Environmental Product Declaration

Fabricated Hollow Structural Sections

ATLAS TUBE, A DIVISION OF ZEKELMAN INDUSTRIES
PLYMOUTH, MI – AVERAGE STEEL SUPPLY MIX

Atlas Tube can produce round, square, and rectangular sizes in the largest size range in North America.

Atlas Tube

Atlas Tube was founded in 1984 and ever since has been growing and innovating to become the largest producer of Hollow Structural Sections in North America. As part of the Zekelman Industries family of companies, Atlas Tube is an integral part of the structural steel supply chain, serving the needs of Architects, Engineers, Fabricators, Contractors and Service Centers, by providing the largest size range in the industry and unmatched technical support.

The North American steel industry is the cleanest of all the major steel producing areas of the world. Of the seven largest steel producing countries, the U.S. has the lowest CO_2 emissions per ton of steel produced and the lowest intensity (AISI, 2024). Atlas is committed to maintain this fact by constantly improving our processes. For more information about Atlas Tube and the products we offer, please visit www.atlastube.com.

CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

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Atlas Tube

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ATLAS TUBE
Fabricated Hollow Structural Sections
Plymouth, MI – Average Steel Supply Mix

According to ISO 14025 and ISO 21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL ENVIRONMENT 333 PFINGSTEN ROADNORTHBROOK, IL 60611
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	Program Operator Rules v.2.7 2022
MANUFACTURER NAME AND ADDRESS	Atlas Tube 13101 Eckles Rd Plymouth, MI 48170
DECLARATION NUMBER	4791401279.104.1
DECLARED PRODUCT & DECLARED UNIT	Fabricated Hollow Structural Steel Sections; 1 metric ton
REFERENCE PCR AND VERSION NUMBER	UL Part A: Life Cycle Assessment Calculation Rules and Report Requirements, v4.0 (2022) Part B: Steel Construction Product EPD Requirements, v2.0 (2020)
DESCRIPTION OF PRODUCT APPLICATION/USE	Fabricated Hollow Structural Steel Sections Used in Construction
MARKETS OF APPLICABILITY	North America
DATE OF ISSUE	August 14, 2024
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-specific Type III
EPD SCOPE	Cradle to gate
YEAR(S) OF REPORTED PRIMARY DATA	October 2021 – September 2022
LCA SOFTWARE & VERSION NUMBER	Sphera Managed LCA Content Database 2024.1 (formerly GaBi Database)
LCI DATABASE(S) & VERSION NUMBER	Sphera LCA for Experts 10.7 (formerly GaBi)
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1, IPCC AR5 GWP_{100}, CML 2001-Jan 2016 ADP_{fossil}

Part A PCR review was conducted by:	Lindita Bushi, PhD, Chair Hugues Imbeault-Tétrault, Eng., M.A. Sc. Jack Geibig
The sub-category PCR review was conducted by:	Dr. Tom Gloria (Chair) Brandie Sebastian James Littlefield
This declaration was independently verified in accordance with ISO 14025: 2006. The UL Environment “Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report,” v4.0, based on CEN Norm EN 15804 (2012) and ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017). ☐ INTERNAL ☒EXTERNAL	Cooper McCollum, UL Solutions James Mellentine, Thrive ESG
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting

Limitations:
Environmental declarations from different programs (ISO 14025) may not be comparable.
Comparison of the environmental performance of construction works and construction products using EPD information shall be based on the product’s use and impacts at the construction works level. In general, EPDs may not be used for comparability purposes when not considered in a construction works context. Given this PCR ensures products meet the same functional requirements, comparability is permissible provided the information given for such comparison is transparent and the limitations of comparability explained.

When comparing EPDs created using this PCR, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to different results for upstream or downstream of the life cycle stages declared.

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and ISO 21930:2017

1. Product Definition and Information

1.1. Description of Organization

Atlas Tube is a division of Zekelman Industries which is the largest independent pipe and tube manufacturer in North America. The Atlas Tube division produces cold-formed, welded hollow structural sections (HSS) in round, square, and rectangular shapes. Atlas Tube has the largest size range and produces the largest volume of HSS in the industry.

This Environmental Product Declaration represents fabricated HSS produced by Atlas Tube at the production facility in Plymouth, MI, using the average annual steel supply mix for 2022. Additionally, cradle-to-gate GWP results are shared for unfabricated HSS.

