ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14025 AND ISO 21930:2017

SmartEPD-2024-001-0114-01

Hot Rolled Coil

SMART EPD CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION

Date of Issue: Apr 23, 2024

Expiration: Apr 23, 2029

Last updated: Apr 23, 2024

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General Information

JSW Steel USA

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https://jswsteel.us/contact-us/ jswsteel.us

Product Name:	Hot Rolled Coil
Declared Unit:	1 t
Declaration Number:	SmartEPD-2024-001-0114-01
Date of Issue:	April 23, 2024
Expiration:	April 23, 2029
Last updated:	April 23, 2024
EPD Scope:	Cradle to gate A1 - A3
Market(s) of Applicability:	North America

Reference Standards

Standard(s):	ISO 14025 and ISO 21930:2017
Core PCR:	UL PCR for Building-Related Products and Services Part A v.3.2, ISO 21930:2017 Date of issue: December 12, 2018
Sub-category PCR:	UL Part B: Designated Steel Construction Products v.2 Date of issue: December 31, 2020 Valid until: December 31, 2025
Sub-category PCR review panel:	Contact Smart EPD for more information.
General Program Instructions:	Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

LCA Author/Creator:	Jana Fogarty | 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

Thomas P Gloria | t.gloria@industrial-ecology.com

Independent external verification of EPD, according to ISO 14025 and reference PCR(s) : External

Anna Lasso | anna.lasso@smartepd.com

Limitations, Liability, and Ownership

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 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 results for upstream or downstream of the life cycle stages declared. The environmental impact results of steel 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 steel 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. The EPD owner has sole ownership, liability, and responsibility for the EPD.

Organization Information

JSW USA is part of the diversified US $22 billion JSW Group. As affiliates of JSW Group, with more than 18 million tons of installed capacity worldwide, JSW Steel USA benefits from having access to team members with world-class expertise and product knowledge.

JSW Steel USA has two strategic locations in the United States; Mingo Junction, Ohio and Baytown, Texas. We are committed to creating a better today, stronger tomorrow.

JSW Steel USA is home to both the largest and most modern Consteel™ EAF technology in North America as well as one of the widest plate mills. By using the Consteel™ EAF method of melted and manufactured steel, JSW produces some of the cleanest steel products possible in the world. JSW services shipyards, oilfeld fabricators, heavy equipment producers, machinery makers, global energy and petrochemicals industry, and many other end users and distributors who need high quality steel.

Further information can be found at: https://jswsteel.us/

Product Description

This EPD represents hot rolled coil produced from steel slab which is melted and manufactured via Electric Arc Furnace (EAF) rout.

This EPD represents carbon steel hot rolled coils produced from steel slab which is melted and manufactured via Electric Arc Furnace (EAF) route. JSW Steel USA is committed to creating safe sustainable steel. Hot rolled coil is an un-processed (non-tempered, mill edge) product rolled to customer specifications. Company procedures conform to all PED, ASTM, Eq, ASME, API, DIN, SAE and JIS Standards. The most demanding customer requirements are met with tightly controlled and documented Quality Assurance and Preventative Maintenance programs.

Products are used in a wide range of applications, including, construction, conversion, distribution, general fabrication, oil and gas transmission, solar energy, strapping, transportation, utility transmission and distribution towers and other OEM applications. Further information can be found at: https://jswsteel.us/hot-rolled-coil/

Further information can be found at: https://jswsteel.us/carbon-steel-plate/

Product Information

Declared Unit:	1 t
Mass:	1000 kg
Product Specificity:	✗ Product Average
	✓ Product Specific

Averaging:

Averaging was not conducted for this EPD. Data utilized for this EPD is based on production records for the calendar year 2021.

