ENVIRONMENTAL PRODUCT DECLARATION

Product names:
High voltage SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc

Manufacturing site:
North Side of Xin Yi Jin Road, Guanlin Town, Yixing City, China

Compliant with ISO 14025 and EN 50693:2019

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration Number	EPD_Prysmian Cina_2
Registration Number	EPDITALY0816

Issue Date	2024/07/30
Valid to	2029/07/29

Rev.2

1. General information

Owner of the declaration	Prysmian Technology Jiangsu Co., Ltd North Side of Xin Yi Jin Road, Guanlin Town, Yixing City, China
Plants involved in the EPD	Prysmian Technology Jiangsu Co., Ltd - Yixing plant North Side of Xin Yi Jin Road, Guanlin Town, Yixing City, China
Product identification	Nr. 1 underground high voltage cable: 1) SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc
Product description	Cable with round aluminium conductors for the transport and distribution of high voltage electrical energy in underground lines.
Program Operator	EPDITALY (www.epditaly.it) Via Gaetano De Castillia 10 - 20124 Milano, Italy
Independent verification	This declaration has been developed in accordance with the EPDItaly Regulations; further information and the Regulations themselves are available on the website: www.epditaly.it EN 50693 is the framework reference for PCRs. The PCR revision was carried out by SGS-info@epditaly.it. Independent verification of the declaration and data according to ISO 14025:2010. Internal ☐ External ☒ Third party verification performed by: SGS Italia S.p.A. Via Caldera, 21, Milano, Lombardia, 20153. Accredited by Accredia (numero accreditamento : 0005VV)
CPC-Based Code	463 family “Insulated wire and cable; optical fibre cables” and sub-sequent clusters
Company contact	Dott. Stefano Luciano Prysmian Group - Via Chiese 6 20126, Milano, Italy stefano.luciano@prysmiangroup.com
Technical support	Deloitte & Touche S.p.a Via Tortona 25 - 20144, Milano, Italy
Comparability	Environmental statements published within the same product category, but from different programs, may not be comparable.
Responsibility	Prysmian Group releases EPDItaly from any non-compliance with environmental legislation self-declared by the manufacturer. The holder of the declaration will be responsible for the information and supporting evidence; EPDItaly declines all responsibility for the manufacturer's information, data and results of the evaluation of the life cycle of the product.
Reference documents	This declaration has been developed following the EPDItaly Programme Regulations, available on the website:www.epditaly.it.

Product Category Rules (PCR)	EPDItaly007 - CORE PCR EN 50693_BASE_rev.3, 2023/01/13 EPDItaly016 - SUB PCR EN 50693_cables_rev.2, 2020/09/25 BS EN 50693:2019

2. Company profile

Prysmian Group is world leader in the power and telecom cable systems industry.
With almost 140 years of experience, the Group offers the widest range of products, services, technologies and know-how for every type of industry, thanks to a widespread commercial presence, R&D centers in Europe, the United States, South America and China and over 500 R&D qualified professionals. The Group is organized into the following operating segments:

Oil & Gas: offers innovative solutions for complex instrumentation and control systems and integrated energy to connect the entire oil and gas distribution chain. State-of-the-art manufacturing facilities and test labs provide a wide range of SURF (Subsea Umbelical, Riser and Flowline) cables and products, from steel or thermoplastic umbilical cables, to flexible tubing and downhole technology for business mining offshore;

Telecom: the Prysmian Group, by offering an essential contribution to the world's leading companies in the telecommunications sector, has become one of the world's largest producers of cables and accessories for voice, video and data transmission thanks to a complete range of optical fibers, optical and copper cables and connectivity systems. FlexTube® with the highest density of optical fibers, installed in 2017 in Hong Kong to increase the quality of optical fibers and innovation applied to cables allow the Group to face the most difficult and ambitious broadband connection challenges;

Energy Projects: the Prysmian Group designs, manufactures and installs high and very high voltage cables and systems for the transmission of underground and submarine energy directly from power plants to primary distribution networks. The technologies of the Group for this business include cables for the operation of wind turbines, cables for connection between the various turbines and for connection to the mainland;

Energy Products: in the field of energy transmission and distribution, the Group produces both medium voltage cables and systems for connecting industrial and residential structures to primary distribution networks, and low voltage ones for energy distribution and wiring of buildings. Prysmian solutions were created to support utilities and network managers, industrial companies, installers and wholesalers in the electricity sector.

