

ABB DS-ARC1 ARC FAULT DETECTION DEVICE

PEP ecopassport®

Product Environmental Profile



Product Environmental Profile - PEP Ecopassport.  
Document in compliance with ISO 14025: 2006 "Environmental labels and declarations. Type III environmental declarations"

ORGANIZATION		CONTACT INFORMATION			
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# ABB Purpose & Embedding Sustainability

ABB is committed to continually promoting and embedding sustainability across its operations and value chain, aspiring to become a role model for others to follow. With its ABB Purpose, ABB is focusing on reducing harmful emissions, preserving natural resources and championing ethical and humane behavior.

"other points or for example a QR code or link to ABB website, where more information on the topic"



## General Information

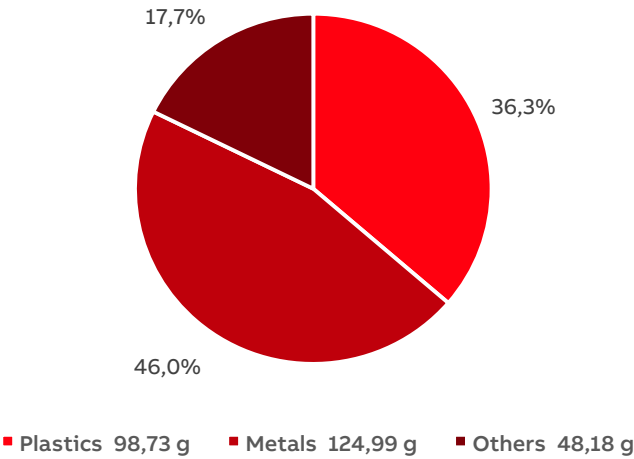
Reference product	2CSA255103R1165 - DS-ARC1 B16 30mA
Description of the product	AFDD with an RCBO-Residual Current Circuit Breakers
Functional unit	The product is an Arc fault detection and protection with an RCBO-Residual Current Circuit Breaker and it is designed to protect people and premises against risks of fire ignited by a hazardous series or parallel electric arc in a final circuit of rated voltage 230 V and rated current 16A, according to the appropriate use scenario, in the Household/Commercial application area, and during the reference service life of the product of 20 years.
Other products covered	List of other products covered or a reference to page 11

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# Constituent Materials



Total weight of Reference product included packaging

271,9g

Plastics as % of weight		Metals as % of weight		Others as % of weight	
Name and CAS number	Weight%	Name and CAS number	Weight%	Name and CAS number	Weight%
PA	23,1	Steel	29,5	Wood	1,4
Glass fiber	9,2	Copper	14,3	PCB+Resistor	8,3
PC	2,4	Aluminium	1,0	CARDBOARD	5,1
PPS	0,9	Ferrous metal	0,7	Paper	2,5
POM/PTFE/PE	0,7	Other Metals	0,6	Other	0,5

Total weight of the reference product 248,4 g plus packaging 23,5g

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# Additional Environmental Information

Manufacturing	The manufacturing stage includes the production and transportation to the manufacturer's last logistic platform of DS-ARC1 and its packaging. The production occurs at the ABB factory located in Santa Palomba (RM).
Distribution	The transport from ABB Santa Palomba factory to the Regional Distribution Centre in Vignate (Italy) was taken into account. For the distribution of the product from Vignate to the final customer, the intracontinental transport scenario provided by PCR-ed4-EN-2021 09 06 standard was adopted, considering the European macro-area.
Installation	The installation phase only implies manual activities and no energy is consumed. This phase also includes the disposal of the packaging of the product. Statistical average data from Eurostat databases [2023] were considered for the disposal of the product and its packaging.
Use	<p>During the use phase, the product dissipates some electricity due to power losses. The average power loss of the switch has been calculated by ABB following the assumption indicated in the PSR-0005-ed3-EN-2023 06 06:</p> <ul style="list-style-type: none"><li>• Nominal current load rate @15% (Household/Commercial scenario)</li><li>• RSL of 20 years.</li><li>• Functioning time of 30% of the RSL (<math>\alpha</math>).</li></ul> <p>No maintenance is planned for the product.</p>
End of life	The default end of life scenario provided by the IEC/TR 62635 [2019] document has been adopted, considering the product transport by lorry over 1000 km and its disposal.
Benefits and loads beyond the system boundaries	The potential benefits derives from the impacts prevented by recycling and waste to energy recovery of the packaging in the installation phase

