ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14025 AND ISO 21930:2017

SmartEPD-2025-001-0586-01

Electrical Metallic Tubing Conduit (EMT) 1/2" to 4"

PENN ALUMINUM INTERNATIONAL LLC

SMART EPD CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION

Date of Issue: Sep 11, 2025

Expiration: Sep 11, 2030

Last updated: Sep 11, 2025

General Information

Penn Aluminum International

1117 North 2nd Street, Murphysboro, IL 62966

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Product Name:	Electrical Metallic Tubing Conduit (EMT) 1/2" to 4"
Declared Unit:	1 m
Declaration Number:	SmartEPD-2025-001-0586-01
Date of Issue:	September 11, 2025
Expiration:	September 11, 2030
Last updated:	September 11, 2025
EPD Scope:	Cradle to gate with other options A1 - A3, C1 - C4, D
Market(s) of Applicability:	North America

General Organization Information

Penn Aluminum is part of The Marmon Group, a Berkshire Hathaway Company. The Marmon Group comprises four autonomous companies consisting of 15 diverse, stand-alone business sectors and more than 185 independent manufacturing and service businesses. These businesses operate more than 350 manufacturing, distribution and service facilities, and employ more than 20,000 people worldwide.

Further information can be found at: https://www.pennaluminum.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 21930:2017
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 and Telecommunications Conduit, 1000-001, v1.0 v.1 Date of issue: January 31, 2024 Valid until: January 31, 2029
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

ACLCA PCR Guidance Version:	2022 ACLCA PCR Guidance Process and Methods Toolkit version 1.0
ACLCA PCR Conformance Level:	Transparency
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 PMB 966, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071: External Salil Arora | arorasal@gmail.com Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External Salil Arora | arorasal@gmail.com

Product Information

Declared Unit:	1 m
Mass:	0.454 kg
Product Specificity:	✗ Product Average ✓ Product Specific
Variation in GWP Result (Products):	0% to 0%
Variation in GWP Result (Facilities):	0% to 0%

Product Description

EMT is a high-quality conduit made from durable, corrosion-resistant aluminum. Known for its lightweight and easy-to-install properties, Penn Aluminum's BLUE LIGHTNING EMT meets UL and ANSI standards, making it ideal for both commercial and light industrial electrical installations. Available in various sizes, it features a smooth interior surface for effortless wire pulling and is compatible with standard connectors and couplings. Its recyclable nature also supports sustainable building practices. Penn Aluminum BLUE LIGHTNING EMT incorporates a proprietary patented interior UL listed wire pulling compound coating to reduce pulling friction in a high-quality, UL listed EMT that is produced in the United States and listed under the UL 797A Standard (File #E513195).

Reference Standard: UL 797A

Further information can be found at: https://www.pennconduit.com/products/aluminum-emt/

Product Specifications

Product SKU(s):	P-100-10-EMT
Product Classification Codes:	Masterformat - 26 05 33.13 EC3 - Electrical -> ElectricalConduit
Outer diameter:	29.54 mm
Inner diameter:	26.64 mm
Wall thickness:	2.9 mm
Material density:	2700 kg/m3
Mass per meter:	0.345 kg

Product Composition Diagram

Material Composition

Material/Component Category	Origin	% Mass
Aluminim Alloy 6063	USA	99.9
Blue Lighting Coating	USA	0.1

Packaging Material	Origin	kg Mass
Wood	USA	0.0042
Plastic Banding	USA	0.00085
Plastic mini bundle wrap	USA	0.00021

Biogenic Carbon Content	kg C per m
Biogenic carbon content in product	None
Biogenic carbon content in accompanying packaging	0.0028

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 was not conducted for this EPD

