E-05
Land use	-	5.21E+05	1.51E+04	2.92E+02	5.70E+01	5.04E+05	1.25E+03	-3.80E+03

Resource use indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	6.21E+04	9.27E+02	1.35E+00	2.93E+00	6.12E+04	6.38E+01	-2.27E+02
Use of renewable primary energy resources as raw materials	MJ	3.81E+02	3.65E+02	0.00E+00	0.00E+00	1.54E+01	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	6.25E+04	1.29E+03	1.35E+00	2.93E+00	6.12E+04	6.38E+01	-2.27E+02

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Use of non-renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	2.95E+06	3.10E+04	5.61E+02	6.70E+01	2.91E+06	1.32E+03	-6.55E+03
Use of non-renewable primary energy resources as raw materials	MJ	6.23E+02	5.88E+02	1.44E+00	0.00E+00	3.32E+01	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	2.95E+06	3.16E+04	5.62E+02	6.70E+01	2.91E+06	1.32E+03	-6.55E+03
Use of secondary materials	kg	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
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
Net use of fresh water	m ³	1.40E+03	1.98E+01	4.27E-02	3.52E-02	1.38E+03	1.75E+00	-2.95E+00
Waste category indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Hazardous waste disposed	kg	1.26E+02	1.37E-01	8.40E-04	1.80E-04	1.45E+00	1.25E+02	-9.23E-03
Non-hazardous waste disposed	kg	1.54E+04	4.25E+02	2.11E+01	3.15E+01	1.49E+04	4.85E+01	-1.58E+02
Radioactive waste disposed	kg	9.16E+00	8.98E-02	3.85E-03	3.46E-04	9.06E+00	7.90E-03	-1.72E-02
Output flow indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
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
Materials for recycling	kg	9.71E+01	1.64E+01	0.00E+00	2.32E+00	1.17E+00	7.72E+01	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Extrapolation factors (Inverter module)

To estimate the environmental impact of a specific module, the LCIA results presented in this PEP document for each life cycle stage should be calculated with the extrapolation factors given here and the reference modules (ACS880-104-0600A-7) LCIA-results. For Inverter units other than the Reference module, the environmental impacts for each phase of the lifecycle are obtained by multiplying the values of the Reference product by the following extrapolation factors:

Product	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
ACS880-104-0470A-3	0.875	0.951	1.000	0.565	0.923	0.931
ACS880-104-0640A-3	0.914	0.969	1.000	0.739	0.954	0.961
ACS880-104-0760A-3	0.962	0.991	1.000	0.857	0.990	0.989
ACS880-104-0900A-3	0.962	0.991	1.000	1.073	0.991	0.990
ACS880-104-0440A-5	0.889	0.958	1.000	0.564	0.936	0.961
ACS880-104-0590A-5	0.915	0.972	1.000	0.718	0.959	0.961

ACS880-104-0740A-5	0.963	0.992	1.000	0.887	0.992	0.990
ACS880-104-0810A-5	0.963	0.992	1.000	0.985	0.992	0.990
ACS880-104-0340A-7	0.923	0.966	1.000	0.634	0.944	0.946
ACS880-104-0410A-7	0.923	0.966	1.000	0.723	0.944	0.946
ACS880-104-0530A-7	0.995	0.999	1.000	0.890	0.999	0.988
ACS880-104-0600A-7 (Reference module)	1.000	1.000	1.000	1.000	1.000	1.000