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# Environmental Impacts

Reference lifetime	20 years
Product category	AFDD with an RCBO-Residual Current Circuit Breakers, Designed to protect people and premises against risks of fire ignited by a hazardous series or parallel electric arc.
Installation elements	No installation materials are required in the life cycle of the product.
Use scenario	The calculation of the use stage electricity consumption from the average power consider the following assumptions: - Nominal current load rate as 15% (Household / Commercial); - RSL of 20 years; - Functioning time of 30% of the RSL. No maintenance is planned for the product
Geographical representativeness	Europe
Technological representativeness	Technological representativeness refers to the specific production process for primary data.
Software and database used	SimaPro 9.5 and ecoinvent 3.9.1

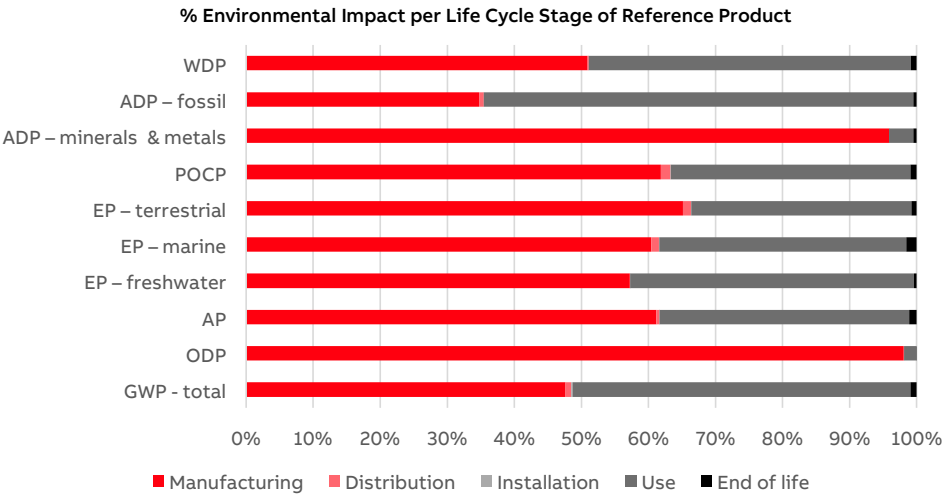
Energy model used

Manufacturing	ABB GO energy mix 2022. The energy-related processes used for the remaining inputs are those included in the ecoinvent v3.9.1 datasets.
Installation	No energy consumption occur during the installation stage.
Use	Electricity, low voltage {RER}  market group for electricity, low voltage   Cut-off, S
End of life	The energy-related processes used for the inputs of the end-of-life stage are those included in the ecoinvent datasets selected for the analysis.

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Common base of mandatory indicators



