

ALGOMA STEEL INC.

VERIFIED by SCS Global Services
ENVIRONMENTAL PRODUCT DECLARATION
BASED ON LCA

**Declaration Owner**

Algoma Steel, Inc.
105 West Street
Sault Ste. Marie, ON P6A 7B4
www.algoma.com | +1 705-945-2351

**Product**

Heat treated Steel Plate

**Declared Unit**

The declared unit is one metric ton of heat treated steel plate

**EPD Number and Period of Validity**

SCS-EPD-10487
EPD Valid August 26, 2025 through August 25, 2030

**Product Category Rule**

PCR Guidance for Version 4.0. UL Environment. March 2022

PCR Guidance for Building-Related Products and Services. Part B: Designated Steel Construction Product EPD Requirements. UL Environment. V.2. August 2020.

**Program Operator**

SCS Global Services
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SCSglobal SERVICES

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|---|---|
| Declaration Owner: | Algoma Steel Inc. |
| Address: | 105 West Street, Sault Ste. Marie, ON P6A 7B4 |
| Declaration Number: | SCS-EPD-10487 |
| Declaration Validity Period: | EPD Valid August 26, 2025 through August 25, 2030 |
| Program Operator: | SCS Global Services |
| General Program Instructions and Version: | SCS Type III Environmental Declaration Program: Program Operator Manual v12.0. December 2023. |
| Declaration URL Link: | https://www.scsglobalservices.com/certified-green-products-guide |
| LCA Practitioner: | Tess Garvey, Ph.D., SCS Global Services |
| LCA Software and LCI database: | OpenLCA v2.5.0.software and the Ecoinvent v3.11 database |
| Product RSL: | n/a |
| Markets of Applicability: | Global |
| EPD Type: | Product-Specific |
| EPD Scope: | Cradle-to-Gate |
| LCIA Method and Version: | TRACI 2.1 and IPCC AR5 |
| Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071 | ☐ internal ☒ external |
| LCA Reviewer: | Lindita Bushi, PhD, Athena Sustainable Materials Institute |
| Part A Product Category Rule: | PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. UL Environment. Version 4.0. March 2022 |
| PCR Review conducted by: | Lindita Bushi, PhD (Chair); Hugues Imbeault-Tétreault, ing., M.Sc.A.; Jack Geibig |
| Part B Product Category Rule: | PCR Guidance for Building-Related Products and Services. Part B: Designated Steel Construction Product EPD Requirements. UL Environment. V.2. August 2020. |
| PCR Review conducted by: | Thomas Gloria, PhD; Brandie Sebastian, James Littlefield |
| Independent verification of the declaration and data, according to ISO 14025 and the PCR | ☐ internal ☒ external |
| EPD Verifier: | Lindita Bushi, PhD, Athena Sustainable Materials Institute |
| Declaration Contents: |  |

***Disclaimers:*** *This EPD conforms to ISO 14025, 14040, 14044, and ISO 21930.*

***Scope of Results Reported:*** *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

***Accuracy of Results:*** *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

***Comparability:*** *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

*In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.*

*The owner of the declaration shall be liable for the underlying information and evidence; SCS shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence supplied or made available to SCS.*

# 1. Algoma Steel, Inc.

With over a century of experience, Algoma Steel has established itself as a trusted partner with their long-running commitment to innovation by investing in the latest technologies in steel production. A proud supplier of high-quality, Canadian-made steel, Algoma's Sault Ste. Marie, Ontario facility supports local jobs and infrastructure with durability tailored to North America's climate. The location's fully integrated production of hot and cold-rolled steel sheet and plate products enables responsive and customer-driven product solutions for a wide range of industries including automotive, construction, energy, and defense.

# 2. Product

### 2.1 PRODUCT DESCRIPTION

Algoma's heat treated plates are engineered for industries requiring high strength, toughness, and wear resistance. Through controlled heat treatment processes like normalizing (refining grain structure), quenching and tempering (for balanced hardness and toughness) these plates achieve optimal strength, impact resistance, and dimensional precision.

**Table 1.** *Declared unit for Algoma Heat treated Steel Plate and the approximate density.*

| Parameter | Value |
|---|---|
| Declared Unit | 1 metric ton |
| Density | 7,850 kg/m$^3$ |

**Figure 1.** *Steel production at Algoma Steel..*

### 2.2 PRODUCT FLOW DIAGRAM

The flow diagram below illustrates the production processes, and the life cycle phases included in the scope of the EPD.

