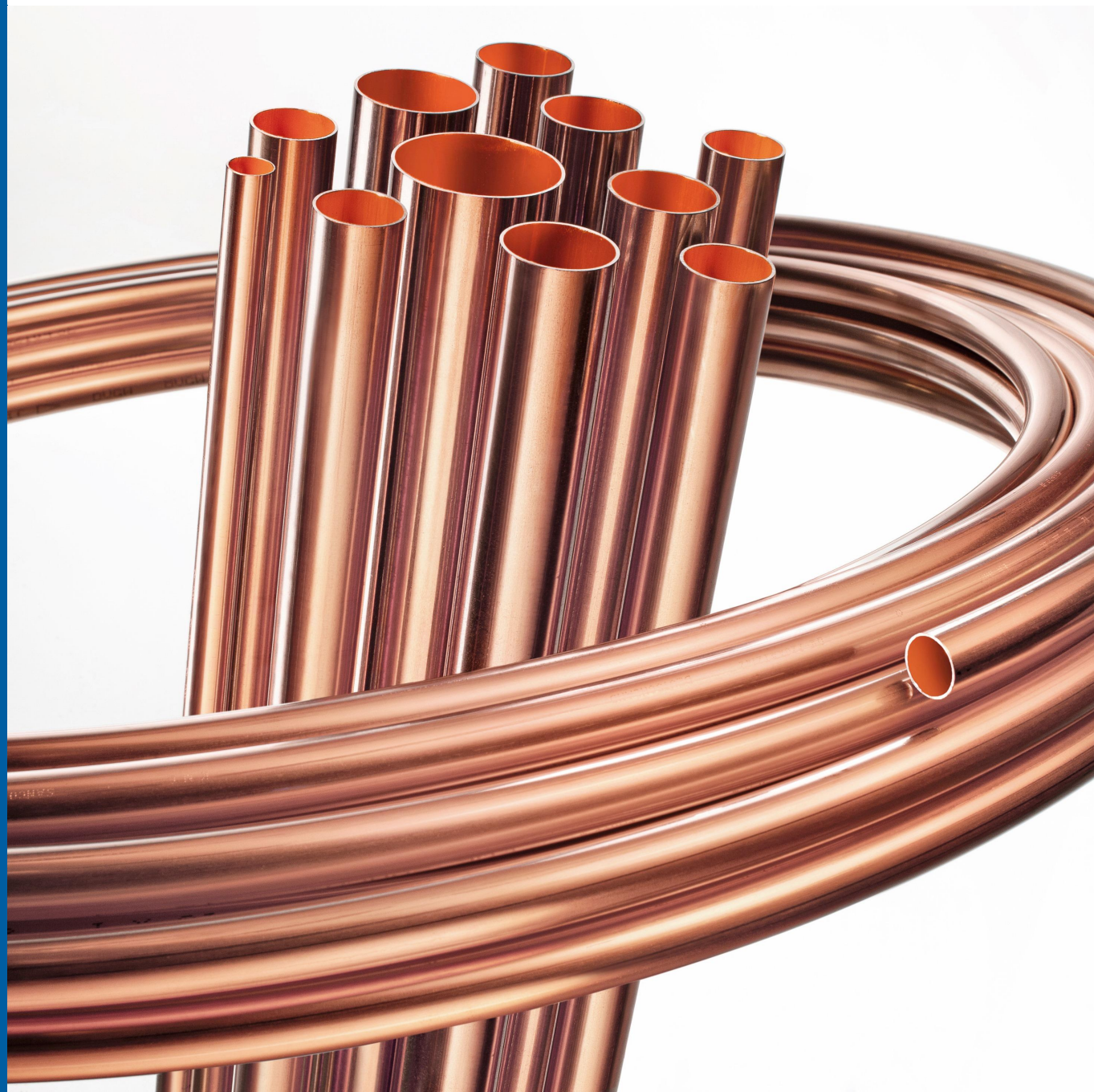
Environmental Product Declaration (EPD)
According to ISO 14025 and EN 15804

Copper tubes



Registration number:	EPD-Kiwa-EE-175069-en
Issue date:	12-06-2024
Valid until:	12-06-2029
Declaration owner:	HME Copper Germany GmbH
Publisher:	Kiwa-Ecobility Experts
Program operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

