ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Metal substations
AS Harju Elekter

Programme operator: Rakennustieto Oy
EPD registration number: RTS_468_26
Publication date: 23.3.2026
Valid until: 23.3.2031

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication.

GENERAL INFORMATION

MANUFACTURER

Manufacturer	AS Harju Elekter
Address	Paldiski mnt 31/17 Keila Harjumaa 76606
Contact details	info.ee@harjuelekter.com
Website	https://harjuelekter.com/et/

PRODUCT IDENTIFICATION

Product name	Metal substation
Product reference	HEKA1VM315-5; HEKA1VM315-8; HEKA1VM1000-8; HEKA1VM1600-1
Place of production	Estonia, Harju Elekter AS Keila factory
Period for data	01.09.2023-31.08.2024

EPD INFORMATION

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	Rakennustieto Oy
EPD standards	This EPD is in line with EN 50693:2019, EN 15804+A2 and ISO 14025.
Product category rules	EN 50693:2019 in accordance with The CEN standard EN 15804 serves as the core PCR. In addition, the RTS EPD PCR 2024 (12.11.2024) is used.
Scope of the EPD	The scope of the EPD is cradle to gate with options, A4-A5, B1, B6, and modules C1-C4, D.
EPD author	Andra Ainsaar, Sustinere OÜ
Category of EPD	Third party verified EPD
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Anni Oviir, LCA Support (Rangi Maja OÜ)
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EPD valid until	23.3.2031

Jukka Seppänen
RTS EPD Committee Secretary

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Managing Director

PRODUCT INFORMATION

PRODUCT DESCRIPTION

The EPD covers four different metal substations with varying technical specifications. The main function of the substations is to deliver power to a distribution network. All metal substations are inside operated, sheet metal substation. Enclosure of the substation is made of hot-dip galvanized sheet metal and the outer surface is covered with powder paint. The substation has a removable roof in a transformer compartment. Colour can be chosen according to needs (RAL). Substations are premanufactured and type tested according to IEC 62271-202.

The exact size of the model is fixed but other configurations of the substation are agreed upon with the client. There can be some modifications, mostly dependent on the transformer and switchgears configuration needs. The current EPD use one maximum kVA transformer per substation as indicated in the table. In most cases the transformer is bought and the installation is organized by the client. Thus, the impacts of the transformer production in the EPD is indicated in the installation stage.

Further information can be found at: https://harjuelekter.com/et/

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate. Wood accounts for less than 5% of the total weight of the product and therefore the biogenic carbon content of the product is not declared.

Biogenic carbon content in product, kg C		ND
Biogenic carbon content in packaging, kg C		
HEKA1VM315-5	HEKA1VM1000-8	HEKA1VM1600-1
1.88	16.30	35.56

TECHNICAL SPECIFICATIONS

	HEKA1VM 315-5	HEKA1VM 315-8	HEKA1VM 1000-8	HEKA1VM 1600-1
Transformer	Up to 315 kVA	Up to 315 kVA	Up to 1000 kVA	Up to 1600 kVA
Medium voltage	Up to 24 kV	Up to 24 kV	Up to 24 kV	Up to 24 kV
Low voltage	Un 400 – 800 V	Un 400 – 800 V	Un 400 – 800 V	Un 400 – 800 V
Nominal current	Up to 630 A	Up to 630 A	Up to 1600 A	Up to 2500 A
Fuse switch disconnectors (NH2)	Up to 14 pcs	Up to 8 pcs	Up to 14 pcs	Up to 20 pcs
Temperature class	K20	K15	K15	K10
IAC class	IAC-AB 10 kA/1s	IAC-AB 16 kA/1s	IAC-AB 20 kA/1s	IAC-AB 20 kA/1s
Lifting with TR installed	No	Yes	Yes (Option)	Yes (Option)
Maximum transformer dimensions (LxWxH)	1,2 x 0,9 x 1,71 m	1,4 x 0,95 x 1,8 m	1,6 x 1 x 1,8 m	2 x 1,35 x 2,2 m

PRODUCT RAW MATERIAL COMPOSITION

The raw material of the product is mainly metal and fossil materials.

Material	Amount, mass %	Usability			Origin
		Renewable	Non-renewable	Recycled	
HEKA1VM315-5					
Steel	50.5%		x	40%	SE/BE
Copper	2.6%		x	30%	PL
Plastic	0.5%		x		EE
Wood	0.2%	x			EE
Cables	4.5%		x		EE
Paint	1.2%		x		EE
Others (electrical devices)	40.5%		x		EU
Packaging raw material composition					
Sawnwood	100%	x			EE
HEKA1VM315-8					
Concrete	60.2%		x		EE
Steel	24.7%		x	40%	SE/BE
Copper	0.6%		x	30%	PL
Plastic	0.7%		x		EE
Wood	0.1%	x			EE
Cables	1.2%		x		EE
Paint	0.5%		x		EE
Others (electrical devices)	12.0%		x		EU
Packaging raw material composition					
N/A					

Material	Amount, mass %	Usability			Origin
		Renewable	Non-renewable	Recycled	
HEKA1VM1000-8					
Concrete	52.4%		x		EE
Steel	30.7%		x	40%	SE/BE
Copper	3.3%		x	30%	PL
Plastic	0.1%		x		EE
Wood	0.1%	x			EE
Cables	2.7%		x		EE
Paint	0.5%		x		EE
Others (electrical devices)	10.1%		x		EU
Packaging raw material composition					
Sawnwood	100%	x			EE
HEKA1VM1600-1					
Concrete	54.9%		x		EE
Steel	25.2%		x	40%	SE/BE
Copper	8.8%		x	30%	PL
Plastic	0.2%		x		EE
Wood	0.0%	x			EE
Cables	2.1%		x		EE
Paint	0.4%		x		EE
Others (electrical devices)	8.3%		x		EU
Packaging raw material composition					
Sawnwood	100%	x			EE

TRANSFORMER RAW MATERIAL COMPOSITION

The raw material of the product is mainly mineral and fossil materials.

Material	Amount, mass %	Usability		
		Renewable	Non-renewable	Recycled
Distribution Transformer for HEKA1VM315-5 and HEKA1VM315-8				
Steel, stainless steel	61.2%		x	40%
Aluminum	15.7%		x	32%
Copper	0.4%		x	30%
Mineral oil	19.1%		x	
Plywood (presspaper and -board)	2.0%	x		
Others (resin, paint etc)	1.6%		x	
Distribution Transformer for HEKA1VM1000-8 and HEKA1VM1600-1				
Steel, stainless steel and copper	60.1%		x	40%
Aluminum	16.1%		x	32%
Mineral oil	20.6%		x	
Plywood (presspaper and -board)	1.8%	x		
Others (resin, paint etc)	0.8%		x	

PRODUCT LIFE-CYCLE

MANUFACTURING (A1-A3)

The production process of a metal substation begins with design and material (A1) selection – procuring raw materials (metal sheets) and electrical components. The raw materials are transported (A2) to the factory where the electrical components are firstly stored and the metal is processed by cutting necessary openings, bending, and painting (A3). After that, all the raw come together in one area where the substation is assembled according to the project documentation and drawings. Before delivery to the customer, the product is inspected for quality and compliance with requirements. As per the previous table, wooden material is also used to package some substations, e.g. 3.8 kg of sawnwood for HEKA1VM315-5, 33 kg of sawnwood for HEKA1VM1000-8 and 72 kg of sawnwood for HEKA1VM1600-1.

DISTRIBUTION AND INSTALLATION (A4-A5)

Transportation impacts occurred from Harju Elekter factory to construction site (A4) covering fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions. The transportation distances for the metal substations were calculated as a weighted average of the distances to the main customers. The main clients are in Estonia, Finland and Sweden. Environmental impacts from installation (A5) include transformer installation and release of biogenic carbon dioxide from wood packaging for those substations which have the packaging. As per the technical specifications table, transformers with the maximum kVA values are considered (i.e. 315, 315, 1000 and 1600 kVA) as this affects directly the B6 energy losses. The site preparation from A5 is excluded as negligible and within cut-off criteria.