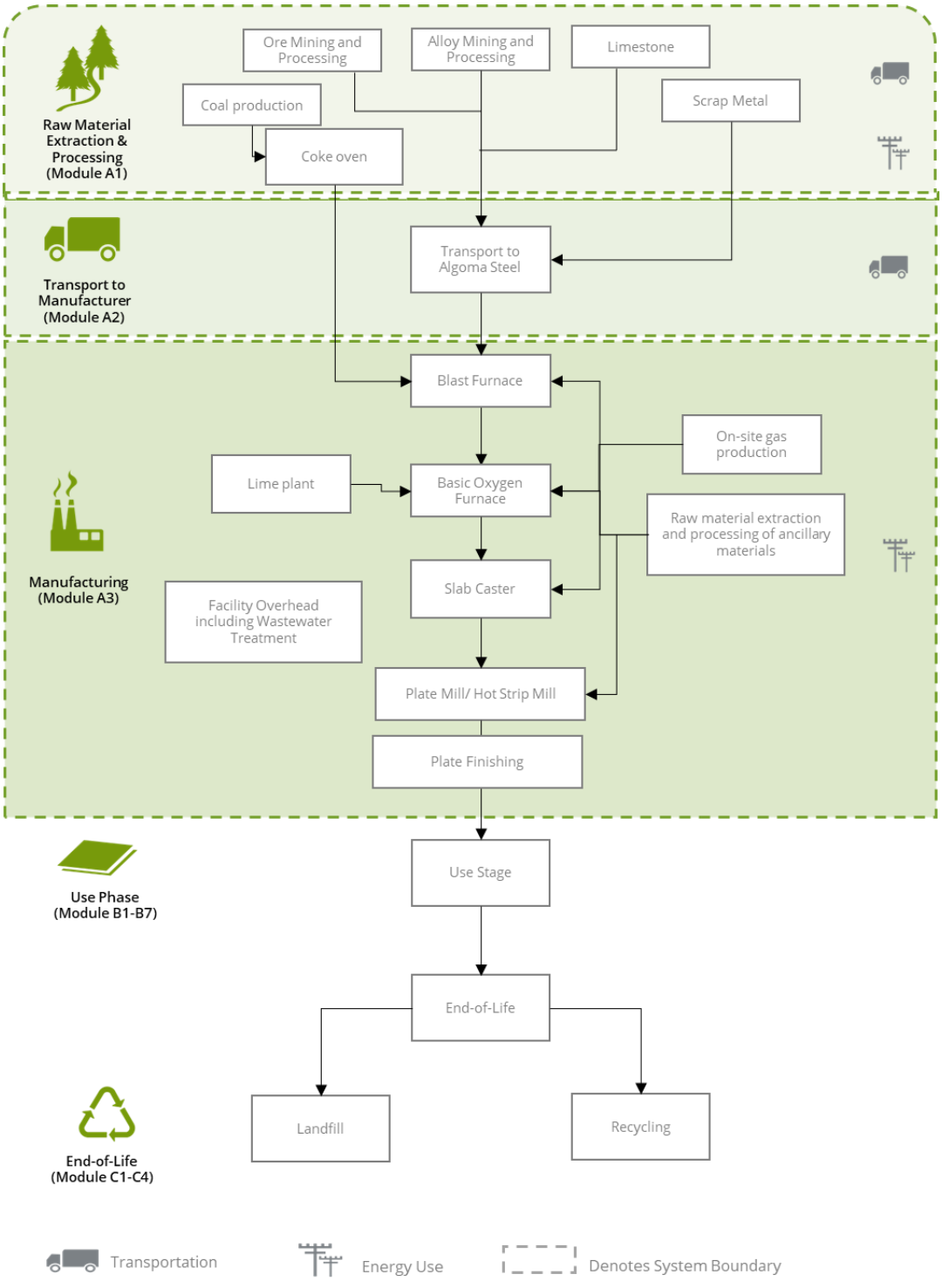


**Figure 2.** *Flow diagram for the life cycle of the Algoma Heat treated Steel Plate.*

### 2.3 INTENDED APPLICATION

Algoma's heat treated steel plates can be used for a variety of intended applications including heavy equipment and agriculture, mining and construction equipment, military armor, industrial equipment, trailers and infrastructure. Examples of uses have included, among others, earth moving machinery, crushers for mining, dump boxes, armored vehicles, and hauling trucks.

### 2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-gate, including raw material extraction and processing, transportation, and product manufacture. The life cycle phases included in the product system boundary are shown below. Cut-off and allocation procedures are described below and conform to the PCR and ISO standards.

**Table 2.** *Life cycle phases included in the product system boundary.*

| Product | | | Construction Process | | Use | | | | | | | End-of-life | | | | 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 extraction and processing | Transport to manufacturer | Manufacturing | Transport | Construction - installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction demolition | Transport | Waste processing | Disposal | Reuse, recovery and/or recycling potential |
| X | X | X | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

X = Module Included | MND = Module Not Declared

### 2.5 TECHNICAL DATA

A summary of technical specifications for the Heat treated steel plates include those listed in Table 3.

