Environmental Product Declaration

Prysmian SunGen® Copper Photovoltaic Wire

Prysmian's SunGen® photovoltaic wires are single conductor copper wires with a flame-retardant cross-linked polyethylene (XLPE) insulation.

SunGen® PV Wire, UL Type PV, 600 V, Single Conductor, Copper
SunGen® PV Wire, UL Type PV, 2000 V, Single Conductor, Copper

With 150 years of experience in over 50 countries around the globe, Prysmian is the world leader in the energy and telecom cable industry. Prysmian offers the broadest range of services and know-how in the industry. Each year, Prysmian manufactures thousands of miles of underground and submarine cables and systems for power transmission and distribution, as well as medium and low voltage cables for the construction and infrastructure sectors. The company produces a comprehensive range of optical fibers, copper cables, and connectivity systems for voice, video, and data transmission for the telecommunication sector.

Prysmian is a leader in the industry and a pioneer in sustainability initiatives. The company has adopted a science-based approach and adheres to EPA standards to achieve net-zero emission targets for Scope 1 and 2 by 2035 and Scope 3 by 2050. Scan the QR code below to learn more about Prysmian's sustainability initiatives.

Environmental Product Declaration

Prysmian SunGen® Copper Photovoltaic Wire

Data Cables

According to ISO 14025, EN 15804+A2, ISO 14040, ISO 14044

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and EN 15804+A2. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	ASTM General Program Instructions. Version 8.0. April 29, 2020.
MANUFACTURER NAME AND ADDRESS	Prysmian Group 4 Tesseneer Road Highland Heights, KY 41076
DECLARATION NUMBER	EPD939
DECLARED PRODUCT & FUNCTIONAL UNIT OF DECLARED UNIT	Prysmian SunGen® Copper Photovoltaic Wire Functional Unit = To transmit energy expressed for 1A over a distance of 1km during 40 years and a 100% use rate, in accordance with the relevant standards shown in the product technical data sheets. Lifetime and use rate correspond to the application of energy distribution network as defined in the table given in Appendix 6.1. of the specific rules for wire, cables and accessories.
REFERENCE PCR AND VERSION NUMBER	Product Category Rules for Electrical, Electronic and HVAC-R Products, v4.0, 2021. PEP ecopassport Program: Product Specific Rules for Wires, Cables and Accessories, v4.0, 2022.
DESCRIPTION OF PRODUCT APPLICATION/USE	These Prysmian cable products are primarily used in building applications.
PRODUCT REFERENCE SERVICE LIFE (RSL) DESCRIPTION	40 Years
MARKETS OF APPLICABILITY	North America
DATE OF ISSUE	March 3, 2025
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product Specific
DATASET VARIABILITY	N/A
EPD SCOPE	Cradle-to-Grave
YEAR(S) OF REPORTED PRIMARY DATA	2023
LCA SOFTWARE & VERSION NUMBER	LCA for Experts v10.7.0.183
LCI DATABASE(S) & VERSION NUMBER	Sphera Managed Content & USLCI v2.0
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1; CML 4.1
The sub-category PCR review was conducted by:	
This declaration was independently verified in accordance with ISO 14025: 2006. The "PEP ecopassport Program: Product Category Rules for Electrical, Electronic and HVAC-R Products, v4.0, 2021." based on EN 15804:2012+A2:2019, serves as the core PCR. The supporting PSR is the "PEP ecopassport Program: Product Specific Rules for Wires, Cables and Accessories, v4.0, 2022." ☐ INTERNAL ☒ EXTERNAL	Timothy S Brooke
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P Gloria, Ph. D Industrial Ecology Consultants

Environmental declarations from different programs (ISO 14025) may not be comparable.
Comparison of the environmental performance using EPD information shall consider all relevant information modules over the full life cycle of the products within the building.
This PCR allows EPD comparability only when the same functional requirements between products are ensured and the requirements of EN 15804:2012+A2:2019 are met. It should be noted that different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared. The owner of the declaration shall be liable for the underlying information and evidence; ASTM, or its affiliates, shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence.

