



# Product Environmental Profile

Variable speed drive  
ACH580-01 Frame R3  
11 to 22 kW

In accordance with  
ISO 14025:2006

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Registration number: ABBG-00232-V01.01-EN

# Company information

ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. By connecting software to its electrification, robotics, automation and motion portfolio, ABB pushes the boundaries of technology to drive performance to new levels. With a history of excellence stretching back more than 130 years, ABB's success is driven by about 105,000 talented employees in over 100 countries.

ABB Motion keeps the world turning, while saving energy every day. Our pioneering drives, motors, generators products and integrated digital powertrain solutions are driving the low-carbon future for industries, cities, infrastructure and transportation. Through our global presence we are always close to our customers. We help them optimize energy efficiency, and improve safety, reliability and performance.



# Aiming to achieve these crucial sustainability targets by 2030

Our 2030 sustainability targets, as shown in this image, are intended to help ABB enable a low-carbon society, promote social progress and preserve natural resources. Working with our customers and suppliers, our aim is to firmly embed sustainable practices across our complete value chain in every step of the lifecycle of our products and solutions. We are equally committed to driving social progress, along with our suppliers and in our communities.

A key part of ABB's 2030 sustainability strategy is to work to support our customers' and suppliers' efforts to reduce their emissions, and aim to achieve carbon neutrality in our own operations. Our greenhouse gas emissions reduction targets have been validated by the Science Based Targets initiative as being in line with the 1.5 °C scenario of the Paris Agreement.

To ensure that we are focused on achieving our goals, the ABB sustainability targets are integrated into our decision-making processes, and we have accountabilities and incentive plans in place to drive the appropriate actions.



# Abbreviations

<b>ABS</b>	Acrylonitrile butadiene styrene
<b>APOS</b>	Allocation at point of substitution
<b>CTU</b>	Comparative toxic unit
<b>DOL</b>	Direct on line
<b>EoL</b>	End of life
<b>HVAC-R</b>	Heating, ventilation, air conditioning and refrigeration
<b>LCA</b>	Life cycle assessment
<b>LCIA</b>	Life cycle impact assessment
<b>PC</b>	Polycarbonate
<b>PCBA</b>	Printed circuit board assembly
<b>PCR</b>	Product Category Rules
<b>PE</b>	Polyethylene
<b>PEP</b>	Product Environmental Profile
<b>PSR</b>	Product Specific Rules
<b>PVC</b>	Polyvinyl chloride
<b>R factors</b>	Proportions of recyclable materials
<b>UN CPC</b>	The United Nations Central Product Classification
<b>VSD</b>	Variable speed drive
<b>WEEE</b>	Waste from Electric and Electronic Equipment





Production plant location of ABB: China and Romania

# Product information

This environmental product declaration describes the environmental performance of Variable speed drive ACH580-01-046A-4.

**Product group:** Electrical, Electronic and HVAC-R products

Representative product	Variable speed drive ACH580-01-046A-4, nominal power 22 kW
Product description	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.  The benefits of VSD control are gained because of precise process control, which leads to significant energy savings due to the optimal speed being applied at all times.
UN CPC code	UN CPC 46122
Total mass of the product including product package	15 kg
Reference lifetime	10 years

## Product range covered

Product	$P_N$ (kW)	$I_N$ (A)	$U_N$ (V)	Enclosure class
ACH580-01-033A-4	15	32	400	IP21
ACH580-01-039A-4	18.5	38	400	IP21
<b>ACH580-01-046A-4 (representative product)</b>	<b>22</b>	<b>45</b>	<b>400</b>	<b>IP21</b>
ACH580-01-047A-2	11	46.7	230	IP21
ACH580-01-060A-2	15	60	230	IP21
ACH580-01-033A-4 +B056	15	32	400	IP55
ACH580-01-039A-4 +B056	18.5	38	400	IP55
ACH580-01-046A-4 +B056	22	45	400	IP55
ACH580-01-047A-2 +B056	11	46.7	230	IP55
ACH580-01-060A-2 +B056	15	60	230	IP55