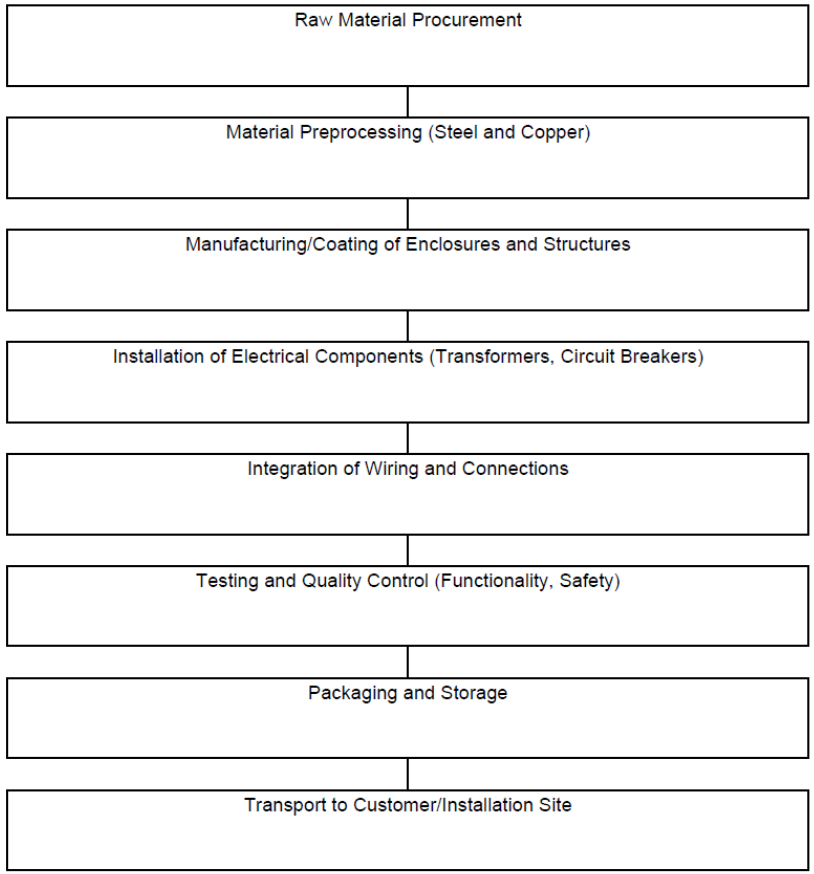
USE AND MAINTENANCE (B1-B7)

Substation use stage includes SF6 leakage (B1) and energy losses (B6). The use scenario is established based on manufacturer technical data and expert knowledge (in accordance with the requirements from EN 50693:2019). The energy consumption and electricity losses occur mainly due to the operation of power transformer. The average load of power transformers can vary depending on the region and type of use. Based on industry practice and Harju Elekter's experience, a typical load factor (50%) is applied. The losses are calculated taking into account the load factor, variable and fixed energy losses due to the system operation and power factor (0.9). Reference service life is considered 40 years.

PRODUCT END OF LIFE AND BENEFITS (C1-C4, D)

Given that the product is shipped mainly to Finland, the end-of-life scenario is modelled according to that region. It is assumed that 100% of the waste is collected and transported to the waste treatment centre. In module C1, the expected scenario for the on-site deconstruction is that the substation is lifted onto a truck and the demolition and disassembly takes place at the waste disposal site. The on-site deconstruction activities are minimal and the impacts therefore considered negligible. The end-of-life is modeled based on materials and devices, a significant portion of which is also recycled. Additionally, potential benefits are reported separately in module D.

MANUFACTURING PROCESS (A3)



LIFE-CYCLE ASSESSMENT

DATA PERIOD

The period for data represents 01.09.2023-31.08.2024.

DECLARED UNIT AND FUNCTIONAL UNIT

*mass is given without transformer

Declared unit		Metal substation	
Reference service life, years		40	
Mass* per declared unit, kg			
HEKA1VM315-5	HEKA1VM315-8	HEKA1VM1000-8	HEKA1VM1600-1_RTU
946 kg	2 393 kg	2 816 kg	3 829 kg

In addition, the functional unit is defined as:
“The functional unit considered in this study is one terawatt-hour (TWh) of electricity delivered to a power distribution network via a sheet-metal substation, designed for a nominal voltage of up to 24 kV and a rated current-carrying capacity of up to 2500 A, depending on the substation type. The substation is assumed to operate with an average annual transformer load rate of 50% and a power factor of 0.9 throughout an expected service life of 40 years.”
The main results are given according to the declared unit. Under allocation, estimates and assumption chapter the coefficient to calculate the results per functional unit is provided.

SYSTEM BOUNDARY

The scope of the EPD is cradle to gate with options, A4-A5, B1, B6, and modules C1-C4, D.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	x	ND	ND	ND	ND	x	ND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Not declared = ND

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances.
The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass, and energy flows and environmental impacts. The total excluded input and output energy flows, mass as well as environmental impacts do not exceed 5% of energy usage or mass. The following inputs or activities were excluded from the analysis:
1) Materials that weigh below 0.2 kg (e.g. stickers; plastic straps; small metal attachments, components etc.). The total mass of excluded materials were well below 1% of total substation mass.
2) Site preparation
3) Disassembly

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. Allocation for co-products is based on EN 50693:2019, where physical properties (e.g. as mass) is preferred, otherwise economic aspects, such as man-hours etc. may be used.
This is also in line with EN 15804. Thus, the allocation is conducted in the following order:
1) Allocation should be avoided.
2) Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.
3) Allocation should be based on economic values.
For the use of energy and the use of the surface area, only facility-level data were available. Energy consumed, and the surface area used during the manufacturing stage have been allocated to the analysed product based on the amount of substation that is produced.

The A1-A3 results represent the substation without the transformer as the transformer is in majority of the cases installed in A5.
The transformer losses in the current EPD are calculated per existing guidelines and expert knowledge. The substation is assumed to operate with an average annual transformer load rate of 50% and a power factor of 0.9 throughout an expected service life of 40 years.
The assessed substations in the current EPD take into account the maximum transformer kVA values (see technical specifications table).

Coefficient to calculate results per functional unit

	HEKA1VM315-5	HEKA1VM315-8	HEKA1VM1000-8	HEKA1VM1600-1
Energy delivered to the power distribution network in 1 year (MWh)	1320.3	1320.3	4380	7008
Reference service life (years)	40	40	40	40
Energy delivered to the power distribution network during service life (TWh)	**52.81**	**52.81**	**175.20**	**280.31**

Calculation to move from declared unit to functional unit:
Value per functional unit = declared unit value / energy delivered to the power distribution network during service life (TWh)

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator (Version: 0.46.0). The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11 environmental data sources follow the methodology 'allocation, Cut-off, EN 15804+A2'.

- 3rd CEER Report on Power Losses 2025, Council of European Energy Regulators. Accessed on: https://www.ceer.eu/publication/3rd-ceer-report-on-power-losses/
- Bozdag, Ö. & Secer, M. 2007. Accessed on: www.irbnet.de/daten/iconda/CIB_DC24603.pdf
- Ecoinvent 3.10.1/3.11 database
- European Suppliers of Waste-to-Energy Technology, 2025 Accessed on: https://eswet.eu/setting-the-record-straight-about-waste-to-energy/
- IDEMAT database
- International Aluminium Institute, Accessed on: https://international-aluminium.org/
- International Copper Association, Accessed on: https://internationalcopper.org/
- Nordic Council of Ministers Report: Current Status of the Waste Incineration Sector in the Nordics, 2024. Accessed on: https://pub.norden.org/temanord2024-524/1-current-status-of-the-waste-incineration-sector-in-the-nordics.html
- Plastics Europe database
- Vantaan Energia: https://www.vantaanenergia.fi/en/about-us/circular-economy/?utm_source=chatgpt.com
- World Steel Association, Accessed on: https://worldsteel.org/

EPD programs: EPD Italy, EPD Norge, Institut Bauen und Umwelt e.V. (IBU), International EPD System, PEP-ecopassport.

ENVIRONMENTAL IMPACT DATA (HEKA1VM315-5)

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

		Manufacturing				Distribution	Installation[6]	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total[1]	kg CO_2e	3,55E+03	1,14E+02	2,66E+03	6,33E+03	6,13E+01	7,20E+03	2,22E+03	ND	ND	ND	ND	8,60E+04	ND	0,00E+00	3,06E+01	1,55E+03	8,91E-01	-5,84E+03
GWP – fossil	kg CO_2e	3,52E+03	1,14E+02	2,66E+03	6,30E+03	6,12E+01	7,12E+03	2,22E+03	ND	ND	ND	ND	8,39E+04	ND	0,00E+00	3,06E+01	1,49E+03	8,91E-01	-5,82E+03
GWP – biogenic	kg CO_2e	1,42E+01	2,57E-02	-3,42E+00	1,08E+01	1,19E-02	3,20E+01	0,00E+00	ND	ND	ND	ND	3.21E+02	ND	0,00E+00	6,79E-03	6,40E+01	4,11E-04	-4,15E+00
GWP – LULUC	kg CO_2e	1,41E+01	5,08E-02	6,58E-02	1,42E+01	2,83E-02	4,92E+01	0,00E+00	ND	ND	ND	ND	1,74E+03	ND	0,00E+00	1,31E-02	7,00E-02	4,63E-04	-1,09E+01
Ozone depletion pot.	kg CFC-$_{11}$e	4,29E-05	1,68E-06	1,11E-04	1,56E-04	8,96E-07	8,11E-04	0,00E+00	ND	ND	ND	ND	1,40E-03	ND	0,00E+00	4,97E-07	9,11E-07	2,34E-08	-2,73E-05
Acidification potential	mol H^+e	2,40E+01	3,87E-01	1,53E+01	3,96E+01	8,19E-01	4,30E+01	0,00E+00	ND	ND	ND	ND	2,96E+02	ND	0,00E+00	1,03E-01	5,39E-01	5,74E-03	-2,73E+01
EP-freshwater[2]	kg Pe	8,10E+01	8,84E-03	3,06E-01	8,13E+01	3,62E-03	2,95E+00	0,00E+00	ND	ND	ND	ND	2,17E+01	ND	0,00E+00	2,29E-03	7,90E-02	6,68E-05	-8,45E+02
EP-marine	kg Ne	3,96E+00	1,27E-01	1,98E+00	6,06E+00	2,17E-01	8,07E-01	0,00E+00	ND	ND	ND	ND	7,12E+01	ND	0,00E+00	3,41E-02	1,94E-01	4,21E-03	-5,48E+00
EP-terrestrial	mol Ne	4,71E+01	1,38E+00	2,05E+01	6,91E+01	2,40E+00	8,78E+00	0,00E+00	ND	ND	ND	ND	7,37E+02	ND	0,00E+00	3,71E-01	2,00E+00	2,39E-02	-5,67E+01
POCP ("smog")[3]	kg NMVOCe	1,22E+01	5,71E-01	6,31E+00	1,91E+01	7,13E-01	2,93E+01	0,00E+00	ND	ND	ND	ND	2,19E+02	ND	0,00E+00	1,56E-01	4,69E-01	8,58E-03	-1,87E+01
ADP-minerals & metals[4]	kg Sbe	3,87E-01	3,17E-04	8,09E-04	3,88E-01	1,27E-04	1,15E-01	0,00E+00	ND	ND	ND	ND	2,23E-01	ND	0,00E+00	8,51E-05	7,50E-04	1,29E-06	3,15E-03
ADP-fossil resources	MJ	3,86E+04	1,65E+03	3,48E+04	7,50E+04	8,36E+02	1,05E+05	0,00E+00	ND	ND	ND	ND	3,92E+06	ND	0,00E+00	4,44E+02	7,68E+02	1,98E+01	-5,70E+04
Water use[5]	m^3e depr.	7,82E+03	8,14E+00	2,33E+04	3,11E+04	3,46E+00	4,35E+03	0,00E+00	ND	ND	ND	ND	1,07E+05	ND	0,00E+00	2,21E+00	6,83E+01	6,72E-02	-1,80E+03