System Boundary

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

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	✓

Table 4: System Boundary Modules

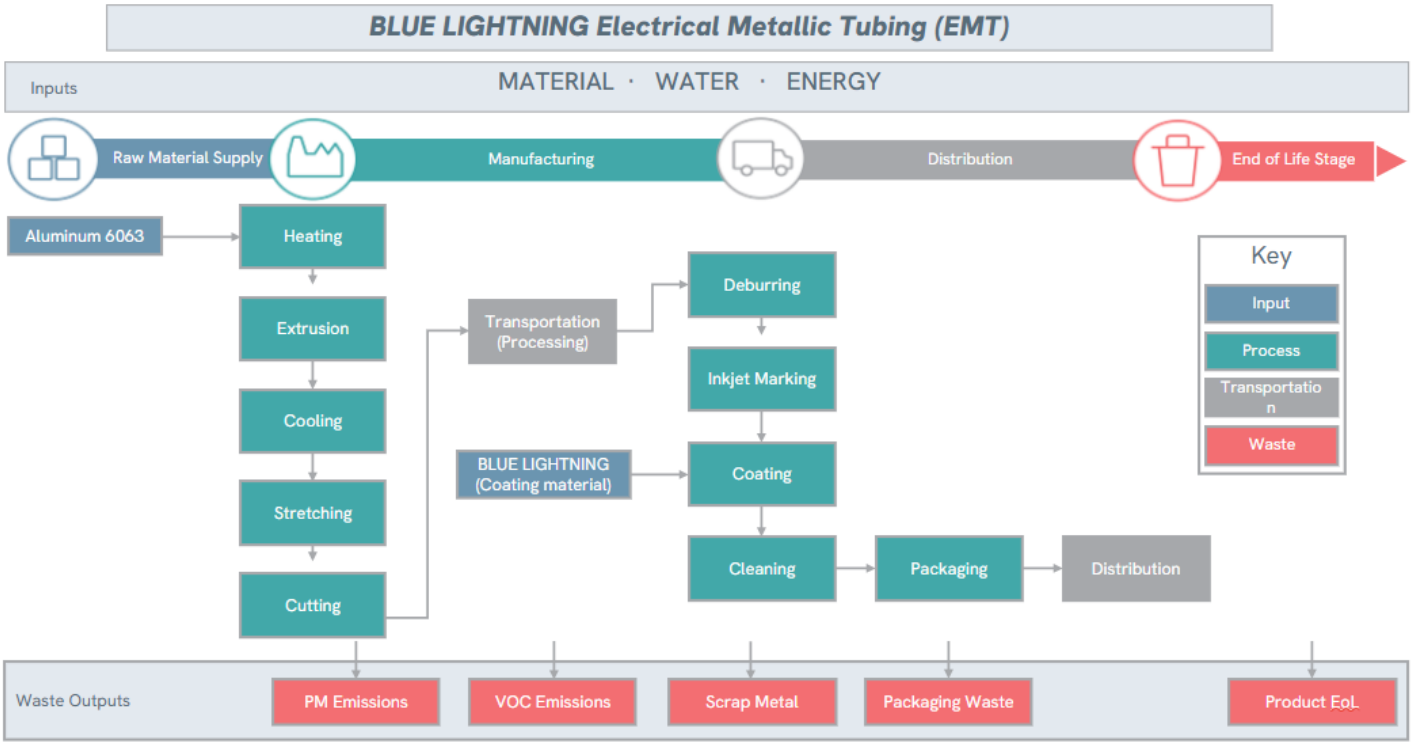
PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS & LOADS BEYOND SYSTEM BOUNDARY
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw Material Supply	Transport	Manufacturing	Transport from gate to site	Assembly/ Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use During Product	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste Processing	Disposal	Reuse, Recovery, Recycling Potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

*MND: module not declared
*X': module was conditionally declared (see text)

Plants

Penn Aluminum
1117 N 2nd St, Murphysboro, IL 62966, USA

Product Flow Diagram



The processes modeled for raw material and packaging supplys include energy purchases, water, and transport of to production for supplier. The processes modeled for manufacturing processes include energy purchases, processing chemicals, ancillary materials, and water.

Software and Database

LCA Software:	SimaPro v. 9.6		
LCI Foreground Database(s):	Ecoinvent v. 3.10	RoW	Cut-Off by Classification
LCI Background Database(s):	Ecoinvent v. 3.10	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

Primary data in combination with representative, secondary literature, and consistent background life cycle inventory (LCI) information from ecoinvent version 3.10.1 (Wernet, et al., 2016) and other sources were used. Primary and secondary data were assessed based on the following criteria.

Temporal, Geographic, and Technological Coverage

Primary data from Penn represent operations in 2024 calendar year. This study covers the facilities in Penn's value chain where primary and/or secondary conduit manufacturing is carried out for the conduit types in this report. Facilities belonging to Penn are located in Murphysboro, IL, USA. Foreground data comes from the year 2024 and background data comes from ecoinvent 3.10 which uses data sourced primarily from 2023 and no earlier than 2022.

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. In addition, key model inputs such as mass balance, energy balance and emission inventory were reviewed by the Parallel and TrueNorth Collective teams.

