ENVIRONMENTAL Product Declaration

SUPERIOR ESSEX 4-PAIR COPPER DATA CABLE

INDOOR/OUTDOOR, RISER, AND PLENUM RATED

Includes Category 6A with FEP Jacket and Powerwise 1G 4PPoE cables

"Our environmental initiative is more than just a company objective; it is an ethical responsibility to our communities and to future generations. We have made the commitment to continuously improve the environmental sustainability of our operation and products and to lead by example."

Tim Waldner
President,
Superior Essex International LP

The Plan

Superior Essex focuses on conservation, recycling, and minimizing any negative impact on the worldwide community. We aim to continuously reduce our environmental footprint to preserve and protect the natural environment.

The Promise

We practice a high level of environmental sustainability in our manufacturing processes by conducting operations in a safe and environmentally responsible manner. By evaluating and measuring environmental performance, we continue to strive to meet worldwide environmental programs and initiatives.

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

SUPERIOR ESSEX

Category 6A with FEP Jacket, Powerwise 1G 4PPoE
Premises Copper Cable

According to ISO 14025

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and EN 15804. 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.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Superior Essex
DECLARATION NUMBER	4786294213.103.1
DECLARED PRODUCT	Indoor/Outdoor, Riser, and Plenum Rated Optical Fiber Cable
REFERENCE PCR	P.E.P. Association. PCR for Electrical, Electronic and HVAC-R Products (2015) P.E.P. Association. PSR for Wires, Cables and Accessories (2015)
DATE OF ISSUE	October 24, 2018
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications
The PCR review was conducted by:	PEP ecopassport Program PCR Review Commitee
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	Grant R. Martin Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas Gloria Thomas Gloria, Industrial Ecology Consultants

Product Definition and Information

Company Description

Superior Essex is a global leader in the design, manufacture and supply of wire and cable products. This declaration is presented as we develop our product stewardship program to evaluate and reduce the impacts of products and processes throughout the corporation and business groups.

Product Description

Two copper cable product families are covered in this declaration. Plenum and non-plenum cables are installed in the plenum and non-plenum spaces of buildings, respectively, and must meet the respective associated fire safety test standards. All products listed below are UL listed CMP and/or CMR/CMX and have been UL or ETL verified as Category 6A or Category 5e products. Various packaging options exist for these products, but most are shipped in 1,000 foot length spools or boxes.

PowerWise® 1G 4PPoE Indoor/Outdoor Part Numbers: PW52-H46-x5; PW52-H72-x5; PW 52-H46-x8; PW52-H72-x8

PowerWise® 1G 4PPoE Indoor/Outdoor cable is specifically designed for outdoor applications. UV-blocking compounds aid in protecting the cable from light. Applications include Ethernet interconnect cable for Wi-Fi or retrofit cable installations that employ exterior runs having long-term outdoor exposure between two environmentally protected points. CMX Outdoor cables are designed to extend the run between the Network Interface Unit and the point of entry into the interior of a residence or a premise. This cable has been tested and listed as UL® 444 Outdoor compliant. This designation requires the cable to resist 300 hours of UV and heat. In addition, the CMR listing allows the cable to be used in riser spaces per UL 1666, eliminating the need to transition to fire resistant cables. PowerWise 1G 4PPoE Indoor/Outdoor AWG 22 cables provide the best performance and overall value for 4-Pair Power over Ethernet (4PPoE) applications requiring up to 100W of power and up to 1 Gigabit Ethernet performance compared to standard CAT 5e and 6 designs. PowerWise 1G 4PPoE cables are specifically designed to mitigate temperature build-up, offer exceptional energy efficiency and ensure performance (up to 1 Gigabit Ethernet) over the lifetime of your system provided the performance benefits of a CAT 5E+ cable including a small diameter. Plenum rated conductors are also 100% FEP insulated and ensure cable performance over the life of your system.