Copper tubes

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-175069-en

1.3 VALIDITY

Issue date: 12-06-2024

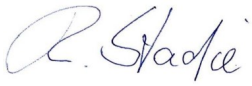
Valid until: 12-06-2029

1.4 PROGRAM OPERATOR

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin
DE

Raoul Mancke

(Head of programme operations, Kiwa-Ecobility Experts)



Dr. Ronny Stadie

(Verification body, Kiwa-Ecobility Experts)

1.5 OWNER OF THE DECLARATION

Manufacturer: HME Copper Germany GmbH

Address: Carl-Benz-Str. 13, 58706 Menden, DE

E-mail: info@hmemetal.com

Website: https://www.hmemetal.com/

Production location: HME Copper Germany GmbH

Address production location: Carl-Benz-Str. 13, 58706 Menden, DE

1.6 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804:2012+A2:2019 serves as the core PCR.

☐ Internal ☑ External

Lucas Pedro Berman, Senda

1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The programme operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

1.8 PRODUCT CATEGORY RULES

PCR A: Kiwa-EE General Product Category Rules, Version 2.1, 2022-02-14

PCR B: Requirements on the EPD for Metal pipes for domestic installations, Version 8, 2023-10-19, From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU)

1.9 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804+A2. For the evaluation of the comparability, the following aspects have to be considered in

1 General information

particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

1.10 CALCULATION BASIS

LCA method R<THiNK: Ecobility Experts | EN15804+A2

LCA software*: Simapro 9.1

Characterization method: EN 15804 +A2 Method v1.0

LCA database profiles: EcoInvent version 3.6

Version database: v3.17 (2024-05-22)

** Simapro is used for calculating the characterized results of the Environmental profiles within R<THiNK.*

1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'Copper tubes' with the calculation identifier ReTHiNK-75069.

2 Product

2.1 PRODUCT DESCRIPTION

This document refers to bare HME copper tubes for industrial solutions as well as for different water or gas applications. For the production of those tubes copper Cu-DHP in accordance with /DIN EN1057/ is used. Cu-DHP is deoxidised copper with a limited phosphorus content (maximum 0.04%) which is characterised by its very good weldability and solderability. The purity is at least 99.90% copper. The dimension range of the copper tubes is between 6 mm x 0,4 mm and 133 mm x3,5 mm.

Component	*Share*
Copper	~100%

2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The applications of the declared branded copper tubes are transport of:

- Drinking water cold, warm, circulation (SANCO)
- Rainwater
- Cable shoes
- Heat transfer media in heating, surface heating, surface cooling and solar thermal energy
- Refrigerants
- Gas and liquid gas

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

The declared scenarios represent the life cycle stages "Cradle to gate with modules C1–C4 and module D". Therefore, according to PCR, no indication of the reference service life is required. If used according to good engineering practice, no ageing of the products is to be expected.

USED RSL (YR) IN THIS LCA CALCULATION:

50

2.4 TECHNICAL DATA

SANCO tubes are manufactured according to:

- DVGW GW 392
- RAL-Gütezeichen
- ÖVGW QS-G 100, QS-G 313
- ÖVGW QS-W 402, QS-W 100, QS-W 200
- KIWA BRL-K10018
- NF 090
- AENOR RP 004.01 / AENOR RP 004.03

Other copper tubes are manufactured according to:

- EN 1057
- EN 12735-1
- EN 13348
- ASTM B 280
- PED 2014/68/EU

For placing on the market in the EU/EFTA with the exception of Switzerland, Regulation (EU) No. 305/2011 of 9 March 2011 (Construction Product Regulation) applies. The products require a declaration of performance taking into account the harmonised standard EN 1057:2006+A1:2010 and the CE marking.

The respective national regulations apply for use. Planning, processing, commissioning, and intended operation of HME branded copper tubes are dependent on the respective application in accordance to the codes of practice and the manufacturer's recommendations.