Environmental impact indicators

Indicator	Unit	Total (no Benefits)	Manu- facturing	Distri- bution	Installation	Use	End of life	Bene- fits
GWP-total	kg CO <sub>2</sub> eq.	2,14E+01	1,02E+01	1,91E-01	3,63E-02	1,08E+01	1,95E-01	-9,02E-01
GWP-fossil	kg CO <sub>2</sub> eq.	2,08E+01	1,01E+01	1,91E-01	1,93E-03	1,04E+01	1,57E-01	-9,30E-01
GWP-biogenic	kg CO <sub>2</sub> eq.	5,50E-01	1,15E-01	1,73E-04	3,44E-02	3,62E-01	3,72E-02	2,95E-02
GWP-luluc	kg CO <sub>2</sub> eq.	4,25E-02	1,63E-02	9,31E-05	7,33E-07	2,59E-02	1,23E-04	-1,26E-03
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	kg CFC-11 eq.	1,06E-05	1,04E-05	4,17E-09	3,31E-11	1,98E-07	2,19E-09	-2,38E-08
ODP = Depletion potential of the stratospheric ozone layer								
AP	H+ eq.	1,60E-01	9,80E-02	7,89E-04	8,81E-06	5,96E-02	1,77E-03	-1,95E-02
AP = Acidification potential, Accumulated Exceedance								
EP-freshwater	kg P eq.	2,33E-02	1,33E-02	1,34E-05	2,18E-07	9,84E-03	9,87E-05	-1,86E-03
EP-marine	kg N eq.	2,62E-02	1,58E-02	3,01E-04	7,69E-06	9,63E-03	4,09E-04	-1,64E-03
EP-terrestrial	mol N eq.	2,65E-01	1,73E-01	3,21E-03	3,57E-05	8,72E-02	2,12E-03	-2,00E-02
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	kg NMVOC eq.	7,83E-02	4,84E-02	1,15E-03	1,34E-05	2,80E-02	7,11E-04	-6,05E-03
POCP = Formation potential of tropospheric ozone								
ADP-minerals & metals	kg Sb eq.	3,48E-03	3,34E-03	6,16E-07	6,56E-09	1,26E-04	1,75E-05	-3,35E-04
ADP-fossil	MJ	3,69E+02	1,28E+02	2,72E+00	2,04E-02	2,36E+02	1,75E+00	-1,09E+01
ADP-minerals & metals = Abiotic depletion potential for non-fossil resources ADP-fossil = Abiotic depletion for fossil resources potential								
WDP	m³ eq. depr.	5,52E+00	2,81E+00	1,10E-02	1,33E-04	2,65E+00	4,92E-02	-3,43E-01
WDP = Water Deprivation potential								

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Common base of mandatory indicators

Inventory flows indicator – Resource use indicators

Indicator	Unit	Total (no Benefits)	Manu- facturing	Distri- bution	Installation	Use	End of life	Bene- fits
PERE	MJ	6,94E+01	1,62E+01	4,22E-02	7,67E-04	5,30E+01	1,90E-01	-1,39E+00
PERM	MJ	5,93E-01	5,93E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	7,00E+01	1,68E+01	4,22E-02	7,67E-04	5,30E+01	1,90E-01	-1,39E+00
PENRE	MJ	3,65E+02	1,25E+02	2,72E+00	2,04E-02	2,36E+02	1,75E+00	-1,09E+01
PENRM	MJ	3,36E+00	3,36E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	3,69E+02	1,28E+02	2,72E+00	2,04E-02	2,36E+02	1,75E+00	-1,09E+01
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 resources								

Inventory flows indicator – Indicators describing the use of secondary materials, water, and energy resources

Indicator	Unit	Total (no Benefits)	Manu- facturing	Distri- bution	Installation	Use	End of life	Bene- fits
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m³	2,94E-01	1,01E-01	3,87E-04	7,29E-06	1,91E-01	1,58E-03	-9,65E-03
SM = Use of secondary material								
RSF = Use of renewable secondary fuels								
NRSF = Use of non-renewable secondary fuels								
FW = Use of net fresh water								

Inventory flows indicator – Waste category indicators

Indicator	Unit	Total (no Benefits)	Manu- facturing	Distri- bution	Installation	Use	End of life	Bene- fits
Hazardous waste disposed	kg	1,32E-03	8,69E-04	1,73E-05	1,23E-07	4,15E-04	1,44E-05	-1,05E-05
Non- hazardous waste disposed	kg	2,67E+00	1,39E+00	1,33E-01	3,98E-03	9,50E-01	1,93E-01	-1,39E-01
Radioactive waste disposed	kg	1,97E-03	2,57E-04	8,84E-07	1,84E-08	1,70E-03	4,92E-06	-1,10E-05