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator. 6) **The transformer is included in the product system at the installation stage (module A5).**

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	Incidence	1,26E-04	1,14E-05	7,44E-05	2,12E-04	4,48E-06	7,21E-05	0,00E+00	ND	ND	ND	ND	2,54E-03	ND	0,00E+00	3,06E-06	8,86E-06	1,31E-07	-4,77E-04
Ionizing radiation[7)]	kBq U235e	1,09E+02	1,43E+00	4,45E+02	5,55E+02	5,95E-01	9,10E+00	0,00E+00	ND	ND	ND	ND	2,27E+05	ND	0,00E+00	4,27E-01	4,26E+00	1,25E-02	-1,18E+02
Ecotoxicity (freshwater)	CTUe	7,82E+04	2,33E+02	3,15E+03	8,16E+04	9,81E+01	1,48E+03	7,25E-03	ND	ND	ND	ND	1,69E+05	ND	0,00E+00	5,99E+01	6,11E+03	5,57E+00	-7,43E+03
Human toxicity, cancer	CTUh	6,65E+01	1,87E-08	1,48E-07	6,65E+01	1,11E-08	1,19E-07	0,00E+00	ND	ND	ND	ND	1,68E-05	ND	0,00E+00	5,05E-09	2,62E-07	1,53E-10	-9,72E-06
Human tox. non-cancer	CTUh	1,19E+03	1,07E-06	1,15E-05	1,19E+03	4,24E-07	6,77E-06	1,10E-12	ND	ND	ND	ND	7,15E-04	ND	0,00E+00	2,88E-07	1,06E-05	4,45E-09	4,53E-06
SQP[8)]	-	9,41E+03	1,66E+03	3,04E+03	1,41E+04	5,76E+02	1,05E+04	0,00E+00	ND	ND	ND	ND	1,25E+06	ND	0,00E+00	4,47E+02	1,31E+03	3,92E+01	-9,87E+03

7) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 8) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Renew. PER as energy	MJ	1,06E+04	2,26E+01	1,22E+03	1,18E+04	9,52E+00	1,53E+04	0,00E+00	ND	ND	ND	ND	1,40E+06	ND	0,00E+00	6,39E+00	-4,97E+02	1,93E-01	-4,78E+03
Renew. PER as material	MJ	2,84E+02	0,00E+00	5,50E+01	3,39E+02	0,00E+00	1,16E+03	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-1,42E+03	-8,46E+01	0,00E+00
Total use of renew. PER	MJ	1,09E+04	2,26E+01	1,28E+03	1,22E+04	9,52E+00	1,64E+04	0,00E+00	ND	ND	ND	ND	1,40E+06	ND	0,00E+00	6,39E+00	-1,92E+03	-8,44E+01	-4,78E+03
Non-re. PER as energy	MJ	3,58E+04	1,65E+03	3,78E+04	7,53E+04	8,36E+02	8,97E+04	0,00E+00	ND	ND	ND	ND	3,92E+06	ND	0,00E+00	4,44E+02	-1,17E+04	-1,65E+01	-5,73E+04
Non-re. PER as material	MJ	2,92E+03	0,00E+00	0,00E+00	2,92E+03	0,00E+00	1,52E+04	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-1,71E+04	-1,00E+03	3,22E+01
Total use of non-re. PER	MJ	3,88E+04	1,65E+03	3,78E+04	7,82E+04	8,36E+02	1,05E+05	0,00E+00	ND	ND	ND	ND	3,92E+06	ND	0,00E+00	4,44E+02	-2,89E+04	-1,02E+03	-5,73E+04
Secondary materials	kg	1,25E+02	7,01E-01	1,64E-01	1,26E+02	3,59E-01	4,45E+00	0,00E+00	ND	ND	ND	ND	3,96E+02	ND	0,00E+00	1,90E-01	1,05E+00	5,01E-03	-2,61E+02
Renew. secondary fuels	MJ	5,26E+00	8,91E-03	5,05E-03	5,28E+00	3,25E-03	5,65E-02	0,00E+00	ND	ND	ND	ND	1,25E+00	ND	0,00E+00	2,41E-03	2,85E-01	1,04E-04	-2,50E-01
Non-ren. secondary fuels	MJ	1,05E+00	0,00E+00	0,00E+00	1,05E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	1,11E+02	2,44E-01	2,19E+01	1,33E+02	9,95E-02	1,09E+02	0,00E+00	ND	ND	ND	ND	3,40E+03	ND	0,00E+00	6,56E-02	1,50E+00	1,67E-02	-3,21E+01

END OF LIFE – WASTE

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	8,00E+01	2,79E+00	1,21E+00	8,40E+01	1,28E+00	1,92E+01	0,00E+00	ND	ND	ND	ND	5,16E+03	ND	0,00E+00	7,22E-01	5,28E+01	2,20E-02	-1,37E+03
Non-hazardous waste	kg	6,55E+02	5,17E+01	2,48E+02	9,55E+02	2,19E+01	2,18E+03	0,00E+00	ND	ND	ND	ND	1,17E+05	ND	0,00E+00	1,36E+01	4,25E+02	3,14E+00	-1,03E+04
Radioactive waste	kg	2,39E+00	3,51E-04	5,02E-02	2,44E+00	1,46E-04	3,99E-01	0,00E+00	ND	ND	ND	ND	4,87E+01	ND	0,00E+00	1,05E-04	1,07E-03	3,05E-06	-3,42E-02

END OF LIFE – OUTPUT FLOWS

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	9,45E-02	0,00E+00	0,00E+00	9,45E-02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	2,47E+01	0,00E+00	1,93E+02	2,17E+02	0,00E+00	2,05E+02	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,28E+03	0,00E+00	0,00E+00
Materials for energy rec	kg	1,58E+00	0,00E+00	1,00E+00	2,58E+00	0,00E+00	3,80E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	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	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,13E+03	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,15E+04	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global Warming Pot.	kg CO_2e	2,03E+03	1,13E+02	2,66E+03	4,80E+03	6,09E+01	7,16E+02	2,07E+03	ND	ND	ND	ND	8,55E+04	ND	0,00E+00	3,04E+01	1,50E+03	8,79E-01	-5,79E+03
Ozone depletion Pot.	kg $CFC_{-11}e$	2,03E-05	1,34E-06	1,09E-04	1,30E-04	7,13E-07	8,48E-06	0,00E+00	ND	ND	ND	ND	1,29E-03	ND	0,00E+00	3,96E-07	7,86E-07	1,86E-08	-2,44E-05
Acidification	kg SO_2e	4,58E+00	2,96E-01	1,32E+01	1,80E+01	6,49E-01	1,88E+00	0,00E+00	ND	ND	ND	ND	2,35E+02	ND	0,00E+00	7,83E-02	3,91E-01	4,25E-03	-2,29E+01
Eutrophication	kg PO_4^3e	7,14E-01	7,20E-02	1,72E+00	2,50E+00	8,53E-02	4,57E-01	0,00E+00	ND	ND	ND	ND	4,14E+01	ND	0,00E+00	1,93E-02	1,46E-01	1,41E-03	-2,63E+00
POCP (“smog”)	kg C_2H_4e	6,04E-01	2,63E-02	5,45E-01	1,18E+00	3,61E-02	1,67E-01	0,00E+00	ND	ND	ND	ND	1,67E+01	ND	0,00E+00	7,08E-03	3,10E-02	4,14E-04	-2,31E+00
ADP-elements	kg Sbe	2,11E-01	3,09E-04	8,01E-04	2,12E-01	1,24E-04	1,96E-03	0,00E+00	ND	ND	ND	ND	2,27E-01	ND	0,00E+00	8,30E-05	7,00E-04	1,26E-06	3,59E-03
ADP-fossil	MJ	2,12E+04	1,62E+03	3,48E+04	5,76E+04	8,26E+02	1,03E+04	0,00E+00	ND	ND	ND	ND	7,22E+05	ND	0,00E+00	4,37E+02	6,96E+02	1,96E+01	-5,51E+04

