GlobalEPD
A VERIFIED ENVIRONMENTAL DECLARATION

ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

AENOR

Low voltage cables for aerial lines

ARE4E4X 0,6/1 kV 3X35+54,6 Fca BA
ARE4E4X 0,6/1 kV 3X70+54,6 Fca BA
ARE4E4X 0,6/1 kV 3X35+54,6 Fca CA
ARE4E4X 0,6/1 kV 3X70+54,6 Fca - CA

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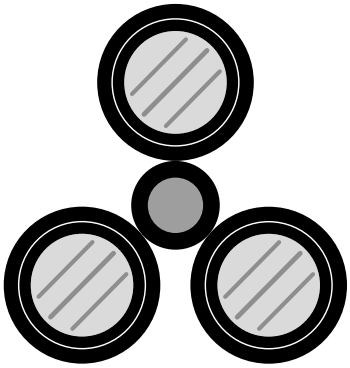
[Core PCR EPDItaly007 rev. 3 2023/01/13 "Electronic and Electrical Products and Systems".

Sub-PCR EPDItaly016 rev. 02 2020/09/25 "Electronic and Electrical Products and Systems – Cables and Wires"]

TRATOS

Tratos Cavi S.p.A.



The holder of this Declaration is responsible for its content, as well as for keeping the supporting documentation that justifies the data and statements included during the period of validity.

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AENOR is a founding member of ECO Platform, the European Association of Environmental Product Declaration Verification Programs.

Core PCR EPDItaly007 rev. 3 2023/01/13 “Electronic and Electrical Products and Systems”

Sub-PCR EPDItaly016 rev. 02 2020/09/25 “Electronic and Electrical Products and Systems – Cables and Wires”

ISO 14040:2006/Amd 1:2020 “Environmental management. Life cycle assessment. Principles and framework”.

ISO 14044:2006/Amd 2:2020 “Environmental management. Life cycle assessment. Requirements and guidelines”.

EN 56093:2019 “Product category rules for life cycle assessments of electronic and electrical products and systems”

Independent third-party verification of the declaration and data, according to ISO 14025:2010.

☐ Internal ☒ External

Verification body

AENOR

EPD Information	
Product names	See first page
CPC Code	463 family “Insulated wire and cable; optical fibre cables” and sub-sequent clusters
Functional Unit	1 km of electrical cable, for all life cycle stages, besides use phase.
Comparability	Tratos Cavi S.p.A., as the EPD Owner, is responsible for the accuracy of this Environmental Product Declaration. This EPD adheres to applicable Product Category Rules and the EN 50693:2019 standard. EPDs for similar products issued by different programs may not be directly comparable.

1. General Information.

1.1. Company profile

To date, Tratos has over 50 years of experience in the cable industry. Various types of cables are designed and produced, including cables designed for transport networks and electrical cables. Tratos also manufactures specific energy cables and cables customized upon customer's request. The parent company of the Tratos Group is TRATOS SRL. The group owns the following production plants:

- TRATOS CAVI (Stab. Catania)
- TRATOS CAVI (Stab. Pieve)
- TRATOS HV (Stab. Pieve)
- TRATOS UK LTD (Stab. Knowsley)

The entire Tratos Group depends on its customers, and it is committed to meeting their present and future needs, to satisfying their requirements and it strives to exceed their expectations. Activities and resources are managed as a process, to achieve both greater efficiency, lower environmental impact and greater energy performance. Interrelated processes are managed as a system to optimize both the effectiveness and the efficiency of the organization in achieving its objectives. Tratos' permanent objective is the continuous improvement of its environmental and energy performance.