General Information

Description of Company/Organization

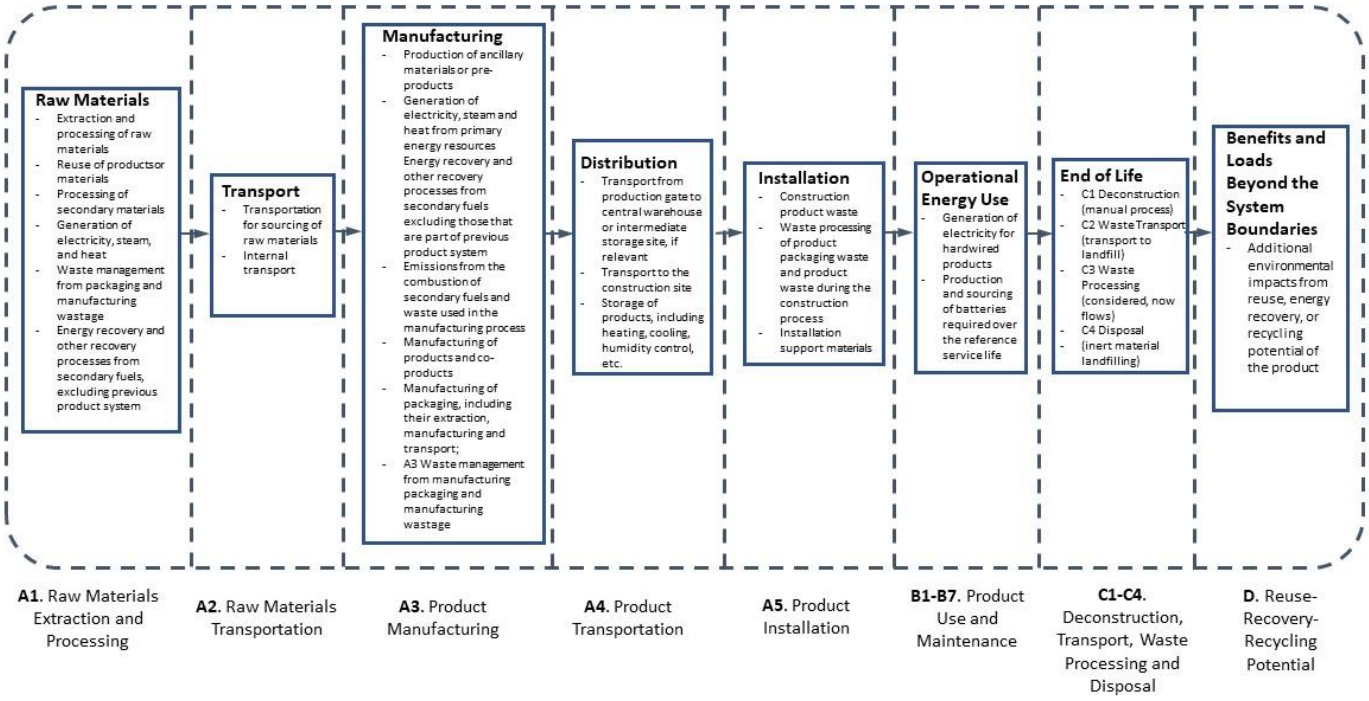
Prysmian, a global provider of cabling solutions, is leading the charge in the energy transition and digital transformation. With 150 years of experience in over 50 countries around the globe, the company's business strategy is a testament to its understanding of market dynamics, focusing on the development of resilient, high-performing, sustainable, and innovative cable solutions across the Transmission, Power Grid, Electrification, and Digital Solutions segments.

Product Description

Prysmian's SunGen® product line consists of single conductor wires for photovoltaic applications in wet or dry locations. The SunGen® PV wire is permitted for direct burial use in accordance with NEC. The SunGen® product line has stable electrical properties over a broad temperature range.

Additional features include:
- 90°C Temperature Rating wet and dry per UL
- Meets cold bend tests at -40°C
- Resistant to crush and compression cuts
- Deformation resistant at high temperatures
- UV/sunlight resistant

Flow Diagram



Manufacturer Specific EPD

This product-specific EPD was developed based on the cradle-to-grave (modules A1-D) life cycle assessment. The EPD accounts for raw material extraction and processing, transport, product manufacturing, distribution, installation, use, maintenance, disposal, and potential benefits and loads following the end of life disposal. Manufacturing data were gathered directly from company personnel. For EPDs with product groups, an impact assessment was completed for each product and the highest impacts were reported as representations of the product group. The rest of the products in each group are represented through scaling factor tables and can be independently calculated.

Application

The SunGen® product line is designed for interconnection wiring of grounded and ungrounded photovoltaic power systems as described in Section 690.31(A) and other applicable parts of the National Electrical Code® (NEC), NFPA 70.

Material Composition

The primary product components and/or materials must be indicated as a percentage mass to enable the user of the EPD to understand the composition of the product in delivery status.

The average composition of a Prysmian 500/3+250G DURASHEATH 600V 3XG cable is as follows:

	Percentage in mass (%)
Material	**Maximum**
Conductor	92.90%
Jacketing	7.10%
Total	100.00%

Technical Details

For the declared product, the following technical data in the delivery status must be provided with reference to the test standard:

Technical Data
Spec 5841 - SunGen® PV Wire, UL Type PV, 600 V, Single Conductor
Spec 5851 - SunGen® PV Wire, UL Type PV, 2000 V, Single Conductor

Placing on the Market / Application Rules

The standards that can be applied for SunGen® PV Wire, 600 V are:
- UL 4703 Type PV
- UL 44 Type RHW-2
- EPA 40 CFR, Part 261
- RoHS Compliant
- UL 1581 VW-1 Flame

The standards that can be applied for SunGen® PV Wire, 2000 V are:
- UL 4703 Type PV
- CSA C22.2 No. 271 RPVU90
- UL 44 Type RHW-2
- EPA 40 CFR, Part 261
- RoHS Compliant
- UL 1581 VW-1 Flame

Properties of Declared Product as Shipped

Material cut to length and shipped on non-returnable wood reels.