Diode supply unit ACS880-304

Reference module ACS880-304-0820A-7

Compulsory Indicators								
Impact indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Climate change - total (GWP-total)	kg CO2 eq.	1.05E+05	1.84E+03	5.70E+01	5.26E+01	1.02E+05	2.16E+02	-5.75E+02
Climate change - fossil (GWP-fossil)	kg CO2 eq.	1.04E+05	1.88E+03	5.69E+01	4.92E+00	1.02E+05	2.16E+02	-5.75E+02
Climate change - biogenic (GWP-biogenic)	kg CO2 eq.	0.00E+00	-4.76E+01	0.00E+00	4.76E+01	0.00E+00	0.00E+00	0.00E+00
Climate change - land use and land use change (GWP-LULUC)	kg CO2 eq.	2.12E+02	2.62E+00	3.17E-02	3.51E-03	2.09E+02	2.06E-01	-4.10E-01
Ozone depletion (ODP)	kg CFC-11 eq.	3.80E-03	1.44E-04	1.19E-05	8.34E-07	3.63E-03	1.31E-05	-2.59E-05
Acidification (AP)	mol H+ eq.	5.54E+02	2.77E+01	1.29E+00	2.32E-02	5.22E+02	2.48E+00	-7.02E+00
Eutrophication aquatic freshwater (EP-F)	kg P eq.	5.37E+01	4.72E+00	2.57E-03	1.30E-03	4.88E+01	1.43E-01	-3.17E+00
Eutrophication aquatic marine (EP-M)	kg N eq.	1.03E+02	3.68E+00	3.23E-01	1.07E-02	9.85E+01	2.07E-01	-1.66E+00
Eutrophication terrestrial (EP-T)	mol N eq.	1.04E+03	4.99E+01	3.58E+00	7.96E-02	9.85E+02	2.39E+00	-2.22E+01
Photochemical ozone formation (POCP)	kg NMVOC eq.	2.78E+02	1.19E+01	9.44E-01	2.09E-02	2.64E+02	7.02E-01	-4.94E+00
Depletion of abiotic resources – minerals and metals (ADP-M)	kg Sb eq.	1.10E+00	5.75E-01	9.25E-05	2.26E-05	4.77E-01	4.93E-02	-6.35E-02
Depletion of abiotic resources – fossil fuels (ADP-F)	MJ	1.36E+06	2.27E+04	7.75E+02	7.01E+01	1.34E+06	1.83E+03	-5.70E+03
Water use (WDP)	m3 world eq.	1.88E+04	6.62E+02	2.02E+00	9.05E-01	1.80E+04	7.94E+01	-1.35E+02

Other Indicators								
Optional Impact indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Particulate matter emissions	Disease incidence	4.13E-03	1.73E-04	3.44E-06	4.18E-07	3.94E-03	1.12E-05	-6.75E-05
Ionizing radiation, human health	kBq U235 eq.	1.52E+04	1.79E+02	3.57E+00	4.71E-01	1.50E+04	2.47E+01	-3.41E+01
Eco-toxicity (fresh water)	CTUe	2.38E+06	3.85E+05	5.42E+02	8.11E+01	1.98E+06	1.61E+04	-2.42E+05
Human toxicity, cancer effects	CTUh	3.93E-05	6.05E-06	2.68E-08	3.14E-09	3.00E-05	3.31E-06	-1.98E-06
Human toxicity, non-cancer effects	CTUh	1.36E-03	2.14E-04	4.45E-07	1.06E-07	1.09E-03	5.74E-05	-1.82E-05
Land use	-	2.51E+05	1.71E+04	4.02E+02	5.90E+01	2.31E+05	1.67E+03	-4.52E+03

Resource use indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	2.90E+04	8.39E+02	1.87E+00	3.22E+00	2.80E+04	8.11E+01	-2.66E+02
Use of renewable primary energy resources as raw materials	MJ	3.86E+02	3.71E+02	0.00E+00	0.00E+00	1.54E+01	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.94E+04	1.21E+03	1.87E+00	3.22E+00	2.81E+04	8.11E+01	-2.66E+02

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Use of non-renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	1.36E+06	2.23E+04	7.74E+02	7.01E+01	1.34E+06	1.83E+03	-5.70E+03
Use of non-renewable primary energy resources as raw materials	MJ	4.56E+02	4.23E+02	1.00E+00	0.00E+00	3.14E+01	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	1.36E+06	2.27E+04	7.75E+02	7.01E+01	1.34E+06	1.83E+03	-5.70E+03
Use of secondary materials	kg	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
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
Net use of fresh water	m ³	6.53E+02	1.76E+01	5.88E-02	3.77E-02	6.33E+02	1.98E+00	-3.59E+00
Waste category indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Hazardous waste disposed	kg	1.82E+02	3.58E-01	1.16E-03	1.86E-04	6.68E-01	1.81E+02	-1.80E-02
Non-hazardous waste disposed	kg	7.44E+03	4.43E+02	2.91E+01	3.21E+01	6.85E+03	8.54E+01	-1.98E+02
Radioactive waste disposed	kg	4.24E+00	6.94E-02	5.31E-03	3.56E-04	4.15E+00	1.30E-02	-1.64E-02
Output flow indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
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
Materials for recycling	kg	1.58E+02	2.90E+01	0.00E+00	2.57E+00	1.14E+00	1.25E+02	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Extrapolation factors (Diode supply module)