# LCA information

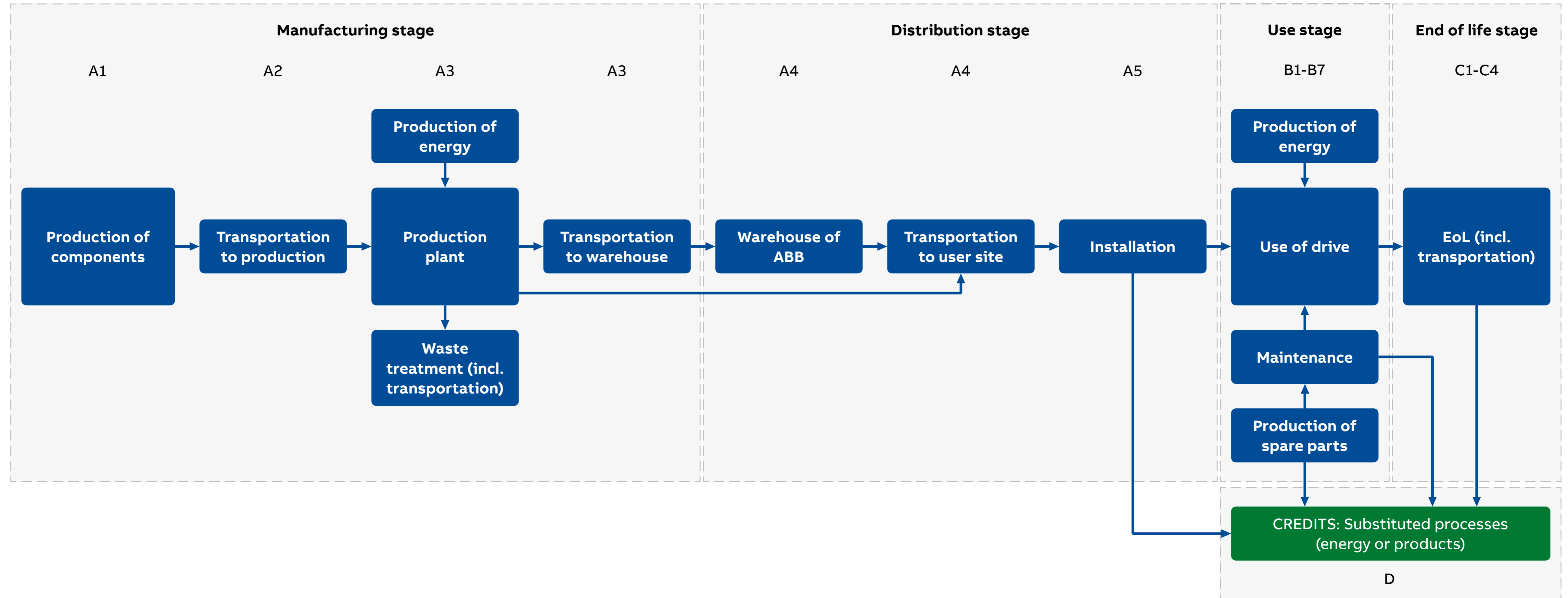
## Scope definition

Functional unit	To control the speed and torque of three phase motors (Asynchronous and Permanent Magnet motors) in energy management for machine applications. Calculation of the environmental impacts is based on 10 years of product service lifetime.  The usage profile considered is 12.5% uptime in use phase at 100 % loading rate, 12.5% uptime in use phase at 49% loading rate, 12.5% uptime in use phase at 21.6% loading rate, 12.5% uptime in use phase at 8.4% loading rate, 10% uptime in standby phase and 40% in OFF phase.
System boundary	Throughout the whole life cycle of the product, including also net loads and benefits beyond system boundaries.
Description of data representativeness	Primary data used in the modelling represents the year 2022. Data of Helsinki factory is applied for other factories since plant-specific data was not available. Data of Helsinki factory is allocated based on annual data of 2021. Manufacturing stage is similar in all production plant locations and thus, the assumption is seen as justified. Production of energy consumed in the manufacturing is modelled according to the country in question based on local market mix.  Use stage modelling represents an average European user of the product.  Technological and geographical representativeness otherwise is as good as possible based on data availability and more information is presented with main assumptions in this document.
Allocation methods applied	At the point of substitution for EoL allocation. Allocation choices in secondary datasets may vary between datasets.
Cut-off rule applied and main exclusions	Cut-off according to applied PCR: The mass, energy flows or environmental impacts of intermediate flows not considered shall be less than or equal to 5% of the mass of the elements/total energy consumption or environmental impacts of the reference product corresponding to the functional unit.
Modelling software	SimaPro 9.4.0.2
Secondary dataset	Ecoinvent 3.8 (APOS system model)



# LCA information

## System boundary



# LCA information

## Main assumptions used in the modelling

### Manufacturing

Manufacturing includes life cycle stages from cradle-to-gate, including material acquisition, component manufacturing, assembly of products and transportation between these facilities.

#### **Component manufacturing**

Component manufacturing is fully modelled with secondary data since the supplier-specific data was not available. Some of the components are modelled with component specific average data (e.g. PCBAs) and the rest of the components with material specific (e.g. ABS 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.

#### **Manufacturing at ABB site**

Data about the energy consumption and waste generation was obtained for one year for similar purpose plant. Manufacturing stage environmental impacts are calculated as weighted average based on production volumes of two production plants. It was allocated between production lines. Energy model for manufacturing at ABB sites is based on local electricity market mix and assumption of heat produced from natural gas.

### Distribution

Distribution considers the whole transportation route from centralized warehouses and ABB manufacturing sites to customers. Distribution of product is modelled based on primary data of the year 2021. Weighted average distribution route was applied in the modelling.

### Installation

Installation stage considers production and transportation of cables (4.55 kg) and mounting bolts (0.24 kg). Waste management of packing materials of the product is also included. Energy consumption in installation is negligible and is excluded.

### Use stage

Use stage includes the power losses from the use of the product according to the functional unit and production of parts replaced during maintenance and waste treatment of discarded parts.

The use profile considered is 12.5% uptime in use phase at 100% loading rate, 12.5% uptime in use phase at 49% loading rate, 12.5% uptime in use phase at 21.6% loading rate, 12.5% uptime in use phase at 8.4% loading rate, 10% uptime in standby phase and 40% in OFF phase for a reference service life of 10 years. Supply voltage is 400 V and default switching frequency is used. Use stage energy model is based on Europe without Switzerland consumption mix data (of the year 2014). 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>.

Production of replacement parts and waste treatment of removed parts are considered in the use stage.