The Group is also active in the design, production, supply and installation of cables for the most varied applications. In transport, the Prysmian Group has also achieved exceptional milestones, carrying out the wiring of some of the largest passenger aircraft and ships in the world, such as the Airbus 380 or Royal Caribbean's GENESIS fleet, of the fastest trains and the most innovative, like the one inaugurated in Shanghai. Three million passengers on the London Underground travel every day through 400 km of cable tunnels thanks to Prysmian and Draka Fire Resistant cables.

Innovative cable technology

With a view to facilitating the development of ever more efficient and integrated grids, Prysmian Group strives constantly to improve the performance of its terrestrial and submarine cables.
Cables are an essential component of the energy transition, representing the backbone of power grids and facilitating the distribution and transportation of energy between various areas marked by different consumption patterns.

Cables are the backbone of power grids, without which it would not be possible to transmit and transport energy from one country to another.

Cables make the entire power grid more efficient, facilitating the exchange of energy between different countries/consumption areas with different consumption patterns.

Submarine cables transmit energy from offshore wind farms to the mainland, where the primary distribution network is located.

Terrestrial cables ensure greater integration between the various power grids, balancing demand and supply and transmitting electricity from the areas in which it is generated (the landfall of submarine cables) to the places where it is consumed.

Production plant

Prysmian Group comprises 104 production plants in more than 50 countries worldwide. The manufacturing site of the product subject to the present EPD is the plant located in Yixing , China:

- Prysmian Technology Jiangsu Co., Ltd North Side of Xin Yi Jin Road, Guanlin Town, Yixing City, China

The Yixing factory has a total annual production capacity of 16.744 tons of energy cables: mainly engages in the manufacturing and sales of high-voltage and extra-high-voltage cable, provides comprehensive cable accessories such as cable joints, terminals, as well as integrated solutions for clients' power transmission and distribution cable system, and also carries on the design and manufacturing of cable and accessories, the system design, installation etc.

Figure 1. Yixing plant

Company contact

For more information on Prysmian's activities or in relation to this environmental product declaration, you can contact:

Dott. Stefano Luciano
Prysmian Group - Via Chiese 6,
20126, Milano, Italy
stefano.luciano@prysmiangroup.com

Alternatively, you can visit the website: www.prysmiangroup.com/en/sustainability

3. Scope and type of the EPD

System boundaries

This EPD considers the entire life cycle of the cable manufactured by Prysmian. The EPD type is therefore “from cradle to grave” type. In accordance with the EPD Regulations, specifically PCR 007 (Electronic and electrical products and systems) and sub-PCR 016 (Cables and wires), the system boundaries are set with reference to the following three modules:

1. **Upstream module** which includes all the relevant supply chain processes.
2. **Core module** which includes all the relevant processes related to the assembly of the cable and the production of its packaging
3. **Downstream module** which includes all the relevant processes that take place after the assembly stage:
    - product transportation/distribution;
    - product installation;
    - product use & maintenance;
    - product end-of-life.

The system boundaries of the product covered by this EPD, together with the main processes that characterize the phases of the life cycle studied, are represented in following Figure. The system boundaries are described also taking into account the stages proposed by EN 50693.

Type of EPD

Product EPD; this declaration relates to a specific product by a specific manufacturer.