Plants

JSW Steel (USA) Inc.
1500 Commercial Ave, Mingo Junction, OH 43938, USA

Product Specifications

Product SKU(s):	Hot Rolled Coil
Product Classification Codes:	EC3 - Steel -> CoilSteel
Form Factor:	Steel >> CoilSteel
Steel Type:	Alloy
Yield Tensile Strength:	235-634 MPa

Material Composition

Material/Component Category	Origin	% Mass
Purchased Scrap Steel	US	75.1
Electrodes, Graphite	unknown	0.3
Dolomitic Lime, Calcium	unknown	1.9
High Calcium Lime, Calcium Oxide	unknown	1.6
Ferromanganese, Iron Manganese Allot	unknown	0.4
EAF Coal/Coke	unknown	2
Pig Iron	unknown	16.9
Other	unknown	1.8

Packaging Material	Origin	kg Mass
Dunnage	None	0.00E+000
Cribbing	None	3.08E-001

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

EPD Data Specificity

Primary Data Year: 2021

Manufacturing Specificity:

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

Software and LCI Data Sources

LCA Software: SimaPro v. 9.4.0

LCI Foreground Database(s): Ecoinvent v. 3.8 | Cut-Off by Classification

LCI Background Database(s): Ecoinvent v. 3.8 | Cut-Off by Classification

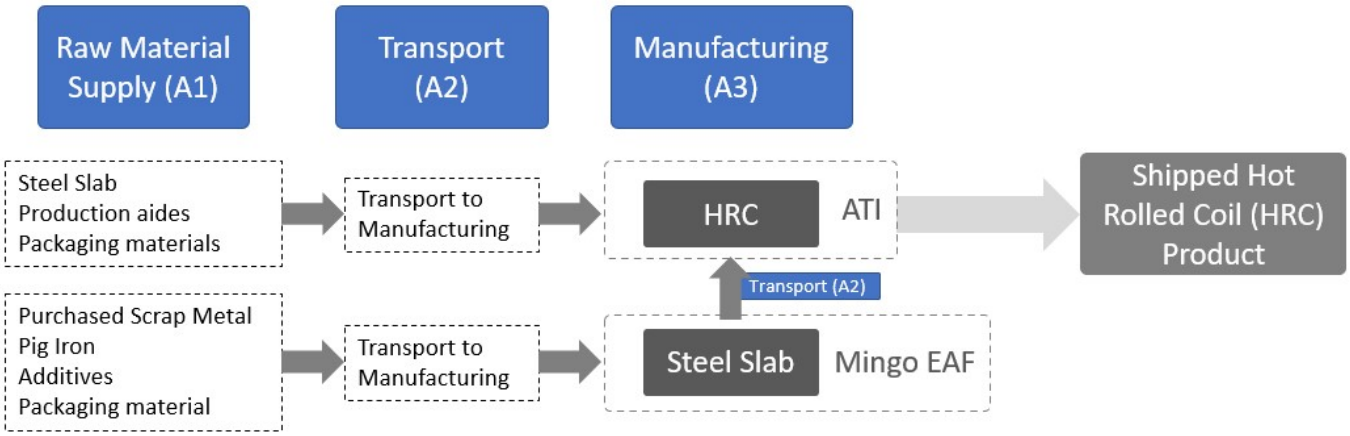
Renewable Electricity

Renewable electricity is used: No

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	ND
	C2	Transport	ND
	C3	Waste Processing	ND
	C4	Disposal	ND
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	ND

Product Flow Diagram



Life Cycle Module Descriptions

Raw Material Supply (A1) For this JSW USA study, primary data was collected through customizable templates and reviewed internally to ensure completeness and credibility. Common practices such as mass balance, energy balance and stoichiometry were considered. Final model inputs were reviewed by the client to verify key assumptions.

Packaging (A1) Steel slab packaging from Mingo Junction consists of wooden cribbing and steel plate packaging from Baytown uses wooden dunnage.

Transportation to Factory (A2) Materials used in the production of steel products can be sourced from multiple suppliers. While material type is the same, transportation distance may differ drastically. In this study, a weighted average distance was estimated for each transportation mode and each material set based on primary data. The average distance per transportation mode was used for all supplied materials. Shipping distances and transportation modes between referenced JSW USA facilities were obtained from JSW USA. Weighted average shipping distances were calculated and used for all 2021 amounts within this study. Upstream transportation was modeled based on primary data using an average distance for incoming supplied ferrous scrap and pig iron. Ferrous scrap and pig iron consist of >84% of the total mass of supplied materials. The average distance is 147 km by truck and 2690 km of transport by sea. An average distance of 100km was used for transportation of manufacturing waste via truck.

