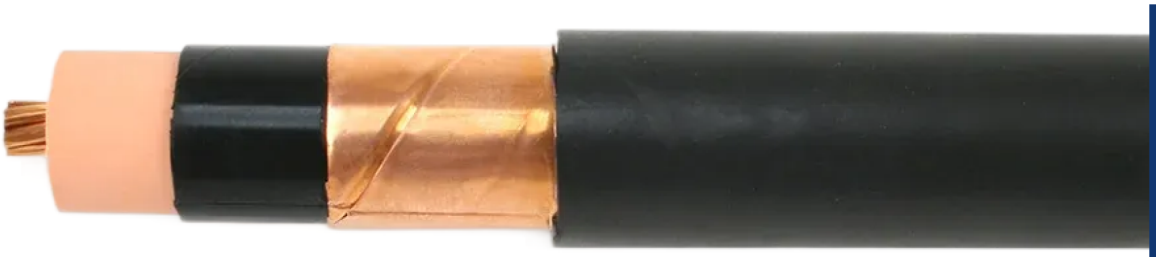
Environmental Product Declaration

IN ACCORDANCE WITH ISO 14025 AND ISO 21930

Program Operator: Smart EPD®
www.smartepd.com



SmartEPD-2025-102-0678-01

EPR / CTS / PVC Power, Type MV-105, 5kV–35kV, Silicone- and PFAS-Free Series G (Copper Conductors)

Date of Issue	Expiration date	Last updated
Dec 15, 2025	**Dec 15, 2030**	**Dec 15, 2025**

Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

General Information

LS Cable & System USA

6625 The Corners Parkway, Suite 400 Peachtree Corners, GA 30092

800-249-0014

energy.us@lscsusa.com lscsusa.com

Product Name:	EPR / CTS / PVC Power, Type MV-105, 5kV–35kV, Silicone- and PFAS-Free Series G (Copper Conductors)
Functional Unit:	1 m
Declaration Number:	SmartEPD-2025-102-0678-01
Date of Issue:	December 15, 2025
Expiration:	December 15, 2030
Last updated:	December 15, 2025
EPD Scope:	Cradle to gate with other options A1 - A3, A4, A5, C1 - C4, D
Market(s) of Applicability:	North America

General Organization Information

LS Cable & System, headquartered in Anyang, South Korea, was established in May 1962 and is a worldwide leader in medium voltage, high voltage and extra high voltage underground cable as well as low voltage and medium voltage busway. With 21 subsidiary companies throughout the world, LS has more than 60 factories, sales and production sites in 20 countries. In April 2017, the LS Group acquired the Energy Division of Superior Essex to create a subsidiary under the LS Cable & System umbrella.

Today, LS Cable & System USA is a leading US manufacturer and supplier of electrical products serving the commercial, industrial, renewable and utility markets. Product offering includes Low Voltage power cable for your industrial or utility power or station control circuits; Medium Voltage 5kV through 46kV power cable for wind and solar applications, as well as primary power and distribution circuits; busway offered in low voltage and medium voltage in full compliance with US industry standards.

Further information can be found at: https://lscsusa.com/about

Limitations, Liability, and Ownership

The EPD owner has sole ownership, liability, and responsibility for the EPD.

The environmental impact results of products in this document are based on a declared unit and therefore do not provide sufficient information to establish comparisons. The results shall not be used for comparisons without knowledge of how the physical properties of the product impact the precise function at the construction level. The environmental impact results shall be converted to a functional unit basis before any comparison is attempted.

Comparison of the environmental performance of construction products using the EPD shall consider all the relevant information modules over the full life cycle of the products within the construction works. Such a comparison requires scenarios in the construction works context. Comparisons are possible at the sub-construction works level, for example for assembled systems, components or services for one or more life cycle stages, provided they meet requirements as outline in ISO 21930 5.5. Information has been provided as transparently as possible in this project report to allow a clear understanding of the limitations of comparability.

Much of the data utilized for this EPD is based on information supplied by the manufacturer. TrueNorth Collective is not responsible for the accuracy, completeness, or reliability of the data provided by the manufacturer or any information or conclusions derived therefrom.

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building or construction works level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and

deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences in results upstream or downstream of the life cycle stages declared.

Reference Standards

Standard(s):	ISO 14025 and ISO 21930
Core PCR:	Smart EPD® Part A Product Category Rules for Building and Construction Products and Services, 1000, v1.2 Date of issue: March 14, 2025
Sub-category PCR:	Smart EPD® Part B PCR for Electrical Cables and Wires, 1000-007, v1 (adapted from EPD Norge) Date of issue: April 02, 2025 Valid until: April 02, 2028
Sub-category PCR review panel:	Contact Smart EPD for more information.
General Program Instructions:	Smart EPD General Program Instructions v.2.0, March 2025

Verification Information

LCA Author/Creator:	Cher Xue | TrueNorth Collective | info@truenorthcollective.net
EPD Program Operator:	Smart EPD | info@smartepd.com | www.smartepd.com 585 Grove St., Ste. 145, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071: External Rifat Karim | Independent Consultant | rifat.chimique@gmail.com Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External Rifat Karim | Independent Consultant | rifat.chimique@gmail.com

Product Information

Functional Unit:	1 m
Mass:	1 kg
Reference Service Life:	75 Years
Product Specificity:	✗ Product Average ✓ Product Specific

Product Description

Medium Voltage, EPR/Cu Tape Shield/PVC, Type MV-105 cable consists of fully annealed bare copper Class B stranded conductors, covered with ethylene propylene rubber (EPR), copper tape shield, and black PVC jacket. These cables are used in industrial power circuits.

Applications

- In conduit, duct, free air, and raceways, primary installations include cable trays, and outdoor locations
- In direct burial if installed in a system with a ground conductor that is in close proximity, and conforms with NEC 250.4 (A)(5)

- In wet or dry locations
- Approved for Class I, Div. 2 industrial hazardous locations per NEC
- Designed to operate continuously at a conductor temperature not exceeding:
  - 105C for normal operations
  - 140C for emergency overload
  - 250C for short circuit

Further information can be found at: https://lscsusa.com/products/mv/105

Product Specifications

Product SKU(s):

Copper Unfilled/Filled Cdr 5kV 100% I.L., 90 mils, Shielded
- G5KAEP-02CB-1CZ-T5Z-Z
- G5KAEP-01CB-1CZ-T5Z-Z
- G5KAEP-1ACB-1CZ-T5Z-Z
- G5KAEP-2ACB-1CZ-T5Z-Z
- G5KAEP-3ACB-1CZ-T5Z-Z
- G5KAEP-4ACB-1CZ-T5Z-Z
- G5KAEP-25CB-1CZ-T5Z-Z
- G5KAEP-35CB-1CZ-T5Z-Z
- G5KAEP-50CB-1CZ-T5Z-Z
- G5KAEP-75CB-1CZ-T5Z-Z
- G5KAEP-A1CB-1CZ-T5Z-Z