Category 6A U/FTP (STP) with FEP Jacket Part Number: 6s-220-xP

Superior Essex offers Shielded Twisted Pair Category 6A cables with a plenum FEP jacket. The cable has guaranteed performance to 600 MHz and meets or exceeds ANSI/TIA-568-C.2 for CAT 6A cables required for 10GBASE-T applications. The cable consists of four (4) balanced 23 AWG copper pairs. Each pair is wrapped with a Mylar® backed aluminum foil with the drain wire in the center of all 4 copper pairs. The wrapped pairs are then jacketed with a flexible FEP jacket for plenum applications.

Manufacturing Locations

These copper cables are manufactured in Hoisington, Kansas. This facility provided the primary data for the life cycle assessment.

Applications and Uses

The products listed are used in the plenum or non-plenum spaces of buildings (depending on the cable categorization). Applications for the plenum and non-plenum products include 10BASE-T through 100GBASE-T Ethernet, Power over Ethernet (PoE) - IEEE 802.3af, PoE+ - IEEE 802.3at Type 1 and 2 and ATM and token ring.

Material Inputs

The raw material inputs for copper cable are listed in Table 1. Table 2 details the average packaging associated with with each product.

Product Composition (lbs/m)	PowerWise® 1G 4PPoE Indoor/Outdoor CMR/CMX	Category 6A U/FTP (STP) with FEP Jacket CMP
Copper	5.69E-03	4.33E-03
FEP Wire Insulation	-	4.79E-03
HDPE Wire Insulation	4.15E-04	-
FRPE Wire Insulation	4.15E-04	-
FRPE Cross Web Separator	7.86E-04	-
Tin-coated Drain Wire	-	3.66E-04
Aluminum Foil Tape Shield	-	2.02E-03
Riser Jacket	3.82E-03	-
FEP Jacket	-	2.31E-03
Ink	4.88E-07	4.88E-07
Total	**1.11E-02**	**1.38E-02**

Table 1: Material Inputs for Copper Cables

Packaging Inventory (lbs/m)	PowerWise® 1G 4PPoE Indoor/Outdoor CMR/CMX	Category 6A U/FTP (STP) with FEP Jacket CMP
Pallets	8.63E-04	7.86E-04
Plastic Spool	6.71E-04	-
Plywood Reel	-	1.71E-03
Box	8.53E-04	-
Plastic End Plates	3.05E-04	-
Corner Boards	7.62E-05	-
Cardboard Dividers	-	1.52E-05
Plastic wrap	3.96E-05	3.96E-05
Pallet Labels	2.53E-06	2.53E-06
Total	**2.81E-03**	**2.55E-03**

Table 2: Average Packaging Material Inputs

Manufacturing Process

The copper wire first goes through an initial drawing process and then a second drawing process with an immediate subsequent annealing. The wire continues down the line to an electric pre-heater and insulation extruder, where the insulation material is applied to the wire. After extrusion, the insulated wire is cooled and dried. The insulated wire is then taken to an electric twinning machine, where two insulated wires are continually spiraled around each other. Four twinned wires, along with separator tape and shielding material (if applicable) are then fed into an electric bunching machine where the internal contents of the cable are assembled. The bunched wire is then fed into a jacketing machine, where jacket material is extruded onto the bunched cable, the cable is cooled, and spooled for packaging. Various packaging options exist, but most product is shipped in 1000-foot length spools or boxes.