### End of life stage

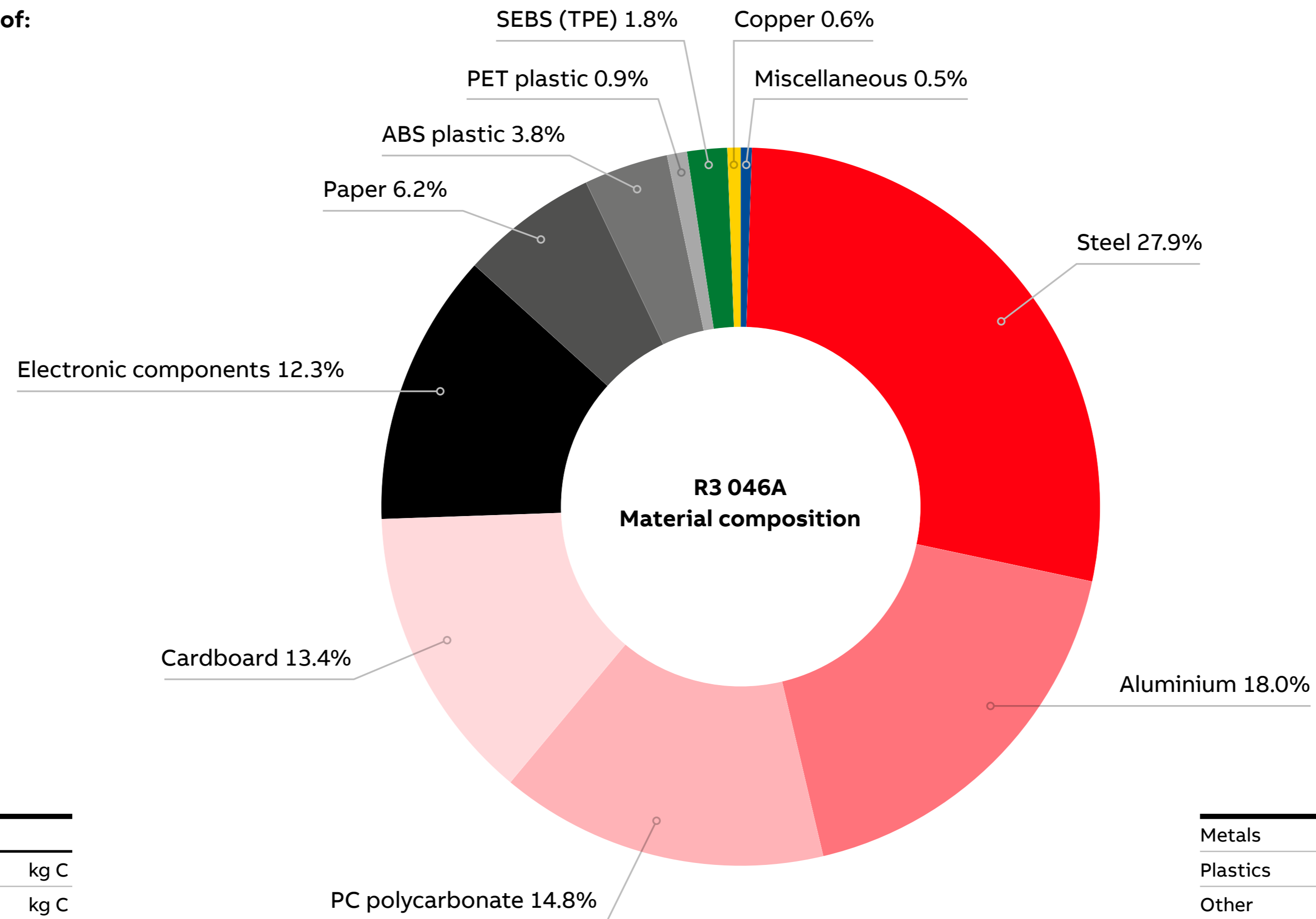
End of life includes the waste treatment and transportation to treatment of the product.

EoL treatment of the product is modelled based on the ABB recycling instructions. R factors of PEF 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. Energy model is applied similarly to the component manufacturing stage.



# Content declaration

Product and its package under study consists of:



**Biogenic carbon content**

Biogenic carbon content of product	0.00	kg C
Biogenic carbon content of product package	1.31	kg C