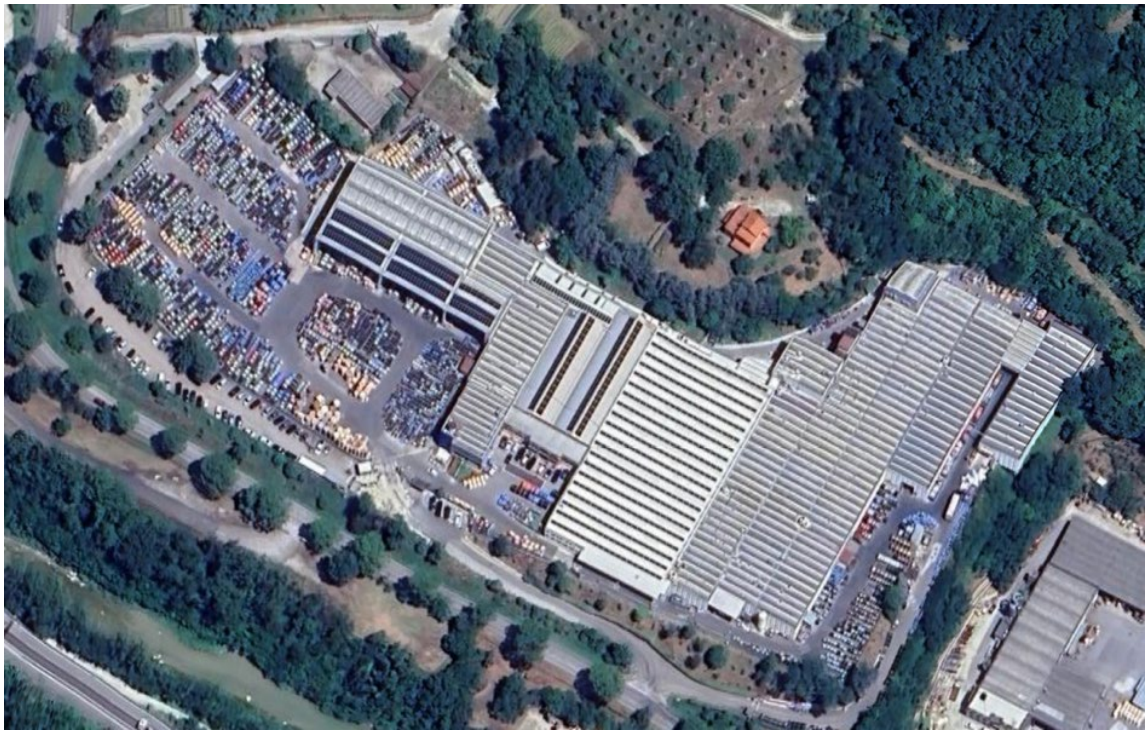

FIGURE 1 TRATOS' HEADQUARTERS IN PIEVE SANTO STEFANO (AREZZO, ITALY)

1.2. Scope and type of the EPD

Type of EPD

Product-Specific EPD; this declaration pertains to a group of specific products by a specific manufacturer.

Product names:

Low voltage cables for aerial lines:

- ARE4E4X 0,6/1 kV 3X35+54,6 Fca BA
- ARE4E4X 0,6/1 kV 3X70+54,6 Fca BA
- ARE4E4X 0,6/1 kV 3X35+54,6 Fca CA
- ARE4E4X 0,6/1 kV 3X70+54,6 Fca - CA

Manufacturing site:

Tratos Cavi Spa (Catania)
Strada XIII Zona Industriale, 57
Catania (CT) 95121 – Italy

Geographical scope

Cable manufacturing occurs in the Italian geographical scope. Distribution and use occur in the European geographical scope.

Functional Unit

1 km of electrical cable, for all life cycle stages, besides use phase.

System boundaries

The system boundaries set in the present EPD are “Cradle to Grave”, thus including the entire life cycle of the cable, from its manufacturing to its End-of-Life. System boundaries are depicted in Table 3 and they are consistent with the indications of PCR 007 – Electronics and Electrical Products and Systems” and sub-PCR 016 – “Cables and Wires”

Product Category Rules

Core PCR EPDItaly007 rev. 3 2023/01/13 “Electronic and Electrical Products and Systems”.

Sub-PCR EPDItaly016 rev. 02 2020/09/25 “Electronic and Electrical Products and Systems – Cables and Wires”.

1.3 Differences form versions of this EPD.

This EPD is an update to the version published on 2024-12-31.

Table 1 System Boundaries

Manufacturing Stage		Distribution Stage	Installation Stage	USE & Maintenance Stage	End-of-Life Stage, De-installation
Upstream Module	**Core Module**	**Downstream Module**			
Extraction of raw materials and production of semi-finished products (copper rods, PVC granulate etc).	Production of the packaging for product shipment	Transport of finished product to the client’s warehouse	Transport finished product to the installation site	Energy loss as heat during the lifetime of the cable	Cable recovery from site and its End-of-Life
Upstream transport of raw materials and packaging to Tratos’ assembly sites for cable production	Cable production, including relevant energy consumption		Transport and recycling of installation waste (trimmed cable)		
	Core waste treatment		Transport and recycling/disposal of cable packaging		

2. Product Information

2.1. Product Identification

The products in this EPD are the following multi-core electrical cables of the family “Low voltage cable for aerial lines”, produced by Tratos:

Cable name	Internal specification code
ARE4E4X 0,6/1 kV 3X35+54,6 Fca BA	212832
ARE4E4X 0,6/1 kV 3X70+54,6 Fca BA	212821
ARE4E4X 0,6/1 kV 3X35+54,6 Fca CA	212833
ARE4E4X 0,6/1 kV 3X70+54,6 Fca - CA	212822

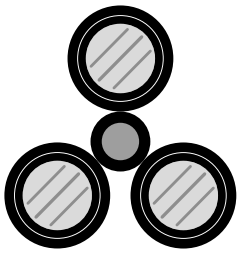

Figure 1 Cross-section representation of the cables in this EPD

Function and application

Cables are used for transmission and distribution of low-voltage electricity in aerial/overhead applications.

Numerical notation

European numerical notation is used, where a period “.” denotes a thousand group separator, and a comma “,” denotes a decimal separator. When numbers are relatively large or small to be expressed as floats, scientific notation is employed, where “E” denotes a power of 10, as indicated.