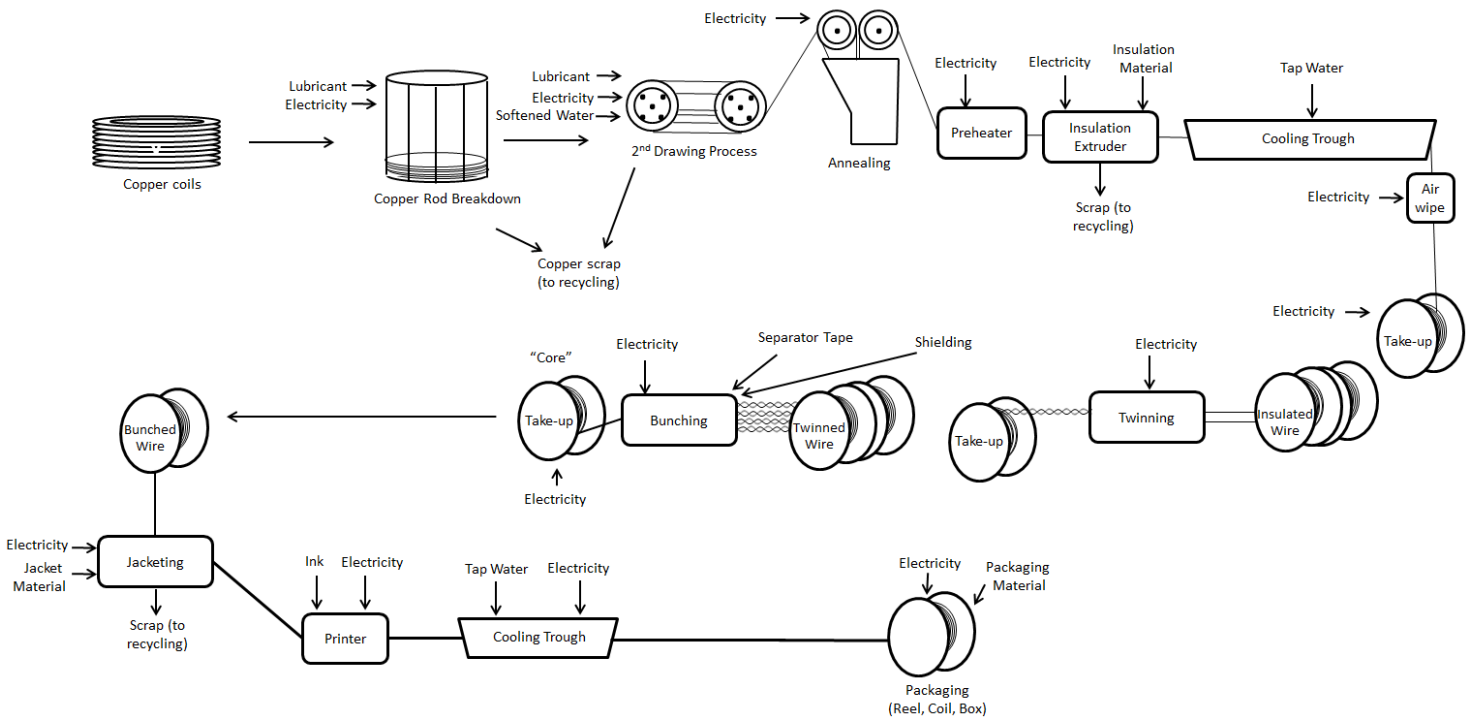

Figure 1: Manufacturing Process Flow of Plenum Copper Data Cable

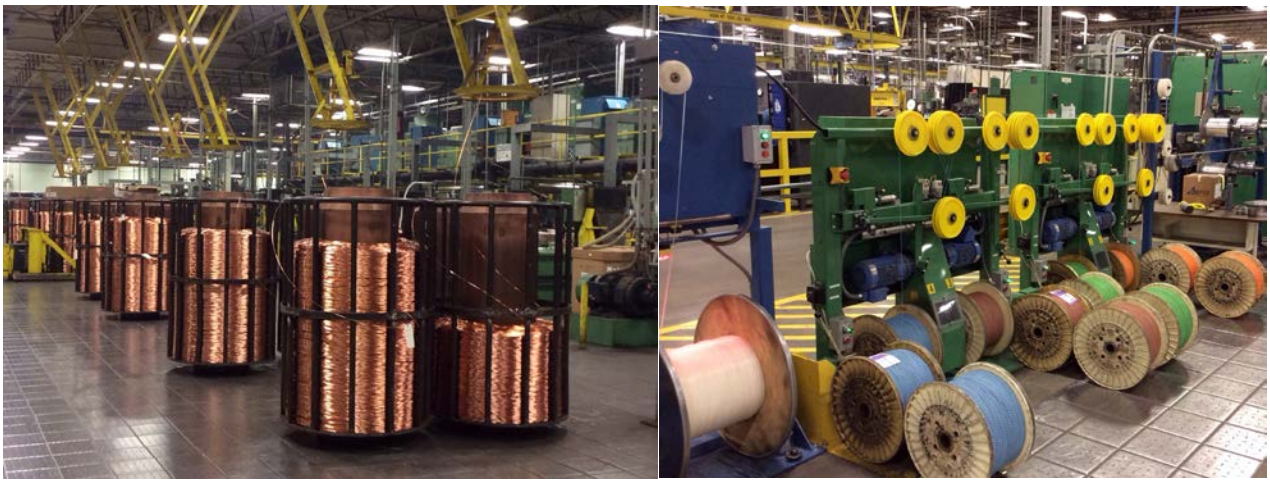

Figure 2: Photographs of Manufacturing Process

Life Cycle Assessment Description

Functional Unit

The functional unit of this product is as follows, according to the PEP PCR Wire and cable specific rules:

To transmit a communication signal on one meter of cable, according to the 1 G and 10G Ethernet protocols (for Cat 6 and Cat 6A, respectively) for copper cables during a 30-year typical lifetime and a 70% use rate in accordance with the TIA-568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components standard and ISO/IEC 11801-1 Information Technology Generic Cabling for Customer Premises Part 1: General Requirements.

Lifetime and use rate correspond to the application Building: Residential/tertiary/industrial as defined in the table given in Appendix 1 of the specific rules for wire, cables and accessories.

Environmental impacts are reported per functional unit of a product and the functional unit is the basis for comparison in an LCA.

Life Cycle Stages Assessed

Life Cycle Boundary	EPD Life Cycle Stage	PCR Life Cycle Stage
Superior Essex Copper Cable Business-to-Business	Raw Material Acquisition	Manufacturing
	Manufacturing	
	Packaging/Storage	
Superior Essex Copper Cable Business-to-Consumer	Marketing and Distribution	Distribution
	Installation	Installation
	Use	Use
	Waste Disposal	End-of-Life

Table 3: Life Cycle Stages Assessed

System Boundary

This project considers the life cycle activities from resource extraction through installation and end-of-life effects. The boundary covers raw material acquisition, manufacturing, marketing, use and waste disposal as seen in Figure 3.