Geographical scope

Manufacturing: China
Product distribution: Asia

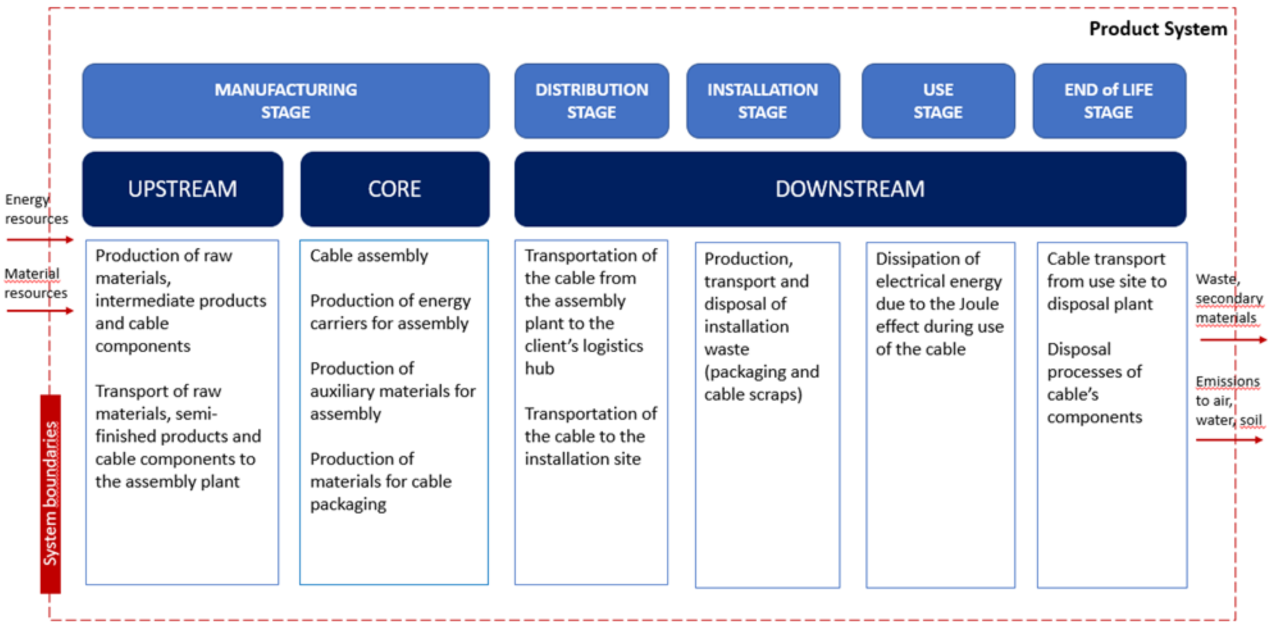

Figure 2. System boundaries

4. Products description

Products identification

Copper high voltage underground cable:

- SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc

The HV cable installed underground for power transmission, which will be installed either direct buried in suitable backfill material, installed in PVC conduits or polyethylene pipes or in a pit or tunnels and conduit system.

Function and application

The function of the product is to transport high voltage electricity; the cable is installed in underground lines. Main applications: industrial installations, energy & installations, power distribution.

Electrical and Thermal parameters

	SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc
Nominal voltage U0 [V]	133.000
Nominal voltage U [V]	230.000
Max. conductor temperature [°C]	90

The parameters entered in the table are deduced from the following standards: IEC 62067, IEC 60228, HD 605

Chemical properties

	SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc
CPR reaction to fire	Fca
Halogen free	Yes
UV resistant	Yes
Silicon free	Yes
Lead free	Yes

Cable properties

	SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc
Nominal thickness insulation *[mm]*	24,0
Nominal outer diameter *[mm]*	111,116
Cable Weight *[kg/km]*	33.162,90

Conductor resistance at 20° C *[Ohm/km]*	0,00900

The parameters entered in the table are deduced from the following standards: IEC 62067, IEC 60228, HD 605

Cable composition

	SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc	
Material	**kg / 1 km of cable**	**% / 1 km of cable**
Bedding	182,9	0,6%
Insulation	5.917,0	18%
Conductor	17.980,4	54%
Inner semiconductor	360,2	1%
Outer semiconductor	438,0	1%
Water blocking	976,3	3%
Metallic sheath	3.539,1	11%
Corrosion protection	75,0	0,2%
Sheath	3.694,1	11%
Totale	**33.162,90**	**100%**

The cable under study do not contain dangerous substances of a high degree of concern (Substances of Very High Concern-SVHC) contemplated in the ECHA Candidate List (https://echa.europa.eu/it/candidate-list-table).