2.2. Product composition

Table 2 shows composition of 1 km of each cable described in this EPD. The unitary mass and the linear resistance of each cable is also reported.

The cables presented in this EPD, as well as their packaging do not contain any Substance of Very High Concern (SHVC), as defined by ECHA and in the ECHA substance candidate list.

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Table 2 Cable composition, mass and linear resistance

	Aluminium	Packaging (wooden spool)	Polymers	Gross weight	Cable weight	Linear resistance
	kg / 1 km	kg / 1 km	kg / 1 km	kg / 1 km	kg / 1 km	Ohm / 1 km
ARE4E4X 0,6/1 kV 3X35+54,6 Fca BA	435	129	266	831	702	0,868
ARE4E4X 0,6/1 kV 3X35+54,6 Fca CA	435	129	265	830	701	0,868
ARE4E4X 0,6/1 kV 3X70+54,6 Fca - CA	722	205	377	1.304	1.098	0,443
ARE4E4X 0,6/1 kV 3X70+54,6 Fca BA	722	266	378	1.365	1.099	0,443

3. LCA and LCI environmental parameter statements.

3.1 Life cycle analysis

Product-Specific EPD; this declaration pertains to a group of specific products by a specific manufacturer.

Cable manufacturing occurs in the Italian geographical scope. Distribution and use occur in the European geographical scope.

3.2 Declared unit

1 km of electrical cable, for all life cycle stages, besides use phase

3.3 Reference Useful Life (RSL)

RSL is the Reference Service Life of the cable. For comparison with other similar cables, RSL is set to 40 years.

Use & Maintenance Stage

This phase includes the energy dissipated as heat during the reference service life (RSL) of the cable. According to sub-PCR 016, the formula to calculate the energy loss is expressed as:

$$Euse\ [J] = Rlinear \cdot I2 \cdot RSL$$

In the formula:

- Euse is the energy dissipated by the cable during its operating time;
- Rlinear is the linear resistivity of the cable, as Ω·km;
- I is the electrical current. I = 1 A shall be set as a reference current for comparison of the environmental performances with other EPDs of similar cables using the same PCR employed in this study.
- RSL is the Reference Service Life of the cable. For comparison with other similar cables, RSL is set to 40 years, expressed in seconds in the formula.

End-of-Life Stage, Deinstallation

It is assumed a 100% recovery of the cable from the installation site. The End-of-Life Stage includes the following operations:

- Transport of the cable to recycling, by means of truck, over a distance of 50 km to recycling site.
- Dismantling of the cable to recover the different materials, including the energy consumption associated to this operation.
- Recycling of 100% of metals and 70% recycling of the plastic materials.
- Disposal processes of fraction of unrecycled plastic material.

3.4 Allocation criteria

- Production waste indirectly generated by the assembly of cables was allocated by mass, on 1 kg of each cable manufactured.
- Amounts of scrap from metal working, extruded polymeric materials and cable trimmings from assembly were allocated by mass, knowing the cable compositions and the production yield.
- Electricity consumption was derived for each production stage and machinery used, based on machinery specification and measured operational energy consumption. Thus, no allocation was deemed necessary in this instance.

3.5 Quality data evaluation

Data sources

Primary data were collected by Tratos, related to the following activities:

- Bill of materials for the assembly of 1 km of cable.

- Bill of materials for the on-site preparation of 1 kg of each polymer and elastomer mix.

- EPD of Tratos' aluminium supplier [12], employed as data source to model the environmental impacts of aluminium production in the present EPD.

- Yearly amount of thermal energy consumption for the generation on electrical energy on-site.

- Yearly amount electrical energy imported from the national grid.

- Electrical Energy consumption for the assembly of 1 km of cable.

- Quantity and type of packaging used for distribution.

- Information about the supplier of raw materials and packaging, including the supply distance, type and quantity of materials and packaging supplied.

- Amount, type of production waste generated; EoL scenario of each type of waste.

- Linear resistance of each cable conductor.

Secondary data, from the Ecoinvent 3.10 database were used to model the production of the raw materials in the upstream phase, including energy consumption.

Distance from Tratos' production sites to client's warehouse was conservatively assumed to be 500 km (truck), in absence of primary data.

Distance from the client's warehouse to installation sites was conservatively assumed to be 100 km (truck), in absence of primary data.

Diesel consumption in machinery for the installation of aerial cables, expressed as thermal energy, was assumed to be 35.520 MJ / 1 km of cable. This data was obtained from an external, verified study.

Distance to disposal site of waste produced in the different stages was conservatively assumed to be 50 km (truck) in absence of primary data.

Data quality

Analysis of the collected data yielded the following conclusions:

- Temporal representativeness: data collected by Tratos relates to the year 2023. Da was collected specifically for the preparation of this study; primary data for aluminium production derived from Tratos' supplier EPD [12]. Secondary data was taken or adapted by the Ecoinvent 3.10 database, cut-off, Unit. This represents the most recent version of the database No data is older than 10 years.