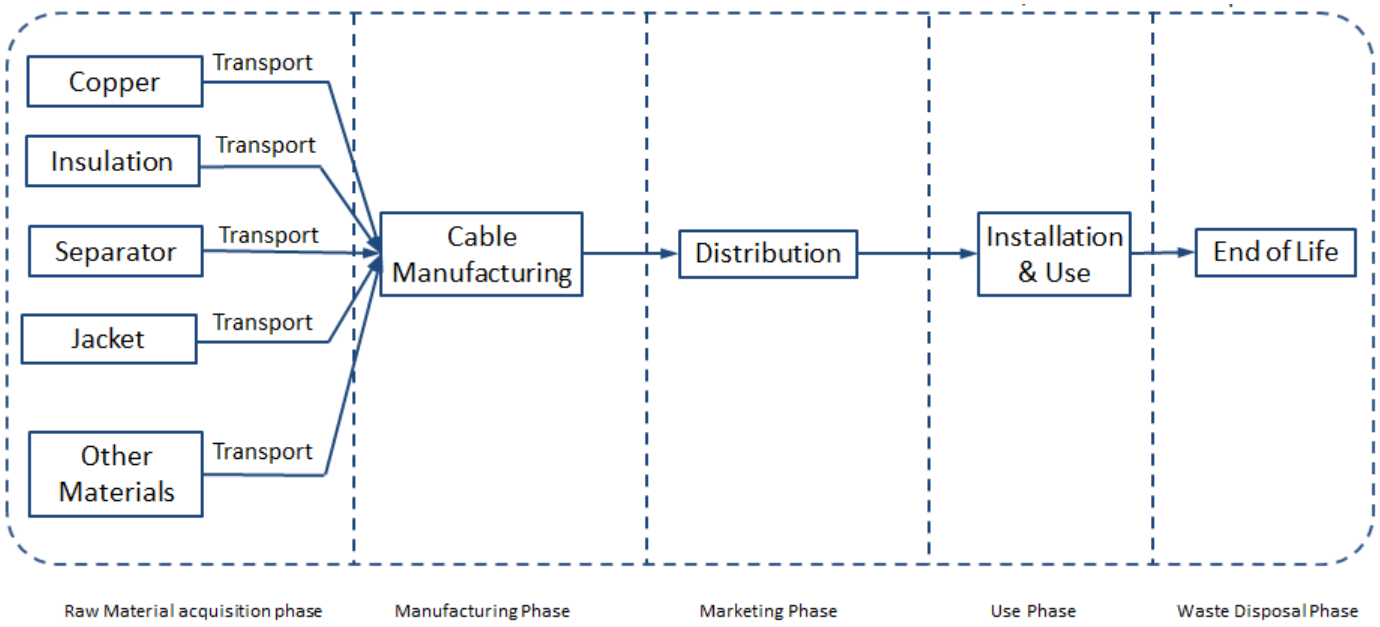

Figure 3: System Boundary

Allocation

Allocation for manufacturing energy was conducted based on production weight and then multiplied by the product weight per meter. Water and waste items were allocated per length of production.

Cut-off Criteria

For any impact category, if the sum of various impacts from a specific process/activity is less than 1% of the impact equivalent in that category, such a process/activity may be neglected during the inventory analysis. Nonetheless, the accumulated impact of neglected process/activity may not exceed 5%. Components and materials omitted from the LCA shall be documented.

This EPD is in compliance with the cut-off criteria. Components and materials omitted from the LCA shall be documented. Capital items for the production processes (machines, buildings, etc.) were not taken into consideration.

Period under Consideration

The data used refer to the production processes of the copper cable production facility from calendar year 2016.

Software and Background Data

For life cycle modeling the SimaPro v8.02 Software System for Life Cycle Engineering, an internationally recognized LCA modeling software program, was used. All background data sets relevant for production and disposal were available in this software. Background and secondary datasets were modeled using the US LCI database, developed by the National Renewable Energy Laboratory, as well as the ecoinvent v3 database, which is developed by the Swiss Centre for Life Cycle Inventories.

Marketing and Distribution

The finished products' distribution transport were based on average truck transportation distances provided by Superior Essex; 1,175 miles for the Category 6A U/FTP (STP) with FEP Jacket cable and 1,153 miles for the PowerWise® 1G 4PPoE Indoor/Outdoor cable.

Transportation

The manufacturing plant provided resource transportation mode and distance data to support the calculation of raw material transportation flows. The transportation LCI data from the US LCI database (kg-km basis) were used to develop the resource transportation LCI profile. Final products were modelled as being shipped 1,175 and 1,153 miles by truck for the Category 6A U/FTP (STP) with FEP Jacket and the PowerWise® 1G 4PPoE Indoor/Outdoor cables, respectively.

Installation and Use Stage

The premises copper cable products are distributed globally, but primarily throughout the United States and Canada. An average installation scrap rate of 5% was assumed in this study, as determined by interviews with installers and the expertise of Superior Essex. Installers routinely use battery-powered signal testing devices (a popular brand name is Fluke) during installation to ensure cable has been installed properly. The electricity consumed (based on calculations from the specifications of a late model Fluke device) is negligible compared to the rest of the installation or life cycle impacts and therefore was excluded from the study as allowed by the cut-off criteria.