Methodological Framework

Functional Unit

Name	Value	Unit
Functional unit	To transmit energy expressed for 1A over a distance of 1km during 40 years and a 100% use rate, in accordance with the relevant standards shown in the product technical data sheets. Lifetime and use rate correspond to the application of energy distribution network as defined in the table given in Appendix 6.1. of the specific rules for wire, cables and accessories.	
Maximum Mass	5015	kg
Conversion factor to 1 kg	2.0E-04	-

System Boundary

This is a cradle to grave Environmental Product Declaration. The following life cycle phases were considered:

Product Stage			Construction Process Stage		Use Stage							End of Life Stage*				Benefits and Loads Beyond the System Boundaries
Raw material supply	Transport	Manufacturing	Transport from gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Description of the System Boundary Stages Corresponding to the PCR

(X = Included; MND = Module Not Declared)

*This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

Reference Service Life

The reference service life of a properly installed Prysmian SunGen® Copper Photovoltaic Wire cable is 40 years.

Allocation

Allocation of manufacturing was determined by mass, in kilogram per kilometer.

Cut-off Criteria

Processes whose total contribution to the final result, with respect to their mass and in relation to all considered impact categories, is less than 1% can be neglected. The sum of the neglected processes may not exceed 5% by mass of the considered impact categories. For that a documented assumption is admissible.

For Hazardous Substances the following requirements apply:

- The Life Cycle Inventory (LCI) of hazardous substances will be included, if the inventory is available.
- If the LCI for a hazardous substance is not available, the substance will appear as an input in the LCI of the product, if its mass represents more than 0.1% of the product composition.
- If the LCI of a hazardous substance is approximated by modeling another substance, documentation will be provided.

This EPD is in compliance with the cut-off criteria. No processes were neglected or excluded. Capital items for the production processes (machine, buildings, etc.) were not taken into consideration.

Data Sources

Primary data were collected for every process in the product system under the control of Prysmian. Secondary data from the Sphera database were utilized when necessary. These data were evaluated and have temporal, geographic, and technical coverage appropriate to the scope of the product category

Data Quality

The data sources used are complete and representative of global systems in terms of the geographic and technological coverage and are a recent vintage (i.e. less than ten years old). The data used for primary data are based on direct information sources of the manufacturers. Secondary data sets were used for raw materials extraction and processing, end of life, transportation, and energy production flows. Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty.

Period Under Review

The period under review is the full calendar year of 2023.

Treatment of Biogenic Carbon

The uptake and release of biogenic carbon throughout the product life cycle follows EN15805+A2 Section 6.4.4.

Comparability and Benchmarking

A comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to EN 15804+A2 and the building context, respectively the product-specific characteristics of performance, are taken into account. Environmental declarations from different programs may not be comparable. Full conformance with the PCR allows for EPD comparability only when all stages a product's life cycle have been considered. However, variations and deviations are possible.

Estimates and Assumptions

End of Life
In the End of Life phase, copper is assumed to have a 60% recycling rate in accordance with the PEP PCR.

Units

The LCA results within this EPD are reported in SI units.

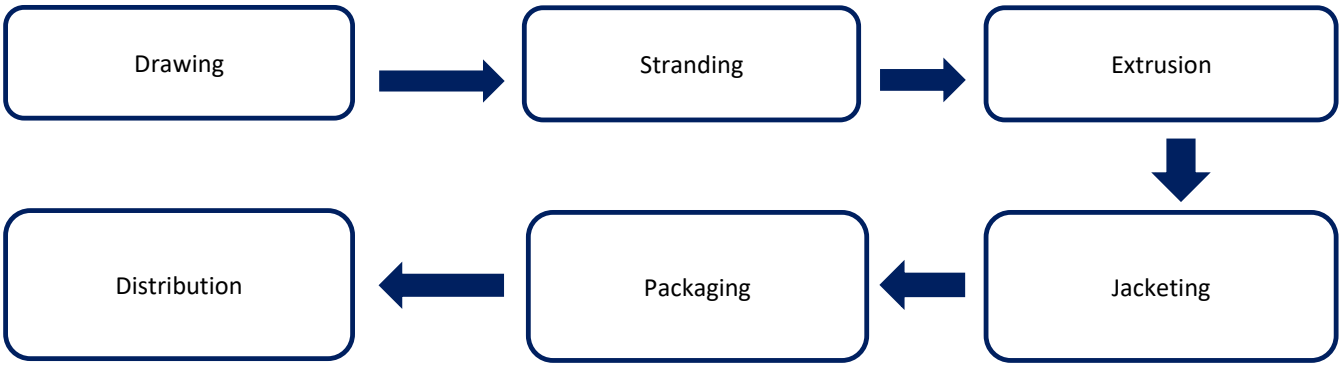
Additional Environmental Information

Background data

For life cycle modeling of the considered products, the LCA for Experts Software System for Life Cycle Engineering, developed by Sphera, is used. The Sphera database contains consistent and documented datasets which are documented online. To ensure comparability of results in the LCA, the basic data of the Sphera database were used for energy, transportation, and auxiliary materials.

Manufacturing

This study includes the impacts from seven of Prysmian's manufacturing facilities which produce data center and tray cables. Conductor materials come either pre-drawn or go through a drawing process at the manufacturing site. The conductor then goes through a stranding process. Jacketing is extruded to size and applied to cables as appropriate along with any insulation or additional cable components. The cables are packaged on reels and sent to customer.



Packaging

All packaging is fully recyclable. The packaging material is composed of a wooden reel.