To estimate the environmental impact of a specific module, the LCIA results presented in this PEP document for each life cycle stage should be calculated with the extrapolation factors given here and the reference modules (ACS880-304-0820A-7) LCIA-results. For Diode supply units other than the Reference module, the environmental impacts for each phase of the lifecycle are obtained by multiplying the values of the Reference product by the following extrapolation factors:

Product	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
ACS880-304-0490A-3	0.463	0.444	0.950	0.731	0.374	0.381
ACS880-304-0650A-3	1.000	1.000	1.000	0.766	1.000	1.000
ACS880-304-0980A-3	1.000	1.000	1.000	1.049	1.000	1.000
ACS880-304-0490A-5	0.463	0.444	0.950	0.731	0.374	0.381
ACS880-304-0650A-5	1.000	1.000	1.000	0.766	1.000	1.000
ACS880-304-0980A-5	1.000	1.000	1.000	1.049	1.000	1.000

ACS880-304-0410A-7	0.506	0.521	0.950	0.694	0.459	0.456
ACS880-304-0570A-7	1.000	1.000	1.000	0.756	1.000	1.000
ACS880-304-0820A-7 (Reference module)	1.000	1.000	1.000	1.000	1.000	1.000

LCL line filter ACS880-BLCL

Reference module ACS880-BLCL-25-7

Compulsory Indicators								
Impact indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Climate change - total (GWP-total)	kg CO2 eq.	1.80E+05	3.40E+03	9.18E+01	5.26E+01	1.76E+05	3.86E+02	-1.24E+03
Climate change - fossil (GWP-fossil)	kg CO2 eq.	1.80E+05	3.45E+03	9.17E+01	4.92E+00	1.76E+05	3.85E+02	-1.24E+03
Climate change - biogenic (GWP-biogenic)	kg CO2 eq.	0.00E+00	-4.76E+01	0.00E+00	4.76E+01	0.00E+00	0.00E+00	0.00E+00
Climate change - land use and land use change (GWP-LULUC)	kg CO2 eq.	3.65E+02	4.43E+00	5.11E-02	3.51E-03	3.60E+02	3.44E-01	-5.41E-01
Ozone depletion (ODP)	kg CFC-11 eq.	6.48E-03	1.84E-04	1.92E-05	8.34E-07	6.26E-03	2.33E-05	-4.63E-05
Acidification (AP)	mol H+ eq.	9.35E+02	3.01E+01	2.09E+00	2.32E-02	9.00E+02	2.82E+00	-1.22E+01
Eutrophication aquatic freshwater (EP-F)	kg P eq.	8.71E+01	2.76E+00	4.15E-03	1.30E-03	8.41E+01	1.81E-01	-3.19E+00
Eutrophication aquatic marine (EP-M)	kg N eq.	1.75E+02	4.26E+00	5.21E-01	1.07E-02	1.70E+02	3.12E-01	-2.32E+00
Eutrophication terrestrial (EP-T)	mol N eq.	1.76E+03	4.79E+01	5.78E+00	7.96E-02	1.70E+03	3.49E+00	-2.83E+01
Photochemical ozone formation (POCP)	kg NMVOC eq.	4.75E+02	1.76E+01	1.52E+00	2.09E-02	4.55E+02	1.01E+00	-7.10E+00
Depletion of abiotic resources – minerals and metals (ADP-M)	kg Sb eq.	1.15E+00	2.48E-01	1.49E-04	2.26E-05	8.50E-01	4.78E-02	-5.92E-02
Depletion of abiotic resources – fossil fuels (ADP-F)	MJ	2.35E+06	4.01E+04	1.25E+03	7.01E+01	2.30E+06	3.07E+03	-1.21E+04
Water use (WDP)	m3 world eq.	3.21E+04	8.70E+02	3.26E+00	9.05E-01	3.11E+04	1.33E+02	-1.99E+02

Other Indicators								
Optional Impact indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Particulate matter emissions	Disease incidence	7.03E-03	2.27E-04	5.55E-06	4.18E-07	6.78E-03	1.68E-05	-1.08E-04
Ionizing radiation, human health	kBq U235 eq.	2.62E+04	2.92E+02	5.75E+00	4.71E-01	2.59E+04	3.97E+01	-6.93E+01
Eco-toxicity (fresh water)	CTUe	3.63E+06	1.85E+05	8.74E+02	8.11E+01	3.42E+06	2.53E+04	-2.29E+05
Human toxicity, cancer effects	CTUh	6.43E-05	6.60E-06	4.32E-08	3.14E-09	5.19E-05	5.77E-06	-3.22E-06
Human toxicity, non-cancer effects	CTUh	2.16E-03	1.72E-04	7.17E-07	1.06E-07	1.89E-03	8.95E-05	-3.15E-05
Land use	-	4.18E+05	1.58E+04	6.47E+02	5.90E+01	3.99E+05	2.50E+03	-5.62E+03