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total	kg CO_2e	3.12E+00	1.00E-01	2.33E+00	5.56E+00	5.38E-02	6.32E+00	1.95E+00	MND	MND	MND	MND	7.55E+01	MND	0.00E+00	2.69E-02	1.36E+00	7.82E-04	-5.13E+00
ADP-minerals & metals	kg Sbe	3.40E-04	2.78E-07	7.10E-07	3.41E-04	1.11E-07	1.01E-04	0.00E+00	MND	MND	MND	MND	1.96E-04	MND	0.00E+00	7.47E-08	6.58E-07	1.13E-09	2.76E-06
ADP-fossil resources	MJ	3.39E+01	1.45E+00	3.05E+01	6.58E+01	7.34E-01	9.22E+01	0.00E+00	MND	MND	MND	MND	3.44E+03	MND	0.00E+00	3.90E-01	6.74E-01	1.74E-02	-5.00E+01
Water use	m^3e depr.	6.86E+00	7.14E-03	2.05E+01	2.73E+01	3.04E-03	3.82E+00	0.00E+00	MND	MND	MND	MND	9.39E+01	MND	0.00E+00	1.94E-03	5.99E-02	5.90E-05	-1.58E+00
Secondary materials	kg	1.25E+02	7.01E-01	1.64E-01	1.26E+02	3.59E-01	4.45E+00	0.00E+00	ND	ND	ND	ND	3.96E+02	ND	0.00E+00	1.90E-01	1.05E+00	5.01E-03	-2.61E+02
Biog. C in product	kg C	n/a	n/a	0.00E+00	0.00E+00	n/a	n/a	n/a	ND	ND	ND	ND	n/a	ND	n/a	n/a	n/a	n/a	n/a
Biog. C in packaging	kg C	n/a	n/a	1.65E-03	1.65E-03	n/a	n/a	n/a	ND	ND	ND	ND	n/a	ND	n/a	n/a	n/a	n/a	n/a

9) Biog. C in product = Biogenic carbon content in product

ENVIRONMENTAL IMPACT DATA (HEKA1VM315-8)

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

		Manufacturing				Distribution	Installation[6]	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total[1]	kg CO_2e	4,31E+03	7,05E+01	1,89E+03	6,28E+03	1,42E+02	7,19E+03	2,22E+03	ND	ND	ND	ND	8,60E+04	ND	0,00E+00	4,68E+01	1,58E+03	1,43E+00	-5,96E+03
GWP – fossil	kg CO_2e	4,29E+03	7,04E+01	1,89E+03	6,25E+03	1,42E+02	7,12E+03	2,22E+03	ND	ND	ND	ND	8,39E+04	ND	0,00E+00	4,68E+01	1,51E+03	1,43E+00	-5,95E+03
GWP – biogenic	kg CO_2e	1,76E+01	1,60E-02	4,19E+00	2,18E+01	2,76E-02	1,96E+01	0,00E+00	ND	ND	ND	ND	3,21E+02	ND	0,00E+00	1,04E-02	6,85E+01	6,63E-04	-4,24E+00
GWP – LULUC	kg CO_2e	9,85E+00	3,15E-02	4,51E-02	9,93E+00	6,55E-02	4,92E+01	0,00E+00	ND	ND	ND	ND	1,74E+03	ND	0,00E+00	2,02E-02	7,00E-02	6,23E-04	-1,10E+01
Ozone depletion pot.	kg $CFC\text{-}_{11}$e	7,09E-04	1,04E-06	7,90E-05	7,89E-04	2,07E-06	8,11E-04	0,00E+00	ND	ND	ND	ND	1,40E-03	ND	0,00E+00	7,43E-07	1,02E-06	3,12E-08	-2,91E-05
Acidification potential	mol H^+e	2,84E+01	2,40E-01	1,08E+01	3,94E+01	1,89E+00	4,30E+01	0,00E+00	ND	ND	ND	ND	2,96E+02	ND	0,00E+00	1,58E-01	6,16E-01	7,68E-03	-2,81E+01
EP-freshwater[2]	kg Pe	2,47E+02	5,48E-03	2,17E-01	2,47E+02	8,38E-03	2,95E+00	0,00E+00	ND	ND	ND	ND	2,17E+01	ND	0,00E+00	3,54E-03	7,98E-02	9,02E-05	-7,77E+02
EP-marine	kg Ne	3,88E+00	7,89E-02	1,40E+00	5,36E+00	5,01E-01	8,07E-01	0,00E+00	ND	ND	ND	ND	7,12E+01	ND	0,00E+00	5,22E-02	2,36E-01	1,16E-02	-5,58E+00
EP-terrestrial	mol Ne	1,10E+02	8,59E-01	1,45E+01	1,25E+02	5,54E+00	8,78E+00	0,00E+00	ND	ND	ND	ND	7,37E+02	ND	0,00E+00	5,68E-01	2,40E+00	3,19E-02	-5,78E+01
POCP ("smog")[3]	kg NMVOCe	1,35E+01	3,54E-01	4,48E+00	1,84E+01	1,65E+00	2,93E+01	0,00E+00	ND	ND	ND	ND	2,19E+02	ND	0,00E+00	2,37E-01	5,89E-01	1,15E-02	-1,92E+01
ADP-minerals & metals[4]	kg Sbe	5,26E-01	1,97E-04	4,52E-04	5,27E-01	2,93E-04	1,15E-01	0,00E+00	ND	ND	ND	ND	2,23E-01	ND	0,00E+00	1,30E-04	7,97E-04	1,75E-06	2,78E-03
ADP-fossil resources	MJ	7,32E+04	1,02E+03	2,47E+04	9,90E+04	1,93E+03	1,05E+05	0,00E+00	ND	ND	ND	ND	3,92E+06	ND	0,00E+00	6,79E+02	8,70E+02	2,64E+01	-5,88E+04
Water use[5]	m^3e depr.	8,17E+03	5,05E+00	1,64E+04	2,46E+04	7,99E+00	4,35E+03	0,00E+00	ND	ND	ND	ND	1,07E+05	ND	0,00E+00	3,38E+00	6,26E+01	7,86E-02	-1,87E+03

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator. 6) **The transformer is included in the product system at the installation stage (module A5).**

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	Incidence	2,42E-05	7,05E-06	5,26E-05	8,39E-05	1,04E-05	7,21E-05	0,00E+00	ND	ND	ND	ND	2,54E-03	ND	0,00E+00	4,68E-06	2,13E-05	1,74E-07	-4,87E-04
Ionizing radiation[7)]	kBq U235e	3,48E+01	8,90E-01	3,14E+02	3,49E+02	1,38E+00	9,10E+00	0,00E+00	ND	ND	ND	ND	2,27E+05	ND	0,00E+00	6,39E-01	4,44E+00	1,71E-02	-1,25E+02
Ecotoxicity (freshwater)	CTUe	3,66E+04	1,45E+02	2,26E+03	3,90E+04	2,27E+02	1,48E+03	7,25E-03	ND	ND	ND	ND	1,69E+05	ND	0,00E+00	9,27E+01	5,99E+03	1,67E+01	-9,42E+03
Human toxicity, cancer	CTUh	4,56E-06	1,16E-08	1,09E-07	4,69E-06	2,56E-08	1,19E-07	0,00E+00	ND	ND	ND	ND	1,68E-05	ND	0,00E+00	7,72E-09	2,63E-07	2,37E-10	-9,48E-06
Human tox. non-cancer	CTUh	6,87E-05	6,62E-07	8,18E-06	7,75E-05	9,81E-07	6,77E-06	1,10E-12	ND	ND	ND	ND	7,15E-04	ND	0,00E+00	4,40E-07	1,10E-05	1,38E-08	-4,92E-07
SQP[8)]	-	2,70E+03	1,03E+03	1,74E+03	5,47E+03	1,33E+03	1,05E+04	0,00E+00	ND	ND	ND	ND	1,25E+06	ND	0,00E+00	6,84E+02	1,41E+03	5,24E+01	-1,06E+04

7) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 8) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Renew. PER as energy	MJ	4,31E+03	1,40E+01	7,98E+02	5,13E+03	2,20E+01	1,53E+04	0,00E+00	ND	ND	ND	ND	1,40E+06	ND	0,00E+00	9,67E+00	-5,15E+02	2,62E-01	-4,89E+03
Renew. PER as material	MJ	3,90E+02	0,00E+00	0,00E+00	3,90E+02	0,00E+00	1,22E+03	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-1,51E+03	-9,89E+01	0,00E+00
Total use of renew. PER	MJ	4,70E+03	1,40E+01	7,98E+02	5,52E+03	2,20E+01	1,66E+04	0,00E+00	ND	ND	ND	ND	1,40E+06	ND	0,00E+00	9,67E+00	-2,03E+03	-9,86E+01	-4,89E+03
Non-re. PER as energy	MJ	7,21E+04	1,02E+03	2,68E+04	9,99E+04	1,93E+03	8,97E+04	0,00E+00	ND	ND	ND	ND	3,92E+06	ND	0,00E+00	6,79E+02	-1,24E+04	-1,26E+02	-5,91E+04
Non-re. PER as material	MJ	1,34E+03	0,00E+00	0,00E+00	1,34E+03	0,00E+00	1,52E+04	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-1,59E+04	-6,00E+02	6,15E+01
Total use of non-re. PER	MJ	7,34E+04	1,02E+03	2,68E+04	1,01E+05	1,93E+03	1,05E+05	0,00E+00	ND	ND	ND	ND	3,92E+06	ND	0,00E+00	6,79E+02	-2,83E+04	-7,26E+02	-5,90E+04
Secondary materials	kg	1,55E+02	4,35E-01	1,75E-01	1,56E+02	8,30E-01	4,45E+00	0,00E+00	ND	ND	ND	ND	3,96E+02	ND	0,00E+00	2,90E-01	1,14E+00	6,76E-03	-2,62E+02
Renew. secondary fuels	MJ	6,54E+01	5,53E-03	6,12E-03	6,54E+01	7,52E-03	5,65E-02	0,00E+00	ND	ND	ND	ND	1,25E+00	ND	0,00E+00	3,68E-03	2,75E-01	1,39E-04	-2,56E-01
Non-ren. secondary fuels	MJ	1,26E+02	0,00E+00	0,00E+00	1,26E+02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	5,95E+03	1,51E-01	1,54E+01	5,96E+03	2,30E-01	1,09E+02	0,00E+00	ND	ND	ND	ND	3,40E+03	ND	0,00E+00	1,00E-01	1,36E+00	1,09E-02	-3,36E+01