	Quantity (% By Weight)
Material	**Maximum**
Paper	0.00%
Metal	0.00%
Plastic	0.00%
Wood	100.00%
Total	100.00%

Transportation

Transport to Building Site (A4)		
Name	**Max**	**Unit**
Fuel type	Diesel	
Liters of fuel	38	l/100km
Transport distance	800	km
Capacity utilization (including empty runs)	85	%
Gross density of products transported	-	kg/m^3
Weight of products transported	5015	kg
Volume of products transported	-	m^3
Capacity utilization volume factor	-	-

Product Installation

Prysmian has established guidelines in HSE for installation processes, beginning with the development of a HSE plan. The HSE plan will be developed with specific site Environmental and Health concerns that might arise during installation process. Management and installation team will all be trained on the HSE plan prior to installation.

Installation into the building (A5)		
Name	**Max**	**Unit**
Water consumption	-	m^3
Other energy carriers	-	MJ
Product loss per functional unit	2.51E+02	kg
Waste materials at construction site	4.23E+02	kg
Output substance (recycle)	1.40E+02	kg
Output substance (landfill)	9.32E+01	kg
Output substance (incineration)	0.00E+00	kg
Packaging waste (recycle)	1.52E+02	kg
Packaging waste (landfill)	3.80E+01	kg
Packaging waste (incineration)	0.00E+00	kg
Direct emissions to ambient air*, soil, and water	8.02E+01	kg CO_2
VOC emissions	-	kg

*CO2 emissions to air from disposal of packaging

Reference Service Life		
Name	**Value**	**Unit**
Reference Service Life	40	years
Replacements	0	-

Product Use

No cleaning, maintenance, repair, or refurbishment is required.
The operational energy use is presented under the assumption that the cable experiences a current of 1 Amp. The equation used to calculate the use phase is:

$$E = Z * l^2 * \Delta t$$

Where:

ℤ = linear resistivity of the cable in Ω/km, provided by Prysmian
L = current in A, assumption is 1 A
Δt = use time in seconds, assumption is 40 years

Operational Energy Use (B6)		
Name	**Max**	**Unit per RSL**
Water consumption (from tap, to sewer)	-	m^3
Electricity consumption	25.24	kWh
Other energy carriers	-	MJ
Equipment output	-	kW
Direct emissions to ambient air, soil, and water	**-**	kg

Disposal

The product can be mechanically dissembled to separate the different materials. The majority of components are disposed of through waste incineration with energy recovery or landfilled, in accordance with the PCR.

End of life (C1-C4)		
Name	**Max**	**Unit**
Collected separately	2.80E+03	kg
Collected as mixed construction waste	1.86E+03	kg
Reuse	0.00E+00	kg
Recycling	2.80E+03	kg
Landfilling	1.86E+03	kg
Incineration with energy recovery	0.00E+00	kg
Removals of biogenic carbon	-	kg

Re-use Phase

Re-use of the product is not common, but a large amount of the metals in this material will be recycled.

Re-Use, recovery, And/Or Recycling Potential (D)		
Name	**Max**	**Unit**
Net energy benefit from energy recovery from waste treatment declared as exported energy in C3 (R>0.6)	0.00	MJ
Net energy benefit from thermal energy due to treatment of waste declared as exported energy in C4 (R<0.6)	0.00	MJ
Net energy benefit from material flow declared in C3 for energy recovery	0.00	MJ
Process and conversion efficiencies	-	
Further assumptions for scenario development (e.g. further processing technologies, assumptions on correction factors);	These products are almost entirely metals and the recycling rate from the PCR and the benefit for module D is calculated by the benefit of recycling product at the end of life.	

System Boundary

This is a cradle to grave Environmental Product Declaration. The following life cycle phases were considered:

Product Stage			**Construction Process Stage**		**Use Stage**							**End of Life Stage***				**Benefits and Loads Beyond the System Boundaries**
Raw material supply	Transport	Manufacturing	Transport from gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Description of the System Boundary Stages Corresponding to the PCR

(X = Included; MND = Module Not Declared)

*This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

LCA Results - Maximum Impact - Results for Prysmian SunGen® Copper Photovoltaic Wire

Please see the system boundary diagram above for an explanation of the A1-D life cycle stages. The below results all represent the Prysmian SunGen® Copper Photovoltaic Wire with the highest impact, which is the Prysmian SunGen® Copper Photovoltaic Wire. For all other cables in this product series, please see the scaling factors below to calculate their impacts.

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment

Parameter	Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	C4	D	Total
GWP	Global warming potential	kg CO_2-Eq.	2.00E+04	3.72E+02	1.47E+03	1.14E+01	1.87E-09	0.00E+00	2.78E+01	-5.07E+03	2.19E+04
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	2.87E-07	1.41E-08	3.26E-08	1.32E-12	7.09E-20	0.00E+00	1.51E-12	1.70E-07	3.34E-07
AP Air	Acidification potential for air emissions	kg SO_2-Eq.	1.57E+02	2.23E+00	1.05E+01	1.45E-02	1.13E-11	0.00E+00	1.73E-01	-1.39E+02	1.70E+02
EP	Eutrophication potential	kg N-Eq.	5.42E+00	1.24E-01	4.16E-01	1.20E-03	6.23E-13	0.00E+00	7.67E-03	-2.17E+00	5.97E+00
SP	Smog formation potential	kg O_3-Eq.	1.40E+03	6.15E+01	1.43E+02	2.10E-01	3.10E-10	0.00E+00	3.24E+00	-1.51E+02	1.61E+03
FFD	Fossil Fuel Depletion	MJ-surplus	2.61E+04	6.58E+02	2.17E+03	1.22E+01	3.31E-09	0.00E+00	4.74E+01	-3.18E+03	2.90E+04