Copper Unfilled/Filled Cdr 5kV 133%/8kV 100% I.L., 115 mils, Shielded
- G5KBEP-02CB-1CZ-T5Z-Z
- G5KBEP-01CB-1CZ-T5Z-Z
- G5KBEP-1ACB-1CZ-T5Z-Z
- G5KBEP-2ACB-1CZ-T5Z-Z
- G5KBEP-3ACB-1CZ-T5Z-Z
- G5KBEP-4ACB-1CZ-T5Z-Z
- G5KBEP-25CB-1CZ-T5Z-Z
- G5KBEP-35CB-1CZ-T5Z-Z
- G5KBEP-50CB-1CZ-T5Z-Z
- G5KBEP-75CB-1CZ-T5Z-Z
- G5KBEP-A1CB-1CZ-T5Z-Z

Copper Unfilled/Filled Cdr 15kV 100% I.L., 175 mils, Shielded
- G15AEP-02CB-1CZ-T5Z-Z
- G15AEP-01CB-1CZ-T5Z-Z
- G15AEP-1ACB-1CZ-T5Z-Z
- G15AEP-2ACB-1CZ-T5Z-Z
- G15AEP-3ACB-1CZ-T5Z-Z
- G15AEP-4ACB-1CZ-T5Z-Z

- G15AEP-25CB-1CZ-T5Z-Z
- G15AEP-35CB-1CZ-T5Z-Z
- G15AEP-50CB-1CZ-T5Z-Z
- G15AEP-75CB-1CZ-T5Z-Z
- G15AEP-A1CB-1CZ-T5Z-Z

Copper Unfilled/Filled Cdr 15kV 133% I.L., 220 mils, Shielded

- G15BEP-02CB-1CZ-T5Z-Z
- G15BEP-01CB-1CZ-T5Z-Z
- G15BEP-1ACB-1CZ-T5Z-Z
- G15BEP-2ACB-1CZ-T5Z-Z
- G15BEP-3ACB-1CZ-T5Z-Z
- G15BEP-4ACB-1CZ-T5Z-Z
- G15BEP-25CB-1CZ-T5Z-Z
- G15BEP-35CB-1CZ-T5Z-Z
- G15BEP-50CB-1CZ-T5Z-Z
- G15BEP-75CB-1CZ-T5Z-Z
- G15BEP-A1CB-1CZ-T5Z-Z

Copper Unfilled/Filled Cdr 25kV 100% I.L., 260 mils, Shielded

- G25AEP-1ACB-1CZ-T5Z-Z
- G25AEP-2ACB-1CZ-T5Z-Z
- G25AEP-3ACB-1CZ-T5Z-Z
- G25AEP-4ACB-1CZ-T5Z-Z
- G25AEP-25CB-1CZ-T5Z-Z
- G25AEP-35CB-1CZ-T5Z-Z
- G25AEP-50CB-1CZ-T5Z-Z
- G25AEP-75CB-1CZ-T5Z-Z
- G25AEP-A1CB-1CZ-T5Z-Z

Copper Unfilled/Filled Cdr 25kV 133% I.L., 320 mils, Shielded

- G25BEP-1ACB-1CZ-T5Z-Z
- G25BEP-2ACB-1CZ-T5Z-Z
- G25BEP-3ACB-1CZ-T5Z-Z
- G25BEP-4ACB-1CZ-T5Z-Z
- G25BEP-25CB-1CZ-T5Z-Z
- G25BEP-35CB-1CZ-T5Z-Z
- G25BEP-50CB-1CZ-T5Z-Z
- G25BEP-75CB-1CZ-T5Z-Z
- G25BEP-A1CB-1CZ-T5Z-Z

Copper Unfilled/Filled Cdr 35kV 100% I.L., 345 mils, Shielded

- G35AEP-1ACB-1CZ-T5Z-Z
- G35AEP-2ACB-1CZ-T5Z-Z
- G35AEP-3ACB-1CZ-T5Z-Z
- G35AEP-4ACB-1CZ-T5Z-Z
- G35AEP-25CB-1CZ-T5Z-Z

- G35AEP-35CB-1CZ-T5Z-Z
- G35AEP-50CB-1CZ-T5Z-Z
- G35AEP-75CB-1CZ-T5Z-Z
- G35AEP-A1CB-1CZ-T5Z-Z

Copper Unfilled/Filled Cdr 35kV 133% I.L., 420 mils, Shielded

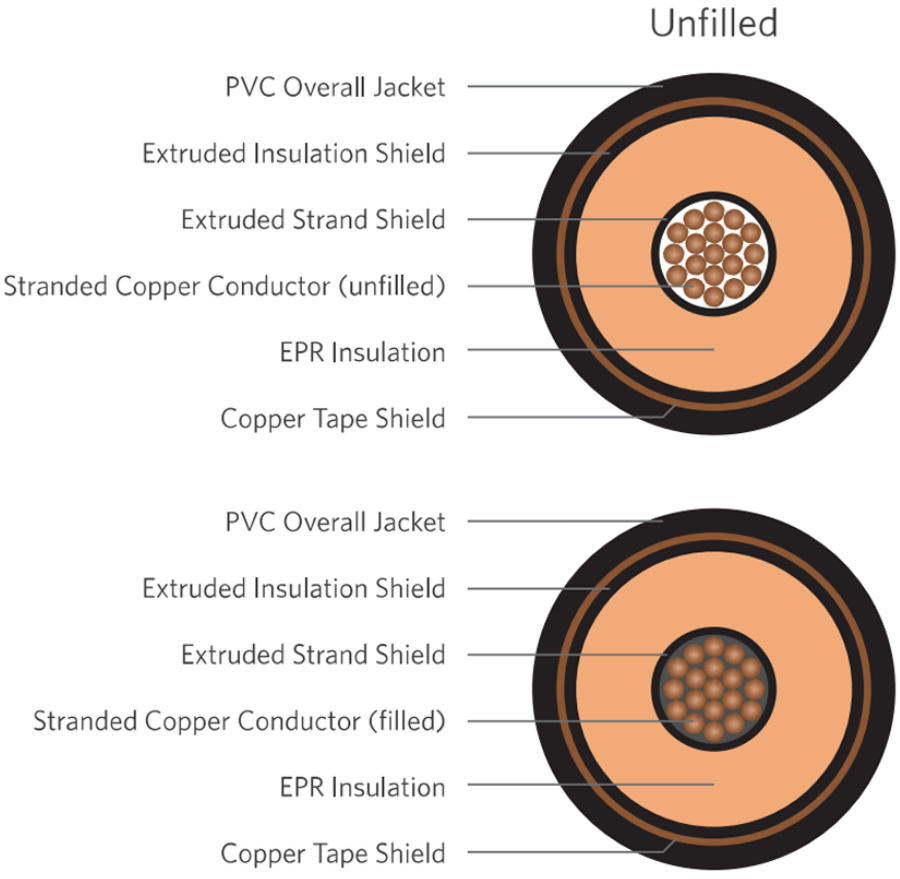
- G35BEP-1ACB-1CZ-T5Z-Z
- G35BEP-2ACB-1CZ-T5Z-Z
- G35BEP-3ACB-1CZ-T5Z-Z
- G35BEP-4ACB-1CZ-T5Z-Z
- G35BEP-25CB-1CZ-T5Z-Z
- G35BEP-35CB-1CZ-T5Z-Z
- G35BEP-50CB-1CZ-T5Z-Z
- G35BEP-75CB-1CZ-T5Z-Z
- G35BEP-A1CB-1CZ-T5Z-Z