- Geographical representativeness: the processes used in this study reflect the geography of the system boundaries (e.g. the energy mix used reflects the country of production, i.e. Italy); the choices are consistent with the field of application of the study.

- Technological representativeness: In selecting data and modeling life cycle phases, we ensured that the technology described in the database accurately represented the analyzed system.

- Precision: Data accuracy was ensured through rigorous collection and validation, including mass and energy balance checks. To estimate uncertainty, a Monte Carlo analysis was conducted on secondary Ecoinvent DB data, as primary data uncertainty was deemed negligible.

- Reproducibility: The modeling processes and data presented in this report ensure reproducibility using the same database, methods, and characterization factors.

3.6 Cut-off criteria

Cut-off criteria and Exclusions from system boundaries

All input flows to the system studied were considered.

In the present study, the following contributions were not considered:

- Production of packaging for transportation of raw materials to the assembly site.

- Construction, maintenance and decommissioning of infrastructures (machinery and buildings).

- Administrative and marketing activities, such as business travels, that are not directly related to the production of the product.

Calculation tools

LCA calculations were performed with Sima Pro 9.6.0.1, using Ecoinvent 3.10 database (most recent versions of the software and of the database).

4. System boundaries, Scenarios and Additional Technical info.

The system boundaries set in the present EPD are “Cradle to Grave”, thus including the entire life cycle of the cable, from its manufacturing to its End-of-Life. System boundaries are depicted in Table 3 and they are consistent with the indications of PCR 007 – Electronics and Electrical Products and Systems” and sub-PCR 016 – “Cables and Wires”.

Table 3 System Boundaries

Manufacturing Stage		Distribution Stage	Installation Stage	USE & Maintenance Stage	End-of-Life Stage, De-installation
Upstream Module	**Core Module**	**Downstream Module**			
Extraction of raw materials and production of semi-finished products (copper rods, PVC granulate etc).	Production of the packaging for product shipment	Transport of finished product to the client’s warehouse	Transport finished product to the installation site	Energy loss as heat during the lifetime of the cable	Cable recovery from site and its End-of-Life
Upstream transport of raw materials and packaging to Tratos’ assembly sites for cable production	Cable production, including relevant energy consumption		Transport and recycling of installation waste (trimmed cable)		
	Core waste treatment		Transport and recycling/disposal of cable packaging		

4.1 Manufacturing

Upstream module

- Extraction of the aluminium ore. Aluminium minerals are refined from the raw ore and the metal is obtained by electrolysis to obtain the primary ingots. Ingots are then smelted and formed into spooled rods by a process of wiring. Spooled rods are distributed to Tratos for further wiring to the appropriate conductor’s size.

- Production of polymer material for preparation of polymer and elastomer mixes and electrical insulators.

- Upstream transport of raw materials and packaging to Tratos.

Core Module

- Preparation of the polymer and elastomer mix.

- Wiring of the aluminium rods to a lower diameter, consistently with the cable specifications.

- Production of compounded polymer and elastomer mixes in a pellet form.

- Insulation of the cable conductors by extrusion of polymer and polymer mix pellets.

- Production of packaging and packaging of the finished cables for shipment.

Operations included in the Core Module:

- Consumption of the materials described above.

- Consumption of electricity and thermal energy to produce electricity on-site.

- Waste treatment from production operations. This includes waste transportation to recycling/disposal site and waste treatment.

4.2 Downstream Module

Distribution Stage

- Cable transportation to the warehouses of the clients.

Installation Stage

- Cable transportation to installation sites.

- Thermal energy required for the installation of aerial cables. In detail, this accounts for the consumption of diesel in machinery for installation operations.

- Cable losses during installation. It is assumed a conservative loss of 5% of the cable, occurring during its installation. Cable trimmings are then recovered, and the material recycled. Energy consumption for the recovery of the individual material is accounted for in this phase.

- End-of-Life of the packaging of the cable, modelled on up-to-date EoL scenarios for wooden packaging, as described by the Italian Institute for the Research and Environmental Protection (ISPRA).

Use & Maintenance Stage

This phase includes the energy dissipated as heat during the reference service life (RSL) of the cable. According to sub-PCR 016, the formula to calculate the energy loss is expressed as:

$$Euse\ [J] = Rlinear \cdot I2 \cdot RSL$$

In the formula:

- Euse is the energy dissipated by the cable during its operating time;

- Rlinear is the linear resistivity of the cable, as Ω·km;

- I is the electrical current. I = 1 A shall be set as a reference current for comparison of the environmental performances with other EPDs of similar cables using the same PCR employed in this study.

- RSL is the Reference Service Life of the cable. For comparison with other similar cables, RSL is set to 40 years, expressed in seconds in the formula.

End-of-Life Stage, Deinstallation

It is assumed a 100% recovery of the cable from the installation site. The End-of-Life Stage includes the following operations:

- Transport of the cable to recycling, by means of truck, over a distance of 50 km to recycling site.

- Dismantling of the cable to recover the different materials, including the energy consumption associated to this operation.

- Recycling of 100% of metals and 70% recycling of the plastic materials.