**Stages B1 through B7 and C1 through C4 have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment

Parameter	Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	C4	D	Total
GWP	Global warming potential	kg CO_2-Eq.	2.02E+04	3.73E+02	1.48E+03	1.15E+01	1.88E-09	0.00E+00	2.80E+01	-5.08E+03	2.20E+04
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	2.76E-07	1.40E-08	3.21E-08	7.83E-11	7.07E-20	0.00E+00	8.90E-11	7.66E-08	3.22E-07
AP Air	Acidification potential for air emissions	kg SO_2-Eq.	1.68E+02	1.83E+00	1.06E+01	1.39E-02	9.24E-12	0.00E+00	1.62E-01	-1.64E+02	1.81E+02
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	9.37E+00	3.27E-01	8.45E-01	1.53E-03	1.65E-12	0.00E+00	1.81E-02	-1.54E+00	1.06E+01
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	7.82E+00	2.14E-01	7.22E-01	1.20E-03	1.08E-12	0.00E+00	1.31E-02	-7.19E+00	8.77E+00
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	5.92E+00	1.55E-07	2.96E-01	1.39E-06	7.78E-19	0.00E+00	8.65E-06	-9.20E+00	6.22E+00
ADPF	Abiotic depletion potential for fossil resources	MJ	2.56E+05	4.74E+03	1.90E+04	1.39E+02	2.39E-08	0.00E+00	3.59E+02	-2.42E+04	2.80E+05

**Stages B1 through B7 and C1 through C4 have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

EN15804+A2

Parameter	Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	C4	D	Total
GWP-total	Climate change - total	kg CO_2-Eq.	2.02E+04	3.74E+02	1.49E+03	1.16E+01	1.88E-09	0.00E+00	2.80E+01	-4.98E+03	2.21E+04
GWP-fossil	Climate change - fossil	kg CO_2-Eq.	2.02E+04	3.74E+02	1.48E+03	1.16E+01	1.88E-09	0.00E+00	2.80E+01	-5.09E+03	2.21E+04
GWP-biogenic	Climate change - biogenic	kg CO_2-Eq.	-8.02E+01	0.00E+00	8.02E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP-luluc	Climate change - land use and land use change	kg CO_2-Eq.	3.52E+00	0.00E+00	1.98E-01	1.18E-03	0.00E+00	0.00E+00	1.68E-01	-4.47E+01	3.89E+00
ODP	Ozone depletion	kg CFC-11 Eq.	1.48E-07	9.68E-09	2.00E-08	6.65E-11	4.88E-20	0.00E+00	7.56E-11	1.35E-08	1.78E-07
AP	Acidification	mol H^+ Eq.	1.94E+02	2.47E+00	1.26E+01	1.57E-02	1.25E-11	0.00E+00	1.99E-01	-1.77E+02	2.09E+02
EP-freshwater	Eutrophication aquatic freshwater	kg P Eq.	8.02E-02	1.06E-04	4.16E-03	6.43E-06	5.36E-16	0.00E+00	6.37E-05	1.96E-02	8.45E-02
EP-marine	Eutrophication aquatic marine	kg N Eq.	2.33E+01	9.52E-01	2.26E+00	3.47E-03	4.80E-12	0.00E+00	5.13E-02	-3.06E+00	2.65E+01
EP-terrestrial	Eutrophication terrestrial	mol N Eq.	2.55E+02	1.04E+01	2.47E+01	3.75E-02	5.23E-11	0.00E+00	5.64E-01	-2.56E+01	2.91E+02
POCP	Photochemical ozone formation	NMVOC Eq.	7.16E+01	2.80E+00	6.93E+00	1.01E-02	1.41E-11	0.00E+00	1.57E-01	-1.62E+01	8.15E+01
ADP-minerals&metals	Depletion of abiotic resources - minerals and metals	kg Sb Eq.	5.93E+00	0.00E+00	2.96E-01	1.12E-06	0.00E+00	0.00E+00	1.82E-06	-9.21E+00	6.22E+00
ADP-fossil	Depletion of abiotic resources - fossil fuels	mol N Eq.	2.96E+05	4.79E+03	2.11E+04	1.93E+02	2.41E-08	0.00E+00	3.70E+02	-1.28E+04	3.22E+05
WDP	Water use	m^3 world Eq. deprived	9.44E+03	0.00E+00	4.72E+02	2.29E+00	0.00E+00	0.00E+00	3.21E+00	-4.47E+03	9.91E+03
PM	Particulate matter emissions	Disease incidence	3.28E-03	9.76E-06	1.75E-04	1.45E-07	4.92E-17	0.00E+00	2.50E-06	-4.04E-04	3.47E-03
IRP	Ionizing radiation, human health	kBq U235 Eq.	1.36E+03	8.41E-17	6.49E+01	1.59E+00	4.24E-28	0.00E+00	4.48E-01	4.39E+02	1.43E+03
ETP-fw	Ecotoxicity (freshwater)	CTUe	1.22E+05	6.93E+03	1.53E+04	3.09E+01	3.49E-08	0.00E+00	2.46E+02	-7.32E+04	1.44E+05
HTP-c	Human toxicity, cancer effects	CTUh	-9.46E-05	1.01E-07	-4.59E-06	1.54E-09	5.07E-19	0.00E+00	5.03E-09	6.08E-06	-9.91E-05
HTP-nc	Human toxicity, non-cancer effects	CTUh	1.31E-03	6.86E-06	7.48E-05	2.62E-08	3.45E-17	0.00E+00	1.94E-07	4.99E-04	1.39E-03
SQP	Land use related impacts/Soil quality	dimensionless	1.84E+04	0.00E+00	8.85E+02	2.14E+01	0.00E+00	0.00E+00	1.02E+02	-1.79E+05	1.94E+04