Ecoinvent v3.10.1 was used as the main database for background data. This version was published in 2023 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 and all known flows were included in this 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.

Life Cycle Module Descriptions

Included in module A1 is the treatment to transform and extraction of virgin aluminum (23%) and recycled aluminum (77%) to aluminum billet and the Blue Lighting Coating material and extraction. Module A2 includes the transport for these materials sent to the manufacturing facility. The manufacturing impacts for A3 include the production of the product. The aluminum billet is pre-heated then extruded through a die. After extrusion the shaped aluminum is cooled, stretched, and cut to the desired shape. This formed aluminum is then transported to the processing facility. Once at the processing center, aluminum used to manufacture EMT is deburred, inkjet marked and coated with BLUE LIGHTNING. After these processes the product is then cleaned and packaged. After consumer use, module C2 includes the transportation assumed from consumer to the waste treatment center. The waste treatment of the product is assumed to be landfill which is included in module C4. With a system expansion model, the loads and benefits associated with this product for the secondary consumer are calculated. The benefit from scrap material available for recycling at end-of-life outweighs the load resulting from required raw material used as input to the system, therefore a net benefit is included in module D.

LCA Discussion

Allocation Procedure

Annual production volume and product mass were used to allocate facility-level inputs, outputs, and emissions. At the manufacturing plant in Murphysboro, IL, the electricity, natural gas, propane, diesel, gasoline, and water consumption is provided for facility-wide production over the reference year. These totals are allocated by mass of production to the appropriate product. Allocation, cut-off by classification was used for the modeling of the processes in this study.

Cut-off Procedure

For the processes within the system boundary, all energy and material flows were included in the model. No 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

End of Life (C1 - C4)
C1 - C4 Modules

Collection Process

Collected Separately:	0.454 kg
Collected with Mixed Construction Waste:	0.454 kg

Recovery

Recycling:	0.431 kg
Landfill:	0.0227 kg

Disposal

Product or Material for Final Disposal:	0.0227 kg

Assumptions for scenario development:

- Recycling rate for aluminum follows that of table 3 in the PCR Part A; 95% recycled and 5% landfilled
- Waste assumptions for packaging follow that of Table 2 in PCR Part A;
  - Plastic: 9.5% recycled; 75.5% landfill; 15% incineration
  - Wood (assumed to match the disposal of Pulp): 64.7% recycled; 28.4% landfill; 6.9% incineration

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

Recycling Rate of Product:	95 %
Recycled Content of Product:	100 %
Net Energy Benefit from Energy Recovery from Waste Treatment Declared as Export Energy in C3:	0 MJ
Net Energy Benefit from Thermal Energy Due to Treatment of Waste Declared as Exported Energy in C4:	0 MJ
Net Energy Benefit from Material Flow Declared in C3 for Energy Recovery:	0 MJ
Further assumptions for scenario development:	In the conduit 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) and disposal (C4). The net inventories were calculated as follows: 1.A1 – Recycled materials used in the product are considered negative net output flows. Input aluminum material consists of 77% recycled materials. 2.A3 - Scrap and other excess material recovered from manufacturing and sent for recycle are all fully recovered. 3.C4 - Per PCR Part A, Table 3, the product recycling rates of 95% is applied for aluminum

Results

Environmental Impact Assessment Results

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	C1	C2	C3	C4	D
GWP-total	TRACI 2.1	kg CO2 eq	2.54e+0	ND	1.09e-2	0	4.43e-4	-2.00e-1
GWP-total (excl biogenic)	TRACI 2.1	kg CO2 eq	2.54e+0	ND	1.09e-2	0	4.41e-4	-2.01e-1
GWP-total (incl biogenic)	TRACI 2.1	kg CO2 eq	2.54e+0	ND	1.09e-2	0	4.43e-4	-2.00e-1
ODP	TRACI 2.1	kg CFC 11 eq	4.00e-8	ND	1.66e-10	0	9.01e-12	-2.01e-9
AP	TRACI 2.1	kg SO2 eq	9.37e-3	ND	5.63e-5	0	3.29e-6	-1.48e-3
EP	TRACI 2.1	kg N eq	4.95e-3	ND	1.21e-5	0	1.17e-6	-7.04e-4
POCP	TRACI 2.1	kg O3 eq	1.02e-1	ND	1.59e-3	0	5.05e-5	-1.30e-2
HTP-c	TRACI 2.1	CTUh	1.86e-6	ND	2.88e-9	0	1.36e-10	-3.33e-7
HTP-nc	TRACI 2.1	CTUh	8.08e-7	ND	2.57e-9	0	1.41e-9	-1.38e-7
ETP-fw	TRACI 2.1	CTUe	3.89e+1	ND	1.11e-1	0	3.21e-2	-6.59e+0
PM	TRACI 2.1	kg PM2.5 eq	1.33e-3	ND	6.82e-6	0	3.72e-7	-1.97e-4

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.