Use phase losses were determined by standards and refer to the loss maximum values as specified in the respective reference standards (cable performance standard IEC 61156-5). The energy loss is calculated using a 40-meter cable length, and the consumed power is then reduced to the functional unit (one meter of cable). The cables covered in this document are Category 6 and Category 6A. Cable category was used to select the protocol and use phase losses determined by standards, according to the *Product Specific Rules for Wires, Cables and Accessories* Table 2. The lifetime and use rate of the cables were determined their application; building: residential/tertiary/industrial, according to the *Product Specific Rules for Wires, Cables and Accessories* Appendix A.

End-of-Life

According to the PEP PCR, this study assumes that metal components of copper cables are separated and recycled at the end of life with all remaining materials being disposed as the average US municipal solid waste disposition. The average US disposition includes 82% landfill and 18% incineration.

Life Cycle Inventory

Energy Use

Cumulative Energy Demand (MJ/m)	Raw Material and Manufacturing	Distribution	Installation	Use	End of Life
PowerWise 1G 4PPoE Indoor/Outdoor copper – CMR/CMX	8.7E+00	1.6E-01	4.6E-01	9.9E-01	1.5E-02
Category 6A U/FTP (STP) with FEP jacket – CMP	1.4E+01	1.8E-01	6.9E-01	2.4E+00	3.0E-03

Table 4: Cradle-to-Grave Cumulative Energy Demand (MJ) per m of Cable

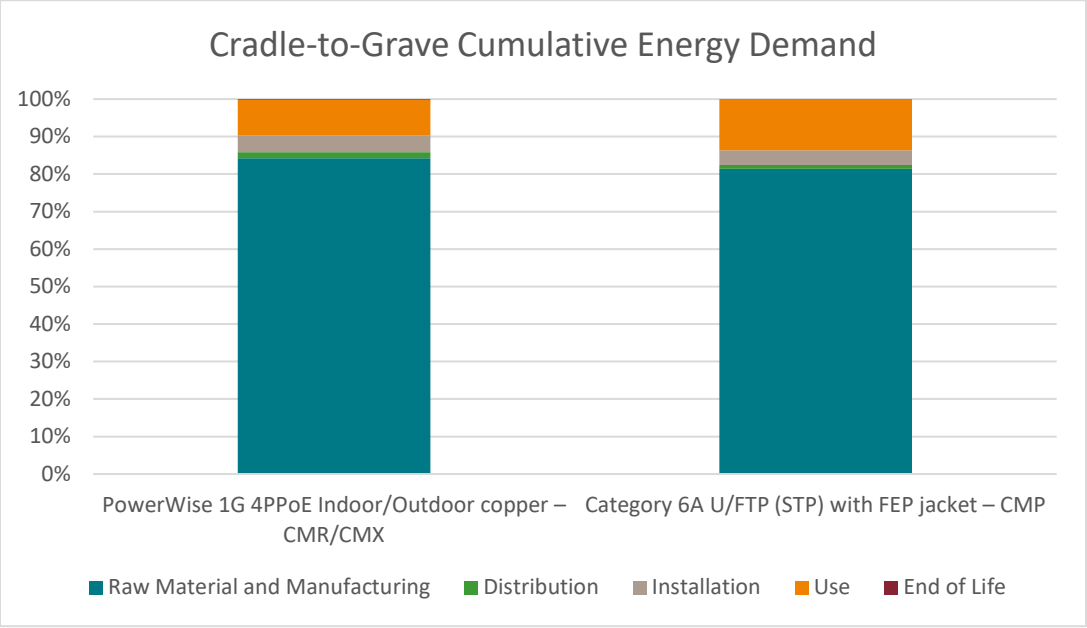

Figure 4: Cradle-to-Grave Cumulative Energy Demand

Use of Resources

Impact Category	PowerWise 1G 4PPoE Indoor/Outdoor copper – CMR/CMX					Category 6A U/FTP (STP) with FEP jacket – CMP				
	Raw Material and Manufacturing	Distribution	Installation	Use	End of Life	Raw Material and Manufacturing	Distribution	Installation	Use	End of Life
Renewable energy (MJ)	7.8E-01	3.5E-04	4.0E-02	0.0E+00	5.2E-04	7.7E-01	3.8E-04	3.7E-02	0.0E+00	1.2E-05
Nonrenewable energy (MJ)	8.0E+00	1.6E-01	4.2E-01	9.9E-01	1.4E-02	1.4E+01	1.8E-01	6.5E-01	2.4E+00	3.0E-03
Net Water Use (m3)	6.8E+00	2.0E-03	3.5E-01	0.0E+00	2.7E-03	6.6E+00	2.2E-03	3.2E-01	0.0E+00	7.1E-05