END OF LIFE – WASTE

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	1,02E+04	1,73E+00	1,31E+00	1,02E+04	2,96E+00	1,91E+01	0,00E+00	ND	ND	ND	ND	5,16E+03	ND	0,00E+00	1,12E+00	5,03E+01	2,99E-02	-1,39E+03
Non-hazardous waste	kg	8,31E+02	3,21E+01	2,26E+02	1,09E+03	5,07E+01	2,18E+03	0,00E+00	ND	ND	ND	ND	1,17E+05	ND	0,00E+00	2,09E+01	4,50E+02	2,15E+01	-1,08E+04
Radioactive waste	kg	3,95E-01	2,18E-04	3,32E-02	4,29E-01	3,36E-04	3,99E-01	0,00E+00	ND	ND	ND	ND	4,87E+01	ND	0,00E+00	1,57E-04	1,12E-03	4,17E-06	-3,55E-02

END OF LIFE – OUTPUT FLOWS

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	8,54E-01	0,00E+00	0,00E+00	8,54E-01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	5,11E+01	0,00E+00	2,42E+02	2,93E+02	0,00E+00	2,05E+02	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	3,71E+03	0,00E+00	0,00E+00
Materials for energy rec	kg	2,20E+00	0,00E+00	1,00E+00	3,20E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	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	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,18E+03	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	1,19E+04	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global Warming Pot.	kg CO_2e	2,34E+03	7,01E+01	1,89E+03	4,30E+03	1,41E+02	7,16E+02	2,07E+03	ND	ND	ND	ND	8,55E+04	ND	0,00E+00	4,65E+01	1,52E+03	1,40E+00	-5,91E+03
Ozone depletion Pot.	kg $CFC_{-11}e$	1,34E-05	8,30E-07	7,71E-05	9,13E-05	1,65E-06	8,48E-06	0,00E+00	ND	ND	ND	ND	1,29E-03	ND	0,00E+00	5,93E-07	8,70E-07	2,48E-08	-2,59E-05
Acidification	kg SO_2e	5,38E+00	1,83E-01	9,27E+00	1,48E+01	1,50E+00	1,87E+00	0,00E+00	ND	ND	ND	ND	2,35E+02	ND	0,00E+00	1,20E-01	4,45E-01	5,69E-03	-2,35E+01
Eutrophication	kg PO_4^3e	7,57E-01	4,47E-02	1,21E+00	2,02E+00	1,97E-01	4,57E-01	0,00E+00	ND	ND	ND	ND	4,14E+01	ND	0,00E+00	2,95E-02	1,61E-01	2,17E-03	-2,83E+00
POCP (“smog”)	kg C_2H_4e	7,32E-01	1,64E-02	3,85E-01	1,13E+00	8,35E-02	1,67E-01	0,00E+00	ND	ND	ND	ND	1,67E+01	ND	0,00E+00	1,08E-02	3,57E-02	5,88E-04	-2,37E+00
ADP-elements	kg Sbe	1,26E-01	1,92E-04	4,45E-04	1,27E-01	2,86E-04	1,96E-03	0,00E+00	ND	ND	ND	ND	2,27E-01	ND	0,00E+00	1,27E-04	7,49E-04	1,71E-06	3,28E-03
ADP-fossil	MJ	2,42E+04	1,01E+03	2,47E+04	4,99E+04	1,91E+03	1,03E+04	0,00E+00	ND	ND	ND	ND	7,22E+05	ND	0,00E+00	6,69E+02	7,95E+02	2,62E+01	-5,67E+04

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total	kg CO_2e	1.64E+00	2.68E-02	7.17E-01	2.38E+00	5.39E-02	2.73E+00	8.43E-01	MND	MND	MND	MND	3.26E+01	MND	0.00E+00	1.78E-02	6.00E-01	5.43E-04	-2.26E+00
ADP-minerals & metals	kg Sbe	2.00E-04	7.48E-08	1.72E-07	2.00E-04	1.11E-07	4.37E-05	0.00E+00	MND	MND	MND	MND	8.46E-05	MND	0.00E+00	4.93E-08	3.03E-07	6.64E-10	1.06E-06
ADP-fossil resources	MJ	2.78E+01	3.87E-01	9.38E+00	3.76E+01	7.33E-01	3.99E+01	0.00E+00	MND	MND	MND	MND	1.49E+03	MND	0.00E+00	2.58E-01	3.30E-01	1.00E-02	-2.23E+01
Water use	m^3e depr.	3.10E+00	1.92E-03	6.22E+00	9.34E+00	3.03E-03	1.65E+00	0.00E+00	MND	MND	MND	MND	4.06E+01	MND	0.00E+00	1.28E-03	2.38E-02	2.98E-05	-7.10E-01
Secondary materials	kg	5.88E-02	1.65E-04	6.64E-05	5.92E-02	3.15E-04	1.69E-03	0.00E+00	MND	MND	MND	MND	1.50E-01	MND	0.00E+00	1.10E-04	4.33E-04	2.57E-06	-9.94E-02
Biog. C in product	kg C	n/a	n/a	0,00E+00	0,00E+00	n/a	n/a	n/a	ND	ND	ND	ND	n/a	ND	n/a	n/a	n/a	n/a	n/a
Biog. C in packaging	kg C	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ND	ND	ND	ND	n/a	ND	n/a	n/a	n/a	n/a	n/a

9) Biog. C in product = Biogenic carbon content in product

ENVIRONMENTAL IMPACT DATA (HEKA1VM1000-8)

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

		Manufacturing				Distribution	Installation[6]	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total[1]	kg CO_2e	5,98E+03	1,07E+02	2,42E+03	8,50E+03	1,70E+02	2,36E+04	7,56E+02	ND	ND	ND	ND	3,37E+05	ND	0,00E+00	7,12E+01	2,97E+03	7,93E+00	-8,87E+03
GWP – fossil	kg CO_2e	5,91E+03	1,07E+02	2,47E+03	8,49E+03	1,70E+02	2,35E+04	7,56E+02	ND	ND	ND	ND	3,29E+05	ND	0,00E+00	7,12E+01	2,86E+03	7,94E+00	-8,85E+03
GWP – biogenic	kg CO_2e	3,83E+01	2,41E-02	-5,37E+01	-1,53E+01	3,32E-02	7,89E+01	0,00E+00	ND	ND	ND	ND	1,26E+03	ND	0,00E+00	1,59E-02	1,16E+02	1,58E-02	-6,11E+00
GWP – LULUC	kg CO_2e	2,89E+01	4,78E-02	1,14E-01	2,91E+01	7,88E-02	3,67E+01	0,00E+00	ND	ND	ND	ND	6,82E+03	ND	0,00E+00	3,08E-02	1,14E-01	7,96E-03	-1,62E+01
Ozone depletion pot.	kg CFC-$_{11}$e	7,49E-04	1,58E-06	1,03E-04	8,54E-04	2,49E-06	1,84E-03	0,00E+00	ND	ND	ND	ND	5,50E-03	ND	0,00E+00	1,13E-06	1,66E-06	1,83E-07	-4,06E-05
Acidification potential	mol H^+e	4,78E+01	3,64E-01	1,42E+01	6,24E+01	2,28E+00	1,55E+02	0,00E+00	ND	ND	ND	ND	1,16E+03	ND	0,00E+00	2,40E-01	9,54E-01	5,02E-02	-3,89E+01
EP-freshwater[2]	kg Pe	9,31E+01	8,32E-03	2,86E-01	9,34E+01	1,01E-02	6,81E+00	0,00E+00	ND	ND	ND	ND	8,51E+01	ND	0,00E+00	5,39E-03	1,63E-01	9,58E-04	-1,87E+03
EP-marine	kg Ne	8,37E+00	1,20E-01	1,84E+00	1,03E+01	6,03E-01	1,66E+00	0,00E+00	ND	ND	ND	ND	2,79E+02	ND	0,00E+00	7,94E-02	3,52E-01	2,23E-02	-8,30E+00
EP-terrestrial	mol Ne	1,72E+02	1,30E+00	1,91E+01	1,92E+02	6,67E+00	1,80E+01	0,00E+00	ND	ND	ND	ND	2,89E+03	ND	0,00E+00	8,64E-01	3,65E+00	2,00E-01	-8,57E+01
POCP ("smog")[3]	kg NMVOCe	2,64E+01	5,37E-01	5,90E+00	3,28E+01	1,98E+00	1,08E+02	0,00E+00	ND	ND	ND	ND	8,59E+02	ND	0,00E+00	3,61E-01	8,85E-01	6,75E-02	-2,83E+01
ADP-minerals & metals[4]	kg Sbe	8,24E-01	2,98E-04	6,07E-04	8,25E-01	3,52E-04	3,07E-01	0,00E+00	ND	ND	ND	ND	8,75E-01	ND	0,00E+00	1,98E-04	1,26E-03	1,71E-05	6,01E-04
ADP-fossil resources	MJ	8,89E+04	1,55E+03	3,23E+04	1,23E+05	2,32E+03	2,90E+05	0,00E+00	ND	ND	ND	ND	1,54E+07	ND	0,00E+00	1,03E+03	1,37E+03	1,61E+02	-8,67E+04
Water use[5]	m^3e depr.	1,71E+04	7,66E+00	2,16E+04	3,87E+04	9,61E+00	2,88E+04	0,00E+00	ND	ND	ND	ND	4,20E+05	ND	0,00E+00	5,14E+00	1,17E+02	1,98E+00	-2,72E+03