Metals	46.4%
Plastics	21.3%
Other	32.3%

# Environmental performance

## Life cycle impact assessment results – core impact indicators

Impact category	Unit	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use (B1-B7)	B1	B2	B3	B4	B5	B6	B7	End of life (C1-C4)	Benefits and loads (D)	TOTAL (without benefits and loads)	
Global warming	TOTAL	kg CO <sub>2</sub> eq.	2.50E+02	2.52E+00	4.34E+01	6.79E+03	0.00E+00	4.95E+00	0.00E+00	0.00E+00	0.00E+00	6.79E+03	0.00E+00	3.58E+01	-3.91E+01	7.13E+03
	Fossil	kg CO <sub>2</sub> eq.	2.58E+02	2.52E+00	3.61E+01	6.77E+03	0.00E+00	4.94E+00	0.00E+00	0.00E+00	0.00E+00	6.77E+03	0.00E+00	3.43E+01	-3.89E+01	7.11E+03
	Biogenic	kg CO <sub>2</sub> eq.	-8.55E+00	0.00E+00	7.07E+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	1.48E+00	0.00E+00	0.00E+00
	Land use and land use change	kg CO <sub>2</sub> eq.	3.71E-01	1.27E-03	1.58E-01	1.91E+01	0.00E+00	1.06E-02	0.00E+00	0.00E+00	0.00E+00	1.91E+01	0.00E+00	7.19E-02	-2.07E-01	1.97E+01
Ozone depletion	kg CFC-11 eq.	1.88E-05	5.38E-07	4.87E-06	4.32E-04	0.00E+00	3.74E-07	0.00E+00	0.00E+00	0.00E+00	4.31E-04	0.00E+00	1.56E-06	-5.07E-06	4.57E-04	
Acidification of soils and water	mole H <sup>+</sup> eq.	2.37E+00	4.74E-02	1.74E+00	3.93E+01	0.00E+00	3.95E-02	0.00E+00	0.00E+00	0.00E+00	3.92E+01	0.00E+00	3.38E-01	-1.95E+00	4.37E+01	
Eutrophication	Freshwater	kg P eq.	1.98E-01	1.28E-04	1.34E-01	6.99E+00	0.00E+00	4.07E-03	0.00E+00	0.00E+00	0.00E+00	6.98E+00	0.00E+00	1.83E-02	-1.53E-01	7.34E+00
	Marine	kg N eq.	3.31E-01	1.20E-02	1.05E-01	6.70E+00	0.00E+00	7.02E-03	0.00E+00	0.00E+00	0.00E+00	6.70E+00	0.00E+00	3.31E-02	-1.17E-01	7.18E+00
	Terrestrial	mole N eq.	3.51E+00	1.33E-01	1.33E+00	5.82E+01	0.00E+00	6.46E-02	0.00E+00	0.00E+00	0.00E+00	5.81E+01	0.00E+00	3.23E-01	-1.48E+00	6.35E+01
Photochemical ozone formation	kg NMVOC eq.	1.15E+00	3.53E-02	3.68E-01	1.60E+01	0.00E+00	2.09E-02	0.00E+00	0.00E+00	0.00E+00	1.60E+01	0.00E+00	1.28E-01	-4.12E-01	1.77E+01	
Depletion of abiotic resources	Minerals, metals	kg Sb eq.	3.40E-02	4.35E-06	3.97E-02	6.42E-02	0.00E+00	9.50E-04	0.00E+00	0.00E+00	0.00E+00	6.32E-02	0.00E+00	6.82E-03	-4.50E-02	1.45E-01
	Fossil fuels	MJ	3.23E+03	3.51E+01	6.13E+02	1.46E+05	0.00E+00	6.81E+01	0.00E+00	0.00E+00	0.00E+00	1.46E+05	0.00E+00	2.28E+02	-5.63E+02	1.50E+05
Water deprivation	m <sup>3</sup> world eq.	6.74E+01	1.02E-01	3.74E+01	2.23E+03	0.00E+00	1.73E+00	0.00E+00	0.00E+00	0.00E+00	2.23E+03	0.00E+00	1.02E+01	-4.21E+01	2.35E+03	

# Environmental performance

## Life cycle impact assessment results – additional impact indicators

Impact category	Unit	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use (B1-B7)	B1	B2	B3	B4	B5	B6	B7	End of life (C1-C4)	Benefits and loads (D)	TOTAL (without benefits and loads)
Particulate matter	Disease incidences	1.59E-05	1.81E-07	4.94E-06	1.34E-04	0.00E+00	2.70E-07	0.00E+00	0.00E+00	0.00E+00	1.33E-04	0.00E+00	1.53E-06	-5.74E-06	1.56E-04
Ionizing radiation	kBq U235 eq.	2.82E+01	1.63E-01	6.92E+00	3.93E+03	0.00E+00	5.28E-01	0.00E+00	0.00E+00	0.00E+00	3.93E+03	0.00E+00	2.39E+00	-7.46E+00	3.96E+03
Ecotoxicity	CTUe	1.42E+04	2.58E+01	1.37E+04	1.11E+05	0.00E+00	3.20E+02	0.00E+00	0.00E+00	0.00E+00	1.11E+05	0.00E+00	2.56E+03	-1.54E+04	1.41E+05
Human toxicity	Cancer	CTUh	2.98E-07	1.10E-09	3.45E-07	2.95E-06	0.00E+00	1.05E-08	0.00E+00	0.00E+00	2.94E-06	0.00E+00	2.06E-07	-3.99E-07	3.80E-06
	Non cancer	CTUh	9.27E-06	2.25E-08	2.19E-05	9.19E-05	0.00E+00	5.59E-07	0.00E+00	0.00E+00	9.13E-05	0.00E+00	7.63E-06	-2.47E-05	1.31E-04
Land use/soil quality index	-	1.42E+03	2.32E+01	7.49E+02	3.02E+04	0.00E+00	4.85E+01	0.00E+00	0.00E+00	0.00E+00	3.01E+04	0.00E+00	2.92E+02	-9.75E+02	3.27E+04