**Table 3.** *Technical specifications for Heat treated steel plates*

| Product | ASTM Standards | Sub-Product (SAE 1006 and 1008 Steel) | Range of Nominal Gauges in (mm) | Maximum Width in (mm) |
|---|---|---|---|---|
| Heat treated Plate | A1018, A656, A514 | Algoma 100 | 0.25 (6.35) – 2.75 (70) | 154 (3,912) |
| Heat treated Plate | A1018, A656, A514 | Algoma 130 | 0.25 (6.35) – 2.5 (65) | 154 (3,912) |
| Heat treated Plate | A1018, A656, A514 | AlgoWear 400 | 0.25 (6.35) – 0.79 (20) | 154 (3,912) |
| Heat treated Plate | A1018, A656, A514 | AlgoTuf 400 | 0.25 (6.35) – 2.75 (70) | 154 (3,912) |
| Heat treated Plate | A1018, A656, A514 | AlgoTuf 450F | 0.25 (6.35) – 2.5 (65) | 154 (3,912) |
| Heat treated Plate | A1018, A656, A514 | AlgoTuf 500 | 0.25 (6.35) – 1.25 (31.8) | 154 (3,912) |
| Heat treated Plate | A1018, A656, A514 | Armour Plate | 0.24 (6) – 1.25 (31.8) | 154 (3,912) |

### 2.6 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

Algoma Heat treated steel plates are custom-made for every project and are delivered in a variety of sizes-widths.

### 2.7 MATERIAL COMPOSITION

The steel is made from virgin iron ore, secondary materials, and an alloy content lower than 5%. The material composition in the year of data modeled were 73.6% primary iron, 8.4% external recycled material, 13.3% internally-produced scrap and secondary material, 3.1% cold pig iron, and 1.6% alloy materials.
Under normal conditions Algoma Heat treated steel plate does not present inhalation, ingestion, or contact health hazards including but not limited to indoor air emissions, gamma or ionizing radiation emissions, or chemicals released to air or leached to water or soil. However, operations such as welding, grinding, sawing and burning, which may cause airborne particulates or fume formation, may present a health hazard.

In conformance with the PCR, product materials were reviewed for the presence of any toxic or hazardous chemicals. Based on a review of the product components provided by the manufacturer, no regulated chemicals are expected to be released to the environment.

### 2.8 MANUFACTURING

The processes in scope for this study at the Sault Ste. Marie, Ontario  Algoma facility consist of one blast furnace, a basic oxygen furnace, and a direct strip production complex. Electricity and steam are produced on-site and are used throughout the Algoma facilities, A lime plant operates to process limestone into high quality lime products used within the steelmaking operations. Additionally, wastewater treatment operations occur on-site. Primary data was collected from Algoma for all production processes from a collection period spanning January 1st, 2022, to December 31, 2022.

The electricity mix for each of the Algoma Steel operations and facilities are modeled using the data collected for the powerhouse, which produces steam and electricity from blast furnace gas, coke oven gas, grid electricity and natural gas. The grid electricity used in the Powerhouse is modeled using the province-specific Ecoinvent electricity grid for Canada (Ontario). No CO2 certificates are included in this LCA.

### 2.9 FURTHER INFORMATION

Further information on the product can be found on the manufacturer's website: www.algoma.com


**Figure 3.** *Algoma Steel Plates.*

# 3. LCA: Calculation Rules

### 3.1 DECLARED UNIT

The declared unit used in the study is one (1) metric ton of steel heat treated plate, consistent with the PCR.

The heat treated steel plate produced by Algoma are custom-made products for specific projects, and therefore, the raw material composition may change depending on the project. An average product is modeled, representing one metric ton of steel heat treated plate.

### 3.2 SYSTEM BOUNDARY

The scope of the EPD is cradle-to-gate, including raw material extraction and processing, transportation, and product manufacture. The construction process stage, use stage, end-of-life stage, and Module D of the product are excluded from the system boundaries of this study. Additional elements that are excluded from the study are capital equipment and infrastructure. The life cycle phases included in the EPD scope are described in Table 4.