Product Classification Codes:

Masterformat - 26 05 19

EC3 - ElectricalTransmissionAndDistributionEquipment -> PowerCabling

Product Composition Diagram



Material Composition

Material/Component Category	Origin	% Mass
Black PVC Jacketing	USA	10 to 18

Copper Tape Shielding	USA	4 to 12
Ethylene Propylene Rubber (EPR)	USA	25 to 26
Copper Conductor	USA	43 to 62

Packaging Material	Origin	kg Mass
Wooden Reel	USA	0.139

Biogenic Carbon Content	kg C per m
Biogenic carbon content in product	None
Biogenic carbon content in accompanying packaging	0.069

Hazardous Materials
No regulated hazardous or dangerous substances are included in this product.

EPD Data Specificity

Primary Data Year: 2024

Manufacturing Specificity:

- ✗ Industry Average
- ✗ Manufacturer Average
- ✓ Facility Specific

Averaging:

Averaging of was not conducted for publishing product specific EPD results. Product specific saling factor tables were provided to extrapolate of environmental impacts to any standard cable length using the product's weight per meter and the normalized impact at 1 kg per declared unit.

This study covers all products included in the product family EPR / CTS / PVC Power, Type MV-105, 5kV35kV, Silicone- and PFAS-Free Series G (Copper Conductors). To establish normalized impacts per declared unit, two representative productsthe smallest and largest sizes from the product familywere modeled in detail. Based on these results, scaling factor tables were developed to enable straightforward extrapolation of environmental impacts to any standard cable length using the product's weight per meter.

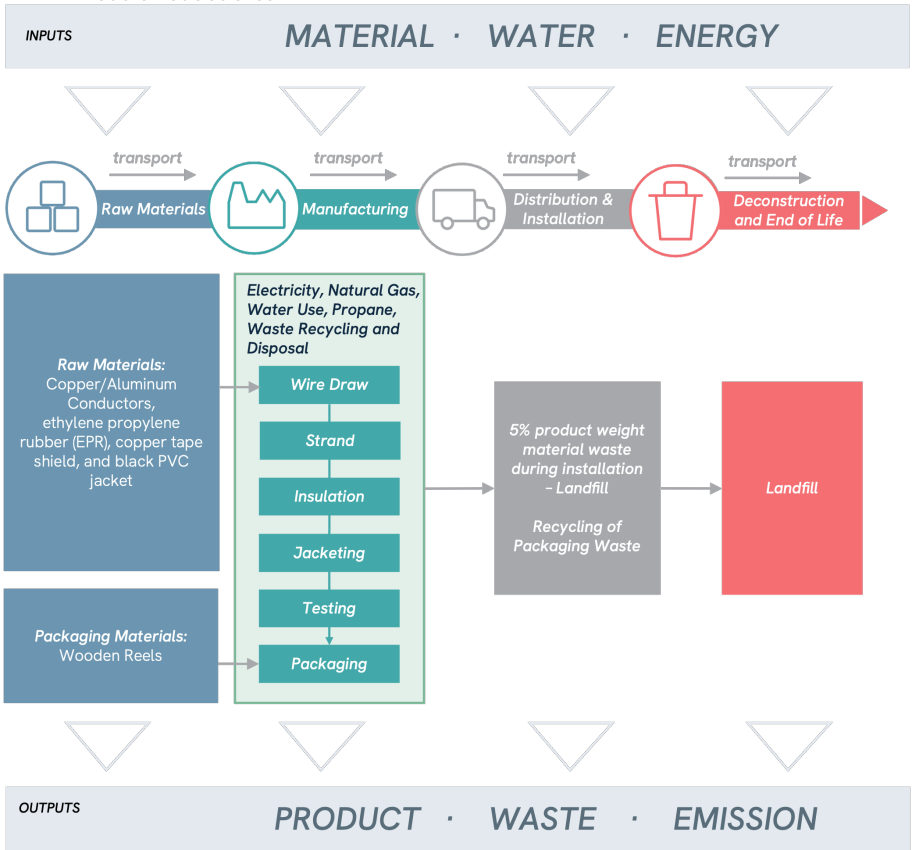
System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓

Use	B1	Use	ND
	B2	Maintenance	ND
	B3	Repair	ND
	B4	Replacement	ND
	B5	Refurbishment	ND
	B6	Operational Energy Use	ND
	B7	Operational Water Use	ND
End of Life	C1	Deconstruction	✓
	C2	Transport	✓
	C3	Waste Processing	✓
	C4	Disposal	✓
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	✓

Note:

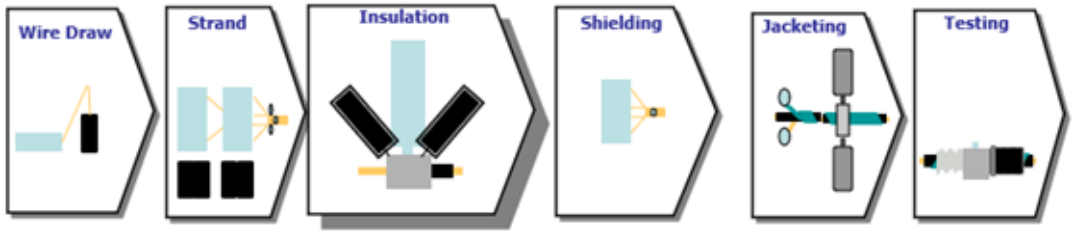
ND = Module not declared



Plants

LS Cable (Cable Manufacturing Facilities)
2801 Anaconda Road, Tarboro, NC, USA

Product Flow Diagram



Medium-voltage cables manufactured by LS Cable & System USA at the Tarboro, NC facility are produced through a series of wire drawing, stranding, insulating, shielding, and jacketing operations. The aluminum or copper conductor is first drawn and stranded to the specified gauge. The conductor is then covered with EPR insulation, conductor and insulation shielding, a copper tape shield, and finally a PVC outer jacket.