Descirption	Value	Unit
Type of metal used	Cu - DHP	-
Thermal conductivity of the metal tube	305	W/(mK)
Coefficient of linear expansion	16.8 (10^-6)	(K^-1)
Tensile strength	220-400	N/mm²
Elongation at break	≥40 - ≥3 %	-
Modulus of elasticity at 20°C	132	kN/mm²
Density	8.94	g/cm³
Melting point	1083	°C

2 Product

2.5 SUBSTANCES OF VERY HIGH CONCERN

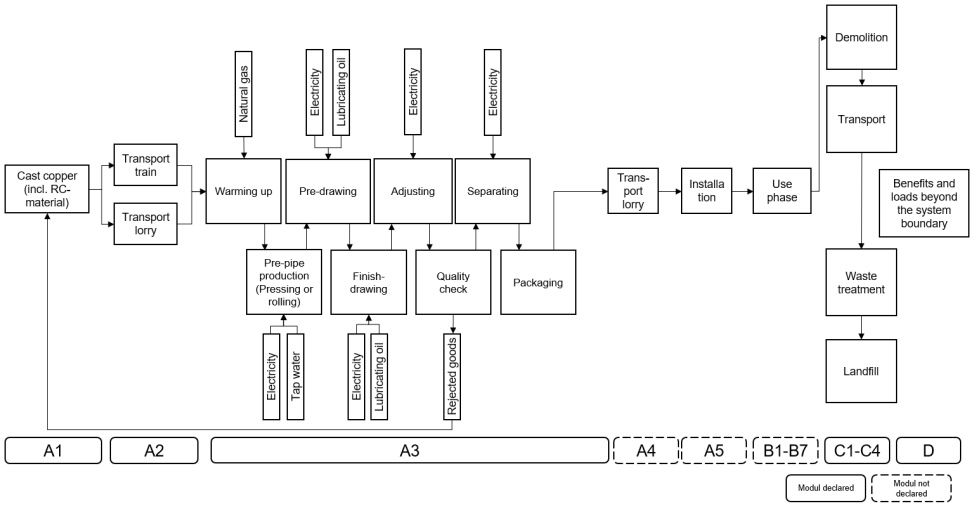
No substance present in the product with a contribution of more than 0.10% of the total weight is present on the "List of Potentially Hazardous Substances" (SVHC) that are candidates for authorisation under REACH legislation.

2.6 DESCRIPTION PRODUCTION PROCESS

In the first stage of copper tube production, a pre-tube is produced from the round billet. This pre-tube can be produced either by hot forming or by a hot piercing process. Hot rolling is followed by cold forming by pilger rolling. This allows high degrees of deformation. In case of hot forming that process is immediately followed by cold drawing.

The further steps to produce the finished tube are carried out in several stages, each by cold drawing in drawing machines. In contrast to hot forming, a "flying mandrel" (mandrill) is used. The respective outer diameter is determined by the die, while the mandrill determines the inner diameter.

In the course of further processing, HME copper tubes are produced in three different strength levels, each of which offers specific advantages for processing. These are hard (R 290), semi-hard (R 250) and soft (R 220). The minimum tensile strength Rm in MPa (N/mm²) is specified as the characteristic value. Hard tubes do not undergo any further annealing. The dimension range of the copper tubes is between 6 mm x 0,4 mm and 133 mm x 3,5 mm.



3 Calculation rules

3.1 DECLARED UNIT

1 kg

The declared unit is 1 kg of copper tubes.

Reference unit: kilogram (kg)

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	kg
Conversion factor to 1 kg	0.999900	kg

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with modules C1-C4 and module D LCA. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

The modules of the EN15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

3.4 REPRESENTATIVENESS

The input data are representative for Copper tubes, a product of HME Copper Germany GmbH. The data are representative for Germany. The scenarios included are currently in use and are representative for one of the most likely scenario alternatives. 100% scenarios can be given. Additional declaration of representative mixes for the relevant region is permissible.

3.5 CUT-OFF CRITERIA

Product Stage (A1-A3)

3 Calculation rules

All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Furthermore, excluded processes are:

- Manufacturing of equipment used in production, buildings or any other capital asset;
- Transportation of personnel to the plant;
- The transportation of personnel within the plant;
- Research and development activities;
- Long-term emissions.