Table 5: Cradle-to-Grave non-renewable energy, renewable energy, and water use per m of Cable

Waste Management

Waste Management (kg)	Hazardous waste	Non hazardous waste	Radioactive waste	Recycling
PowerWise 1G 4PPoE Indoor/Outdoor copper – CMR/CMX	1.57E-04	1.04E-01	5.63E-06	5.69E-03
Category 6A U/FTP (STP) with FEP jacket – CMP	1.44E-04	1.01E-01	5.25E-06	4.33E-03

Table 6: Cradle-to-Grave Waste (kg) per m of Cable

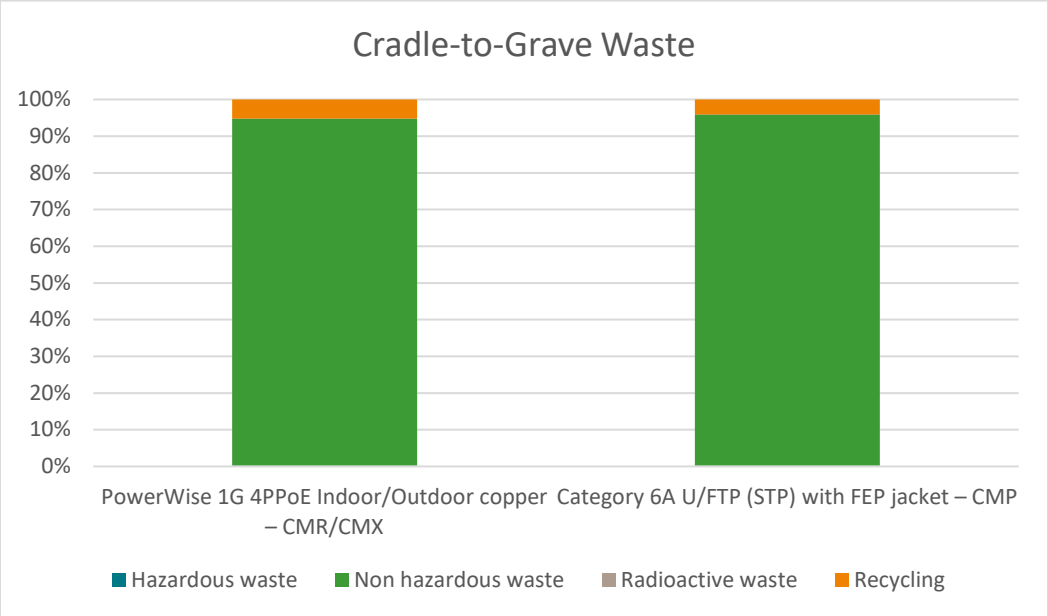

Figure 5: Cradle-to-Grave Waste

Life Cycle Impact Assessment

The environmental impacts listed below were assessed throughout the life cycle of the copper cable products as defined above, per one meter of cable. The environmental impacts were analyzed using CML methodology.