The packaging of the cables in the functional unit consists of steel reel on which the calbe is wound.

5. Environmental performances

The environmental performance of the high voltage underground cable:

- SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc

is shown for 1 km of cable for each module (upstream, core, downstream) and for each stage (Manufacturing, Distribution, Installation, Use and End-of-life) of the life cycle.

The declared environmental indicators include:

- core environmental impacts
- resource use
- waste production
- output flows.

The environmental impact indicators are quantified using the characterisation factors and impact assessment methods specified in EN 15804:2012+A2:2019 and EDIP 2003 V1.07

SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc

- **Core Environmental Impact Indicators** - 1 km of cable SH22123 133/230 kV electricity transmission of 1A of carried current for 40 years

SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc					
Indicator	**Unit**	**UPSTREAM**	**CORE**	**DOWNSTREAM**	**TOTAL**
GWP-total	kg CO_2 eq	2,71E+05	1,11E+03	1,34E+04	2,86E+05
GWP-fossil	kg CO_2 eq	2,70E+05	1,09E+03	1,34E+04	2,84E+05
GWP-biogen.	kg CO_2 eq	1,16E+03	1,37E+01	7,62E+00	1,19E+03
GWP-luluc	kg CO_2 eq	2,45E+02	1,73E-01	5,40E+00	2,51E+02
ODP	kg CFC11eq	5,01E-03	7,80E-06	6,21E-05	5,08E-03
AP	mol H+ eq	4,33E+03	2,14E+00	4,94E+01	4,38E+03
EP-freshw.	kg Peq	2,28E+03	2,71E-01	1,01E+00	2,28E+03
POCP	kgNMVOCeq	3,16E+03	3,65E+00	4,15E+01	3,20E+03
ADPmin&met	kg Sb eq	4,61E+01	6,58E-04	2,20E-02	4,61E+01
ADPfossil	MJ	3,32E+06	4,66E+03	6,48E+04	3,39E+06
WDP	m^3 depriv.	7,40E+04	0,00E+00	5,62E+02	7,45E+04

SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc							
Indicator	**Unit**	**Manufacturing stage**	**Distribution stage**	**Installation stage**	**Use Stage**	**End-of-life stage**	**TOTAL**
GWP-total	kg CO_2 eq	2,72E+05	2,55E+03	8,83E+02	2,62E+00	9,95E+03	2,86E+05
GWP-fossil	kg CO_2 eq	2,71E+05	2,54E+03	8,82E+02	2,62E+00	9,94E+03	2,84E+05
GWP-biogen.	kg CO_2 eq	1,18E+03	8,48E-01	3,67E-01	6,45E-04	6,41E+00	1,19E+03
GWP-luluc	kg CO_2 eq	2,45E+02	1,77E+00	2,08E-01	1,46E-03	3,42E+00	2,51E+02
ODP	kg CFC11eq	5,01E-03	3,74E-05	7,60E-06	3,35E-09	1,71E-05	5,08E-03
AP	mol H+ eq	4,33E+03	3,38E+01	4,64E+00	1,28E-02	1,09E+01	4,38E+03
EP-freshw.	kg Peq	2,28E+03	1,57E-01	5,41E-02	4,31E-04	7,98E-01	2,28E+03
POCP	kgNMVOCeq	3,16E+03	2,70E+01	6,51E+00	7,89E-03	7,98E+00	3,20E+03
ADP-min.& met.	kg Sb eq	4,61E+01	5,76E-03	8,39E-04	5,72E-07	1,54E-02	4,61E+01
ADPfossil	MJ	3,32E+06	3,30E+04	7,00E+03	2,79E+01	2,48E+04	3,39E+06
WDP	m^3 depriv.	7,40E+04	1,23E+02	3,28E+01	3,25E-01	4,06E+02	7,45E+04

GWP-total = Global Warming Potential; **GWP-fossil** = Global Warming Potential - fossil; **GWP-biogenic** = Global Warming Potential - biogenic; **GWP-luluc** = Global Warming Potential - land use and land use change; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential, Accumulated Exceedance; **EP-freshwater** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **POCP** = Formation potential of tropospheric ozone; **ADP-minerals&metals** = Abiotic depletion potential for non-fossil resources; **ADP-fossil** = Abiotic depletion for fossil resources potential; **WDP** = Water deprivation potential, deprivation weighted water consumption