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator. 6) **The transformer is included in the product system at the installation stage (module A5).**

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	Incidence	4,98E-05	1,07E-05	6,96E-05	1,30E-04	1,25E-05	1,48E-04	0,00E+00	ND	ND	ND	ND	9,96E-03	ND	0,00E+00	7,12E-06	2,88E-05	1,04E-06	-7,18E-04
Ionizing radiation[7)]	kBq U235e	7,86E+01	1,35E+00	4,12E+02	4,92E+02	1,66E+00	1,86E+01	0,00E+00	ND	ND	ND	ND	8,88E+05	ND	0,00E+00	9,71E-01	7,28E+00	2,10E-01	-1,83E+02
Ecotoxicity (freshwater)	CTUe	8,79E+04	2,19E+02	2,95E+03	9,10E+04	2,73E+02	3,04E+03	2,47E-03	ND	ND	ND	ND	6,62E+05	ND	0,00E+00	1,41E+02	9,11E+03	2,92E+04	-9,25E+03
Human toxicity, cancer	CTUh	6,73E-06	1,76E-08	1,42E-07	6,89E-06	3,08E-08	2,44E-07	0,00E+00	ND	ND	ND	ND	6,58E-05	ND	0,00E+00	1,17E-08	4,47E-07	3,81E-09	-1,81E-05
Human tox. non-cancer	CTUh	1,65E-04	1,00E-06	1,08E-05	1,77E-04	1,18E-06	1,39E-05	3,75E-13	ND	ND	ND	ND	2,80E-03	ND	0,00E+00	6,69E-07	1,60E-05	6,86E-07	3,91E-05
SQP[8)]	-	4,66E+03	1,56E+03	8,55E+03	1,48E+04	1,60E+03	2,16E+04	0,00E+00	ND	ND	ND	ND	4,92E+06	ND	0,00E+00	1,04E+03	2,18E+03	2,86E+02	-1,45E+04

7) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 8) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Renew. PER as energy	MJ	1,19E+04	2,12E+01	1,72E+03	1,36E+04	2,65E+01	2,39E+05	0,00E+00	ND	ND	ND	ND	5,48E+06	ND	0,00E+00	1,47E+01	-9,19E+02	3,09E+00	-7,21E+03
Renew. PER as material	MJ	3,49E+02	0,00E+00	4,78E+02	8,27E+02	0,00E+00	3,48E+04	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-3,09E+04	-4,66E+03	0,00E+00
Total use of renew. PER	MJ	1,22E+04	2,12E+01	2,20E+03	1,45E+04	2,65E+01	2,74E+05	0,00E+00	ND	ND	ND	ND	5,48E+06	ND	0,00E+00	1,47E+01	-3,19E+04	-4,65E+03	-7,21E+03
Non-re. PER as energy	MJ	8,80E+04	1,55E+03	3,51E+04	1,25E+05	2,32E+03	2,28E+04	0,00E+00	ND	ND	ND	ND	1,54E+07	ND	0,00E+00	1,03E+03	-2,50E+04	1,24E+02	-8,73E+04
Non-re. PER as material	MJ	1,17E+03	0,00E+00	0,00E+00	1,17E+03	0,00E+00	2,68E+05	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-2,34E+05	-3,51E+04	3,69E+01
Total use of non-re. PER	MJ	8,91E+04	1,55E+03	3,51E+04	1,26E+05	2,32E+03	2,91E+05	0,00E+00	ND	ND	ND	ND	1,54E+07	ND	0,00E+00	1,03E+03	-2,59E+05	-3,50E+04	-8,73E+04
Secondary materials	kg	2,11E+02	6,60E-01	2,58E-01	2,11E+02	9,98E-01	9,12E+00	0,00E+00	ND	ND	ND	ND	1,55E+03	ND	0,00E+00	4,41E-01	1,85E+00	5,09E-02	-3,83E+02
Renew. secondary fuels	MJ	7,38E+01	8,38E-03	9,99E-03	7,39E+01	9,05E-03	1,16E-01	0,00E+00	ND	ND	ND	ND	4,90E+00	ND	0,00E+00	5,59E-03	4,17E-01	8,60E-04	-4,12E-01
Non-ren. secondary fuels	MJ	1,30E+02	0,00E+00	0,00E+00	1,30E+02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	3,81E+02	2,29E-01	2,03E+01	4,02E+02	2,77E-01	3,17E+00	0,00E+00	ND	ND	ND	ND	1,33E+04	ND	0,00E+00	1,53E-01	2,58E+00	-5,42E-01	-4,84E+01

END OF LIFE – WASTE

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	1,03E+04	2,63E+00	1,34E+00	1,03E+04	3,56E+00	7,40E+02	0,00E+00	ND	ND	ND	ND	2,02E+04	ND	0,00E+00	1,70E+00	8,15E+01	6,37E-01	-2,07E+03
Non-hazardous waste	kg	1,32E+03	4,86E+01	2,66E+02	1,63E+03	6,10E+01	7,06E+02	0,00E+00	ND	ND	ND	ND	4,59E+05	ND	0,00E+00	3,19E+01	6,78E+02	9,12E+02	-1,48E+04
Radioactive waste	kg	5,28E-01	3,30E-04	4,37E-02	5,72E-01	4,05E-04	4,56E-03	0,00E+00	ND	ND	ND	ND	1,91E+02	ND	0,00E+00	2,38E-04	1,83E-03	5,14E-05	-5,57E-02

END OF LIFE – OUTPUT FLOWS

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	1,02E+00	0,00E+00	0,00E+00	1,02E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	5,65E+01	0,00E+00	3,53E+02	4,09E+02	0,00E+00	2,80E+02	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	4,99E+03	0,00E+00	0,00E+00
Materials for energy rec	kg	3,38E+00	0,00E+00	0,00E+00	3,38E+00	0,00E+00	3,30E+01	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	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	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,42E+03	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,45E+04	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global Warming Pot.	kg CO_2e	3,43E+03	1,06E+02	2,47E+03	6,01E+03	1,69E+02	1,47E+03	7,05E+02	ND	ND	ND	ND	3,35E+05	ND	0,00E+00	7,08E+01	2,88E+03	7,89E+00	-8,80E+03
Ozone depletion Pot.	kg $CFC_{-11}e$	2,30E-05	1,26E-06	1,01E-04	1,25E-04	1,98E-06	1,74E-05	0,00E+00	ND	ND	ND	ND	5,04E-03	ND	0,00E+00	9,01E-07	1,43E-06	1,46E-07	-3,63E-05
Acidification	kg SO_2e	7,94E+00	2,78E-01	1,22E+01	2,04E+01	1,80E+00	3,84E+00	0,00E+00	ND	ND	ND	ND	9,21E+02	ND	0,00E+00	1,83E-01	6,91E-01	3,72E-02	-3,26E+01
Eutrophication	kg PO_4^3e	1,20E+00	6,78E-02	1,60E+00	2,87E+00	2,37E-01	9,37E-01	0,00E+00	ND	ND	ND	ND	1,62E+02	ND	0,00E+00	4,49E-02	2,53E-01	1,84E-02	-3,95E+00
POCP (“smog”)	kg C_2H_4e	1,07E+00	2,48E-02	5,09E-01	1,60E+00	1,00E-01	3,43E-01	0,00E+00	ND	ND	ND	ND	6,54E+01	ND	0,00E+00	1,65E-02	5,49E-02	3,19E-03	-3,39E+00
ADP-elements	kg Sbe	2,33E-01	2,91E-04	6,02E-04	2,34E-01	3,44E-04	4,01E-03	0,00E+00	ND	ND	ND	ND	8,90E-01	ND	0,00E+00	1,93E-04	1,16E-03	1,66E-05	1,21E-03
ADP-fossil	MJ	3,47E+04	1,53E+03	3,23E+04	6,85E+04	2,30E+03	2,11E+04	0,00E+00	ND	ND	ND	ND	2,83E+06	ND	0,00E+00	1,02E+03	1,25E+03	1,57E+02	-8,38E+04