All products are manufactured at the LS Cable & System USA facility in Tarboro, NC. This facility also manufactures other products that are excluded from this study. But the manufacturing processes are essentially the same. Most plant inputs and outputs were assigned across total production volume (including out-of-scope products) using mass-based allocation. Subdivision for product and packaging raw material inputs and scrap amounts was made possible through product bills of materials (BOMs). Once the product has been manufactured, the medium voltage cables are packaged and shipped directly to the end customer.

Software and Database

LCA Software:	SimaPro v. 10.2		
LCI Foreground Database(s):	Ecoinvent v. 3.11	RoW	Cut-Off by Classification
LCI Background Database(s):	Ecoinvent v. 3.11	RoW	Cut-Off by Classification

A foreground LCI database is the database used to model the primary, site-specific data collected for this EPD. A background LCI database is the database used to model generic or non-specific data.

Data Quality

Temporal, Geographic, and Technological Coverage
Primary data are collected for medium voltage cable manufactured by LS Cable & System in its facility in Tarboro, NC for calendar year 2024, and associated LS Cable & System USA's value chain. No additional requirements for technology coverage.

Precision and Completeness
Foreground data were sourced from primary information provided by the client and has been reviewed internally to ensure precision and completeness. In order to balance out seasonal variations, operations data over a 12-month period, corresponding to the 2024 calendar year, was used to represent production activities. All products in scope are manufactured in the same facility and share the same manufacturing processes. Manufacturing input and output were assigned across total production volume using mass-based allocation. Subdivision for product and packaging raw material inputs and scrap amounts was made possible through product

bills of materials (BOMs). In addition, key model inputs such as mass balance, energy balance and emission inventory were reviewed by the Parallel and TrueNorth Collective teams.

Ecoinvent v3.11 was used as the database for background data. This version was published in 2024 and the chosen datasets encompass data collection periods ending no earlier than 2022. Ecoinvent is widely used in research and industry to support life cycle assessment practices. Each version of this database goes through thorough review process and documentation of precision and completeness is available by the provider.

Exceptions
There were no exceptions in inclusion of value-add activities. Process-specific inputs such as extrusion additives, cooling water treatment chemicals, or lubricants were not individually metered; their contributions are expected to be < 1 % of total mass and energy and therefore are considered immaterial. No other known flows are excluded from the study.

Consistency and Reproducibility
Primary data were collected at the same level of granularity and from existing sources that are reported annually, so the consistency is assumed to be high. All input and output information, modelling assumptions and dataset choices are provided in this report for the purpose of reproducibility.

Representativeness
The representativeness of the datasets is chosen to be representative of North America, average technologies of the major producers and distributors and are of recent and modern vintage.

Data Sources

Material/Process Category	Module	Material/Process Name	Inventory Dataset Name	Dataset Geographic Region	Reporting Period/Year Dataset Represents	Reference	Amount (if relevant)	Unit
Raw Materials	A1	Copper	Copper, cathode {GLO}| market for copper, cathode | Cut-off, U	GLO	2024/2025	EI 3.11	ND	ND
Raw Materials	A1	Silver	Silver {GLO}| market for silver | Cut-off, U	GLO	2024/2025	EI 3.11	ND	ND
Raw Materials Transportation	A2	Truck	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 {RoW}| transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 | Cut-off, U	RoW	2024/2025	EI 3.11	ND	ND
Manufacturing	A3	Electricity	Electricity, medium voltage {US-SERC}| market for electricity, medium voltage | Cut-off, U	US-SERC	2024/2025	EI 3.11	ND	ND
Product Distribution	A4	Truck	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 {RoW}| transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 | Cut-off, U	RoW	2024/2025	EI 3.11	ND	ND
Installation	A5	Copper	Copper, cathode {GLO}| market for copper, cathode | Cut-off, U	GLO	2024/2025	EI 3.11	ND	ND
Installation	A5	Silver	Silver {GLO}| market for silver | Cut-off, U	GLO	2024/2025	EI 3.11	ND	ND
Installation	A5	Electricity	Electricity, medium voltage {US-SERC}| market for electricity, medium voltage | Cut-off, U	US-SERC	2024/2025	EI 3.11	ND	ND
End-of-Life Transportation	C2	Truck	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 {RoW}| transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 | Cut-off, U	RoW	2024/2025	EI 3.11	ND	ND
Disposal	C4	Landfill	Municipal solid waste {RoW}| treatment of municipal solid waste, sanitary landfill | Cut-off, U	RoW	2024/2025	EI 3.11	ND	ND
Potential Loads and Benefits Beyond the System	Module D	Copper Recycling Burden	Copper, cathode {RoW}| treatment of copper scrap by electrolytic refining | Cut-off, U	RoW	2024/2025	EI 3.11	ND	ND
Potential Loads and Benefits Beyond the System	Module D	Aluminum Recycling Burden	Aluminium, cast alloy {RoW}| treatment of aluminium scrap, new, at refiner | Cut-off, U	RoW	2024/2025	EI 3.11	ND	ND
Potential Loads and Benefits Beyond the System	Module D	Aluminum Substitution	Aluminium, primary, ingot {CA}| aluminium production, primary, ingot | Cut-off, U	CA	2024/2025	EI 3.11	ND	ND
Potential Loads and Benefits Beyond the System	Module D	Copper Substitution	Copper, cathode {GLO}| electrorefining of copper, anode | Cut-off, U	RoW	2024/2025	EI 3.11	ND	ND

Life Cycle Module Descriptions

A cradle-to-gate with options (cradle-to-construction and end-of-life) system boundary was adopted for the study. The minimum system boundary per the PCR is cradle-to-gate with modules A1-A3, covering supplied raw materials and associated energy, water, and transport required for the raw materials (A1), transport from suppliers to LS Cable & System USA (A2), and production of manufactured products (which includes associated energy purchases, processing chemicals, ancillary materials, and water) and the associated packaging and transport (A3). Transportation of medium voltage to customer (A4) and Installation (A5) are also included. The installation in module A5 include waste treatment of packaging and wastage of material during installation (5% loss). The energy use and surface treatment products are minimal and excluded from the study. Additionally, the end-of-life stage shall be declared, encompassing modules C1 (deconstruction), C2 (transport), C3 (waste processing), and C4 (disposal). Module D must also be declared, specifying potential loads and benefits of secondary material, secondary fuel or recovered energy leaving the product system based on scenarios.