Resource use indicators - 1 km of cable SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc electricity transmission of 1A of carried current for 40 years

SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc					
Indicator	Unit	UPSTREAM	CORE	DOWNSTREAM	TOTAL
PENRE	MJ, NCV	2,00E+06	4,16E+03	5,27E+04	2,06E+06
PERE	MJ, NCV	6,74E+05	9,15E+01	3,34E+03	6,78E+05
PENRM	MJ, NCV	2,69E+05	0,00E+00	0,00E+00	2,69E+05
PERM	MJ, NCV	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ, NCV	2,27E+06	4,16E+03	5,27E+04	2,33E+06
PERT	MJ, NCV	6,74E+05	9,15E+01	3,34E+03	6,78E+05
FW	m^3	2,00E+03	0,00E+00	1,95E+01	2,02E+03
MS	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00

SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc							
Indicator	Unit	Manufacturing stage	Distribution stage	Installation stage	Use Stage	End-of-life stage	TOTAL
PENRE	MJ, NCV	2,01E+06	3,10E+04	6,33E+03	8,25E+00	1,54E+04	2,06E+06
PERE	MJ, NCV	6,74E+05	3,64E+02	1,64E+02	1,52E+00	2,81E+03	6,78E+05
PENRM	MJ, NCV	2,69E+05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,69E+05
PERM	MJ, NCV	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ, NCV	2,27E+06	3,10E+04	6,33E+03	8,25E+00	1,54E+04	2,33E+06
PERT	MJ, NCV	6,74E+05	3,64E+02	1,64E+02	1,52E+00	2,81E+03	6,78E+05
FW	m^3	2,00E+03	3,94E+00	1,16E+00	7,76E-03	1,44E+01	2,02E+03
MS	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

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; **MS** = Use of secondary material; **RSF** = Use of renewable secondary fuels; **NRSF** = Use of non-renewable secondary fuels;

Waste production indicators - 1 km of cable SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc electricity transmission of 1A of carried current for 40 years

SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc					
Indicator	Unit	UPSTREAM	CORE	DOWNSTREAM	TOTAL
HWD	kg	0,00E+00	1,47E-03	6,33E-02	6,47E-02
NHWD	Kg	0,00E+00	8,26E+00	9,65E+03	9,66E+03
RWD	kg	0,00E+00	1,84E-04	5,61E-02	5,63E-02

SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc							
Indicator	Unit	Manufacturing stage	Distribution stage	Installation stage	Use Stage	End-of-life stage	TOTAL
HWD	kg	1,47E-03	0,00E+00	2,53E-03	0,00E+00	6,07E-02	6,47E-02
NHWD	Kg	8,26E+00	0,00E+00	3,88E+02	0,00E+00	9,27E+03	9,66E+03
RWD	kg	1,84E-04	0,00E+00	2,24E-03	0,00E+00	5,38E-02	5,63E-02

HWD = Hazardous waste disposed; **NHWD** = Non-hazardous waste disposed; **RWD** = Radioactive waste disposed;

Output flows indicators - 1 km of cable SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc electricity transmission of 1A of carried current for 40 years

SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc					
Indicator	Unit	UPSTREAM	CORE	DOWNSTREAM	TOTAL
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	3,77E+03	1,15E+03	4,92E+03
CRU	kg	0,00E+00	0,00E+00	8,33E-01	8,33E-01
ETE	MJ, NCV	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ, NCV	0,00E+00	0,00E+00	0,00E+00	0,00E+00

SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc							
Indicator	Unit	Manufacturing stage	Distribution stage	Installation stage	Use Stage	End-of-life stage	TOTAL
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	3,77E+03	0,00E+00	8,60E+02	0,00E+00	2,91E+02	4,92E+03
CRU	kg	0,00E+00	0,00E+00	8,33E-01	0,00E+00	0,00E+00	8,33E-01
ETE	MJ, NCV	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ, NCV	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

MER = Materials for energy recovery; **MFR** = Materials for recycling; **CRU** = Components for reuse; **ETE**= Exported thermal energy; **EEE**= Exported electricity energy;

6. Interpretation of results

The environmental impacts of the cable, quantified from a life cycle perspective, are largely produced by their upstream phase.
This result is motivated by the relevance of the raw material production phase and its procurement in the entire cables life cycle.