1.2. Product Description

Steel tubes covered by this product declaration are classified as either Hollow Structural Sections (HSS) or mechanical tubing. They are produced by the single seam Electric Resistance Welded (ERW) process in round, square, and rectangular shapes. These products can be used in any welded or bolted construction and in various manufactured products.

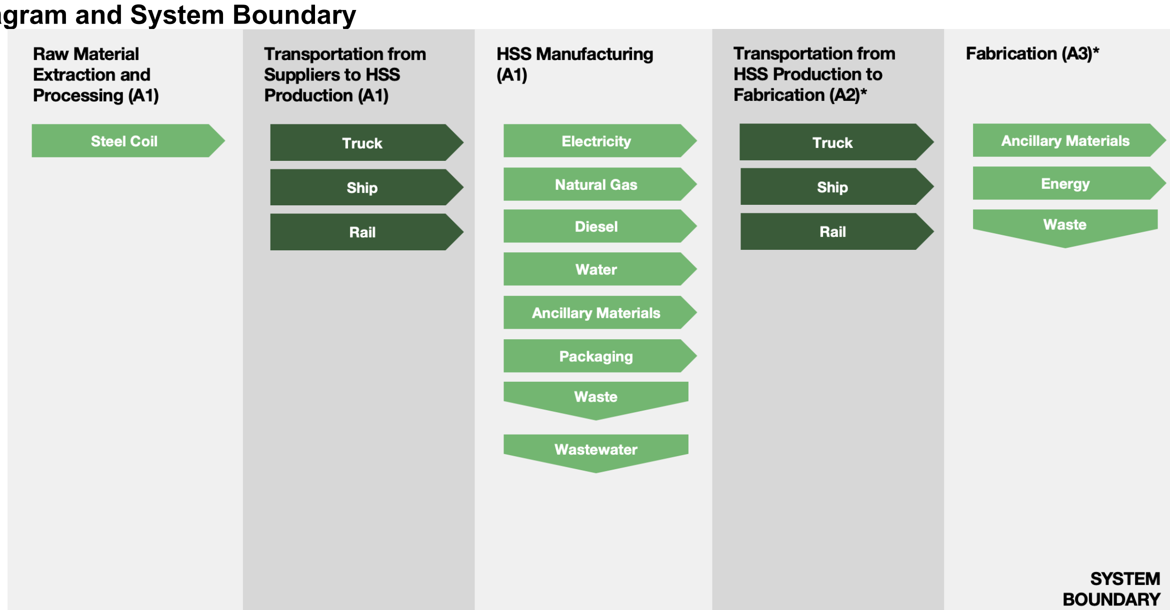
This EPD covers fabricated hollow structural sections (HSS) from CSI division 05 12 00 and UNSPSC code classes 30104000, including 30104001, 30104002, and 30104003.

Product Specification

HSS products produced by Atlas Tube are defined by the following ASTM standards:

- **ASTM A500** – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- **ASTM A847** – Standard Specification for Cold-Formed Welded and Seamless High-Strength, Low-Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance
- **ASTM A1085** – Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS)
- **ASTM A252** – Standard Specification for Welded and Seamless Steel Pipe Piles
- **CSA G40.20/G40.21** – General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
- **ASTM A513** – Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing

Flow Diagram and System Boundary



All A1 steps represent manufacturing of unfabricated HSS by Atlas Tube. Stages with an asterisk rely on data from the AISC & STI industry average EPD for fabricated HSS (AISC & STI, 2022). This EPD does not declare the modes of transportation used in A2, so it is assumed all common modes (truck, ship, rail) are used.

1.3. Application

Applications can be, but are not limited to, buildings, bridges, sign support structures, driven pipe piles, and any other application that requires the strength and beauty of HSS.

1.4. Material Composition

Steel HSS products are made of carbon steel with a small percentage of alloy elements included. The products do not contain any hazardous substances according to the Resource Conservation and Recovery Act (RCRA), Subtitle 3. The products do not release dangerous substances to the environment, including indoor air emissions, gamma or ionizing radiation, or chemicals released to air or leached to water and soil.

1.5. Declaration of Methodological Framework

This LCA uses an attributional approach.