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Common base of mandatory indicators

Inventory flows indicator – Output flow indicators

Indicator	Unit	Total (no Benefits)	Manu- facturing	Distri- bution	Installation	Use	End of life	Bene- fits
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	2,87E-01	1,49E-01	0,00E+00	1,72E-02	0,00E+00	1,21E-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	1,28E-01	0,00E+00	0,00E+00	1,62E-02	0,00E+00	1,11E-01	0,00E+00

Inventory flow indicator – other indicators

Indicator	Unit	Total (no Benefits)	Manu- facturing	Distri- bution	Installation	Use	End of life	Bene- fits
Biogenic carbon content of the product	kg of C	5,54E-04	5,54E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	---
Biogenic carbon content of the associated packaging	kg of C	1,76E-02	1,76E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	---

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Optional indicators

Environmental indicators

Indicator	Unit	Total (no Benefits)	Manu- facturing	Distri- bution	Installation	Use	End of life	Bene- fits
Total use of primary energy during the life cycle	MJ	4,39E+02	1,45E+02	2,76E+00	2,12E-02	2,89E+02	1,94E+00	-1,23E+01
Emissions of fine particles	incidence of diseases	8,66E-07	6,20E-07	1,56E-08	1,61E-10	2,18E-07	1,19E-08	-7,88E-08
Ionizing radiation, human health	kBq U235 eq.	7,71E+00	1,03E+00	3,64E-03	7,35E-05	6,66E+00	1,92E-02	-4,43E-02
Ecotoxicity (fresh water)	CTUe	3,11E+02	2,68E+02	1,34E+00	2,14E-02	3,97E+01	2,12E+00	-2,97E+01
Human toxicity, car-cinogenic effects	CTUh	2,39E-08	1,61E-08	8,71E-11	2,06E-12	4,88E-09	2,86E-09	-1,92E-09
Human toxicity, non- carcinogenic effects	incidence of diseases	9,64E-07	7,30E-07	1,91E-09	2,38E-11	1,94E-07	3,82E-08	-2,08E-07
Impact related to land use/soil quality		1,13E+02	6,36E+01	1,62E+00	1,02E-02	4,61E+01	1,24E+00	-7,53E+00

Other indicators

Indicator	Unit	Total (no Benefits)	Manu- facturing	Distri- bution	Installation	Use	End of life	Bene- fits
No Other indicators used								

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Extrapolation Factors

For other products than the Reference product covered by this PEP, the environmental impacts for each phase of the lifecycle are obtained by a linear correlation with respect to weight for the production, distribution, and end-of-life phase and with respect to average power loss for the use phase. Each environmental indicator value shall be calculated using the following formulas:  
For the manufacturing and use stages:  $y = a_n \cdot x + b_n$