# Environmental performance

## Life cycle impact assessment – PEP-PCR-ed4-EN-2021 09 06 Annex C indicators

Impact category	Unit	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use (B1-B7)	B1	B2	B3	B4	B5	B6	B7	End of life (C1-C4)	Benefits and loads (D)	TOTAL (without benefits and loads)
<b>Global warming potential (GWP-total)</b>	kg CO <sub>2</sub> eq.	2.49E+02	2.50E+00	3.54E+01	6.67E+03	0.00E+00	4.84E+00	0.00E+00	0.00E+00	0.00E+00	6.67E+03	0.00E+00	3.42E+01	-3.81E+01	<b>6.99E+03</b>
<b>Ozone depletion (ODP)</b>	kg CFC-11 eq.	1.59E-05	3.77E-07	3.56E-06	4.25E-04	0.00E+00	3.71E-07	0.00E+00	0.00E+00	0.00E+00	4.24E-04	0.00E+00	1.31E-06	-3.88E-06	<b>4.46E-04</b>
<b>Acidification of soils and water (AP)</b>	kg SO <sub>2</sub> eq.	1.73E+00	3.41E-02	1.29E+00	2.89E+01	0.00E+00	2.85E-02	0.00E+00	0.00E+00	0.00E+00	2.89E+01	0.00E+00	2.51E-01	-1.45E+00	<b>3.22E+01</b>
<b>Eutrophication aquatic freshwater (EP-F)</b>	kg (PO <sub>4</sub> ) <sup>3-</sup> eq.	7.51E-01	4.64E-03	4.61E-01	2.39E+01	0.00E+00	1.57E-02	0.00E+00	0.00E+00	0.00E+00	2.39E+01	0.00E+00	7.34E-02	-5.21E-01	<b>2.52E+01</b>
<b>Photochemical ozone formation (POCP)</b>	kg C <sub>2</sub> H <sub>4</sub> eq.	3.03E-01	4.00E-03	1.03E-01	2.42E+00	0.00E+00	6.06E-03	0.00E+00	0.00E+00	0.00E+00	2.42E+00	0.00E+00	5.65E-02	-1.16E-01	<b>2.89E+00</b>
<b>Depletion of abiotic resources – fossil fuels (ADP-F)</b>	MJ	2.80E+03	3.48E+01	5.00E+02	7.73E+04	0.00E+00	5.96E+01	0.00E+00	0.00E+00	0.00E+00	7.72E+04	0.00E+00	1.92E+02	-4.39E+02	<b>8.08E+04</b>
<b>Depletion of abiotic resources – elements</b>	kg Sb eq.	3.40E-02	4.35E-06	3.97E-02	6.43E-02	0.00E+00	9.50E-04	0.00E+00	0.00E+00	0.00E+00	6.34E-02	0.00E+00	6.82E-03	-4.50E-02	<b>1.45E-01</b>

# Environmental performance

## Life cycle inventory results – resource use indicators

Parameter	Unit	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use (B1-B7)	B1	B2	B3	B4	B5	B6	B7	End of life (C1-C4)	Benefits and loads (D)	TOTAL (without benefits and loads)
Total use of primary energy	MJ	3.39E+03	3.52E+01	6.56E+02	1.50E+05	0.00E+00	7.46E+01	0.00E+00	0.00E+00	0.00E+00	1.50E+05	0.00E+00	2.65E+02	-6.48E+02	1.54E+05
Use of renewable primary energy resources as energy	MJ	9.02E+01	8.74E-02	4.22E+01	4.30E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.30E+03	0.00E+00	3.75E+01	-8.53E+01	4.47E+03
Use of renewable primary energy resources as raw materials	MJ	6.81E+01	0.00E+00	0.00E+00	6.54E+00	0.00E+00	6.54E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.47E+01
Total use of renewable primary energy	MJ	1.58E+02	8.74E-02	4.22E+01	4.31E+03	0.00E+00	6.54E+00	0.00E+00	0.00E+00	0.00E+00	4.30E+03	0.00E+00	3.75E+01	-8.53E+01	4.55E+03
Use of non-renewable primary energy as energy	MJ	3.10E+03	3.51E+01	5.70E+02	1.46E+05	0.00E+00	6.28E+01	0.00E+00	0.00E+00	0.00E+00	1.46E+05	0.00E+00	2.28E+02	-5.62E+02	1.50E+05
Use of non-renewable primary energy as raw materials	MJ	1.35E+02	0.00E+00	4.37E+01	5.32E+00	0.00E+00	5.32E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E+02
Total use of non-renewable primary energy	MJ	3.23E+03	3.51E+01	6.13E+02	1.46E+05	0.00E+00	6.81E+01	0.00E+00	0.00E+00	0.00E+00	1.46E+05	0.00E+00	2.28E+02	-5.62E+02	1.50E+05

# Environmental performance

Life cycle inventory results – indicators describing the use of secondary materials, water and energy resources

Parameter	Unit	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use (B1-B7)	B1	B2	B3	B4	B5	B6	B7	End of life (C1-C4)	Benefits and loads (D)	TOTAL (without benefits and loads)
Use of secondary materials	kg	1.23E+00	0.00E+00	4.08E-02	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	0.00E+00	1.27E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m <sup>3</sup>	2.00E+00	2.97E-03	9.35E-01	1.37E+02	0.00E+00	4.98E-02	0.00E+00	0.00E+00	0.00E+00	1.37E+02	0.00E+00	2.82E-01	-1.11E+00	1.40E+02

# Environmental performance

## Life cycle inventory results – waste flow and output flow indicators

Parameter	Unit	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use (B1-B7)	B1	B2	B3	B4	B5	B6	B7	End of life (C1-C4)	Benefits and loads (D)	TOTAL (without benefits and loads)
Hazardous waste disposed	kg	1.02E-02	5.99E-05	4.77E-02	1.11E-01	0.00E+00	2.56E-04	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	1.78E+01	-3.56E-03	1.80E+01
Non-hazardous waste disposed	kg	3.55E+01	1.77E+00	1.89E+01	5.51E+02	0.00E+00	1.54E+00	0.00E+00	0.00E+00	0.00E+00	5.49E+02	0.00E+00	7.04E+00	-1.47E+01	6.14E+02
Radioactive waste disposed	kg	9.63E-03	2.39E-04	2.42E-03	1.06E+00	0.00E+00	1.83E-04	0.00E+00	0.00E+00	0.00E+00	1.06E+00	0.00E+00	1.10E-03	-2.56E-03	1.08E+00
Components for re-use	kg	3.70E-02	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	0.00E+00	0.00E+00	0.00E+00	3.70E-02
Materials for recycling	kg	1.18E+00	0.00E+00	1.05E+00	3.72E-01	0.00E+00	3.72E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.21E+00	0.00E+00	1.18E+01
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

# Environmental performance

## Determination of the environmental impacts of the other products with the same frame size

According to the conducted LCA study, proportionality rules to evaluate the environmental impacts of other products from this product family have been defined. To estimate the environmental impact of a specific product, the LCIA results presented in this PEP document for each life cycle stage should be multiplied with the factor presented in table below to estimate the environmental impacts from them.