1.6. Manufacturing

Hollow structural sections are manufactured by cold-forming steel coil into tubes. Hot-rolled coil is first slit into sections of appropriate width. The narrower coils are then uncoiled and passed through a series of rollers that form the continuous sheet into tubes. Tube cross-sections can be square, rectangular, or round. The two edges of the coil are welded together via an electric arc resistance welding process and product is then cut to length. Once manufactured, HSS can be powder coated or primed, or left uncoated. The tubes are subsequently packaged for shipment.

The primary input into HSS production is the steel itself, although small amounts of process materials are needed.

Electricity is used for manufacturing and to move the materials. Manufacturing produces some metal scrap. This scrap is recycled by an external recycler.

Fabrication requires 1.08 metric tons of HSS per 1 metric ton of fabricated product (AISC & STI, 2022). A1 includes production of all 1.08 metric tons of HSS, A2 represents transportation to the fabrication facility, and A3 represents the fabrication activities.

1.7. Packaging

Atlas Tube HSS are packaged and shipped using wood dunnage, steel strapping, and plastic film.

As required per ISO 21930 and the Part A PCR, information on packaging is provided to specify the end-of-life scenarios used for packaging or to support development of the end-of-life scenarios for packaging at the construction works level where the A5 module is not declared. These data are provided in the table below per metric ton of fabricated HSS.

Table 1. Packaging Waste Details for A5 Scenario Development

PACKAGING WASTE	VALUE	UNIT
Plastic Packaging Waste to Landfill	6.40E-01	kg
Plastic Packaging Waste to Incineration	1.56E-01	kg
Plastic Packaging Waste to Recycling	1.25E-01	kg
Steel Packaging Waste to Landfill	2.61E-01	kg
Steel Packaging Waste to Incineration	6.13E-02	kg
Steel Packaging Waste to Recycling	9.05E-01	kg
Wood Packaging Waste to Landfill	2.51E+00	kg
Wood Packaging Waste to Incineration	6.09E-01	kg
Wood Packaging Waste to Recycling	1.14E+00	kg

1.8. Transportation

Transportation distances from suppliers to Atlas Tube sites in A1 were calculated based on the supplier location and the location of manufacturing and modeled using primary data on the mode of transport.

Transportation from the HSS producers to the fabricator (A2) is included in the analysis and comes from the American Institute of Steel Construction (AISC) and Steel Tube Institute (STI) EPD for fabricated HSS (AISC & STI, 2022).

1.9. Product Installation

Because the declared system boundary is A1-A3, product Installation is not declared in this EPD.

1.10. Use

Because the declared system boundary is A1-A3, use of product is not declared in this EPD.

1.11. Reference Service Life and Estimated Building Service Life

Because the declared system boundary is A1-A3, a reference service life is not declared.

1.12. Reuse, Recycling, and Energy Recovery

Because the declared system boundary is A1-A3, reuse, recyling and energy recovery of product is not declared in this EPD.

1.13. Disposal

Because the declared system boundary is A1-A3, disposal of the product is not declared in this EPD.

2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

The declared unit of calculation is one metric ton of fabricated HSS (1,000 kg).

Table 2. Functional Unit

NAME	VALUE	UNIT
Declared Unit	1	metric ton
Density	7,850	kg/m^3

2.2. System Boundary

The declared system boundary is cradle-to-gate. This includes the PCR life cycle modules A1, A2, and A3. Module A1 represents cradle-to-gate impacts for unfabricated HSS, including raw material supply, transport of raw materials to Atlas Tube, and manufacturing of HSS by Atlas Tube. Module A2 represents transport of unfabricated HSS to fabricators, and module A3 represents fabrication of HSS. The declared system boundaries are shown in Table 3.

2.3. Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The primary energy and ancillary material data were collected as annual totals including all utility usage and production information. For the LCA, the energy and ancillary usage information was divided by the production to use per metric ton.

Assumptions and limitations to the study have been identified as follows:

- Supplier EPDs utilized in this LCA reported all LCA results as site-specific values. In the case of some suppliers, results for resource use indicators and waste and output flows are reported as production weighted-average results over multiple mills. The site-weighted average results are used in this LCA's results since they are the best data available.