- Disposal processes of fraction of unrecycled plastic material.

5. LCA and Environmental Parameters Declaration

The environmental performances of the different cables in this EPD are listed in the following tables. In addition to reporting the total impact for each cable in each impact category, results are also reported individually for each stage in the life cycle of each cable. In agreement with EN 50693:2019, separate tables are reported, quantifying the impacts in the following indicators:

- Environmental impact indicators.
- Resource use indicators.
- Waste production indicators.
- Output flows indicators.

TABLE 4 ENVIRONMENTAL PERFORMANCES OF 1 KM OF CABLE 212832, ARE4E4X 0,6/1 KV 3X35+54,6 FCA BA

Environmental Impact Indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
Climate change - Total	kg CO_2 eq	2,90E+03	4,82E+02	6,45E+01	3,26E+03	9,57E+01	2,24E+02	**7,02E+03**
Climate change - Fossil	kg CO_2 eq	2,89E+03	6,73E+02	6,45E+01	3,12E+03	9,18E+01	2,22E+02	**7,07E+03**
Climate change - Biogenic	kg CO_2 eq	3,39E+00	-1,91E+02	2,11E-02	1,33E+02	3,62E+00	1,95E+00	**-4,84E+01**
Climate change - LULUC	kg CO_2 eq	1,38E+00	1,82E-01	1,58E-03	1,01E-01	2,91E-01	1,28E-01	**2,08E+00**
Acidification	mol H^+ eq	1,96E+01	1,41E+00	1,61E-01	2,66E+01	4,60E-01	2,62E-01	**4,85E+01**
Eutrophication, freshwater	kg P eq	9,60E-02	6,29E-02	4,65E-04	2,17E-02	8,35E-02	3,92E-02	**3,04E-01**
Eutrophication, marine	kg N eq	2,45E+00	3,54E-01	6,17E-02	1,24E+01	7,90E-02	6,05E-02	**1,54E+01**
Eutrophication, terrestrial	mol N eq	6,16E+00	3,60E+00	6,74E-01	1,36E+02	6,70E-01	5,32E-01	**1,47E+02**
Photochemical ozone formation	kg NMVOC eq	1,43E+01	1,81E+00	2,80E-01	3,84E+01	2,23E-01	1,85E-01	**5,52E+01**
Ozone depletion	kg CFC11 eq	6,91E-04	1,71E-05	1,32E-06	4,90E-05	1,45E-06	1,08E-06	**7,61E-04**
Resource use, minerals and metals	kg Sb eq	5,40E-03	2,34E-05	2,13E-06	1,06E-04	5,74E-06	1,37E-05	**5,55E-03**
Non renewable, fossil	MJ	1,01E+05	1,44E+03	8,52E+00	3,94E+02	1,62E+03	7,21E+02	**1,05E+05**
Water use	m^3 depriv.	2,42E+03	1,49E+02	3,62E-01	2,69E+01	2,42E+01	1,76E+01	**2,64E+03**
Additional Environ. Impact Ind.	**Unit**	**Manufacturing**		**Distribution**	**Installation**	**Use**	**End-of-Life**	**Total**
		Upstream module	**Core Module**	**Downstream module**				
GWP-GHG	kg CO_2 eq	2,89E+03	6,73E+02	6,45E+01	3,13E+03	9,23E+01	2,22E+02	**7,07E+03**

Resource use indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
PENRE	MJ	1,03E+05	1,44E+03	8,52E+00	3,94E+02	1,62E+03	7,21E+02	**1,07E+05**
PENRM	MJ	9,58E+03	1,64E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,12E+04**
PENRT	MJ	1,12E+05	3,09E+03	8,52E+00	3,94E+02	1,62E+03	7,21E+02	**1,18E+05**
PERE	MJ	5,42E+03	3,63E+03	3,01E+00	8,99E+01	6,20E+02	2,42E+02	**1,00E+04**
PERM	MJ	0,00E+00	2,08E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**2,08E+03**
PERT	MJ	5,42E+03	5,71E+03	3,01E+00	8,99E+01	6,20E+02	2,42E+02	**1,21E+04**
FW	m^3	5,33E+01	4,32E+00	2,18E-02	9,66E-01	1,86E+00	3,96E+00	**6,44E+01**
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
RSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
NRSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**

Waste Production Indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
HWD	kg	1,49E+01	4,37E-02	5,64E-03	2,79E-01	2,90E-03	6,04E-03	**1,52E+01**
NHWD	kg	1,21E+03	4,29E+00	2,53E-02	4,68E+01	1,23E+00	7,21E+00	**1,27E+03**
RWD	kg	1,19E+00	6,12E-03	8,00E-05	2,18E-03	1,63E-02	7,20E-03	**1,22E+00**

Output Flows Indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
MFR	kg	0,00E+00	6,03E+01	0,00E+00	1,16E+02	0,00E+00	6,22E+02	**7,98E+02**
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**

Acronyms in the table: PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; PERT = Total use of renewable primary energy resources; FW = Use of net fresh water; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; MER = Materials for energy recovery; MFR = Materials for recycling; CRU = Components for reuse; ETE= Exported thermal energy; EEE= Exported electricity energy.