**Table 4.** *The modules and unit processes included in the scope for Heat Treated Steel Plates.*

| Module | Module Description | Unit Processes Included in Scope |
|---|---|---|
| A1 | Extraction and processing of raw materials; any reuse of products or materials from previous product systems; processing of secondary materials; generation of electricity from primary energy resources; energy, or other, recovery processes from secondary fuels | Raw material extraction and processing for the raw materials upstream of the Algoma facility.<br><br>Ore mining and processing, alloy mining and processing, limestone processing and coal production are included in scope of this study. |
| A2 | Transport (to the manufacturer) | Transportation of component materials from upstream manufacture to the Algoma facility in Sault Ste. Marie, Ontario. |
| A3 | Manufacturing, including packaging and ancillary material production | Manufacture and fabrication at the Algoma facility in Sault Ste. Marie, Ontario for the Heat treated steel plates, ancillary materials, lime production, on-site electricity production and waste water treatment. |
| A4 | Transport (to the building site) | Module Not Declared |
| A5 | Construction-installation process | Module Not Declared |
| B1 | Product use | Module Not Declared |
| B2 | Product maintenance | Module Not Declared |
| B3 | Product repair | Module Not Declared |
| B4 | Product replacement | Module Not Declared |
| B5 | Product refurbishment | Module Not Declared |
| B6 | Operational energy use by technical building systems | Module Not Declared |
| B7 | Operational water uses by technical building systems | Module Not Declared |
| C1 | Deconstruction, demolition | Module Not Declared |
| C2 | Transport (to waste processing) | Module Not Declared |
| C3 | Waste processing for reuse, recovery and/or recycling | Module Not Declared |
| C4 | Disposal | Module Not Declared |
| D | Reuse-recovery-recycling potential | Module Not Declared |

### 3.3 UNITS

All data and results are presented using SI units.

### 3.4 ESTIMATES AND ASSUMPTIONS

The assessment relied on several assumptions. The major assumptions used in the assessment are described below.

- The hot strip mill for products other than plate was included in the production for 2022, while the hot strip mill is currently only operational for plate products.
- Compressed air production is produced on-site, and electricity used by compressors is modeled and allocated to compressed air used within the steel mills.
- A third-party operates gas production (argon, nitrogen and oxygen) on-site at Algoma. The electricity use for gas production was provided, as well as the the production and distribution of gases within the Algoma processes. Electricity use was allocated to the gas production based on volume.
- Water use and Wastewater treatment was allocated to the overhead of the facility, as it was not possible to separate out between processes on-site.
- For purchased electricity from the grid, the Ecoinvent dataset for electricity from the respective Canadian province, Ontario, was selected and use. This grid mix is based upon statistics from the Government of Canada - Statistics Canada (StatCAN) for 2022 .
- Disposal of some manufacturing wastes were modeled within overhead.

### 3.5 CUT-OFF RULES

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results. No known flows are deliberately excluded from this EPD.

### 3.6 DATA SOURCES

Primary data were provided by Algoma for their manufacturing facility in Sault Ste. Marie, Ontario. The sources of secondary LCI data are the Ecoinvent database.

**Table 5.** *LCI datasets and associated databases used to model raw material processing, transport and product manufacturing for the Algoma Heat Treated Steel Plates.*

| Flow | Dataset | Data Source | Publication Date |
|---|---|---|---|
| **Raw Materials** | | | |
| **Blast furnace** | | | |
| Internal Coke | Algoma coke oven model | -- | -- |
| External coke | coke production \| coke \| Cutoff, U - US | Ecoinvent 3.11 | 2024 |
| Iron pellet | iron pellet production \| iron pellet \| Cutoff, U – RoW | Ecoinvent 3.11 | 2024 |
| Limestone (external) | market for limestone, milled, loose \| limestone, milled, loose \| Cutoff, U - RoW | Ecoinvent 3.11 | 2024 |
| Natural gas (raw material) | market for natural gas, high pressure \| natural gas, high pressure \| Cutoff, U - CA | Ecoinvent 3.11 | 2024 |
| **Basic oxygen furnace/ Alloys** | | | |
| Copper | market for copper, cathode \| copper, cathode \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Ferroboron | boric oxide production \| boric oxide \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Ferrochrome | ferrochromium production, high-carbon, 68% Cr \| ferrochromium, high-carbon, 68% Cr \| Cutoff, U - RoW | Ecoinvent 3.11 | 2024 |
| Ferromanganese | ferromanganese production, high-coal, 74.5% Mn \| ferromanganese, high-coal, 74.5% Mn \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Manganese | manganese production \| manganese \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Ferroniobium | market for ferroniobium, 66% Nb \| ferroniobium, 66% Nb \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Ferrosilicon | market for ferrosilicon \| ferrosilicon \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |

| Flow | Dataset | Data Source | Publication Date |
|---|---|---|---|
| Ferromolybdenum | market for molybdenum trioxide \| molybdenum trioxide \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Nickel | market for nickel, class 1 \| nickel, class 1 \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Ferrotitanium | titanium production \| titanium \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Primary aluminum | market for aluminium, primary, ingot \| aluminium, primary, ingot \| Cutoff, U - IAI Area, North America | Ecoinvent 3.11 | 2024 |
| Calcium carbide | calcium carbide production, technical grade \| calcium carbide, technical grade \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| External scrap | sorting and pressing of iron scrap \| iron scrap, sorted, pressed \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Ferrophosphorus | market for phosphoric acid, fertiliser grade, without water, in 70% solution state \| phosphoric acid, fertiliser grade, without water, in 70% solution state \| Cutoff, U - RoW | Ecoinvent 3.11 | 2024 |
| Quicklime | market for quicklime, milled, loose \| quicklime, milled, loose \| Cutoff, U - RoW | Ecoinvent 3.11 | 2024 |
| Dolomitic lime | dolomite production \| dolomite \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| **Lime plant** | | | |
| Dolomitic limestone | dolomite production \| dolomite \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Limestone | market for limestone, crushed, washed \| limestone, crushed, washed \| Cutoff, U - CH | Ecoinvent 3.11 | 2024 |
| Rock salt | sodium chloride production, brine solution \| sodium chloride, brine solution \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| *Additional ancillary materials as below* | | | |
| **Ancillary – Across Products** | | | |
| Gases- argon, nitrogen and oxygen | *Primary data : electricity production allocated to gas production* | -- | -- |
| Compressed air | Electricity use allocated to air compression | | |
| Refractory materials | market for refractory, basic, packed \| refractory, basic, packed \| Cutoff, U – GLO<br>market for refractory, high aluminium oxide, packed \| refractory, high aluminium oxide, packed \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Lubricating oils | lubricating oil production \| lubricating oil \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Various materials and chemicals based on SDS | sodium chloride production, brine solution \| sodium chloride, brine solution \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| | market for silica sand \| silica sand \| Cutoff, U – GLO<br>market for sand \| sand \| Cutoff, U - RoW | Ecoinvent 3.11 | 2024 |
| | market for sodium hydroxide, without water, in 50% solution state \| sodium hydroxide, without water, in 50% solution state \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| | market for bleach \| bleach \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| | market for phosphoric acid, fertiliser grade, without water, in 70% solution state \| phosphoric acid, fertiliser grade, without water, in 70% solution state \| Cutoff, U - RoW | Ecoinvent 3.11 | 2024 |
| | market for rape seed \| rape seed \| Cutoff, U - RoW | Ecoinvent 3.11 | 2024 |
| | hard coal mine operation and hard coal preparation \| hard coal \| Cutoff, U - RNA | Ecoinvent 3.11 | 2024 |
| | market for diethylene glycol \| diethylene glycol \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| | market for organophosphorus-compound, unspecified \| organophosphorus-compound, unspecified \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| **DSPC** | | | |
| Mold powder | magnesium oxide production \| magnesium oxide \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Tundish powder | soda production, solvay process \| soda ash, light \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| *Refractories, phosphoric acid, sodium hydroxide, lubricating oil, etc. as above* | | | |
| **Cold Mill** | | | |
| Hydrochloric acid | market for hydrochloric acid, without water, in 30% solution state \| hydrochloric acid, without water, in 30% solution state \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Soda ash | soda production, solvay process \| soda ash, light \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Various chemicals, based on SDS | chlorine production, liquid \| chlorine, liquid \| Cutoff, U – RER<br>citric acid production \| citric acid \| Cutoff, S – RNA<br>market for potassium hydroxide \| potassium hydroxide \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| *Additional ancillary materials as above* | | | |
| **Plate Mill** | | | |

| Flow | Dataset | Data Source | Publication Date |
|---|---|---|---|
| Hardwood packaging | board, hardwood, raw, kiln drying to u=10% \| sawnwood, board, hardwood, raw, dried (u=10%) \| Cutoff, U - Europe without Switzerland | Ecoinvent 3.11 | 2024 |
| **Plate Finishing Mill** | | | |
| Acetylene | acetylene production \| acetylene \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Mortar | light mortar production \| light mortar \| Cutoff, U - CH | Ecoinvent 3.11 | 2024 |
| Hardwood | board, hardwood, raw, kiln drying to u=10% \| sawnwood, board, hardwood, raw, dried (u=10%) \| Cutoff, U - Europe without Switzerland | Ecoinvent 3.11 | 2024 |
| softwood | market for sawnwood, board, softwood, raw, dried (u=20%) \| sawnwood, board, softwood, raw, dried (u=20%) \| Cutoff, U - Europe without Switzerland | Ecoinvent 3.11 | 2024 |
| **Fuels (Across Operations)** | | | |
| Electricity and Steam from Powerhouse | market for electricity, medium voltage \| electricity, medium voltage \| Cutoff, U - CA-ON<br><br>market for natural gas, high pressure \| natural gas, high pressure \| Cutoff, U – CA<br><br>*Air emissions per primary data.*<br><br>*Blast furnace and coke oven gas per primary data* | Ecoinvent 3.11 | 2024 |
| Natural gas | market for natural gas, high pressure \| natural gas, high pressure \| Cutoff, U - CA | Ecoinvent 3.11 | 2024 |
| Diesel | diesel, burned in building machine \| diesel, burned in building machine \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Gasoline | petrol, unleaded, burned in machinery \| petrol, unleaded, burned in machinery \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Propane | propane, burned in building machine \| propane, burned in building machine \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| **Transportation** | | | |
| Rail | market for transport, freight, train, fleet average \| transport, freight, train, fleet average \| Cutoff, U - US | Ecoinvent 3.11 | 2024 |
| Road | transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 \| transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| Inland water transport | transport, freight, inland waterways, barge, diesel \| transport, freight, inland waterways, barge, diesel \| Cutoff, U - RER | Ecoinvent 3.11 | 2024 |
| **Wastewater treatment - ancillary materials** | | | |
| Carbon dioxide | market for carbon dioxide, liquid \| carbon dioxide, liquid \| Cutoff, U – RER | Ecoinvent 3.11 | 2024 |
| WWTP – gravel | market for gravel, round \| gravel, round \| Cutoff, U - CH | Ecoinvent 3.11 | 2024 |
| Chemical - Based on SDS | market for isopropanol \| isopropanol \| Cutoff, U - RER<br>market for naphtha \| naphtha \| Cutoff, U - RER | Ecoinvent 3.11<br>Ecoinvent 3.11 | 2024<br>2024 |
| Fine salt | market for salt \| salt \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| **Waste treatment** | | | |
| Landfill general | process-specific burdens, inert material landfill \| process-specific burdens, inert material landfill \| Cutoff, U - RoW | Ecoinvent 3.11 | 2024 |
| Dust treatment | treatment of basic oxygen furnace dust, residual material landfill \| basic oxygen furnace dust \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Sludge treatment | treatment of basic oxygen furnace sludge, residual material landfill \| basic oxygen furnace sludge \| Cutoff, U - GLO | Ecoinvent 3.11 | 2024 |
| Waste pickle liquor | market for waste mineral oil \| waste mineral oil \| Cutoff, U - Europe without Switzerland | Ecoinvent 3.11 | 2024 |