LCA Discussion

Allocation Procedure

Allocation of secondary data taken from ecoinvent v3.11 cut-off by classification has allocation applied to it.

All products included in the study are manufactured at the LS Cable & System USA facility in Tarboro, NC. This facility also manufactures other products that are excluded from this study, but the manufacturing processes are essentially the same. Most plant inputs and outputs were assigned across total production volume (including out-of-scope products) using mass-based allocation. Subdivision for product and packaging raw material inputs and scrap amounts was made possible through product bills of materials (BOMs).

This study uses the cut-off method for recycling. According to this approach, the first life of a material bears the environmental burdens of its production (e.g., raw material extraction and processing) and the second life (e.g., scrap input) bears the burdens of refurbishment (e.g., collection and refining of scrap). The burdens from waste treatment are taken on by the next life of the product and potential benefits and loads related to recovered materials crossing the system boundary are addressed in Module D.

Given that raw materials are key contributors to environmental performance, mass-based allocation of plant utility consumption, resource use and waste generation was applied for the facility, where all products in this study are manufactured.

Cut-off Procedure

For the processes within the system boundary, all energy and material flows were included in the model. Process-specific inputs such as extrusion additives, cooling water treatment chemicals, or lubricants were not individually metered; their contributions are expected to be < 1 % of total mass and energy and therefore are considered immaterial. No other known flows were excluded. All upstream and downstream activities were included using a combination of primary and secondary data. While most inventory data were sourced from primary resources, representative proxies were used to close gaps in the absence of primary data.

Renewable Electricity

Energy Attribute Certificates (EACs) such as Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) are included in the baseline reported results:	✕ No

Scenarios

Transport to the building/construction site (A4)

A4 Module

Fuel Type:	Diesel
Liters of Fuel:	27.9 l/100km
Vehicle Type:	Diesel Truck 16-32t
Transport Distance:	1263 km
Capacity Utilization:	37 %
Packaging Mass:	0.139 kg
Gross density of products transported:	1000 kg/m3
Weight of products transported:	1 kg
Capacity utilization volume factor:	<1
Assumptions for scenario development:	Primary data of distribution amount by location for medium voltage cable are collected for 2024. A weighted average transportation distance is calculated. All products are shipped by truck.

Installation in to the building/construction site (A5)

A5 Module

Installation Scrap Rate Assumed:	5 %
Ancillary Materials:	0 kg
Net Fresh Water Consumption Specified by Water Source and Fate:	0 m3
Other Resources:	0 kg
Electricity Consumption:	0 kWh
Other Energy Carriers:	0 MJ
Product Lost per Declared/Functional Unit:	0.05 kg
Waste Materials at the Construction Site Before Waste Processing:	0.189 kg
Output Materials Resulting from On-site Waste Processing:	0.189 kg
Mass of Packaging Waste Specified by Type:	0.139 kg
Biogenic Carbon Contained in Packaging (kg C):	0.069 kg
Direct Emissions to Ambient Air, Soil and Water:	0 kg
VOC Emissions:	0 ug/m3
Assumptions for scenario development:	The installation in module includes waste treatment of packaging and wastage of material during installation. The material waste at the construction site is set to 5% by product weight according to the specified PCR Part B. It is assumed all wastes are transported to a waste treatment facility with an average of 50 km by truck. The energy use and surface treatment products are minimal and excluded from the study. Packaging is assumed to be recycled, and biogenic carbon emissions of packaging disposal emissions are accounted for in module D per guidance from ACLCA (ACLCA, 2019).

End of Life (C1 - C4)

C1 - C4 Modules

Collection Process

Collected Separately:	0 kg
Collected with Mixed Construction Waste:	1 kg

Recovery

Landfill:	1 kg

Disposal

Product or Material for Final Disposal:	1 kg

Assumptions for scenario development:

For all cable types, it was assumed that deconstruction (C1) requires only human labor and did not contribute to lifetime environmental impacts. Transport to landfill (C2) was assumed to be 50km from the point of deconstruction by truck and tare no waste processing (C3) impacts.

Although the products are technically recyclable, this study assumes that they are landfilled at the end of their life. Because the cables are installed in long-term applications (≥40 years, with an RSL of up to 75 years), only a very small proportion is expected to reach recycling or disposal in any given year. If the cables are disposed of, the metal components and PVC jacket are fully recyclable. However, the three-layer EPR/semicon insulation system is much more difficult to recycle because it is a thermoset material that cannot be re-melted like thermoplastics. Thermoset insulation can only be downcycled—for example, ground and used as filler or aggregate—which is not commonly practiced. As a result, most of the three-layer insulation system that is removed from service is expected to be landfilled and are classified as non-hazardous waste.

Reuse, Recovery and / or Recycling Potentials & Relevant Scenario Information (D)

D Module

Recycling Rate of Product:	0 %
Recycled Content of Product:	11 %
Further assumptions for scenario development:	In the medium voltage cable product systems studied in this project, no secondary fuel or recovered energy are produced. Secondary materials may be integrated in the product (A1). On the other hand, materials for recycle may be generated during manufacturing (A3). As the products are assumed to be landfill, there's no recyclable amount calculated for product end of life. The net inventories were calculated as follows: 1.A1 – secondary material included in the background dataset from ecoinvent for the following raw materials are calculated based on material flow: a. 19.7% scrap input based on the proxy 'Copper, cathode {GLO}| market for copper, cathode | Cut-off, U' b.0% scrap input based on 'Aluminium, primary, ingot {CA}| aluminium production, primary, ingot | Cut-off, U' 2.A3 – Copper and Aluminum scrap from manufacturing and sent for recycle are all fully recovered.

Results

Environmental Impact Assessment Results

IPCC AR6 GWP 100, TRACI 2.1

per 1 m of product .