### Extrapolation factors

Product	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use (B1-B7)	B1	B2	B3	B4	B5	B6	B7	End of life (C1-C4)	Benefits and loads (D)
ACH580-01-033A-4	0.969	0.991	1.000	0.765	1.000	1.000	1.000	1.000	1.000	0.765	1.000	0.988	0.985
ACH580-01-039A-4	1.000	1.000	1.000	0.806	1.000	1.000	1.000	1.000	1.000	0.806	1.000	1.000	1.000
<b>ACH580-01-046A-4</b> (representative product)	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>
ACH580-01-047A-2	1.024	1.005	1.000	0.802	1.000	1.000	1.000	1.000	1.000	0.802	1.000	1.054	1.023
ACH580-01-060A-2	1.024	1.005	1.000	1.111	1.000	1.000	1.000	1.000	1.000	1.112	1.000	1.054	1.023
ACH580-01-033A-4 +B056	0.973	1.002	1.000	0.765	1.000	1.000	1.000	1.000	1.000	0.765	1.000	0.996	0.985
ACH580-01-039A-4 +B056	1.004	1.010	1.000	0.806	1.000	1.000	1.000	1.000	1.000	0.806	1.000	1.008	1.000
ACH580-01-046A-4 +B056	1.004	1.010	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.008	1.000
ACH580-01-047A-2 +B056	1.028	1.015	1.000	0.802	1.000	1.000	1.000	1.000	1.000	0.802	1.000	1.062	1.023
ACH580-01-060A-2 +B056	1.028	1.015	1.000	1.111	1.000	1.000	1.000	1.000	1.000	1.112	1.000	1.062	1.023