Construction process stage (A4-A5)

All input flows (e.g. transportation to the construction site, additional raw material use for construction, installation energy (use)of energy use for assembly , etc.) and output flows (e.g. construction waste, packaging waste, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass

Use stage (B1-B3)

All (known) input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. emissions to soil, air and water, construction waste, packaging waste, end-of-life waste, etc.) related to the building fabric are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

End of life stage (C1-C4)

All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Benefits and Loads beyond the system boundary (Module D)

All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

3.6 ALLOCATION

Allocation was avoided where possible. In this LCA study, a physical allocation has been carried out: The electricity consumption of the production of HME copper tubes has been allocated to 1 kg of product. The differenences in tensile strength of the copper tubes were neglected.

3.7 DATA COLLECTION & REFERENCE TIME PERIOD

All process-specific data was collected for the 2022 operating year. The quantities of raw materials, consumables and supplies used and the energy consumption were recorded and averaged over the entire 2022 operating year.

3.8 ESTIMATES AND ASSUMPTIONS

Representative and average data for Germany was used for most inputs (raw materials and external inputs). For inputs for which there was no corresponding German data set, a data set for a neighbouring country (e.g. Switzerland or the Netherlands) or a regional data set (e.g. for the EU) was used. In a few cases, a global dataset was used. If data was provided by a manufacturer (e.g. an EPD), this was used as the data source.

All specific transport distances of the source materials were recorded and taken into account.

The distances from the place of use to the respective waste treatment are taken from the LCA calculation software R<THiNK, which source for the distances is the National Environmental Database (National Environmental Database; NMD) of the Netherlands.

For reasons of data protection, further assumptions are only explained in the background report which accompanies this EPD.

A waste scenario for copper has been assumed for Germany. According to the Copper Association (Kupferverband), only 10% of the construction waste generated are disposed. The remaining material was properly recycled and/or reused. More information on this can be found at Recycling – Kupferverband.

3 Calculation rules

3.9 DATA QUALITY

All process-specific data was collected for the 2022 operating year and is therefore up-to-date. The data is based on the annual average. In order to ensure comparability of the results, only consistent background data of the Ecoinvent database V3.6 was used in the LCA (e.g., records on energy, transportation, and supplies), which refers to reference year 2019. The database is regularly reviewed and thus complies with the requirements of EN 15804 (background data not older than 10 years). All consistent datasets contained in the Ecoinvent database are documented and can be viewed in the online Ecoinvent documentation. The primary data were provided by HME Copper Germany GmbH. The life cycle was modelled with the R<THiNK EPD App.

The quality of the data used for this EPD can be divided into three categories according to the criteria of the United Nations Global Environmental Guidelines for the development of an LCA database (as described in EN 15804+A2).

The quality level of geographical representativeness is very good, the quality level of technical representativeness can be considered good, and the temporal representativeness can also be considered good. Therefore, the overall data quality for this EPD can be described as good.

3.10 GUARANTEES OF ORIGIN

In this EPD, the local based approach was considered for the LCA, therefore no guaranties of origin (GO) are needed.

4 Scenarios and additional technical information

4.1 DE-CONSTRUCTION, DEMOLITION (C1)

The following information describes the scenario for demolition at end of life.

Description	Amount	Unit
Diesel, burned in building machine {GLO}| processing | Cut-off, U	0.043	MJ

4.2 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
Copper Germany	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default) | market group for (GLO)
Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.3 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables. First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
Copper Germany	DE	0	10	0	90	0

4 Scenarios and additional technical information

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
Copper Germany	0.000	0.100	0.000	0.900	0.000
Total	**0.000**	**0.100**	**0.000**	**0.900**	**0.000**

4.4 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
Copper Germany	0.374	0.000
Total	**0.374**	**0.000**

5 Results

For the impact assessment, the characterization factors of the LCIA method EN 15804 +A2 Method v1.0 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER KILOGRAM