Results below contain the resource use throughout the life cycle of the product.

Resource Use

Parameter	Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	C4	D	Total
RPR_E	Renewable primary energy as energy carrier	MJ	1.72E+04	0.00E+00	7.86E+02	4.98E+01	0.00E+00	0.00E+00	6.45E+01	-3.76E+04	1.81E+04
RPR_M	Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	2.96E+05	4.79E+03	2.11E+04	1.93E+02	0.00E+00	0.00E+00	3.70E+02	-1.28E+04	3.22E+05
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E+01	0.00E+00
FW	Use of net fresh water	m^3	2.18E+02	0.00E+00	1.09E+01	7.00E-02	0.00E+00	0.00E+00	1.00E-01	-1.54E+01	2.29E+02

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories

Parameter	Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	C4	D	Total
HWD	Hazardous waste disposed	kg	7.41E-03	0.00E+00	3.70E-04	1.12E-07	0.00E+00	0.00E+00	9.21E-08	4.28E-03	7.78E-03
NHWD	Non-hazardous waste disposed	kg	5.49E+02	0.00E+00	2.30E+02	5.53E-02	0.00E+00	0.00E+00	1.88E+03	1.02E+04	2.66E+03
HLRW	High-level radioactive waste	kg	1.50E+01	0.00E+00	7.31E-01	1.93E-02	0.00E+00	0.00E+00	3.88E-03	4.45E+00	1.58E+01
ILLRW	Intermediate- and low-level radioactive waste	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E+01	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

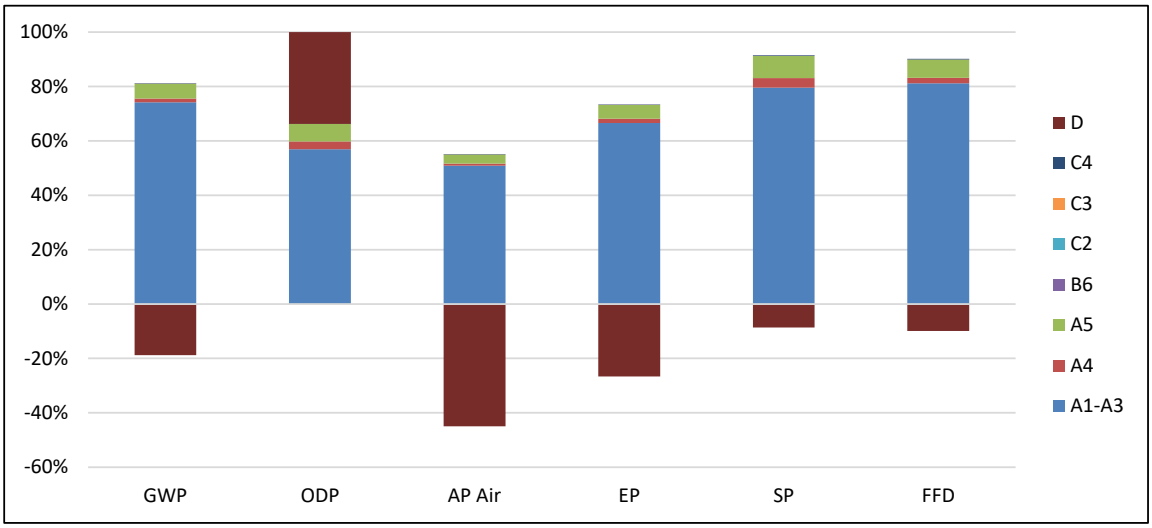
Biogenic Carbon Content

Parameter	Unit	A1-A3	A4	A5	B6	C2	C3	C4	D	Total
Biogenic Carbon Content in Product	kg C	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic Carbon Content in Accompanying Packaging	kg C	-2.94E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.94E+02

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

LCA Interpretation - Maximum Impact - Results for Prysmian SunGen® Copper Photovoltaic Wire

The production life cycle stage (A1-A3) dominates the impacts across all impact categories. This is due to the upstream production of raw materials used in the product, along with energy use in the manufacturing of the product. The D reuse, recovery, and recycling potential stage shows as a negative value and accounts for the benefit of energy recovery during incineration, and the benefit from recycling material at the end-of-life for a product. Though the energy use (B6) phase does not have a large impact, this is due to the functional unit of 1 AMP, lifetime use may be larger than 1 AMP.