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total	kg CO_2e	1.89E+00	3.38E-02	7.64E-01	2.68E+00	5.36E-02	7.45E+00	2.39E-01	MND	MND	MND	MND	1.06E+02	MND	0.00E+00	2.25E-02	9.37E-01	2.50E-03	-2.80E+00
ADP-minerals & metals	kg Sbe	2.60E-04	9.40E-08	1.92E-07	2.60E-04	1.11E-07	9.69E-05	0.00E+00	MND	MND	MND	MND	2.76E-04	MND	0.00E+00	6.25E-08	3.98E-07	5.40E-09	1.90E-07
ADP-fossil resources	MJ	2.81E+01	4.89E-01	1.02E+01	3.88E+01	7.32E-01	9.15E+01	0.00E+00	MND	MND	MND	MND	4.86E+03	MND	0.00E+00	3.25E-01	4.32E-01	5.08E-02	-2.74E+01
Water use	m^3e depr.	5.40E+00	2.42E-03	6.82E+00	1.22E+01	3.03E-03	9.09E+00	0.00E+00	MND	MND	MND	MND	1.33E+02	MND	0.00E+00	1.62E-03	3.69E-02	6.25E-04	-8.58E-01
Secondary materials	kg	6.66E-02	2.08E-04	8.14E-05	6.66E-02	3.15E-04	2.88E-03	0.00E+00	MND	MND	MND	MND	4.89E-01	MND	0.00E+00	1.39E-04	5.84E-04	1.61E-05	-1.21E-01
Biog. C in product	kg C	n/a	n/a	0.00E+00	0.00E+00	n/a	n/a	n/a	ND	ND	ND	ND	n/a	ND	n/a	n/a	n/a	n/a	n/a
Biog. C in packaging	kg C	n/a	n/a	5.14E-03	5.14E-03	n/a	n/a	n/a	ND	ND	ND	ND	n/a	ND	n/a	n/a	n/a	n/a	n/a

9) Biog. C in product = Biogenic carbon content in product

ENVIRONMENTAL IMPACT DATA (HEKA1VM1600-1)

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

		Manufacturing				Distribution	Installation[6]	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total[1]	kg CO_2e	7,62E+03	1,56E+02	3,14E+03	1,09E+04	2,28E+02	2,37E+04	7,56E+02	ND	ND	ND	ND	5,29E+05	ND	0,00E+00	8,28E+01	3,04E+03	8,25E+00	-9,38E+03
GWP – fossil	kg CO_2e	7,54E+03	1,56E+02	3,26E+03	1,10E+04	2,28E+02	2,35E+04	7,56E+02	ND	ND	ND	ND	5,16E+05	ND	0,00E+00	8,27E+01	2,92E+03	8,23E+00	-9,35E+03
GWP – biogenic	kg CO_2e	4,87E+01	3,53E-02	-1,23E+02	-7,46E+01	4,44E-02	2,07E+02	0,00E+00	ND	ND	ND	ND	1,97E+03	ND	0,00E+00	1,84E-02	1,22E+02	1,60E-02	-5,56E+00
GWP – LULUC	kg CO_2e	3,90E+01	6,99E-02	1,97E-01	3,93E+01	1,05E-01	3,67E+01	0,00E+00	ND	ND	ND	ND	1,07E+04	ND	0,00E+00	3,57E-02	1,25E-01	8,08E-03	-1,60E+01
Ozone depletion pot.	kg CFC-$_{11}$e	3,49E-04	2,31E-06	1,36E-04	4,87E-04	3,33E-06	1,84E-03	0,00E+00	ND	ND	ND	ND	8,63E-03	ND	0,00E+00	1,32E-06	1,81E-06	1,89E-07	-4,01E-05
Acidification potential	mol H^+e	8,46E+01	5,33E-01	1,88E+01	1,04E+02	3,05E+00	1,55E+02	0,00E+00	ND	ND	ND	ND	1,82E+03	ND	0,00E+00	2,79E-01	1,05E+00	5,18E-02	-2,64E+01
EP-freshwater[2]	kg Pe	1,20E+02	1,22E-02	3,79E-01	1,21E+02	1,35E-02	6,81E+00	0,00E+00	ND	ND	ND	ND	1,33E+02	ND	0,00E+00	6,24E-03	1,68E-01	9,76E-04	-5,52E+03
EP-marine	kg Ne	1,93E+01	1,75E-01	2,44E+00	2,20E+01	8,06E-01	1,66E+00	0,00E+00	ND	ND	ND	ND	4,37E+02	ND	0,00E+00	9,22E-02	3,95E-01	2,48E-02	-8,75E+00
EP-terrestrial	mol Ne	3,60E+02	1,90E+00	2,54E+01	3,87E+02	8,91E+00	1,80E+01	0,00E+00	ND	ND	ND	ND	4,53E+03	ND	0,00E+00	1,00E+00	4,01E+00	2,06E-01	-8,89E+01
POCP ("smog")[3]	kg NMVOCe	5,72E+01	7,85E-01	7,82E+00	6,58E+01	2,65E+00	1,08E+02	0,00E+00	ND	ND	ND	ND	1,35E+03	ND	0,00E+00	4,20E-01	9,86E-01	6,98E-02	-2,91E+01
ADP-minerals & metals[4]	kg Sbe	1,45E+00	4,36E-04	7,84E-04	1,45E+00	4,70E-04	3,07E-01	0,00E+00	ND	ND	ND	ND	1,37E+00	ND	0,00E+00	2,30E-04	1,43E-03	1,74E-05	-2,02E-02
ADP-fossil resources	MJ	1,07E+05	2,27E+03	4,26E+04	1,52E+05	3,11E+03	2,90E+05	0,00E+00	ND	ND	ND	ND	2,41E+07	ND	0,00E+00	1,20E+03	1,51E+03	1,66E+02	-9,26E+04
Water use[5]	m^3e depr.	1,65E+04	1,12E+01	2,86E+04	4,51E+04	1,29E+01	2,88E+04	0,00E+00	ND	ND	ND	ND	6,59E+05	ND	0,00E+00	5,98E+00	1,23E+02	2,00E+00	-2,63E+03

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator. 6) **The transformer is included in the product system at the installation stage (module A5).**

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter	Incidence	1,90E-04	1,56E-05	9,22E-05	2,98E-04	1,66E-05	1,48E-04	0,00E+00	ND	ND	ND	ND	1,56E-02	ND	0,00E+00	8,27E-06	3,50E-05	1,07E-06	-7,13E-04
Ionizing radiation[7)]	kBq U235e	1,07E+04	1,97E+00	5,46E+02	1,13E+04	2,21E+00	1,87E+01	0,00E+00	ND	ND	ND	ND	1,39E+06	ND	0,00E+00	1,14E+00	8,42E+00	2,14E-01	-1,52E+02
Ecotoxicity (freshwater)	CTUe	1,08E+05	3,21E+02	3,89E+03	1,12E+05	3,65E+02	3,05E+03	2,47E-03	ND	ND	ND	ND	1,04E+06	ND	0,00E+00	1,63E+02	9,71E+03	2,92E+04	2,53E+03
Human toxicity, cancer	CTUh	1,24E-03	2,58E-08	1,87E-07	1,24E-03	4,11E-08	2,46E-07	0,00E+00	ND	ND	ND	ND	1,03E-04	ND	0,00E+00	1,36E-08	4,64E-07	3,86E-09	-3,91E-05
Human tox. non-cancer	CTUh	2,11E-04	1,47E-06	1,43E-05	2,27E-04	1,58E-06	1,40E-05	3,75E-13	ND	ND	ND	ND	4,39E-03	ND	0,00E+00	7,78E-07	1,71E-05	6,89E-07	2,38E-04
SQP[8)]	-	3,79E+03	2,28E+03	1,66E+04	2,27E+04	2,14E+03	2,16E+04	0,00E+00	ND	ND	ND	ND	7,71E+06	ND	0,00E+00	1,21E+03	2,54E+03	2,96E+02	-9,14E+03

7) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 8) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Renew. PER as energy	MJ	2,72E+04	3,11E+01	2,85E+03	3,01E+04	3,54E+01	2,38E+05	0,00E+00	ND	ND	ND	ND	8,59E+06	ND	0,00E+00	1,72E+01	-8,98E+02	3,14E+00	-7,02E+03
Renew. PER as material	MJ	4,03E+02	0,00E+00	1,04E+03	1,45E+03	0,00E+00	3,42E+04	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-3,10E+04	-4,64E+03	0,00E+00
Total use of renew. PER	MJ	2,76E+04	3,11E+01	3,89E+03	3,16E+04	3,54E+01	2,73E+05	0,00E+00	ND	ND	ND	ND	8,59E+06	ND	0,00E+00	1,72E+01	-3,19E+04	-4,64E+03	-7,02E+03
Non-re. PER as energy	MJ	1,07E+05	2,27E+03	4,63E+04	1,55E+05	3,11E+03	2,28E+04	0,00E+00	ND	ND	ND	ND	2,41E+07	ND	0,00E+00	1,20E+03	-2,55E+04	9,70E+01	-9,44E+04
Non-re. PER as material	MJ	1,67E+03	0,00E+00	0,00E+00	1,67E+03	0,00E+00	2,68E+05	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	-2,35E+05	-3,52E+04	6,66E+01
Total use of non-re. PER	MJ	1,08E+05	2,27E+03	4,63E+04	1,57E+05	3,11E+03	2,91E+05	0,00E+00	ND	ND	ND	ND	2,41E+07	ND	0,00E+00	1,20E+03	-2,60E+05	-3,51E+04	-9,43E+04
Secondary materials	kg	2,83E+02	9,65E-01	3,35E-01	2,84E+02	1,33E+00	9,13E+00	0,00E+00	ND	ND	ND	ND	2,44E+03	ND	0,00E+00	5,13E-01	2,01E+00	5,22E-02	-1,63E+02
Renew. secondary fuels	MJ	1,01E+02	1,23E-02	1,27E-02	1,01E+02	1,21E-02	1,16E-01	0,00E+00	ND	ND	ND	ND	7,69E+00	ND	0,00E+00	6,50E-03	4,30E-01	8,88E-04	-5,91E-01
Non-ren. secondary fuels	MJ	1,85E+02	0,00E+00	0,00E+00	1,85E+02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	1,26E+03	3,35E-01	2,69E+01	1,28E+03	3,70E-01	3,18E+00	0,00E+00	ND	ND	ND	ND	2,09E+04	ND	0,00E+00	1,77E-01	2,72E+00	-5,40E-01	-4,30E+01