### 3.7 DATA QUALITY

The data quality assessment addresses the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

**Table 6.** *Data quality assessment for the product system.*

| Data Quality Parameter | Data Quality Discussion |
|---|---|
| **Time-Related Coverage:** Age of data and the minimum length of time over which data is collected | The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 10 years old (typically 2019 or more recent). All of the data used represented an average of at least one year's worth of data collection. Manufacturer-supplied data (primary data) is based on a full year of operations at the Algoma facility from January 1, 2022 - December 31, 2022. |
| **Geographical Coverage:** Geographical area from which data for unit processes is collected to satisfy the goal of the study | The data used in the analysis provide the best possible representation available with current data. Actual processes for upstream operations are primarily North American. Surrogate data used in the assessment are representative of North American operations. Data representative of European operations are considered sufficiently similar to actual processes. Data representing disposal practices are based on regional statistics. |
| **Technology Coverage:** Specific technology or technology mix | For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. |
| **Precision:** Measure of the variability of the data values for each data expressed | Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results. |
| **Completeness:** Percentage of flow that is measured or estimated | The LCA model included all known mass and energy flows for the production of heat treated steel plates. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded. |
| **Representativeness:** Qualitative assessment of the degree to which the data set reflects the true population of interest | Data used in the assessment represent typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction. For supplier information, the most representative source of data possible was chosen or modeled. |
| **Consistency:** Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis | The consistency of the assessment is considered to be high. Data sources of similar quality and age are used with a bias towards Ecoinvent v3.11 data.<br>Different portions of the product life cycle are equally considered; however, it must be noted that final disposition of the product is based on assumptions of current average practices in Europe and North America. |
| **Reproducibility:** Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study | Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners with access to the primary data. All assumptions, models, and data sources are documented. |
| **Sources of the Data:** Description of all primary and secondary data sources | Data representing energy use at the Algoma manufacturing facilities represent an annual average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. The Ecoinvent database is used for secondary LCI datasets. The other EPD data are also considered high quality due to the fact that they similarly span a full calendar year and are representative of the materials. |
| **Uncertainty of the Information:** Uncertainty related to data, models, and assumptions | Uncertainty related to materials in the products is low. Actual supplier data for upstream operations was not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years) but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points. |

### 3.8 PERIOD UNDER REVIEW

The period of review for the primary data is from January 1st, 2022, to December 31, 2022.

### 3.9 ALLOCATION

This study follows the allocation guidelines of ISO 14044 and allocation rules specified in the PCR and minimizes the use of allocation wherever possible. This LCA follows the attributional LCA approach.

Per the worldsteel allocation guidance, blast furnace slag and basic oxygen furnace slag are considered co-products within their respective processes. All other materials are considered by-products and not allocated any impacts. For the blast furnace and BOF processes, the slag is allocated a portion of the shared materials, resource use (e.g., electricity, natural gas, water), waste/byproducts, and emissions released, on based on the amount of energy required to heat steel and slag. The allocation factors were derived from actual slag production within the Algoma processes using the equations provided in the worldsteel guidance.

Elsewhere, primary data for resource use (e.g., electricity, natural gas, water), waste/byproducts, and emissions released are allocated on a mass basis as a fraction of total annual production of each steel product and co-products.