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
AP	mol H+ eqv.	7.33E-2	1.49E-4	2.10E-3	7.55E-2	4.12E-5	4.31E-5	2.69E-4	7.82E-6	-2.74E-2
GWP-total	kg CO2 eqv.	1.68E+0	2.07E-2	5.48E-1	2.25E+0	3.94E-3	7.43E-3	2.10E-2	9.39E-4	-6.29E-1
GWP-b	kg CO2 eqv.	4.31E-3	6.60E-5	-1.65E-2	-1.22E-2	1.10E-6	3.43E-6	-1.27E-3	4.15E-5	-1.61E-3
GWP-f	kg CO2 eqv.	1.68E+0	2.06E-2	5.64E-1	2.26E+0	3.94E-3	7.42E-3	2.22E-2	8.97E-4	-6.27E-1
GWP-luluc	kg CO2 eqv.	1.65E-3	1.63E-5	5.32E-4	2.19E-3	3.10E-7	2.72E-6	2.48E-5	2.52E-7	-6.16E-4
EP-m	kg N eqv.	6.80E-3	5.23E-5	3.02E-4	7.16E-3	1.82E-5	1.52E-5	5.94E-5	2.89E-6	-2.54E-3
EP-fw	kg P eqv.	5.85E-4	5.53E-7	5.40E-5	6.40E-4	1.43E-8	7.49E-8	1.51E-6	1.16E-8	-2.19E-4
EP-T	mol N eqv.	1.05E-1	5.79E-4	4.07E-3	1.10E-1	1.99E-4	1.67E-4	6.89E-4	3.20E-5	-3.93E-2
ODP	kg CFC 11 eqv.	1.32E-7	3.65E-9	1.32E-7	2.68E-7	8.50E-10	1.64E-9	3.19E-9	3.23E-10	-4.94E-8
POCP	kg NMVOC eqv.	2.31E-2	1.60E-4	1.19E-3	2.45E-2	5.48E-5	4.78E-5	1.88E-4	9.14E-6	-8.66E-3
ADP-f	MJ	2.14E+1	3.07E-1	1.33E+1	3.51E+1	5.42E-2	1.12E-1	3.08E-1	2.40E-2	-8.02E+0
ADP-mm	kg Sb-eqv.	1.22E-3	3.37E-7	2.05E-6	1.22E-3	6.04E-9	1.88E-7	1.23E-6	7.88E-9	-4.57E-4
WDP	m3 world eqv.	1.46E+0	1.93E-3	8.61E-2	1.55E+0	7.26E-5	4.01E-4	3.10E-3	1.13E-4	-5.48E-1

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

5 Results

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
ETP-fw	CTUe	1.31E+3	3.02E-1	6.84E+0	1.32E+3	3.27E-2	9.98E-2	1.32E+0	1.16E-1	-4.90E+2
PM	disease incidence	2.61E-7	1.69E-9	1.09E-8	2.73E-7	1.09E-9	6.68E-10	3.38E-9	1.61E-10	-9.75E-8
HTP-c	CTUh	2.86E-8	1.46E-11	1.33E-10	2.88E-8	1.14E-12	3.24E-12	3.22E-11	1.11E-12	-1.07E-8
HTP-nc	CTUh	2.08E-6	3.34E-10	3.96E-9	2.08E-6	2.81E-11	1.09E-10	1.53E-9	9.08E-11	-7.78E-7
IR	kBq U235 eqv.	1.03E-1	1.51E-3	4.92E-2	1.54E-1	2.32E-4	4.69E-4	1.53E-3	1.20E-4	-3.86E-2
SQP	Pt	2.24E+1	2.38E-1	7.13E+0	2.97E+1	6.92E-3	9.71E-2	6.20E-1	5.89E-2	-8.37E+0

ETP-fw=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP)

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	AAcidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2

5 Results

ILCD classification	Indicator	Disclaimer
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	7.00E+0	1.55E-2	1.11E+0	8.13E+0	2.93E-4	1.40E-3	4.83E-2	1.35E-3	-2.62E+0
PERM	MJ	0.00E+0	0.00E+0	3.74E-1	3.74E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	7.00E+0	1.55E-2	1.48E+0	8.50E+0	2.93E-4	1.40E-3	4.83E-2	1.35E-3	-2.62E+0
PENRE	MJ	2.28E+1	3.25E-1	1.41E+1	3.72E+1	5.76E-2	1.19E-1	3.26E-1	2.55E-2	-8.54E+0
PENRM	MJ	0.00E+0	0.00E+0	1.84E-1	1.84E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	MJ	2.28E+1	3.25E-1	1.43E+1	3.74E+1	5.76E-2	1.19E-1	3.26E-1	2.55E-2	-8.54E+0
SM	Kg	5.26E-1	0.00E+0	0.00E+0	5.26E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	3.70E-2	9.21E-5	4.13E-3	4.12E-2	2.79E-6	1.36E-5	1.46E-4	3.00E-5	-1.38E-2