- In absence of primary data, industry average results from the AISC & STI EPD for Fabricated HSS were used to represent impacts of transport to fabrication (A2) and fabrication (A3) portions of the life cycle.
- Steel scrap generated in production is accounted for in A1 (raw materials) and A2 (transportation of raw materials), where impacts are modeled for sourcing and transporting the materials that are lost in production.
- Availability of geographically more accurate background LCI datasets would have improved the accuracy of the study.
- Since this LCA uses the cut-off approach to model recycled material in the product, no credit is given to the product system. Instead, the manufacturer realizes reduced environmental impacts through the absence of the burden of extracting virgin material.
- Only known and quantifiable environmental impacts are considered.
- Due to the assumptions and value choices listed above, these do not reflect real-life scenarios and hence they cannot assess actual and exact impacts, but only potential environmental impacts.

2.4. Cut-off Criteria

Input and output flows of mass and energy greater than 1% (based on total mass final product and total energy usage of the product system) or greater than 1% of environmental impacts were included within the scope of analysis. Flows less than 1% were included if sufficient data were available to warrant inclusion and/or the flow was thought to have significant environmental impact. Cumulative excluded flows and environmental impacts are less than 5% per module based on total mass, energy usage, and impacts of the product system. Where data gaps were identified, they are filled by conservative assumptions with average, generic, or proxy data and assumptions are documented. No known flows relevant to the product system are deliberately excluded from this LCA and EPD. Some material inputs may have been excluded within the MLC datasets used for this project. All MLC datasets have been critically reviewed and conform to the exclusion requirement of the PCR, Part A: "Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report."

2.5. Data Sources

Primary data were collected by facility personnel and from utility bills and were used for all manufacturing processes for fiscal year 2022, defined as October 2021 to September 2022. Whenever available, supplier data were used for raw materials used in the production process. Supplier EPDs were utilized for steel coils purchased by Atlas Tube, when available. When primary data do not exist, secondary data for raw material production were utilized from the AISI industry average dataset for hot rolled coil in North America (AISI, 2020). Secondary data for HSS manufacturing energy and materials were sourced from Sphera Managed LCA Content (fka GaBi) Database 2024.1. LCA results for transport to fabricators (A2) and fabrication (A3) were taken from the AISC & STI EPD for fabricated HSS. This data in this EPD represents fabrication activity in 2019 and 2020, intended to represent production in 2020.

2.6. Data Quality

The geographical scope of the HSS manufacturing portion of the life cycle is North America. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered very good.

The primary data provided by Atlas Tube represents all information for October 2021 to September 2022. Using this data meets the PCR requirements. Time coverage of this data is considered very good. Primary data provided by Atlas Tube are specific to technology used in manufacturing their product. They are site-specific and considered of good quality.

Supplier EPDs were utilized for representing steel coil production, where available. This data represents the technology specific to the suppliers and technological representativeness of this data is considered very good. This data represents the site-specific results for the suppliers and geographic coverage of this data is considered very good. Time coverage of EPDs ranges from 2019 to 2022 and is considered of very good quality. Supplier EPD consistency is considered good. A majority of steel supplier EPDs reported product- and site-specific results for LCIA impact categories. Supplier EPDs used consistent PCRs and LCIA methodologies for global warming potential (IPCC AR5 GWP_{100}) and other LCA impact categories (TRACI, with CML 2001-2016 for ADP_{fossil}). However, the LCA modeling software and databases used were not consistent across all supplier EPDs. For a majority of the steel supply, supplier EPD results were modeled in LCA FE using MLC datasets. A minority of EPD results were modeled in SimaPro using ecoinvent datasets or modeled in OpenLCA using ecoinvent datasets. Use of consistent LCA software and background LCA data would improve the consistency of this LCA.

When supplier EPDs were not available, this study utilized the AISI industry average dataset for hot rolled coil produced in North America (AISI, 2020). This dataset represents industry average production for 2017 in the relevant region. In absence of supplier data, time, technological, and geographical coverage of this data is considered good.

Secondary data for transport to fabricators and fabrication from AISC & STI represent fabrication activities in 2019. It represents industry average technology in the relevant region. In absence of primary fabrication data, technological and geographical coverage of this data is considered good.

It is worth noting that the electricity, water, and thermal energy used in HSS manufacturing the product includes overhead energy such as lighting and heating. Sub-metering would improve the technological coverage of data quality. Data necessary to model cradle-to-gate unit processes were sourced from Sphera Managed LCA Content (fka GaBi) datasets and critically reviewed LCAs.

2.7. Period under Review

Period under review is Atlas Tube's 2022 fiscal year, defined as October 2021 to September 2022.