END OF LIFE – WASTE

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	8,31E+03	3,84E+00	1,68E+00	8,31E+03	4,76E+00	7,40E+02	0,00E+00	ND	ND	ND	ND	3,17E+04	ND	0,00E+00	1,97E+00	8,43E+01	6,43E-01	-2,15E+03
Non-hazardous waste	kg	1,84E+03	7,11E+01	3,07E+02	2,21E+03	8,15E+01	7,46E+02	0,00E+00	ND	ND	ND	ND	7,19E+05	ND	0,00E+00	3,70E+01	7,61E+02	9,17E+02	-9,71E+03
Radioactive waste	kg	1,11E+00	4,83E-04	5,80E-02	1,16E+00	5,41E-04	4,57E-03	0,00E+00	ND	ND	ND	ND	2,99E+02	ND	0,00E+00	2,79E-04	2,12E-03	5,23E-05	-6,78E-02

END OF LIFE – OUTPUT FLOWS

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	1,42E+00	0,00E+00	0,00E+00	1,42E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	7,84E+01	0,00E+00	4,06E+02	4,85E+02	0,00E+00	2,80E+02	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	6,00E+03	0,00E+00	0,00E+00
Materials for energy rec	kg	4,30E+00	0,00E+00	0,00E+00	4,30E+00	0,00E+00	7,20E+01	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	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	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,47E+03	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00	2,49E+04	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Global Warming Pot.	kg CO_2e	3,70E+03	1,55E+02	3,26E+03	7,11E+03	2,26E+02	1,47E+03	7,05E+02	ND	ND	ND	ND	5,25E+05	ND	0,00E+00	8,23E+01	2,94E+03	8,17E+00	-9,30E+03
Ozone depletion Pot.	kg $CFC_{-11}e$	2,60E-05	1,84E-06	1,33E-04	1,61E-04	2,65E-06	1,74E-05	0,00E+00	ND	ND	ND	ND	7,91E-03	ND	0,00E+00	1,05E-06	1,56E-06	1,51E-07	-3,59E-05
Acidification	kg SO_2e	9,65E+00	4,07E-01	1,62E+01	2,62E+01	2,41E+00	3,85E+00	0,00E+00	ND	ND	ND	ND	1,44E+03	ND	0,00E+00	2,12E-01	7,61E-01	3,83E-02	-2,24E+01
Eutrophication	kg PO_4^3e	1,38E+00	9,91E-02	2,12E+00	3,60E+00	3,17E-01	9,39E-01	0,00E+00	ND	ND	ND	ND	2,55E+02	ND	0,00E+00	5,22E-02	2,76E-01	1,88E-02	-3,92E+00
POCP (“smog”)	kg C_2H_4e	1,24E+00	3,62E-02	6,75E-01	1,95E+00	1,34E-01	3,43E-01	0,00E+00	ND	ND	ND	ND	1,03E+02	ND	0,00E+00	1,92E-02	6,14E-02	3,31E-03	-2,92E+00
ADP-elements	kg Sbe	1,45E-01	4,25E-04	7,78E-04	1,47E-01	4,60E-04	4,01E-03	0,00E+00	ND	ND	ND	ND	1,40E+00	ND	0,00E+00	2,25E-04	1,33E-03	1,69E-05	-1,98E-02
ADP-fossil	MJ	3,72E+04	2,24E+03	4,26E+04	8,20E+04	3,07E+03	2,11E+04	0,00E+00	ND	ND	ND	ND	4,44E+06	ND	0,00E+00	1,18E+03	1,37E+03	1,63E+02	-9,03E+04

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

		Manufacturing				Distribution	Installation	Use							End-of-life stage				
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total	kg CO_2e	1.80E+00	3.68E-02	7.42E-01	2.57E+00	5.38E-02	5.60E+00	1.79E-01	ND	ND	ND	ND	1.25E+02	ND	0.00E+00	1.96E-02	7.18E-01	1.95E-03	-2.22E+00
ADP-minerals & metals	kg Sbe	3.42E-04	1.03E-07	1.85E-07	3.42E-04	1.11E-07	7.25E-05	0.00E+00	ND	ND	ND	ND	3.24E-04	ND	0.00E+00	5.43E-08	3.38E-07	4.11E-09	-4.77E-06
ADP-fossil resources	MJ	2.53E+01	5.36E-01	1.01E+01	3.59E+01	7.34E-01	6.85E+01	0.00E+00	ND	ND	ND	ND	5.69E+03	ND	0.00E+00	2.83E-01	3.57E-01	3.92E-02	-2.19E+01
Water use	m^3e depr.	3.90E+00	2.65E-03	6.75E+00	1.07E+01	3.05E-03	6.80E+00	0.00E+00	ND	ND	ND	ND	1.56E+02	ND	0.00E+00	1.41E-03	2.90E-02	4.72E-04	-6.21E-01
Secondary materials	kg	6.68E-02	2.28E-04	7.91E-05	6.71E-02	3.14E-04	2.16E-03	0.00E+00	ND	ND	ND	ND	5.76E-01	ND	0.00E+00	1.21E-04	4.75E-04	1.23E-05	-3.85E-02
Biog. C in product	kg C	n/a	n/a	0.00E+00	0.00E+00	n/a	n/a	n/a	ND	ND	ND	ND	n/a	ND	n/a	n/a	n/a	n/a	n/a
Biog. C in packaging	kg C	n/a	n/a	8.40E-03	8.40E-03	n/a	n/a	n/a	ND	ND	ND	ND	n/a	ND	n/a	n/a	n/a	n/a	n/a

9) Biog. C in product = Biogenic carbon content in product

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity, Estonia, residual mix, 2023 (One Click LCA)
Electricity CO_2e / kWh	0.68
Heating data source and quality	Market for heat, district or industrial, natural gas, 2024, Europe (Ecoinvent 3.10.1)
Heating CO_2e / MJ	0.0563

Transport scenario documentation A4

Scenario parameter	Value
Specific transport CO_2e emissions / kg CO_2e	0.19 (lorry), 0.12 (ferry)
Average transport distance / km	309.8 km (lorry), 171.1 (ferry)
Capacity utilization (including empty return) %	100%
Bulk density of transported products	-
Volume capacity utilization factor	1

Installation scenario documentation A5

Scenario information	Value
Waste materials on the building site before waste processing, generated by the product's installation (specified by type) / kg	Packaging wood 3.8 kg (HEKA1VM315-5) Packaging wood 33 kg (HEKA1VM1000-8) Packaging wood 72 kg (HEKA1VM1600-1)
Output materials (specified by type) as result of waste processing at the building site e.g. collection for recycling, for energy recovery, disposal (specified by route) / kg	Materials for energy recovery, 3.8 kg (HEKA1VM315-5) Materials for energy recovery, 33 kg (HEKA1VM1000-8) Materials for energy recovery, 72 kg (HEKA1VM1600-1)
Direct emissions to ambient air, soil and water / kg	6.7 kg (HEKA1VM315-5) 59.8 kg (HEKA1VM1000-8) 130.4 kg (HEKA1VM1600-1)

Use scenario documentation

Scenario information	Value
B1: Direct emissions to ambient air, soil and water / kg	SF6 0.088 kg (HEKA1VM315-5) SF6 0.088 kg (HEKA1VM315-8) SF6 0.03 kg (HEKA1VM1000-8) SF6 0.03 kg (HEKA1VM1600-1)
Reference service life	40 years
B6: Operational energy use / MWh	604.0 MWh (HEKA1VM315-5) 604.0 MWh (HEKA1VM315-8) 2368.0 MWh (HEKA1VM1000-8) 3712.5 MWh (HEKA1VM1600-1)

End of life scenario documentation

Scenario information	Value
Collection process specified by type / kg	Substations are collected as one unit
Recovery process – kg for recycling	2276.4 kg (HEKA1VM315-5) 3711.1 kg (HEKA1VM315-8) 4988.1 kg (HEKA1VM1000-8) 5998.3 kg (HEKA1VM1600-1)
Recovery process – kg for energy recovery	394.7 kg (HEKA1VM315-5) 414.1 kg (HEKA1VM315-8) 987.5 kg (HEKA1VM1000-8) 1007.4 kg (HEKA1VM1600-1)
Disposal specified by type / kg	140.5 kg (HEKA1VM315-5) 181.7 kg (HEKA1VM315-8) 598.7 kg (HEKA1VM1000-8) 633.9 kg (HEKA1VM1600-1)
Scenario assumptions e.g. transportation	100 km