PERE=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

5 Results

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	Kg	2.66E-5	6.84E-7	1.03E-5	3.76E-5	1.48E-7	2.84E-7	9.27E-7	2.95E-8	-9.97E-6
NHWD	Kg	1.30E+0	1.16E-2	2.70E-2	1.34E+0	6.42E-5	7.10E-3	9.00E-3	1.00E-1	-4.87E-1
RWD	Kg	9.47E-5	1.94E-6	6.96E-5	1.66E-4	3.76E-7	7.35E-7	1.83E-6	1.59E-7	-3.54E-5

HWD=hazardous waste disposed | **NHWD**=non hazardous waste disposed | **RWD**=radioactive waste disposed

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.00E-1	0.00E+0	0.00E+0
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	4.65E-2	4.65E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	MJ	0.00E+0	0.00E+0	2.70E-2	2.70E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

5 Results

5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER KILOGRAM

BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per kilogram:

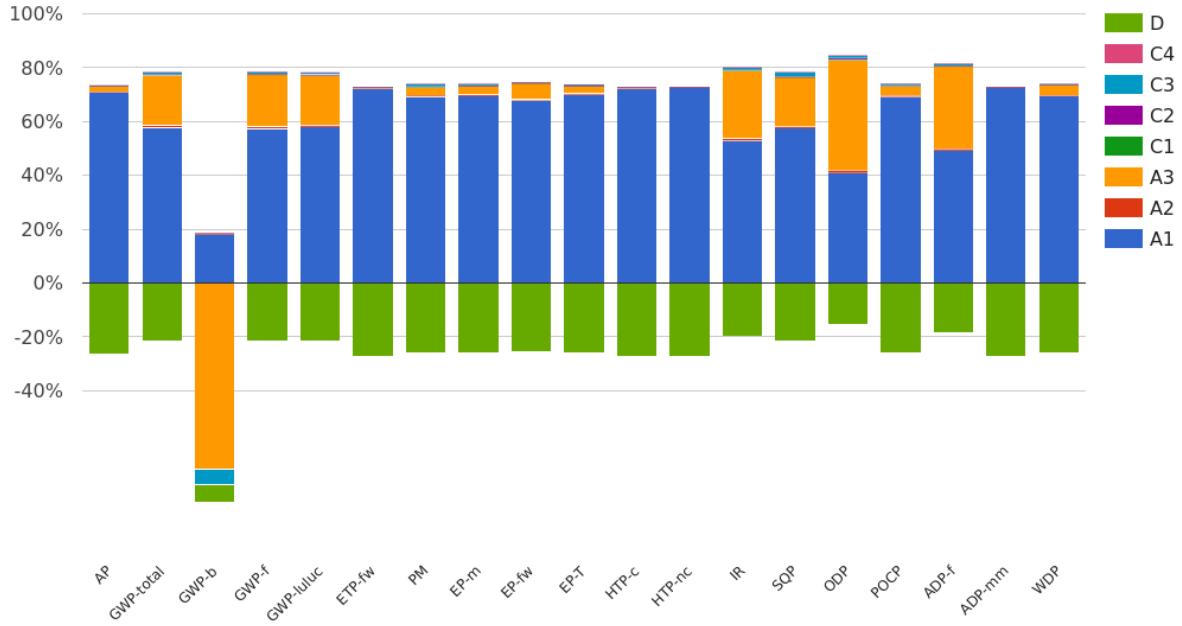
Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0.01202	kg C

UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results.

Uptake Biogenic Carbon dioxide	Amount	Unit
Packaging	0.04407	kg CO2 (biogenic)

6 Interpretation of results



The Raw material supply (A1), and Manufacturing (A3) predominate in almost all of the environmental impact categories analysed. For example, around 75 % of CO2 emissions (GWP-total) are attributable to raw material supply, while the A3 module accounts for around 24 % of the GWP. Copper accounts for approx. 99 % of the total GWP in the raw material supply (A1) and energy consumption accounts for aprox. 81 % in the manufacturing (A3).

7 References

ISO 14040
ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044
ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

ISO 14025
ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A2
EN 15804+A2: 2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

8 Contact information

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