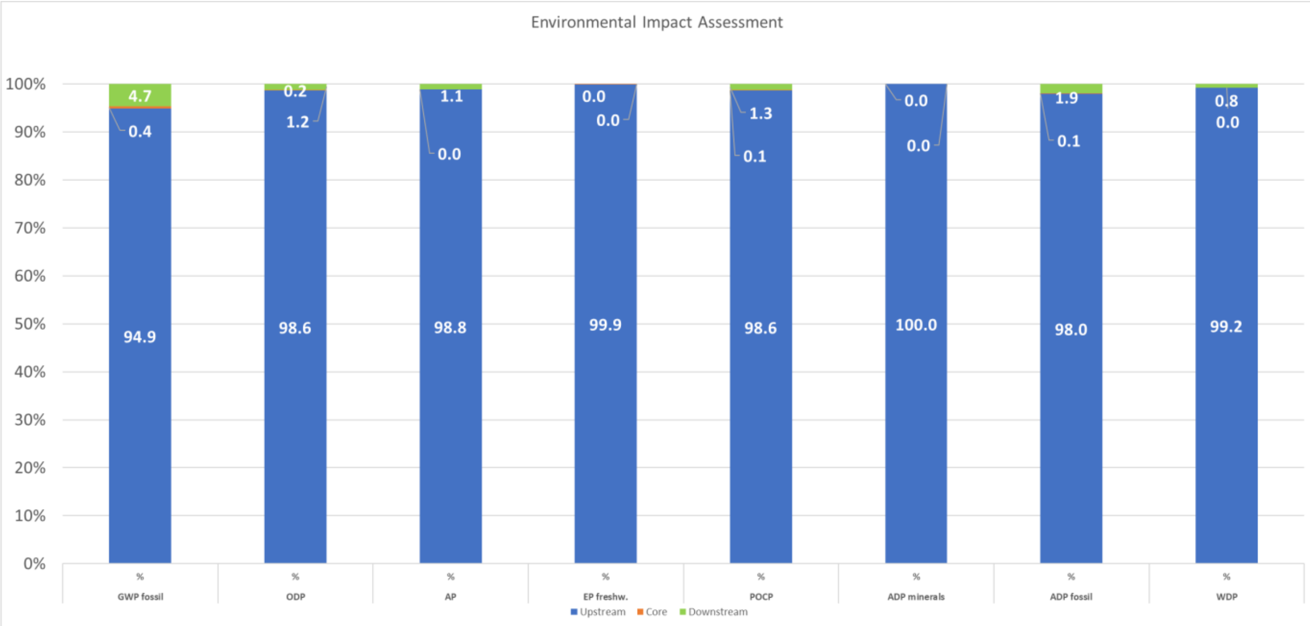

Figure 3. Environmental Impact Analysis of the SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc cable

The downstream phase, including distribution, installation, use and maintenance and end of life, contributes for all cable is for around the 4,7% to the GWP-fossil indicator. The Core phase, on the other hand, around 0,4% to the GWP-fossil.

7. LCA calculations

Functional unit

The functional unit of the LCA product system is:

To transmit electricity with current of 1A by means of the SH22123 (Y2)/133/230kV 1C2000 SWB-UD-CU/XLPE/CAS/AT MDPE RD-Esc cable, over a distance of 1 km for 40 years and a 100% use rate.

Reference Service Life (RSL)

An average RSL of 40 years is used for the LCA calculations.

Exclusions from system boundaries

The construction, maintenance and decommissioning of infrastructures (buildings and machinery) as well as the occupation of industrial land were not considered in the LCA study.