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Method	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
GWP-total	IPCC AR6 GWP 100	kg CO2 eq	1.64e+1	2.53e-1	8.20e-1	ND	9.52e-3	ND	5.13e-1	-6.28e-1
GWP-fossil	IPCC AR6 GWP 100	kg CO2 eq	1.62e+1	2.53e-1	8.14e-1	ND	9.51e-3	ND	4.32e-2	-6.19e-1
GWP-biogenic	IPCC AR6 GWP 100	kg CO2 eq	1.07e-1	5.79e-5	5.33e-3	ND	2.18e-6	ND	4.70e-1	-1.03e-3
GWP-luluc	IPCC AR6 GWP 100	kg CO2 eq	2.47e-2	1.15e-4	1.23e-3	ND	4.32e-6	ND	1.04e-5	-7.92e-3
ODP	TRACI 2.1	kg CFC 11 eq	4.44e-7	3.84e-9	2.22e-8	ND	1.44e-10	ND	3.03e-10	-8.10e-9
AP	TRACI 2.1	kg SO2 eq	4.50e-1	9.71e-4	2.25e-2	ND	3.65e-5	ND	1.32e-4	-3.36e-2
EP	TRACI 2.1	kg N eq	4.48e-1	3.59e-4	2.24e-2	ND	1.35e-5	ND	1.93e-2	-1.63e-2
POCP	TRACI 2.1	kg O3 eq	2.89e+0	2.40e-2	1.44e-1	ND	9.01e-4	ND	1.98e-3	-9.72e-2

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

All results have been normalized to a product with a length of 1 meter and a mass of 1 kg. This normalization is applied consistently across all reporting modules and impact categories. The purpose of this approach is to allow SKU-specific results to be derived by multiplying the normalized impacts by the corresponding scaling factor, defined as the product's weight (kg) per meter. Because the normalization is set at 1 kg per 1 meter, the results expressed per functional unit (1 meter) and per declared unit (1 kg) are numerically identical. Therefore, reporting two separate sets of results would be redundant and may cause confusion, as the values would not differ.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted.
Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Resource Use Indicators

per 1 m of product .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
RPRE	MJ	3.42e+1	4.90e-2	1.71e+0	ND	1.84e-3	ND	5.55e-3	-5.00e+0
RPRM	MJ	2.20e+0	0	1.10e-1	ND	0	ND	0	0
RPRT	MJ	3.64e+1	4.90e-2	1.82e+0	ND	1.84e-3	ND	5.55e-3	-5.00e+0
NRPRE	MJ	2.38e+2	3.75e+0	1.19e+1	ND	1.41e-1	ND	2.76e-1	-7.36e+0
NRPRM	MJ	1.76e+1	0	8.79e-1	ND	0	ND	0	0
NRPRT	MJ	2.55e+2	3.75e+0	1.28e+1	ND	1.41e-1	ND	2.76e-1	-7.36e+0
ADP-fossil	MJ	2.09e+1	4.53e-1	1.05e+0	ND	1.70e-2	ND	3.33e-2	-6.31e-1
SM	kg	1.57e-1	0	7.85e-3	ND	0	ND	0	0
RSF	MJ	0	0	0	ND	0	ND	0	0
NRSF	MJ	0	0	0	ND	0	ND	0	0
FW	m3	2.59e-1	4.95e-4	1.30e-2	ND	1.86e-5	ND	-3.58e-3	-3.29e-2
RE	MJ	0	0	0	ND	0	ND	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 m of product .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	0	0	0	ND	0	ND	0	0
NHWD	kg	1.24e-1	0	1.95e-1	ND	0	ND	9.50e-1	0
HLRW	kg	0	0	0	ND	0	ND	0	0
ILLRW	kg	0	0	0	ND	0	ND	0	0
CRU	kg	0	0	0	ND	0	ND	0	0
MFR	kg	2.58e-1	0	2.91e-1	ND	0	ND	0	0
MER	kg	0	0	0	ND	0	ND	0	0
EEE	MJ	0	0	0	ND	0	ND	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Impact Scaling Factors

Part Number	Conductor Size AWG/kcmil	Nom. Conductor Diameter (in) / (mm)	Insulation Diameter (in) / (mm)	Jacket Thickness (in) / (mm)	Approx Overall Diameter (in / (mm))	Scaling Factor Approx Net Weight kg/m
G5KAEP-02CB-1CZ-T5Z-Z	2	0.28 / 7.19	0.52 / 13.21	0.06 / 1.52	0.73 / 18.54	0.640
G5KAEP-01CB-1CZ-T5Z-Z	1	0.32 / 8.18	0.56 / 14.22	0.06 / 1.52	0.77 / 19.56	0.744
G5KAEP-1ACB-1CZ-T5Z-Z	1/0	0.36 / 9.19	0.60 / 15.24	0.06 / 1.52	0.81 / 20.57	0.871
G5KAEP-2ACB-1CZ-T5Z-Z	2/0	0.41 / 10.29	0.65 / 16.51	0.06 / 1.52	0.86 / 21.84	1.019
G5KAEP-3ACB-1CZ-T5Z-Z	3/0	0.46 / 11.58	0.70 / 17.78	0.08 / 1.91	0.94 / 23.88	1.250
G5KAEP-4ACB-1CZ-T5Z-Z	4/0	0.51 / 13.00	0.76 / 19.30	0.08 / 1.91	1.00 / 25.40	1.481
G5KAEP-25CB-1CZ-T5Z-Z	250	0.56 / 14.17	0.81 / 20.57	0.08 / 1.91	1.05 / 26.67	1.697
G5KAEP-35CB-1CZ-T5Z-Z	350	0.66 / 16.79	0.92 / 23.37	0.08 / 1.91	1.16 / 29.46	2.225
G5KAEP-50CB-1CZ-T5Z-Z	500	0.79 / 20.04	1.05 / 26.67	0.08 / 1.91	1.29 / 32.77	2.984