System Boundary

This is a cradle to grave Environmental Product Declaration. The following life cycle phases were considered:

Product Stage			Construction Process Stage		Use Stage							End of Life Stage*				Benefits and Loads Beyond the System Boundaries
Raw material supply	Transport	Manufacturing	Transport from gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Description of the System Boundary Stages Corresponding to the PCR

(X = Included; MND = Module Not Declared)

*This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

Scaling Factor Tables

For EPDs with product groups, an impact assessment was completed for each product and the highest impacts were reported as representations of the product group. The rest of the products in each group are represented through scaling factor tables and can be independently calculated.

To use these scaling factors, you will need the result from the tables in section 'LCA Results - Maximum Impact' and the chosen cable you are investigating. The scaling factors multiplied by the results above will be the results for that particular cable. For example, if you wanted to know how much GWP impact came from the A1-A3 stage of the example product, you would follow the equation below:

	Scaling Factor	*	Results	=	Final GWP
SunGen® 12 AWG 19-Wire Bare CU 2kV Black	3.63E-03	*	2.00E+04	=	7.26E+01

This equation can be used for all steps of the life cycle, where the scaling factor from each stage is multiplied by the results shown in this study in order to get any of the results. The scaling factors below are split into A1-A3 factors, which have each main impact category distinct from the others. This is due to the fact that the manufacturing site and the raw materials used in each cable can vary tremendously in these category. The A4-D categories are mostly based on weight of the cable, the individual impact category does not have as much variability and can be assumed to be the same. C2-D will all have the same scaling factor, and therefore, the scaling factor for these can be used in the equation above for any individual category. These scaling factors can be used for each methodology, including the TRACI 2.1 impacts, CML 4.1 impacts and EN15804+A2 impacts, from the results section.

To adjust for more operational energy use than one amp, you will need the result from the tables in section 'LCA Results - Maximum Impact', the chosen cable you are investigating, and your expected amperage over 40 years. The scaling factors multiplied by the results above will be the operational use results for that particular cable, multiplied by the squared amperage. For example, if you wanted to know how much 100 Amps would increase the B6 stage GWP for the example product, you would follow the equation below:

	Scaling Factor	*	Results	*	Amperage-squared	=	Final GWP
SunGen® 12 AWG 19-Wire Bare CU 2kV Black	1.30E+01	*	1.14E+01	*	100^2	=	1.48E+06

	A1 - A3							A4	A5	B6	C2 - D
	GWP	ODP	AP	EP	PCOP	FFD/ADP	Resources				
SunGen® 12 AWG 19-Wire Bare CU 2kV Black	3.63E-03	3.62E-03	2.25E-03	2.71E-03	2.72E-03	3.25E-03	3.66E-03	3.66E-03	3.66E-03	1.30E+01	3.66E-03
SunGen® 12 AWG 19-Wire Bare CU 2kV Red	3.63E-03	3.62E-03	2.25E-03	2.71E-03	2.72E-03	3.25E-03	3.66E-03	3.66E-03	3.66E-03	1.30E+01	3.66E-03
SunGen® 12 AWG 19-Wire Bare CU 2kV White	3.32E-03	3.26E-03	9.40E-03	1.13E-02	1.12E-02	7.06E-03	3.84E-03	3.84E-03	3.84E-03	1.30E+01	3.84E-03
SunGen® 12 AWG 19-Wire Tinned CU 2kV Black	3.32E-03	3.26E-03	9.41E-03	1.13E-02	1.12E-02	7.07E-03	3.84E-03	3.84E-03	3.84E-03	1.30E+01	3.84E-03
SunGen® 12 AWG 19-Wire Tinned CU 2kV Red	3.32E-03	3.26E-03	9.40E-03	1.13E-02	1.12E-02	7.06E-03	3.84E-03	3.84E-03	3.84E-03	1.30E+01	3.84E-03
SunGen® 12 AWG 19-Wire Bare CU 600V Black	2.92E-03	2.87E-03	7.51E-03	9.05E-03	8.98E-03	5.79E-03	3.32E-03	3.32E-03	3.32E-03	1.30E+01	3.32E-03
SunGen® 12 AWG 19-Wire Bare CU 600V Red	2.94E-03	2.89E-03	7.24E-03	8.73E-03	8.66E-03	5.65E-03	3.33E-03	3.33E-03	3.33E-03	1.30E+01	3.33E-03