2.8. Allocation

General principles of allocation were based on ISO 14040/44. Where possible, allocation was avoided. No co-product allocation was applied to the primary manufacturing data. As a default, Sphera Managed LCA Content datasets use a physical mass basis for allocation.

For fabrication, allocation based on shop hours was used to separate the manufacturing of fabricated structural steel from that of fabricated non-structural steel, according to the AISC & STI industry average EPD.

Of relevance to the defined system boundary is the method in which recycled materials were handled. Throughout the study recycled materials were accounted for via the cut-off method. Under this method, impacts and benefits associated with the previous life of a raw material from recycled stock are excluded from the system boundary. Additionally, impacts and benefits associated with secondary functions of materials at end of life are also excluded (i.e., production into a third life or energy generation from the incineration plant). The study does include the impacts associated with reprocessing and preparation of recycled materials that are part of the bill of materials of the products under study.

3. Life Cycle Assessment Results

Table 3. Description of the system boundary modules

PRODUCT STAGE			CONSTRUCT-ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE 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	Building Operational Energy Use During Product Use	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	MND	MND	MND	MND	MND

X=module is declared, MND=module not declared

3.1. Life Cycle Impact Assessment Results – Fabricated HSS

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. These six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.

Table 4. North American Impact Assessment Results: 1 metric ton of Fabricated HSS

TRACI, IPCC AR5 GWP_{100}, AND CML 2001-2016	A1	A2	A3	A1-A3
GWP [kg CO_2 eq]	1.78E+03	4.46E+01	9.67E+01	**1.92E+03**
ODP [kg CFC 11 eq]	8.57E-06	8.67E-14	1.62E-09	**8.57E-06**
AP [kg SO_2 eq]	4.41E+00	1.83E-01	1.52E-01	**4.74E+00**
EP [kg N eq]	1.62E+00	1.64E-02	1.23E-02	**1.65E+00**
SFP [kg O_3 eq]	6.90E+01	4.44E+00	2.23E+00	**7.57E+01**
ADP_{fossil} [MJ, LHV]	1.77E+04	7.16E+01	1.04E+02	**1.79E+04**

Comparability: 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. 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.

3.2. Life Cycle Inventory Results – Fabricated HSS

Table 5. Resource Use: 1 metric ton of Fabricated HSS

PARAMETER	A1	A2	A3	A1-A3
RPR_E [MJ, LHV]	1.03E+03	6.24E+01	2.16E+02	**1.31E+03**
RPR_M [MJ, LHV]	8.70E+01	0.00E+00	0.00E+00	**8.70E+01**
$NRPR_E$ [MJ, LHV]	2.27E+04	6.91E+02	1.47E+03	**2.49E+04**
$NRPR_M$ [MJ, LHV]	2.27E+01	0.00E+00	1.26E+01	**3.53E+01**
SM [kg]	6.62E+02	0.00E+00	7.62E-01	**6.63E+02**
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
RE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
FW [m^3]	1.12E+01	1.81E-01	6.82E-01	**1.21E+01**

Table 6. Output Flows and Waste Categories: 1 metric ton of Fabricated HSS

PARAMETER	A1	A2	A3	A1-A3
HWD [kg]	0.00E+00	0.00E+00	3.32E-01	**3.32E-01**
NHWD [kg]	3.07E+00	0.00E+00	9.66E+00	**1.27E+01**
HLRW [kg]	6.64E-04	3.16E-05	1.18E-04	**8.13E-04**
ILLRW [kg]	5.55E-01	2.64E-02	9.85E-02	**6.80E-01**
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
MR [kg]	7.10E+01	0.00E+00	7.71E+01	**1.48E+02**
MER [kg]	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
EEE [MJ, LHV]	3.70E-01	0.00E+00	0.00E+00	**3.70E-01**
EET [MJ, LHV]	1.74E-01	0.00E+00	0.00E+00	**1.74E-01**