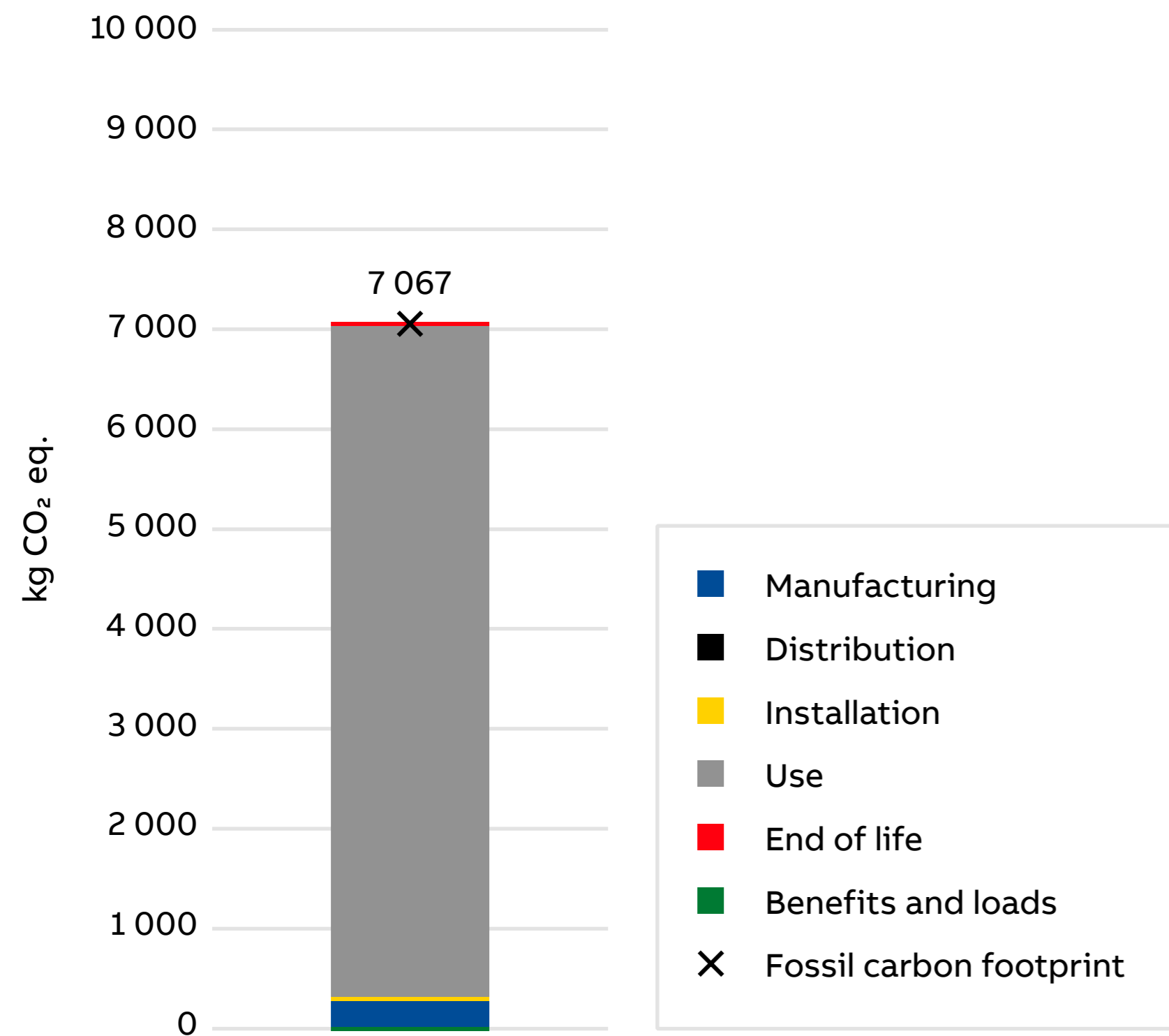


# Environmental performance

## Summary

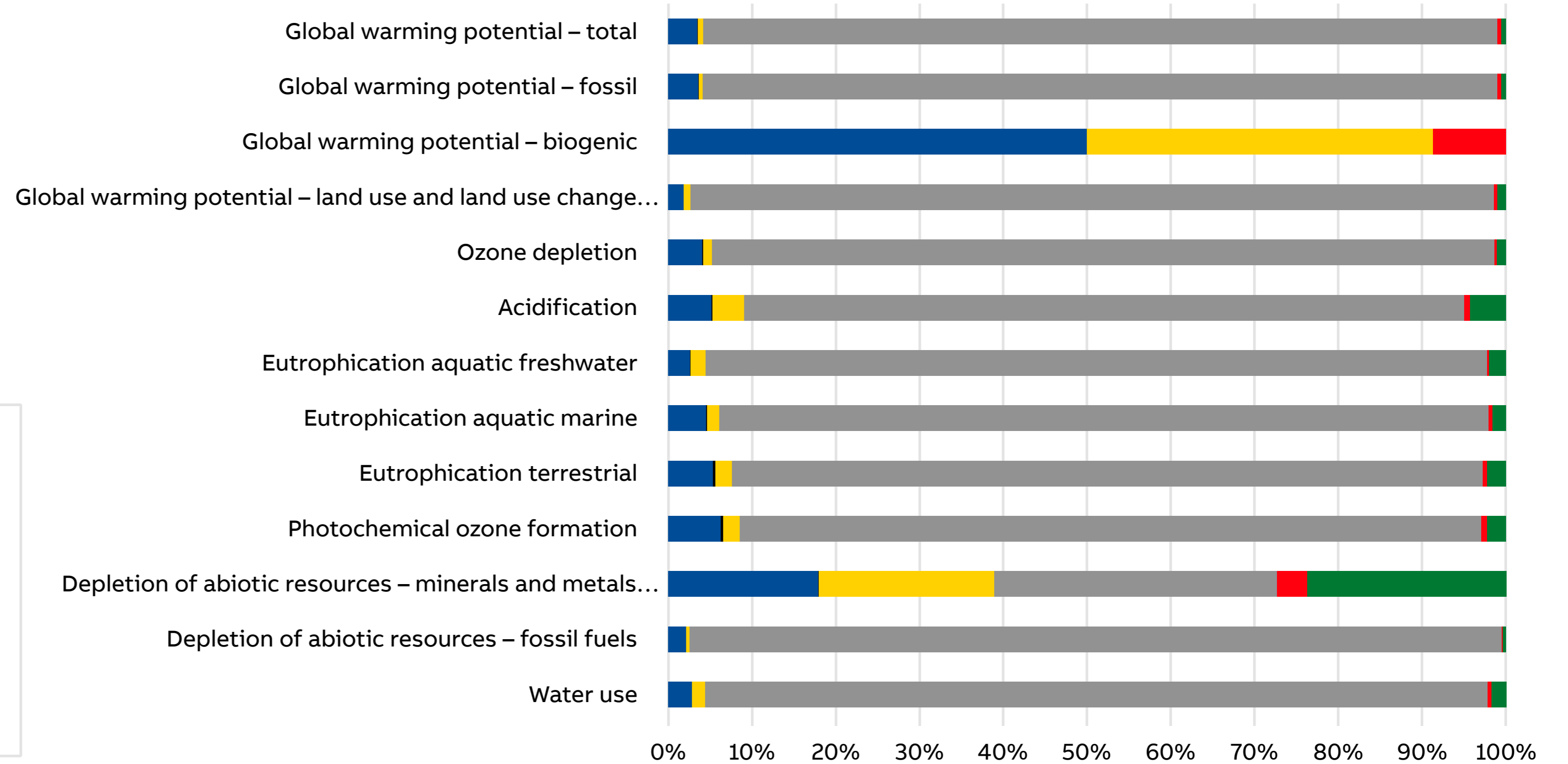
### Global warming potential / ACH580-01-046A-4

Global warming potential fossil results – i.e. the carbon footprint results of studied variable speed drive including also the benefits and loads beyond life cycle.



### Contribution analysis / ACH580-01-046A-4

Contribution of life cycle stages to the core environmental impacts.