Cut-off rules

All relevant input and output flows of matter and energy included within the system boundaries were considered.
In compliance with the cut-off criteria established by the applicable PCR, the following flows were excluded:

- production, use and disposal of raw materials packaging
- raw materials for which specific data are not available and whose total mass does not exceed 2% of the total mass of the finished product
- auxiliary materials and energy consumed in the installation process as these operations are performed manually
- external devices necessary for the installation of the cable itself
- packaging derived from the purchase of raw materials

Data sources

Primary and site-specific data from records and documentation provided by the Prysmian cable manufacturing plant in Yixing, China were used for the foreground processes.

The primary data used include: cable composition (cable design documentation), type and amount of material and energy flows In the assembly phase, packaging materials of the finished product.

For the modeling of the background processes secondary data deriving from international databases (Ecoinvent 3.9.1) were used. Secondary data are related to the manufacture of cable components, the production of energy carriers used in the product system (electricity in the core and downstream modules), the transportation processes and the waste treatment processes.

Data quality

Completeness: all the main flows of matter and energy have been fully quantified and included in the study; the flows excluded from the analysis are identified in the Cut-off rules section.

Time representativeness: the primary data used refer to the year 2023 (12 months).

The secondary data are taken from the ecoinvent 3.9.1 environmental database.

Geographic representativeness: primary site-specific data were used for the cable assembly processes; for the secondary data, datasets were selected from databases consistent with the geography of the processes studied, whenever this was known.

Technological representativeness: the primary data used represent the specific production technology of the product under study. For the secondary data taken from the database, reference was made to the most representative technology for the processes in question, where this is known.

Allocations

In the context of multifunctional processes allocation procedures were used in accordance with the provisions of EN 50693: 2019.
The main allocations made are:

- consumption during the cable assembly phase: the specific consumption (relating to Diesel, Petrol and LPG) for the product under study was quantified by allocating the aggregate plant consumption according to the share of mass production of the cable under study compared to the total cable production.
- Hazard waste production during the cable assembly phase: allocation of the total plant waste production based on the share of mass production of the cable under study compared to the total cable production.
- air emissions during assembly phase: methane emissions (degassing) allocated on the basis of the specific weight of the compound (insulator and semiconductor) for each cable.

Software and Database

The software used for the LCA calculations is SimaPro. The database used for process modeling is ecoinvent 3.9.1.

Use phase scenario

The use phase includes the environmental impacts associated to the electricity deriving from the cable during its operation.
The electricity losses are directly proportional to the square of the intensity of the transmitted current, expressed in Ampere (A), according to the following formula:

$$E_{use}\,(J) = R_{linear} * I^2 * RSL$$

where:
E_{use} is the dissipated energy
R_{linear} is the linear resistivity value of the cable, expressed in Ω / km
I^2 is the carried current value, expressed in A
RSL is the Reference Service Life (RSL) of the cable, expressed in seconds.

Since the actual intensity of the transmitted current is not known, a value of 1 A was used in the use phase modeling, as required by the EPDItaly PCR 016.
The parameters for the use-phase scenario are summarized as follows:

Parameter	Unit	SH22123 133/230kV
Linear resistivity	Ω/km	0,009
Reference Service Life	years	40
Current valure	A	1

For the modeling of the pressure drops due to the Joule effect in the use phase, an average mix for Italian market, taken from ecoinvent database, has been used.

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End of Life scenario

The End of life scenario is defined on the basis of the following assumptions:

- recovery of the dismissed cable (100% of recovered cable)
- dismissed cable transportation from the installation site to the waste treatment site: 300 km by truck
- pre-treatment of the cable through granulation

The percentage used for the different waste treatments are[1]:

- material recovery for 99% of copper
- landfill for 1% of copper
- material recovery for 6% of plastic
- incineration for 47% of plastic
- landfill for 47% of plastic
- landfill for 100% of plastic rubbers material

[1] National Environmental Agency of Singapore, Waste Statistics and Overall Recycling available at https://www.nea.gov.sg/our-services/waste-management/waste-statistics-and-overall-recycling

8.References

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6. ISO 14020:2000 Environmental labels and declarations-General principles
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