G5KAEP-75CB-1CZ-T5Z-Z	750	0.97 / 24.59	1.24 / 31.50	0.08 / 1.91	1.48 / 37.59	4.256
G5KAEP-A1CB-1CZ-T5Z-Z	1000	1.12 / 28.37	1.39 / 35.31	0.08 / 1.91	1.63 / 41.40	5.484
G5KBEP-02CB-1CZ-T5Z-Z	2	0.28 / 7.19	0.57 / 14.48	0.06 / 1.52	0.78 / 19.81	0.692
G5KBEP-01CB-1CZ-T5Z-Z	1	0.32 / 8.18	0.61 / 15.49	0.06 / 1.52	0.82 / 20.83	0.796
G5KBEP-1ACB-1CZ-T5Z-Z	1/0	0.36 / 9.19	0.65 / 16.51	0.06 / 1.52	0.87 / 22.10	0.923
G5KBEP-2ACB-1CZ-T5Z-Z	2/0	0.41 / 10.29	0.70 / 17.78	0.08 / 1.91	0.94 / 23.88	1.116
G5KBEP-3ACB-1CZ-T5Z-Z	3/0	0.46 / 11.58	0.75 / 19.05	0.08 / 1.91	0.99 / 25.15	1.310
G5KBEP-4ACB-1CZ-T5Z-Z	4/0	0.51 / 13.00	0.81 / 20.57	0.08 / 1.91	1.05 / 26.67	1.548
G5KBEP-25CB-1CZ-T5Z-Z	250	0.56 / 14.17	0.86 / 21.84	0.08 / 1.91	1.10 / 27.94	1.771
G5KBEP-35CB-1CZ-T5Z-Z	350	0.66 / 16.79	0.97 / 24.64	0.08 / 1.91	1.21 / 30.73	2.299
G5KBEP-50CB-1CZ-T5Z-Z	500	0.79 / 20.04	1.10 / 27.94	0.08 / 1.91	1.34 / 34.04	3.066
G5KBEP-75CB-1CZ-T5Z-Z	750	0.97 / 24.59	1.29 / 32.77	0.08 / 1.91	1.53 / 38.86	4.345
G5KBEP-A1CB-1CZ-T5Z-Z	1000	1.12 / 28.37	1.44 / 36.58	0.08 / 1.91	1.69 / 42.93	5.588
G15AEP-02CB-1CZ-T5Z-Z	2	0.28 / 7.19	0.69 / 17.53	0.06 / 1.52	0.90 / 22.86	0.811
G15AEP-01CB-1CZ-T5Z-Z	1	0.32 / 8.18	0.73 / 18.54	0.08 / 1.91	0.97 / 24.64	0.960
G15AEP-1ACB-1CZ-T5Z-Z	1/0	0.36 / 9.19	0.77 / 19.56	0.08 / 1.91	1.01 / 25.65	1.094
G15AEP-2ACB-1CZ-T5Z-Z	2/0	0.41 / 10.29	0.81 / 20.57	0.08 / 1.91	1.05 / 26.67	1.257
G15AEP-3ACB-1CZ-T5Z-Z	3/0	0.46 / 11.58	0.86 / 21.84	0.08 / 1.91	1.10 / 27.94	1.458
G15AEP-4ACB-1CZ-T5Z-Z	4/0	0.51 / 13.00	0.92 / 23.37	0.08 / 1.91	1.16 / 29.46	1.704
G15AEP-25CB-1CZ-T5Z-Z	250	0.56 / 14.17	0.98 / 24.89	0.08 / 1.91	1.22 / 30.99	1.927
G15AEP-35CB-1CZ-T5Z-Z	350	0.66 / 16.79	1.08 / 27.43	0.08 / 1.91	1.32 / 33.53	2.470
G15AEP-50CB-1CZ-T5Z-Z	500	0.79 / 20.04	1.21 / 30.73	0.08 / 1.91	1.45 / 36.83	3.259
G15AEP-75CB-1CZ-T5Z-Z	750	0.97 / 24.59	1.40 / 35.56	0.08 / 1.91	1.65 / 41.91	4.561
G15AEP-A1CB-1CZ-T5Z-Z	1000	1.12 / 28.37	1.56 / 39.62	0.11 / 2.67	1.87 / 47.50	5.990
G15BEP-02CB-1CZ-T5Z-Z	2	0.28 / 7.19	0.78 / 19.81	0.08 / 1.91	1.02 / 25.91	0.960
G15BEP-01CB-1CZ-T5Z-Z	1	0.32 / 8.18	0.82 / 20.83	0.08 / 1.91	1.06 / 26.92	1.079
G15BEP-1ACB-1CZ-T5Z-Z	1/0	0.36 / 9.19	0.86 / 21.84	0.08 / 1.91	1.10 / 27.94	1.213
G15BEP-2ACB-1CZ-T5Z-Z	2/0	0.41 / 10.29	0.90 / 22.86	0.08 / 1.91	1.14 / 28.96	1.384
G15BEP-3ACB-1CZ-T5Z-Z	3/0	0.46 / 11.58	0.96 / 24.38	0.08 / 1.91	1.20 / 30.48	1.592
G15BEP-4ACB-1CZ-T5Z-Z	4/0	0.51 / 13.00	1.01 / 25.65	0.08 / 1.91	1.25 / 31.75	1.838
G15BEP-25CB-1CZ-T5Z-Z	250	0.56 / 14.17	1.07 / 27.18	0.08 / 1.91	1.31 / 33.27	2.076
G15BEP-35CB-1CZ-T5Z-Z	350	0.66 / 16.79	1.17 / 29.72	0.08 / 1.91	1.42 / 36.07	2.627
G15BEP-50CB-1CZ-T5Z-Z	500	0.79 / 20.04	1.30 / 33.02	0.08 / 1.91	1.55 / 39.37	3.430
G15BEP-75CB-1CZ-T5Z-Z	750	0.97 / 24.59	1.50 / 38.10	0.08 / 1.91	1.74 / 44.20	4.747
G15BEP-A1CB-1CZ-T5Z-Z	1000	1.12 / 28.37	1.65 / 41.91	0.11 / 2.67	1.96 / 49.78	6.198
G25AEP-1ACB-1CZ-T5Z-Z	1/0	0.36 / 9.19	0.94 / 23.88	0.08 / 1.91	1.18 / 29.97	1.332
G25AEP-2ACB-1CZ-T5Z-Z	2/0	0.41 / 10.29	0.99 / 25.15	0.08 / 1.91	1.23 / 31.24	1.503
G25AEP-3ACB-1CZ-T5Z-Z	3/0	0.46 / 11.58	1.04 / 26.42	0.08 / 1.91	1.28 / 32.51	1.711
G25AEP-4ACB-1CZ-T5Z-Z	4/0	0.51 / 13.00	1.09 / 27.69	0.08 / 1.91	1.34 / 34.04	1.972
G25AEP-25CB-1CZ-T5Z-Z	250	0.56 / 14.17	1.15 / 29.21	0.08 / 1.91	1.39 / 35.31	2.210
G25AEP-35CB-1CZ-T5Z-Z	350	0.66 / 16.79	1.26 / 32.00	0.08 / 1.91	1.50 / 38.10	2.768
G25AEP-50CB-1CZ-T5Z-Z	500	0.79 / 20.04	1.39 / 35.31	0.08 / 1.91	1.63 / 41.40	3.586
G25AEP-75CB-1CZ-T5Z-Z	750	0.97 / 24.59	1.58 / 40.13	0.11 / 2.67	1.89 / 48.01	5.090
G25AEP-A1CB-1CZ-T5Z-Z	1000	1.12 / 28.37	1.73 / 43.94	0.11 / 2.67	2.04 / 51.82	6.392
G25BEP-1ACB-1CZ-T5Z-Z	1/0	0.36 / 9.19	1.06 / 26.92	0.08 / 1.91	1.31 / 33.27	1.518
G25BEP-2ACB-1CZ-T5Z-Z	2/0	0.41 / 10.29	1.11 / 28.19	0.08 / 1.91	1.35 / 34.29	1.697
G25BEP-3ACB-1CZ-T5Z-Z	3/0	0.46 / 11.58	1.16 / 29.46	0.08 / 1.91	1.40 / 35.56	1.912
G25BEP-4ACB-1CZ-T5Z-Z	4/0	0.51 / 13.00	1.22 / 30.99	0.08 / 1.91	1.46 / 37.08	2.180
G25BEP-25CB-1CZ-T5Z-Z	250	0.56 / 14.17	1.27 / 32.26	0.08 / 1.91	1.51 / 38.35	2.426
G25BEP-35CB-1CZ-T5Z-Z	350	0.66 / 16.79	1.38 / 35.05	0.08 / 1.91	1.62 / 41.15	2.999
G25BEP-50CB-1CZ-T5Z-Z	500	0.79 / 20.04	1.51 / 38.35	0.08 / 1.91	1.75 / 44.45	3.832
G25BEP-75CB-1CZ-T5Z-Z	750	0.97 / 24.59	1.70 / 43.18	0.11 / 2.67	2.01 / 51.05	5.380
G25BEP-A1CB-1CZ-T5Z-Z	1000	1.12 / 28.37	1.85 / 46.99	0.11 / 2.67	2.16 / 54.86	6.704
G35AEP-1ACB-1CZ-T5Z-Z	1/0	0.36 / 9.19	1.12 / 28.45	0.08 / 1.91	1.36 / 34.54	1.600
G35AEP-2ACB-1CZ-T5Z-Z	2/0	0.41 / 10.29	1.16 / 29.46	0.08 / 1.91	1.40 / 35.56	1.786
G35AEP-3ACB-1CZ-T5Z-Z	3/0	0.46 / 11.58	1.21 / 30.73	0.08 / 1.91	1.45 / 36.83	2.002
G35AEP-4ACB-1CZ-T5Z-Z	4/0	0.51 / 13.00	1.27 / 32.26	0.08 / 1.91	1.51 / 38.35	2.269
G35AEP-25CB-1CZ-T5Z-Z	250	0.56 / 14.17	1.32 / 33.53	0.08 / 1.91	1.57 / 39.88	2.522
G35AEP-35CB-1CZ-T5Z-Z	350	0.66 / 16.79	1.43 / 36.32	0.08 / 1.91	1.67 / 42.42	3.103
G35AEP-50CB-1CZ-T5Z-Z	500	0.79 / 20.04	1.56 / 39.62	0.11 / 2.67	1.87 / 47.50	4.107
G35AEP-75CB-1CZ-T5Z-Z	750	0.97 / 24.59	1.75 / 44.45	0.11 / 2.67	2.06 / 52.32	5.499
G35AEP-A1CB-1CZ-T5Z-Z	1000	1.12 / 28.37	1.91 / 48.51	0.11 / 2.67	2.22 / 56.39	6.838
G35BEP-1ACB-1CZ-T5Z-Z	1/0	0.36 / 9.19	1.27 / 32.26	0.08 / 1.91	1.51 / 38.35	1.868