Environmental declarations from different programs 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.

Data Gaps and Assumptions

Assumptions are sometimes needed in LCA to address unknown data. Conservative estimations, literature review and expert judgement are used to close gaps as accurately as possible. Several types of assumptions needed for this study are listed here

Raw Materials

- Life cycle input amounts are only provided by the Penn facility in Murphysboro, IL.
- The aluminum raw materials are sourced from remelting suppliers in Penn's value chain. Raw materials content data provided by supplier is used to model the contribution of primary and secondary aluminum. Supplied aluminum into the process comprises an average of 77% secondary aluminum (a blend of various pre- and post-consumer waste streams) and 23% primary aluminum.
- Based on the same raw material info provided by Penn's supplier, on average the primary aluminum used is sourced 90% from US/Canada and 10% offshore trade.
- Aluminum 6061 and 6063 are assumed to be the same composition with a linear density at 2700 kg/m3.

Manufacturing

- Primary data for scrap was provided by Penn. All scrap is assumed to be recycled.
- Energy and water totals are provided for the entire facility. Considering there are more products produced at the facility, mass allocation is used to determine the energy and water intensity for both products in this study.

Transportation Assumptions

- Transportation for packaging delivered to the facility is assumed to be 60km
- Transportation for manufactured product to consumer is assumed to be 60km
- Transportation of waste to processing center is assumed to be 50km
- Primary data for location of suppliers were provided by Penn. Transportation distance was estimated between the location provided and the facility location
- For waste streams without a declared transport distance (in A3 for manufacturing waste, C2 for product End of Life) 100 kilometers by truck was assumed.

End of Life Assumptions

- Recycling rate for aluminum follows that of the PCR; 95% recycled and 5% landfilled
- Pallets used in packaging for the product are recycled at 95 percent

- Waste assumptions for packaging follow that of the PCR;
- Plastic: 9.5% recycled; 75.5% landfill; 15% incineration
- Wood: 64.7% recycled; 28.4% landfill; 6.9% incineration
- Energy associated with demolition and destruction of concrete is assumed to be 10 kWh/tonne (Erlandsson et al. (2015))

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	C1	C2	C3	C4	D
PERE	MJ	5.66e+0	ND	2.01e-3	0	2.21e-4	-1.03e+0
PERM	MJ	1.54e-1	ND	0	0	0	0
PERT	MJ	5.81e+0	ND	2.01e-3	0	2.21e-4	-1.03e+0
PENRE	MJ	7.55e+0	ND	1.56e-2	0	1.39e-3	-1.03e+0
PENRM	MJ	4.98e-2	ND	0	0	0	0
PENRT	MJ	7.60e+0	ND	1.56e-2	0	1.39e-3	-1.03e+0
RPRE	MJ	5.66e+0	ND	2.01e-3	0	2.21e-4	-1.03e+0
RPRM	MJ	1.54e-1	ND	0	0	0	0
RPRT	MJ	5.81e+0	ND	2.01e-3	0	2.21e-4	-1.03e+0
NRPRE	MJ	7.55e+0	ND	1.56e-2	0	1.39e-3	-1.03e+0
NRPRM	MJ	4.98e-2	ND	0	0	0	0
NRPRT	MJ	7.60e+0	ND	1.56e-2	0	1.39e-3	-1.03e+0
ADP-fossil	MJ	5.30e-2	ND	1.18e-4	0	9.72e-6	-8.01e-3
SM	kg	3.19e-1	ND	0	0	0	-6.12e-2
RSF	MJ	0	ND	0	0	0	0
NRSF	MJ	0	ND	0	0	0	0
FW	m3	6.22e-2	ND	3.52e-5	0	-1.14e-4	-1.12e-2
RE	MJ	0	ND	0	0	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	C1	C2	C3	C4	D
HWD	kg	0	ND	0	0	0	0
NHWD	kg	0	ND	0	0	0	0
RWD	kg	0	ND	0	0	0	0
HLRW	kg	0	ND	0	0	0	0
ILLRW	kg	0	ND	0	0	0	0
CRU	kg	0	ND	0	0	0	0
MFR	kg	1.38e-1	ND	0	0	0	2.84e-3
MER	kg	0	ND	0	0	0	0
MNER	kg	0	ND	0	0	0	0
EEE	MJ	0	ND	0	0	0	0
EET	MJ	0	ND	0	0	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.