Information on Additional Environmental Impact Indicators: GWP – GHG: Climate change – Total, where the contributions of CO_2 – *uptake* and emissions of CO_2 – biogenic are neglected.

Table 4 Environmental performances of 1 km of cable 212821, ARE4E4X 0,6/1 kV 3X70+54,6 Fca BA

Environmental Impact Indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
Climate change - Total	kg CO_2 eq	4,63E+03	4,12E+02	1,06E+02	3,41E+03	4,89E+01	3,25E+02	**8,93E+03**
Climate change - Fossil	kg CO_2 eq	4,63E+03	8,12E+02	1,06E+02	3,13E+03	4,69E+01	3,22E+02	**9,05E+03**
Climate change - Biogenic	kg CO_2 eq	5,09E+00	-4,01E+02	3,47E-02	2,74E+02	1,85E+00	3,00E+00	**-1,17E+02**
Climate change - LULUC	kg CO_2 eq	2,21E+00	3,60E-01	2,60E-03	1,05E-01	1,49E-01	2,01E-01	**3,03E+00**
Acidification	mol H^+ eq	3,19E+01	1,70E+00	2,64E-01	2,66E+01	2,35E-01	4,02E-01	**6,12E+01**
Eutrophication, freshwater	kg P eq	1,36E-01	7,58E-02	7,65E-04	2,32E-02	4,26E-02	6,09E-02	**3,39E-01**
Eutrophication, marine	kg N eq	3,97E+00	4,56E-01	1,01E-01	1,24E+01	4,03E-02	9,17E-02	**1,71E+01**
Eutrophication, terrestrial	mol N eq	9,24E+00	4,62E+00	1,11E+00	1,36E+02	3,42E-01	8,07E-01	**1,52E+02**
Photochemical ozone formation	kg NMVOC eq	2,30E+01	2,33E+00	4,60E-01	3,84E+01	1,14E-01	2,81E-01	**6,46E+01**
Ozone depletion	kg CFC11 eq	1,08E-03	2,17E-05	2,16E-06	4,92E-05	7,40E-07	1,65E-06	**1,16E-03**
Resource use, minerals and metals	kg Sb eq	8,93E-03	4,35E-05	3,50E-06	1,07E-04	2,93E-06	1,98E-05	**9,11E-03**
Non renewable, fossil	MJ	1,67E+05	1,65E+03	1,40E+01	4,16E+02	8,26E+02	1,13E+03	**1,71E+05**
Water use	m^3 depriv.	3,94E+03	1,84E+02	5,94E-01	2,70E+01	1,23E+01	2,64E+01	**4,19E+03**

Additional Environ. Impact Ind.	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
GWP-GHG	kg CO_2 eq	4,63E+03	8,13E+02	1,06E+02	3,14E+03	4,71E+01	3,22E+02	**9,06E+03**

Resource use indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
PENRE	MJ	1,70E+05	1,65E+03	1,40E+01	4,16E+02	8,25E+02	1,12E+03	**1,74E+05**
PENRM	MJ	1,36E+04	2,57E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,62E+04**
PENRT	MJ	1,84E+05	4,22E+03	1,40E+01	4,16E+02	8,25E+02	1,12E+03	**1,90E+05**
PERE	MJ	8,88E+03	7,27E+03	4,95E+00	9,70E+01	3,17E+02	3,77E+02	**1,69E+04**
PERM	MJ	0,00E+00	4,29E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**4,29E+03**
PERT	MJ	8,88E+03	1,16E+04	4,95E+00	9,70E+01	3,17E+02	3,77E+02	**2,12E+04**
FW	m^3	8,71E+01	5,31E+00	3,59E-02	7,73E-01	9,49E-01	5,73E+00	**9,99E+01**
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
RSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
NRSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**

Waste Production Indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
HWD	kg	2,45E+01	5,52E-02	9,27E-03	2,80E-01	1,48E-03	8,83E-03	**2,49E+01**
NHWD	kg	2,01E+03	6,19E+00	4,16E-02	9,55E+01	6,27E-01	1,03E+01	**2,12E+03**
RWD	kg	1,96E+00	7,82E-03	1,31E-04	2,39E-03	8,33E-03	1,12E-02	**1,99E+00**
Output Flows Indicators	**Unit**	**Manufacturing**		**Distribution**	**Installation**	**Use**	**End-of-Life**	**Total**
		Upstream module	**Core Module**	**Downstream module**				
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
MFR	kg	0,00E+00	9,47E+01	0,00E+00	2,22E+02	0,00E+00	9,86E+02	**1,30E+03**
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**

Acronyms in the table: PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; PERT = Total use of renewable primary energy resources; FW = Use of net fresh water; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; MER = Materials for energy recovery; MFR = Materials for recycling; CRU = Components for reuse; ETE= Exported thermal energy; EEE= Exported electricity energy.