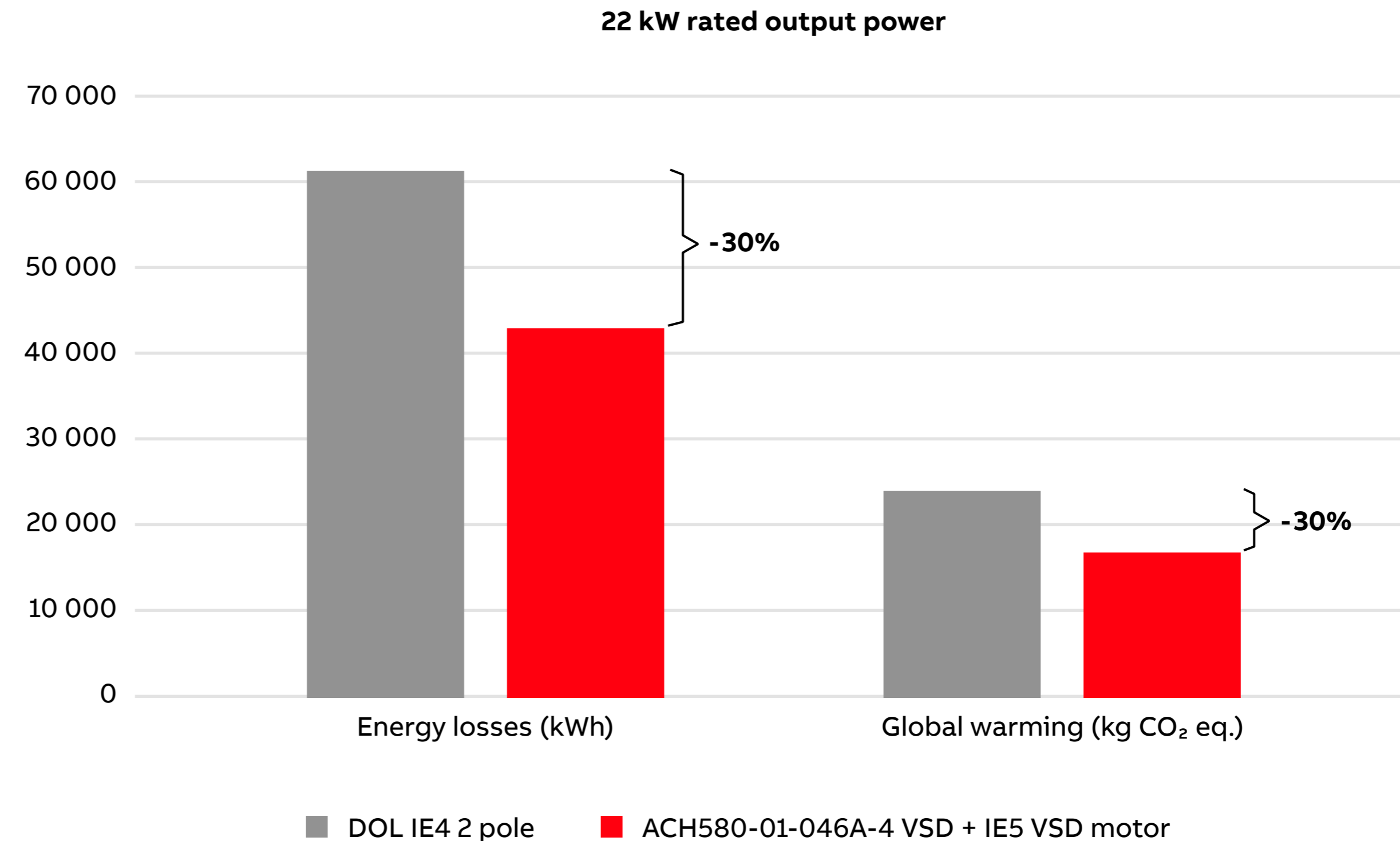
# Additional environmental information

## Energy savings, and potential for reduced emissions, when using a variable speed drive (VSD) to control an electrical motor

Using a variable speed drive (VSD) with an electrical motor enables significant energy savings and emission reduction compared to a Direct-on-Line (DOL) motor. The benefits of VSD control are gained via precise process control, which leads to significant energy savings due to the optimal speed being applied at all times.

The figures below present the use stage energy losses and contribution to global warming of ACH580-01-046A-4 VSD + IE5 VSD motor system and an equivalent DOL motor. The losses and emissions have been calculated for the reference service life of the drive, which is 10 years.

Drive losses for each operating point have been calculated by applying the linear interpolation method taken from IEC 61800-9-2. Rated current of the drive has been used in the calculation as 100% reference value. This is overestimating the drive losses (by up to +13%) as drive current is higher than motor current. DOL motor losses for each operating point are taken from IEC 60034-30-1. VSD motor losses for each operating point have been calculated using interpolation method from IEC 60034-31.



Use stage energy losses and contribution to global warming of ACH580-01-046A-4 VSD + IE5 VSD motor system and an equivalent DOL motor. The GWP values in this chart only consider the energy losses in use. Other life cycle impacts like manufacturing of the motors and the VSD are not included.

# Programme information and references

## Commissioner of the study

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<b>Verifier accreditation number:</b> VH44	<b>Information and reference documents:</b> <a href="http://www.pep-ecopassport.org">www.pep-ecopassport.org</a>
<b>Date of issue:</b> 6/2024	<b>Validity period:</b> 5 years
Independent verification of the declaration and data, in compliance with ISO 14025:2006 <input checked="" type="checkbox"/> External	
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 elements of the present PEP cannot be compared with elements from another program.	
Document in compliance with ISO 14025:2006 Environmental labels and declarations. Type III environmental declarations.	



## References

ISO. (2006a). ISO 14025: Environmental labels and declarations – Type III environmental declarations – Principles and procedures. Geneva: International Organization for Standardization.

ISO. (2006b). ISO 14040: Environmental management – Life cycle assessment – Principles and framework. Geneva: International Organization for Standardization.

ISO. (2006c). ISO 14044: Environmental management – Life cycle assessment – Requirements and guidelines. Geneva: International Organization for Standardization.

PEP ecopassport® PROGRAM. (2021). Product Category Rules for Electrical, Electronic and HVAC-R Products, PCR-ed4-EN-2021 09 06. [www.pep-ecopassport.org](http://www.pep-ecopassport.org)

Ecoinvent 3.8.

ABB Oy. 2022. Inventory data.

# ABB Drives

## Empowering your business, with profitable and sustainable efficiency

You base your business on efficiency and performance. You know that everything counts to make you more competitive. Our drives are made with all this in mind, empowering productivity and efficiency. They provide flexibility to help you optimize your processes and control, and reliable for less downtime. You also get premium service and expertise, anywhere on the globe.