Carbon Emissions and Removals

per 1 m of product .

Indicator	Unit	A1A2A3	C1	C2	C3	C4	D
BCRP	kg CO2	0	ND	0	0	0	0
BCEP	kg CO2	0	ND	0	0	0	0
BCRK	kg CO2	7.77e-3	ND	0	0	0	5.03e-3
BCEK	kg CO2	0	ND	0	0	0	6.12e-4
BCEW	kg CO2	0	ND	0	0	0	0
CCE	kg CO2	0	ND	0	0	0	0
CCR	kg CO2	0	ND	0	0	0	0
CWNR	kg CO2	0	ND	0	0	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:

BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Impact Scaling Factors

Trade Size (in)	Outer Diameter (in)	Outer Diameter (mm)	Inner Diameter (in)	Inner Diameter (mm)	Scaling Factor, mass/meter (kg/m)	Scaling Factor, mass/meter (lb/m)	Adjusted Scaling factor based on 1", Scaling factor, mass/meter (kg/m)
0.50	0.71	17.93	0.62	15.80	0.15	0.34	0.44
0.75	0.92	23.42	0.82	20.93	0.23	0.52	0.68
1.00	1.16	29.54	1.05	26.64	0.35	0.76	1.00
1.25	1.51	38.35	1.38	35.05	0.51	1.13	1.49
1.50	1.74	44.20	1.61	40.89	0.60	1.32	1.73
2.00	2.20	55.80	2.07	52.50	0.76	1.67	2.19
2.50	2.88	73.03	2.73	69.37	1.11	2.44	3.20
3.00	3.50	88.90	3.36	85.24	1.35	2.98	3.91
3.50	4.00	101.60	3.83	97.38	1.78	3.93	5.15

4.00	4.50	114.30	4.33	110.08	2.01	4.43	5.81

The specifications for different EMT trade sizes are provided in this section. The linear density is provided in terms of kg per m as required by the PCR at 2700 kg/m3. A reference product with a nominal trade size of 1 inch is selected for the product group, and its scaling factor is set to 1 to enable straightforward extrapolation of environmental impacts to standard conduit lengths. Scaling factors for other trade sizes are then calculated relative to the reference, allowing for consistent and comparable impact conversion across product variations.

Interpretation

The analysis of Penn aluminum conduit provides useful insights regarding the life cycle environmental impacts. The LCA results also identify where substantial impacts are occurring to allow further process and materials improvements to be implemented by Penn.

Both the raw materials module (A1) and the manufacturing module (A3) share a large contribution to almost all LCIA indicators, for both product types explored in this study. Penn's greatest opportunity for improving the environmental profile of their products is to focus on natural gas use during manufacturing. For example, decisions on a different fuel source to replace the energy used during manufacturing would reduce final impacts. The energy during melting relies heavily on fossil fuel consumption based on high demand during the melting process. The current production process uses natural gas which accounts for about 90 percent of the impact for the manufacturing module (A3). The impact from this energy demand can be reduced by integrating renewable energy alternatives instead of fossil fuels. There is evidence in the market from some aluminum manufacturers that hydropower is a viable replacement for fossil fuels successfully reducing energy impacts. There is also evidence of induction furnaces, solar power, and wind power for smelting of aluminum. Focusing on reducing this impact of this input would have the largest effect on total impacts.

The raw materials module (A1) also plays an important role in the indicator values. The aluminum used in the lifecycle includes impact from transforming recycled material into usable inputs for the system. Considering this material is recycled aluminum material, reduction of the impact for the process would come from energy intensity associated with transformation of the recycled material. Use of renewable sources of energy would allow for a less impact from these processes.

Module D represents a net credit, as the system produces more scrap material available for recycling at end-of-life than raw material used as input to the system. It is important to note that Module D is outside the system boundary of the cradle-to-grave assessment and should not be aggregated with the core life cycle results.

Additional Environmental Information

Penn aluminum conduit does 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.

Penn aluminum conduit does not release any dangerous substances as classified by the standards listed in PCR Part A 8.4.1.

Environmental Activities and Certifications

Certification
Blue Lightning Aluminum EMT Declare Label (LBC Red List Free)

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