Impact	USE	
	a4	b4
Climate change	1.92E+01	4.53E-02
Climate change - Fossil	1.85E+01	4.37E-02
Climate change - Biogenic	6.46E-01	1.53E-03
Climate change - Land use and LU change	4.62E-02	1.09E-04
Ozone depletion	3.53E-07	8.34E-10
Acidification	1.06E-01	2.51E-04
Eutrophication, freshwater	1.75E-02	4.14E-05
Eutrophication, marine	1.72E-02	4.05E-05
Eutrophication, terrestrial	1.55E-01	3.67E-04
Photochemical ozone formation	4.99E-02	1.18E-04
Resource use, minerals and metals	2.25E-04	5.30E-07
Resource use, fossils	4.21E+02	9.95E-01
Water use (from AWARE)	4.72E+00	1.12E-02
Components for re-use	0.00E+00	0.00E+00
Materials for recycling	0.00E+00	0.00E+00
Materials for energy recovery	0.00E+00	0.00E+00
Exported energy	0.00E+00	0.00E+00
Particulate matter	3.90E-07	9.20E-10
Ionising radiation	1.19E+01	2.80E-02
PENRE	4.21E+02	9.94E-01
PENRM	0.00E+00	0.00E+00
PENRT	4.21E+02	9.94E-01
PERE	9.45E+01	2.23E-01
PERM	0.00E+00	0.00E+00
PERT	9.45E+01	2.23E-01
PE	5.16E+02	1.22E+00
Use of secondary material	0.00E+00	0.00E+00
Use of renewable secondary fuels	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	0.00E+00	0.00E+00
Net use of fresh water	3.41E-01	8.05E-04
Hazardous waste disposed	7.40E-04	1.75E-06
Non-hazardous waste disposed	1.69E+00	4.00E-03
Radioactive waste disposed	3.04E-03	7.18E-06
Ecotoxicity, freshwater	7.08E+01	1.67E-01
Human toxicity, cancer	8.71E-09	2.06E-11
Human toxicity, non-cancer	3.47E-07	8.19E-10
Land use	8.21E+01	1.94E-01
Biogenic C content_product	0.00E+00	0.00E+00
Biogenic C content_packaging	0.00E+00	0.00E+00

PE = Total use of primary energy during the life cycle  
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 resources

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Extrapolation Factors

ABB Code of the specific product	Name	Weight of the product [g]	Avg power loss @15%In [w]
2CSA255103R1205	DS-ARC1 B20 A30	2,48E+02	5,80E-01
2CSA255103R1104	DS-ARC1 C10 A30	2,48E+02	5,30E-01
2CSA255103R1105	DS-ARC1 B10 A30	2,48E+02	5,30E-01
2CSA255103R1204	DS-ARC1 C20 A30	2,48E+02	5,80E-01
2CSA255103R1135	DS-ARC1 B13 A30	2,48E+02	5,30E-01
2CSA255103R1134	DS-ARC1 C13 A30	2,48E+02	5,30E-01
2CSA255103R1065	DS-ARC1 B6 A30	2,48E+02	5,50E-01
2CSA255103R1164	DS-ARC1 C16 A30	2,48E+02	5,60E-01
2CSA255103R1165	DS-ARC1 B16 A30	2,48E+02	5,60E-01
2CSA275103R1135	DS-ARC1 M B13 A30	2,48E+02	5,30E-01
2CSA255103R1064	DS-ARC1 C6 A30	2,48E+02	5,50E-01
2CSA275103R1105	DS-ARC1 M B10 A30	2,48E+02	5,30E-01
2CSA275103R1204	DS-ARC1 M C20 A30	2,48E+02	5,80E-01
2CSA275103R1104	DS-ARC1 M C10 A30	2,48E+02	5,30E-01
2CSA255107R1104	DS-ARC1 C10 A30 240V	2,48E+02	5,30E-01
2CSA275103R1205	DS-ARC1 M B20 A30	2,48E+02	5,80E-01
2CSA255107R1064	DS-ARC1 C6 A30 240V	2,48E+02	5,50E-01
2CSA275103R1064	DS-ARC1 M C6 A30	2,48E+02	5,50E-01
2CSA255107R1065	DS-ARC1 B6 A30 240V	2,48E+02	5,50E-01
2CSA275103R1165	DS-ARC1 M B16 A30	2,48E+02	5,60E-01
2CSA275103R1065	DS-ARC1 M B6 A30	2,48E+02	5,50E-01
2CSA275103R1164	DS-ARC1 M C16 A30	2,48E+02	5,60E-01
2CSA275103R1134	DS-ARC1 M C13 A30	2,48E+02	5,30E-01
2CSA275107R1064	DS-ARC1 M C6 A30 240V	2,48E+02	5,50E-01
2CSA275107R1135	DS-ARC1 M B13 A30 240V	2,48E+02	5,30E-01
2CSA275107R1104	DS-ARC1 M C10 A30 240V	2,48E+02	5,30E-01
2CSA275107R1105	DS-ARC1 M B10 A30 240V	2,48E+02	5,30E-01
2CSA255107R1105	DS-ARC1 B10 A30 240V	2,48E+02	5,30E-01
2CSA275107R1204	DS-ARC1 M C20 A30 240V	2,48E+02	5,80E-01
2CSA255107R1204	DS-ARC1 C20 A30 240V	2,48E+02	5,80E-01
2CSA275107R1065	DS-ARC1 M B6 A30 240V	2,48E+02	5,50E-01
2CSA275107R1164	DS-ARC1 M C16 A30 240V	2,48E+02	5,60E-01
2CSA255107R1205	DS-ARC1 B20 A30 240V	2,48E+02	5,80E-01
2CSA255107R1165	DS-ARC1 B16 A30 240V	2,48E+02	5,60E-01
2CSA275107R1165	DS-ARC1 M B16 A30 240V	2,48E+02	5,60E-01
2CSA275107R1134	DS-ARC1 M C13 A30 240V	2,48E+02	5,30E-01
2CSA255107R1164	DS-ARC1 C16 A30 240V	2,48E+02	5,60E-01
2CSA255107R1134	DS-ARC1 C13 A30 240V	2,48E+02	5,30E-01
2CSA275107R1205	DS-ARC1 M B20 A30 240V	2,48E+02	5,80E-01
2CSA255107R1135	DS-ARC1 B13 A30 240V	2,48E+02	5,30E-01