With respect to the steel scrap, the 100-0 recycled content approach is used in which the recycled material bears only the burden of any processing from waste material.

Transportation from the primary producer of material components to the manufacturing facility is based on primary data provided by Algoma, including modes, distances, and amount of material transported. Transportation was allocated on the basis of the mass and distance the material was transported.

### 3.10 COMPARABILITY

The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

## 4. LCA: Scenarios and Additional Technical Information

**Manufacturing**

This stage includes all the on-site steelmaking and processing steps including Blast Furnace, Basic Oxygen Furnace (BOF), the Slab Caster, the Plate Mill, and Plate Finishing. Other processes such as lime production and wastewater treatment are also included in scope. Production of capital goods, infrastructure, manufacturing equipment, and personnel-related activities are not included. The grid electricity used in is modeled using the province-specific Ecoinvent electricity grid for Canada (Ontario).

Transportation for waste materials at the manufacturing facility assumes a 20 miles (~32 km) average distance to disposal, consistent with assumptions used in the EPA WARM model. Based on statistics for solid waste generation and disposal in Canada, the model assumes 80% of non-hazardous wastes are disposed in landfill and 20% incinerated.

# 5. LCA: Results

Results of the Life Cycle Assessment are presented below. The following environmental impact category indicators are reported using characterization factors based on the TRACI 2.1, IPCC AR5 and CML-IA impact assessment methods  It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins, or risks.

All LCA results are stated to three significant figures in agreement with the PCR for this product, and therefore, the sum of the total values may not exactly equal 100%.

**Table 7.** *Nomenclature and reporting units for LCIA impact category indicators.*

| TRACI 2.1 Impact Category | Unit | IPCC AR5 | Unit |
|---|---|---|---|
| Global Warming Potential **(GWP)** | kg $CO_2$ eq | Global Warming Potential **(GWP)** | kg $CO_2$ eq |
| Ozone Depletion Potential **(ODP)** | kg CFC 11 eq | **CML-IA Impact Category** | **Unit** |
| Acidification Potential **(AP)** | kg $SO_2$ eq | Abiotic depletion potential **(ADP-fossil fuels)** for fossil resources | MJ, LHV |
| Eutrophication Potential **(EP)** | kg N eq | - | - |
| Smog Formation Potential **(SFP)** | kg $O_3$ eq | - | - |
| Fossil Fuel Depletion Potential **(FFD)** | MJ Surplus, LHV | - | - |

The following inventory parameters, specified by the PCR, are also reported.

**Table 8.** *Nomenclature and reporting units for resource use and waste flows.*

| Parameter | Units |
|---|---|
| **RESOURCES** | |
| Use of renewable primary resources used as an energy carrier ($RPR_E$) | MJ, LHV |
| Use of renewable primary resources used as material ($RPR_M$) | MJ, LHV |
| Non-renewable primary resources used as an energy carrier ($NRPR_E$) | MJ, LHV |
| Non-renewable primary resources used as material ($NRPR_M$) | MJ, LHV |
| Secondary materials (SM) | mt |
| Renewable secondary fuels (RSF) | MJ, LHV |
| Non-renewable secondary fuels (NRSF) | MJ, LHV |
| Recovered energy (RE) | MJ, LHV |
| Use of net freshwater resources (FW) | $m^3$ |
| **WASTES** | |
| Non-hazardous waste disposed (NHWD) | kg |
| Hazardous waste disposed (NWD) | kg |
| High-level radioactive waste (HLRW) | kg |
| Intermediate- and low-level radioactive waste (ILLRW) | kg |
| Components for re-use (CRU) | kg |
| Materials for recycling (MR) | kg |
| Materials for energy recovery (MER) | kg |
| Recovered energy exported from the product system (EE) | MJ, LHV |

**Table 9.** *Life Cycle Impact Assessment results by life cycle phase for the declared unit (metric ton) of Heat Treated Steel Plates. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

| Impact Category | Raw Materials (A1) | Upstream Transport (A2) | Manufacturing (A3) | Total (A1-A3) |
|---|---|---|---|---|
| **IPCC AR5** | | | | |
| Global Warming Potential (kg $CO_2$ eq) | 761 | 70.7 | 3,040 | 3,880 |
| | 20% | 2% | 79% | 100% |
| **TRACI 2.1** | | | | |
| Global Warming Potential (kg $CO_2$ eq) | 742 | 69.7 | 3,030 | 3,840 |
| | 19% | 2% | 79% | 100% |
| Ozone Depletion Potential (kg CFC-11 eq) | $1.93x10^{-5}$ | $1.15x10^{-6}$ | $8.35x10^{-6}$ | $2.88x10^{-5}$ |
| | 67% | 4% | 29% | 100% |
| Acidification Potential (kg $SO_2$ eq) | 3.12 | 0.565 | 4.29 | 7.97 |
| | 39% | 7% | 54% | 100% |
| Eutrophication Potential (kg N eq) | 0.771 | $6.51x10^{-3}$ | 0.0300 | 0.808 |
| | 95% | 1% | 4% | 100% |
| Smog Formation Potential (kg $O_3$ eq) | 43.1 | 16.2 | 58.3 | 118 |
| | 37% | 14% | 50% | 100% |
| Fossil Fuel Depletion (MJ surplus) | 997 | 121 | 2,470 | 3,590 |
| | 28% | 3% | 69% | 100% |
| **CML-IA** | | | | |
| Abiotic Depletion Potential, FF (MJ) | 18,200 | 872 | 15,100 | 34,200 |
| | 53% | 3% | 44% | 100% |