Impact Category	PowerWise 1G 4PPoE Indoor/Outdoor copper – CMR/CMX				
	Raw Material and Manufacturing	Distribution	Installation	Use	End of Life
Global warming (kg CO_2 eq)	4.71E-01	1.22E-02	2.51E-02	6.89E-02	3.60E-03
Ozone layer depletion (kg CFC-11 eq)	9.66E-07	1.34E-11	5.46E-08	5.09E-13	3.38E-11
Acidification (kg SO_2 eq)	1.83E-02	5.42E-05	9.54E-04	6.41E-04	4.24E-06
Eutrophication (kg PO_4^{3-} eq)	3.02E-02	1.14E-05	1.57E-03	2.09E-05	1.58E-06
Photochemical oxidation (kg C_2H_4 eq)	7.17E-04	2.38E-06	3.74E-05	2.50E-05	2.00E-07
Abiotic depletion – elements (kg Sb eq)	7.69E-05	5.54E-10	3.98E-06	0.00E+00	2.31E-09
Abiotic depletion – fossil fuels (MJ)	7.42E+00	1.62E-01	3.93E-01	9.94E-01	1.11E-02
Impact Category	Category 6A U/FTP (STP) with FEP jacket – CMP				
	Raw Material and Manufacturing	Distribution	Installation	Use	End of Life
Global warming (kg CO_2 eq)	8.48E-01	1.33E-02	4.07E-02	1.66E-01	5.45E-03
Ozone layer depletion (kg CFC-11 eq)	7.54E-06	1.46E-11	3.68E-07	1.23E-12	1.87E-12
Acidification (kg SO_2 eq)	1.75E-02	5.90E-05	8.37E-04	1.55E-03	1.29E-06
Eutrophication (kg PO_4^{3-} eq)	2.94E-02	1.24E-05	1.41E-03	5.06E-05	1.09E-06
Photochemical oxidation (kg C_2H_4 eq)	8.79E-04	2.59E-06	4.23E-05	6.03E-05	5.52E-08
Abiotic depletion – elements (kg Sb eq)	7.17E-05	6.02E-10	3.45E-06	0.00E+00	4.41E-11
Abiotic depletion – fossil fuels (MJ)	1.30E+01	1.76E-01	6.27E-01	2.40E+00	2.95E-03

Table 7: Cradle-to-Grave Life Cycle Impact Assessment Results per m of Cable

Optional Environmental Information

Organizational Third-Party Certification

A third-party audit was conducted by GreenCircle Certified, LLC for the hazardous and non-hazardous waste streams and verified that the Hoisington, KS facility is a Zero Waste to Landfill facility during this study's reference period.

References

- ANSI/TIA-568.2-D *Balanced Twisted-Pair Telecommunications Cabling and Components*
- ISO/IEC 11801-1 *Information Technology – Generic Cabling for Customer Premises – Part 1: General Requirements*
- C22.2 NO. 214-08 (R2013) - Communications cables (Bi-national standard, with UL 444)
- EN 15804:2012 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- EPA, Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI)
- EPA, Wire and Cable Insulation and Jacketing: Life-Cycle Assessments for Selected Applications, June 2008, EPA 744-R-08-001
- FTC Part 260, Green guides
- (ILCD, 2010) Joint Research Commission, 2010, ILCD Handbook: General Guide for Life Cycle Assessment
- Intergovernmental Panel on Climate Change (IPCC)
- ISO 14025:2006 *Environmental labels and declarations – Type III environmental declarations – Principles and procedures*
- ISO 14040:2006 *Environmental management - Life cycle assessment – Principles and framework*
- ISO 14044:2006 *Environmental management - Life cycle assessment – Requirements and guidelines*
- NFPA 262: Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces
- NFPA 70®: National Electrical Code
- P.E.P. Association. PSR *Product Specific Rules for Wires, Cables and Accessories*. 2015.
- P.E.P. Association. PCR. *Product Category Rules for Electrical, Electronic and HVAC-R Products*. 2015.
- UL 44 Standard Thermoset-Insulated Wires and Cables
- UL 1666 Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
- USEPA Waste Reduction Model (WARM)
- Krieger, T. et al. *New Fire Hazard and Environmental Burden Evaluations of Electrical Cable Installations Utilizing ISO 14040 Environmental Methodologies*. DuPont. November 10, 2007.

LCA Development

This EPD and corresponding LCA were prepared by Sustainable Solutions Corporation of Royersford, Pennsylvania.

SustainableSolutions CORPORATION

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