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# Environmental Impact Indicator Glossary

## Impact indicators

Indicator	Description	Distribution
Global warming potential (GWP) - total	Indicator of potential global warming caused by emissions to air contributing to the greenhouse effect. The total global warming potential (GWP-total) is the sum of three sub-categories of climate change. GWP-total = GWP-fossil + GWP-biogenic + GWP- land use and land use change	kg CO <sub>2</sub> eq.
Ozone depletion (ODP)	Emissions to air that contribute to the destruction of the stratospheric ozone layer	kg CFC-11 eq.
Acidification of soil and water (A)	Acidification of soils and water caused by the release of certain gases to the atmosphere, such as nitrogen oxides and sulphur oxides	H+ eq.
Eutrophication (E)	Indicator of the contribution to eutrophication of water by the enrichment of the aquatic ecosystem with nutritional elements, e.g. industrial or domestic effluents, agriculture, etc. This indicator is divided to three: freshwater, marine and terrestrial.	kg P eq., kg N eq., mole N eq.
Photochemical ozone creation (POCP)	Indicator of emissions of gases that affect the creation of photochemical ozone in the lower atmosphere (smog) because of the rays of the sun.	kg NMVOC eq.
Depletion of abiotic resources – elements (ADPe)	Indicator of the depletion of natural non-fossil resources	kg Sb eq.
Depletion of abiotic resources – fossil fuels (ADPf)	The use of non-renewable fossil resources in an unsustainable way (e.g. from material to waste)	MJ (lower heating value)
Water Deprivation potential (WDP)	Deprivation-weighted water consumption. Assesses the potential of water deprivation, to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived.	m <sup>3</sup> eq. depr.

## Resource use indicators


Indicator	Description	Distribution
Total use of primary energy	Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) + Total use of renewable primary energy re-sources (primary energy and primary energy resources used as raw materials)	MJ (lower heating value)

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Internal:	<input type="radio"/>	External:	<input checked="" type="radio"/>
The PCR review was conducted by a panel of experts chaired by Julie ORGELET (DDemain)			
PEP are compliant with XP C08-100-1 :2016 or EN 50693:2019 The components of the present PEP cannot be compared with components from any other program.			
Document in compliance with ISO 14025: 2006 "Environmental labels and declarations. Type III environmental declarations"			