Information on Additional Environmental Impact Indicators: GWP – GHG: Climate change – Total, where the contributions of CO_2 – *uptake* and emissions of CO_2 – biogenic are neglected.

Table 5 Environmental performances of 1 km of cable 212833, ARE4E4X 0,6/1 kV 3X35+54,6 Fca CA

Environmental Impact Indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
Climate change - Total	kg CO_2 eq	2,89E+03	4,82E+02	6,44E+01	3,26E+03	9,57E+01	2,23E+02	**7,01E+03**
Climate change - Fossil	kg CO_2 eq	2,88E+03	6,72E+02	6,44E+01	3,12E+03	9,18E+01	2,21E+02	**7,05E+03**
Climate change - Biogenic	kg CO_2 eq	3,35E+00	-1,91E+02	2,11E-02	1,33E+02	3,62E+00	1,94E+00	**-4,85E+01**
Climate change - LULUC	kg CO_2 eq	1,38E+00	1,82E-01	1,58E-03	1,01E-01	2,91E-01	1,28E-01	**2,08E+00**
Acidification	mol H^+ eq	1,96E+01	1,41E+00	1,60E-01	2,66E+01	4,60E-01	2,61E-01	**4,85E+01**
Eutrophication, freshwater	kg P eq	9,61E-02	6,29E-02	4,65E-04	2,17E-02	8,35E-02	3,92E-02	**3,04E-01**
Eutrophication, marine	kg N eq	2,44E+00	3,53E-01	6,16E-02	1,24E+01	7,90E-02	6,03E-02	**1,54E+01**
Eutrophication, terrestrial	mol N eq	6,07E+00	3,59E+00	6,73E-01	1,36E+02	6,70E-01	5,31E-01	**1,47E+02**
Photochemical ozone formation	kg NMVOC eq	1,43E+01	1,81E+00	2,80E-01	3,84E+01	2,23E-01	1,85E-01	**5,51E+01**
Ozone depletion	kg CFC11 eq	6,88E-04	1,71E-05	1,31E-06	4,90E-05	1,45E-06	1,08E-06	**7,58E-04**
Resource use, minerals and metals	kg Sb eq	5,40E-03	2,34E-05	2,13E-06	1,06E-04	5,74E-06	1,36E-05	**5,55E-03**
Non renewable, fossil	MJ	1,01E+05	1,44E+03	8,51E+00	3,94E+02	1,62E+03	7,20E+02	**1,05E+05**
Water use	m^3 depriv.	2,42E+03	1,49E+02	3,61E-01	2,69E+01	2,42E+01	1,75E+01	**2,63E+03**

Additional Environ. Impact Ind.	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
GWP-GHG	kg CO_2 eq	2,88E+03	6,73E+02	6,44E+01	3,13E+03	9,23E+01	2,22E+02	**7,06E+03**

Resource use indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
PENRE	MJ	1,03E+05	1,44E+03	8,51E+00	3,94E+02	1,62E+03	7,20E+02	**1,07E+05**
PENRM	MJ	9,48E+03	1,64E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,11E+04**
PENRT	MJ	1,12E+05	3,08E+03	8,51E+00	3,94E+02	1,62E+03	7,20E+02	**1,18E+05**
PERE	MJ	5,41E+03	3,63E+03	3,01E+00	8,99E+01	6,20E+02	2,42E+02	**1,00E+04**
PERM	MJ	0,00E+00	2,08E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**2,08E+03**
PERT	MJ	5,41E+03	5,71E+03	3,01E+00	8,99E+01	6,20E+02	2,42E+02	**1,21E+04**
FW	m^3	5,33E+01	4,31E+00	2,18E-02	9,66E-01	1,86E+00	3,94E+00	**6,44E+01**
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
RSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
NRSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**

Waste Production Indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
HWD	kg	1,49E+01	4,37E-02	5,63E-03	2,79E-01	2,90E-03	6,02E-03	**1,52E+01**
NHWD	kg	1,21E+03	4,29E+00	2,53E-02	4,68E+01	1,23E+00	7,18E+00	**1,27E+03**
RWD	kg	1,19E+00	6,12E-03	7,99E-05	2,18E-03	1,63E-02	7,19E-03	**1,22E+00**
Output Flows Indicators	**Unit**	**Manufacturing**		**Distribution**	**Installation**	**Use**	**End-of-Life**	**Total**
		Upstream module	**Core Module**	**Downstream module**				
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
MFR	kg	0,00E+00	6,02E+01	0,00E+00	1,16E+02	0,00E+00	6,21E+02	**7,97E+02**
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**

Acronyms in the table: PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; PERT = Total use of renewable primary energy resources; FW = Use of net fresh water; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; MER = Materials for energy recovery; MFR = Materials for recycling; CRU = Components for reuse; ETE= Exported thermal energy; EEE= Exported electricity energy.

Information on Additional Environmental Impact Indicators: GWP – GHG: Climate change – Total, where the contributions of CO_2 – *uptake* and emissions of CO_2 – biogenic are neglected.