G35BEP-2ACB-1CZ-T5Z-Z	2/0	0.41 / 10.29	1.31 / 33.27	0.08 / 1.91	1.55 / 39.37	2.054
G35BEP-3ACB-1CZ-T5Z-Z	3/0	0.46 / 11.58	1.37 / 34.80	0.08 / 1.91	1.61 / 40.89	2.284
G35BEP-4ACB-1CZ-T5Z-Z	4/0	0.51 / 13.00	1.42 / 36.07	0.08 / 1.91	1.66 / 42.16	2.567
G35BEP-25CB-1CZ-T5Z-Z	250	0.56 / 14.17	1.48 / 37.59	0.08 / 1.91	1.72 / 43.69	2.820
G35BEP-35CB-1CZ-T5Z-Z	350	0.66 / 16.79	1.58 / 40.13	0.11 / 2.67	1.89 / 48.01	3.594
G35BEP-50CB-1CZ-T5Z-Z	500	0.79 / 20.04	1.71 / 43.43	0.11 / 2.67	2.02 / 51.31	4.464
G35BEP-75CB-1CZ-T5Z-Z	750	0.97 / 24.59	1.91 / 48.51	0.11 / 2.67	2.22 / 56.39	5.893
G35BEP-A1CB-1CZ-T5Z-Z	1000	1.12 / 28.37	2.06 / 52.32	0.11 / 2.67	2.40 / 60.96	7.344

To allow application-specific contexts, declared unit scaling factors to common cable weight per meter are provided below. The following formula can then be used to translate the impact associated with 1 kg per meter of cable to the impact per meter of cable with specific weight:
Medium Voltage cable product specific Impact per meter = Scaling factor (kg per meter) x Normalized impact at 1 kg per meter

Interpretation

Copper is the largest contributor to overall impacts, driven by its use in both the conductor and the copper tape shield. Opportunities for improvement include optimizing conductor design, reducing the copper tape shield thickness, or evaluating alternative shielding materials where technically feasible. LS Cable & System USA may also consider sourcing copper with higher secondary (recycled) content, provided the material meets electrical-grade purity requirements.

In addition, the polymer layers (EPR insulation, semiconducting shields, and PVC jacket) represent another major source of impactsparticularly under the assumption of landfilling. While the metal components and PVC jacket are technically recyclable, the three-layer EPR/semicon insulation system is far more difficult to recycle because it is a thermoset material that cannot be re-melted like thermoplastics. Due to the lack of available product end-of-life data, this study conservatively assumes that 100% of the product is landfilled. Future studies could evaluate recycling or recovery options to reduce end-of-life burdens and improve circularity.

Improvements in A3 manufacturing impacts may be achieved by reducing scrap rates, enhancing extrusion and handling efficiency, upgrading to energy-efficient annealing or drawing equipment, and further increasing the use of renewable electricity at the Tarboro facility.

Additional Environmental Information

LS Cable & System USA medium voltage cable products do not contain any substances identified as hazardous according to the normative requirements in standards or regulations applicable in the markets where they are sold, and the additional standards listed in PCR Part A 8.4.1.

LS Cable & System USA medium voltage cable products do not release any dangerous substances as classified by the standards listed in PCR Part A 8.4.1.

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