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.

**Table 10.** *Resource use and waste flows per declared unit (metric ton) for Heat Treated Steel Plates. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*

| Parameter | Raw Materials (A1) | Upstream Transport (A2) | Manufacturing (A3) | Total (A1-A3) |
|---|---|---|---|---|
| **RESOURCES** | | | | |
| Renewable primary resources used as energy carrier ($RPR_E$) (MJ) | 772 | 22.2 | 1,990 | 2,790 |
| | 28% | 1% | 72% | 100% |
| Renewable primary resources used as material ($RPR_M$) (MJ) | 0.00 | 0.00 | 0.00 | 0.00 |
| | N/A | N/A | N/A | N/A |
| Non-renewable primary resources used as an energy carrier ($NRPR_E$) (MJ) | 5,960 | 897 | 18,400 | 25,300 |
| | 24% | 4% | 73% | 100% |
| Non-renewable primary resources used as material ($NRPR_M$) (MJ) | 12,900 | 0.00 | 0.00 | 12,900 |
| | 100% | 0% | 0% | 100% |
| Secondary materials (SM) (metric ton) | 0.280 | 0.00 | 0.00 | 0.280 |
| | 100% | 0% | 0% | 100% |
| Renewable secondary fuels/ Nonrenewable secondary fuels (RSF/NRSF) (MJ) | 0.00 | 0.00 | 0.00 | 0.00 |
| Recovered energy (MJ) | 0.00 | 0.00 | 0.00 | 0.00 |
| Use of net freshwater resources (FW) ($m^3$) | 4.04 | 0.148 | 64.6 | 68.8 |
| | 6% | 0% | 94% | 100% |
| **WASTES** | | | | |
| Non-hazardous waste disposed (NHWD) (kg) | 0.00 | 0.00 | 61.7 | 61.7 |
| | 0% | 0% | 100% | 100% |
| Hazardous waste disposed (HWD) (kg) | 0.00 | 0.00 | 0.00 | 0.00 |
| | N/A | N/A | N/A | N/A |
| High-level radioactive waste (HLRW) (kg) | 0.00 | 0.00 | 0.00 | 0.00 |
| | N/A | N/A | N/A | N/A |
| Low-level radioactive waste (ILLRW) (kg) | 0.00 | 0.00 | 0.00 | 0.00 |
| | N/A | N/A | N/A | N/A |
| Components for Reuse (CRU) (kg) | 0.00 | 0.00 | 0.00 | 0.00 |
| Materials for Recycling (MR) (kg) | 0.00 | 0.00 | 108 | 108 |
| | 0% | 0% | 100% | 100% |
| Materials for Energy Recovery (MER) (kg) | 0.00 | 0.00 | 0.00 | 0.00 |
| Exported Energy (EE) (MJ) | 0.00 | 0.00 | 0.00 | 0.00 |

Additionally, the PCR requires the calculation of carbon emissions and removals. No biogenic materials are used in the product system, and as such carbon emissions and removals associated with each products are 0.0 kg per declared unit. While the product packaging includes biogenic content, there is not enough information to assess this indicator per ACLCA guidance.

# 6. LCA: Interpretation

LCIA results were assessed relative to the production of 1 metric ton of heat treated steel plates, and the impact category indicator results are presented in Section 5. The indicator results when considered across all life cycle stages indicate that the manufacturing phase (A3) is the most significant contributor to results for heat treated steel plates, with the exception being Ozone Depletion, Eutrophication and Abiotic Depletion which is dominated by the upstream raw material production phase (A1). For this product, the total (A1-A3) Green House Gas (GHG) impacts are driven by the Plate Mill process (24%), the BF Furnace (18%), and Plate Finishing (14%).

### Limitations

As a result of the choice of study scope and LCIA methodologies used, there are several important study limitations which should be understood to ensure an appropriate interpretation of results, as described below.

### Limitations in the Study Scope

Primary data of material components was not available for some raw materials upstream of Algoma. Secondary data consists of ecoinvent datasets.

Comparability of EPDs is limited to those applying a functional unit. 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.

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