Table 6 Environmental performances of 1 km of cable 212822, ARE4E4X 0,6/1 kV 3X70+54,6 Fca - CA

Environmental Impact Indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
Climate change - Total	kg CO_2 eq	4,61E+03	4,90E+02	1,01E+02	3,41E+03	4,89E+01	3,24E+02	**8,99E+03**
Climate change - Fossil	kg CO_2 eq	4,61E+03	7,96E+02	1,01E+02	3,13E+03	4,69E+01	3,21E+02	**9,00E+03**
Climate change - Biogenic	kg CO_2 eq	5,58E+00	-3,07E+02	3,31E-02	2,74E+02	1,85E+00	2,99E+00	**-2,20E+01**
Climate change - LULUC	kg CO_2 eq	2,20E+00	2,82E-01	2,48E-03	1,05E-01	1,49E-01	2,00E-01	**2,94E+00**
Acidification	mol H^+ eq	3,18E+01	1,62E+00	2,52E-01	2,66E+01	2,35E-01	4,02E-01	**6,09E+01**
Eutrophication, freshwater	kg P eq	1,32E-01	7,11E-02	7,30E-04	2,32E-02	4,26E-02	6,09E-02	**3,30E-01**
Eutrophication, marine	kg N eq	3,94E+00	4,31E-01	9,68E-02	1,24E+01	4,03E-02	9,16E-02	**1,70E+01**
Eutrophication, terrestrial	mol N eq	9,00E+00	4,34E+00	1,06E+00	1,36E+02	3,42E-01	8,06E-01	**1,51E+02**
Photochemical ozone formation	kg NMVOC eq	2,29E+01	2,21E+00	4,39E-01	3,84E+01	1,14E-01	2,81E-01	**6,43E+01**
Ozone depletion	kg CFC11 eq	1,08E-03	2,13E-05	2,06E-06	4,92E-05	7,40E-07	1,65E-06	**1,15E-03**
Resource use, minerals and metals	kg Sb eq	8,93E-03	3,51E-05	3,34E-06	1,07E-04	2,93E-06	1,97E-05	**9,09E-03**
Non renewable, fossil	MJ	1,67E+05	1,59E+03	1,34E+01	4,15E+02	8,26E+02	1,12E+03	**1,71E+05**
Water use	m^3 depriv.	3,93E+03	1,77E+02	5,68E-01	2,69E+01	1,23E+01	2,64E+01	**4,18E+03**

Additional Environ. Impact Ind.	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
GWP-GHG	kg CO_2 eq	4,61E+03	7,97E+02	1,01E+02	3,14E+03	4,71E+01	3,21E+02	**9,01E+03**

Resource use indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
PENRE	MJ	1,70E+05	1,59E+03	1,34E+01	4,15E+02	8,25E+02	1,12E+03	**1,74E+05**
PENRM	MJ	1,36E+04	2,57E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,61E+04**
PENRT	MJ	1,83E+05	4,16E+03	1,34E+01	4,15E+02	8,25E+02	1,12E+03	**1,90E+05**
PERE	MJ	8,86E+03	5,72E+03	4,73E+00	9,69E+01	3,17E+02	3,77E+02	**1,54E+04**
PERM	MJ	0,00E+00	3,31E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**3,31E+03**
PERT	MJ	8,86E+03	9,03E+03	4,73E+00	9,69E+01	3,17E+02	3,77E+02	**1,87E+04**
FW	m^3	8,68E+01	5,08E+00	3,43E-02	7,72E-01	9,49E-01	5,72E+00	**9,93E+01**
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
RSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
NRSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**

Waste Production Indicators	Unit	Manufacturing		Distribution	Installation	Use	End-of-Life	Total
		Upstream module	Core Module	Downstream module				
HWD	kg	2,46E+01	5,38E-02	8,85E-03	2,80E-01	1,48E-03	8,82E-03	**2,49E+01**
NHWD	kg	2,00E+03	6,06E+00	3,97E-02	9,55E+01	6,27E-01	1,03E+01	**2,12E+03**
RWD	kg	1,96E+00	7,41E-03	1,25E-04	2,39E-03	8,33E-03	1,12E-02	**1,99E+00**
Output Flows Indicators	**Unit**	**Manufacturing**		**Distribution**	**Installation**	**Use**	**End-of-Life**	**Total**
		Upstream module	**Core Module**	**Downstream module**				
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
MFR	kg	0,00E+00	9,47E+01	0,00E+00	2,22E+02	0,00E+00	9,85E+02	**1,30E+03**
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**

Acronyms in the table: PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; PERT = Total use of renewable primary energy resources; FW = Use of net fresh water; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; MER = Materials for energy recovery; MFR = Materials for recycling; CRU = Components for reuse; ETE= Exported thermal energy; EEE= Exported electricity energy.

Information on Additional Environmental Impact Indicators: GWP – GHG: Climate change – Total, where the contributions of CO_2 – *uptake* and emissions of CO_2 – biogenic are neglected.

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Una declaración ambiental verificada

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