	A1 - A3							A4	A5	B6	C2 - D
	GWP	ODP	EP	AP	PCOP	FFD/ADP	Resources				
SunGen® 10 AWG 19-Wire Bare CU 2kV Black	4.81E-03	4.81E-03	2.96E-03	3.56E-03	3.58E-03	4.30E-03	4.86E-03	4.86E-03	4.86E-03	1.50E+01	4.86E-03
SunGen® 10 AWG 19-Wire Bare CU 2kV Red	5.16E-03	5.18E-03	1.55E-02	1.87E-02	1.85E-02	1.09E-02	5.02E-03	5.02E-03	5.02E-03	1.50E+01	5.02E-03
SunGen® 10 AWG 19-Wire Bare CU 2kV White	4.38E-03	4.31E-03	1.08E-02	1.30E-02	1.29E-02	8.40E-03	4.96E-03	4.96E-03	4.96E-03	1.50E+01	4.96E-03
SunGen® 10 AWG 19-Wire Tinned CU 2kV Black	4.86E-03	4.85E-03	2.98E-03	3.59E-03	3.61E-03	4.34E-03	4.90E-03	4.90E-03	4.90E-03	1.50E+01	4.90E-03
SunGen® 10 AWG 19-Wire Tinned CU 2kV Red	5.16E-03	5.18E-03	1.52E-02	1.83E-02	1.82E-02	1.08E-02	5.03E-03	5.03E-03	5.03E-03	1.50E+01	5.03E-03
SunGen® 10 AWG 19-Wire Bare CU 600V Black	4.00E-03	3.94E-03	8.50E-03	1.02E-02	1.02E-02	6.93E-03	4.43E-03	4.43E-03	4.43E-03	1.50E+01	4.43E-03
SunGen® 10 AWG 19-Wire Bare CU 600V Red	4.53E-03	4.54E-03	1.17E-02	1.41E-02	1.40E-02	8.59E-03	4.44E-03	4.44E-03	4.44E-03	1.50E+01	4.44E-03
SunGen® 10 AWG 7-Wire Bare CU 2kV Black	5.11E-03	5.13E-03	1.59E-02	1.92E-02	1.90E-02	1.11E-02	5.00E-03	5.00E-03	5.00E-03	1.50E+01	5.00E-03
SunGen® 10 AWG 7-Wire Bare CU 2kV Red	5.13E-03	5.14E-03	1.54E-02	1.86E-02	1.84E-02	1.09E-02	4.99E-03	4.99E-03	4.99E-03	1.50E+01	4.99E-03
SunGen® 8 AWG 19-Wire Bare CU 2kV Black	6.70E-03	6.60E-03	1.51E-02	1.82E-02	1.80E-02	1.21E-02	7.49E-03	7.49E-03	7.49E-03	3.08E+01	7.49E-03
SunGen® 8 AWG 19-Wire Bare CU 2kV Red	7.68E-03	7.70E-03	2.12E-02	2.55E-02	2.53E-02	1.53E-02	7.50E-03	7.50E-03	7.50E-03	3.08E+01	7.50E-03
SunGen® 8 AWG 19-Wire Bare CU 2kV White	7.69E-03	7.71E-03	2.12E-02	2.55E-02	2.53E-02	1.53E-02	7.50E-03	7.50E-03	7.50E-03	3.08E+01	7.50E-03
SunGen® 8 AWG 19-Wire Tinned CU 2kV	6.57E-03	6.48E-03	1.43E-02	1.73E-02	1.71E-02	1.16E-02	7.31E-03	7.31E-03	7.31E-03	3.08E+01	7.31E-03
SunGen® 8 AWG 19-Wire Tinned CU 2kV Red	7.67E-03	7.69E-03	2.11E-02	2.54E-02	2.52E-02	1.52E-02	7.48E-03	7.48E-03	7.48E-03	3.08E+01	7.48E-03
SunGen® 8 AWG 7-Wire Bare CU 2kV Black	6.52E-03	6.43E-03	1.45E-02	1.74E-02	1.73E-02	1.17E-02	7.28E-03	7.28E-03	7.28E-03	3.08E+01	7.28E-03
SunGen® 8 AWG 7-Wire Bare CU 2kV Red	7.64E-03	7.66E-03	2.14E-02	2.57E-02	2.55E-02	1.53E-02	7.45E-03	7.45E-03	7.45E-03	3.08E+01	7.45E-03
SunGen® 6 AWG 19-Wire Bare CU 2kV Black	7.17E-03	7.16E-03	4.30E-03	5.18E-03	5.20E-03	6.35E-03	7.23E-03	7.23E-03	7.23E-03	1.91E+01	7.23E-03
SunGen® 6 AWG 19-Wire Bare CU 2kV Red	1.07E-02	1.08E-02	2.56E-02	3.08E-02	3.06E-02	1.93E-02	1.05E-02	1.05E-02	1.05E-02	1.91E+01	1.05E-02

Additional Environmental Information

Environmental and Health During Manufacturing

Prysmian has an established HSE Management System in place at its manufacturing sites. Site programs ensure that OSHA and environmental requirements are met or exceeded to help ensure the safety and health of all employees, contractors, and guests.

Environmental and Health During Installation

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

Extraordinary Effects

Fire

N/A

Water

N/A

Mechanical Destruction

N/A

Delayed Emissions

Global warming potential is calculated using the TRACI 2.1 and CML 4.1 impact assessment methodologies. Delayed emissions are not considered.

Environmental Activities and Certifications

Prysmian North America manufacturing sites strive to meet or exceed all applicable federal, state, and local environmental regulations. All manufacturing sites are ISO 14001:2015 Certified.

Prysmian maintains a variety of certifications based on the widely accepted industry standards:
- Quality Management System certifications (ISO9001/TL9000)
- Environmental Management System certifications (ISO14001)
- Health and Safety Management System certifications (ISO45001)

These certificates can be downloaded from our company website here: https://www.prysmian.com/en

Further Information

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References

- PCR — PEP ecopassport Program: Product Category Rules for Electrical, Electronic and HVAC-R Products, v4.0, 2021.
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Contact Information

Study Commissioner

- For more information, visit our website at
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