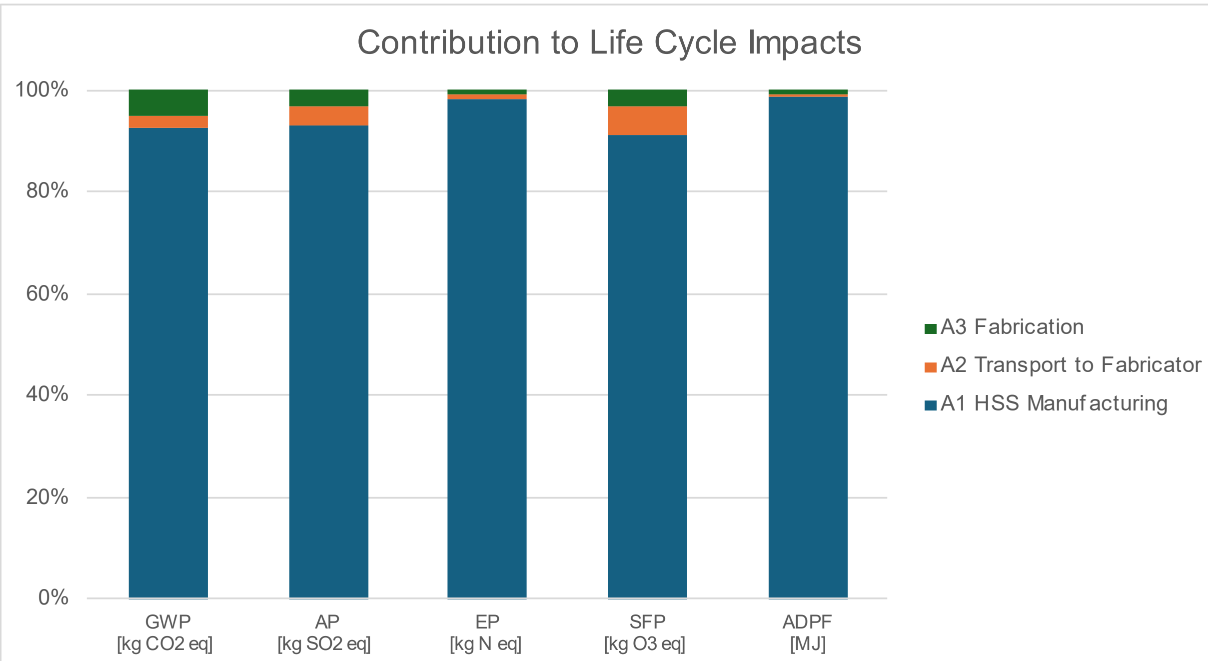
3.3. Life Cycle Impact Assessment Results – Unfabricated HSS

Table 7. Cradle-to-Gate Global Warming Potential (GWP): 1 metric ton of Unfabricated HSS

IPCC AR5 GWP_{100}	CRADLE-TO-GATE, MILL PRODUCT
GWP [kg CO_2 eq]	1.64E+03

4. Life Cycle Assessment Interpretation

For all the impact categories, steel coil production (A1) has the highest contribution, 91% or more, to cradle-to-gate impacts, except for ozone depletion potential (ODP). Transportation of HSS to fabricators (A2) and HSS fabrication (A3) each contribute contributes less than 10% to all impact categories.



5. Additional Environmental Information

5.1. Environment and Health During Manufacturing

Atlas Tube maintains an SDS of the product which contains specific Environmental, Health and Safety information of finished goods as it relates to local and international regulations. An SDS database is a centralized location in which recommended handling and regulatory exposure limits and recommended control measures can be found.

Atlas Tube always implements compliance focused measures with regulatory requirements in mind. A proactive compliance approach is used as a guidance tool at all Atlas Tube facilities. Each facility is accountable and held to a proactive compliance standard.

5.2. Environmental Activities and Certifications

Waste/Recycling: Atlas Tube facilities generate very little hazardous waste streams. All locations are classified as being a small quantity generator or very small quantity generator. Where feasible, Atlas Tube recycles what would otherwise be deemed a waste, with a goal of diverting wastes from landfill. All facilities have a procedure in place to extend the life expectancy of coolant minimizing overall generated industrial waste while reducing the introduction of virgin coolant.

Contaminants are continuously removed from the process allowing coolants to be reused in a closed loop system for an extended period of time.

Emissions: The process at Atlas Tube generates minimal air emissions. Rust inhibitors used are generally water based with a very low organics content. All cleaners are either water based or federally exempt organic based materials.

Safety: Zekelman Industries understands that health and safety of its teammates are critical to the success of the organization and strives to provide a safe and healthy workplace that exceeds the most established health and safety standards. Our consistent improvements to safety and health are accomplished through the integration of safety in all teammates' daily duties and responsibilities. This has resulted in a sustainable level of safety, engagement, empowerment, and accountability throughout the organization.

6. References

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