Resource use indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	4.96E+04	1.12E+03	3.01E+00	3.22E+00	4.83E+04	1.30E+02	-3.22E+02
Use of renewable primary energy resources as raw materials	MJ	3.86E+02	3.71E+02	0.00E+00	0.00E+00	1.54E+01	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	5.00E+04	1.50E+03	3.01E+00	3.22E+00	4.83E+04	1.30E+02	-3.22E+02

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Use of non-renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	2.35E+06	3.92E+04	1.25E+03	7.01E+01	2.30E+06	3.07E+03	-1.21E+04
Use of non-renewable primary energy resources as raw materials	MJ	1.06E+03	8.74E+02	1.00E+00	0.00E+00	1.84E+02	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	2.35E+06	4.01E+04	1.25E+03	7.01E+01	2.30E+06	3.07E+03	-1.21E+04
Use of secondary materials	kg	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
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
Net use of fresh water	m ³	1.12E+03	2.41E+01	9.47E-02	3.77E-02	1.09E+03	3.29E+00	-5.44E+00
Waste category indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
Hazardous waste disposed	kg	3.11E+02	8.70E-02	1.87E-03	1.86E-04	1.16E+00	3.09E+02	-2.93E-02
Non-hazardous waste disposed	kg	1.27E+04	6.76E+02	4.68E+01	3.21E+01	1.18E+04	1.42E+02	-3.49E+02
Radioactive waste disposed	kg	7.29E+00	1.06E-01	8.55E-03	3.56E-04	7.16E+00	2.18E-02	-3.13E-02
Output flow indicators	Unit	Total, without benefits and loads	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
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
Materials for recycling	kg	2.69E+02	4.85E+01	0.00E+00	2.57E+00	3.78E+00	2.14E+02	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Extrapolation factors (BLCL modules)


To estimate the environmental impact of a specific module, the LCIA results presented in this PEP document for each life cycle stage should be calculated with the extrapolation factors given here and the reference modules (ACS880-BLCL-25-7) LCIA-results. For BLCL filter units other than the Reference module, the environmental impacts for each phase of the lifecycle are obtained by multiplying the values of the Reference product by the following extrapolation factors:

Product	Manufacturing	Distribution	Installation	Use	End of life	Benefits and loads
ACS880-BLCL-13-5	0.622	0.622	0.950	0.469	0.622	0.622
ACS880-BLCL-15-5	0.720	0.720	0.950	0.507	0.720	0.720
ACS880-BLCL-13-7	0.577	0.577	0.950	0.422	0.577	0.577
ACS880-BLCL-15-7	0.695	0.695	0.950	0.558	0.695	0.695
ACS880-BLCL-24-5	1.026	1.026	1.000	0.936	1.026	1.026
ACS880-BLCL-25-5	1.038	1.038	1.000	1.011	1.038	1.038

ACS880-BLCL-24-7	1.008	1.008	1.000	0.794	1.008	1.008
ACS880-BLCL-25-7 (Reference module)	1.000	1.000	1.000	1.000	1.000	1.000

References

- ISO. (2006a). ISO 14025:2006 Environmental labels and declarations — Type III environmental declarations — Principles and procedures. Geneva: International Organization for Standardization.
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- Ecoinvent 3.8.
- ABB Oy. 2023. Inventory data.

Registration number: ABBG-00641-V01.01-EN		Drafting Rules PCR-ed4-EN-2021 09 06
Verifier accreditation number: VH44		Information and reference documents: www.pep-ecopassport.org
Date of issue: 08-2024		Validity period: 5 years
Independent verification of the declaration and data, in compliance with ISO 14025: 2006		
Internal: <input type="checkbox"/>	External: <input checked="" type="checkbox"/>	
The PCR review was conducted by a panel of experts chaired by Julie ORGELET (DDemain)		
PEPs are compliant with XP C08-100-1:2016 and EN 50693:2019 or NF E38-500 :2022		
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”		

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