Manufacturing (A3) The information module manufacturing includes: - A3, production of ancillary materials or pre-products - A3, generation of electricity, steam and heat from primary energy resources used in manufacturing including their extraction, refining and transport - A3, emissions from the combustion of secondary fuels and waste used in the manufacturing process - A3, manufacturing of products and co-products, including their extraction, manufacturing and transport - A3, manufacturing of packaging, including their extraction, manufacturing and transport - A3, waste management from manufacturing packaging and manufacturing wastages transport up to the recycler or disposal

LCA Discussion

Allocation Procedure

Allocation & Recycling While conducting an LCA, if the life cycles of more than one product are connected, allocation of the process inputs should be avoided by using the system boundary expansion approach. In accordance with the PCR, mass should be used as the primary basis for co-product allocation. The allocations of relevance for calculation (appropriation of impacts across various products) shall be indicated, at least: • Allocation in the use of recycled and/or secondary raw materials. • Allocation of energy, ancillary and operating materials used for individual products in a factory. No multi-output allocation was necessary in the foreground of the study. Allocation of secondary data taken from ecoinvent v3.8 cut-off by classification has allocation applied to it. Since the EPD does not include end-of-life of the product, end-of-life allocation is outside the scope of the study. For the cradle-to-gate boundaries, this study uses the cut-off approach method for recycling. According to this approach, the first life of a material bears the

environmental burdens of its production (e.g., raw material extraction and processing) and the second life (e.g., scrap input) bears the burdens of refurbishment (e.g., collection and refining of scrap). The burdens from waste treatment are taken by the life after which they occur. The results of the study are only applicable to the defined scenarios. Any adjustment of the study boundaries or processes may change the results. Environmental declarations from different programs may not be comparable (ISO 14025, 2006). Even when the same PCR is followed, different LCA software and background LCI datasets may lead to different results for upstream or downstream of the life cycle stages declared. EPD's produced under this PCR do not include the operational impacts of the whole building or end of life impacts. In most applications, steel products have little to no maintenance or replacement and do not result in emissions to air or water.

Cut-off Procedure

Cut-Off Criteria All known mass and energy flows are included; no known flows are deliberately excluded. All upstream and downstream activities are included using a combination of primary and secondary data. While the majority of inventory data are sourced from primary resources, representative proxies are used to close gaps in the absence of primary data.

Data Quality Discussion

Life cycle inventory data used in this study are evaluated based on three categories: precision and completeness, consistency and reproducibility, and representativeness. Precision and completeness: Foreground data are sourced from primary information and have been reviewed to ensure precision and completeness. In order to balance out seasonal variations, operations data over a 12-month period are used to represent production activities. In addition, key model input such as mass balance, energy balance and emission inventory have been externally reviewed. Ecoinvent v3.8 is used as the main database for background data. This version is published in 2021. 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. Consistency and reproducibility: To ensure consistency, primary data were collected at the same level of granularity. All input and output information, modelling assumptions and dataset choices are provided in this report for the purpose of reproducibility. Technology Coverage This study uses a mix of primary and secondary data modeled using Ecoinvent v3.8 database to represent the raw material supply, transportation and manufacturing energy inputs. Geographic Coverage For the Mingo Junction JSW facility, located in Ohio, the Reliability First Corporation electricity mix was used. Natural Gas processes were also customized to utilize region specific geography, as well as direct emissions data from each facility. Time Coverage Primary data from JSW USA represents operations in 2021. In addition, secondary data are modeled using Ecoinvent v3.8. Treatment of missing data No known data was excluded in this study.

Results

Environmental Impact Assessment Results

IPCC AR5 GWP, TRACI 2.1
per 1 t 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	Unit	A1	A2	A3	A1A2A3
GWP-total	kg CO2 eq	6.82e+2	6.23e+1	7.01e+2	1.45e+3
ODP	kg CFC-11 eq	6.47e-5	1.37e-5	4.86e-5	1.27e-4
AP	kg SO2 eq	2.61e+0	1.11e+0	2.46e+0	6.18e+0
EP	kg N eq	2.06e+0	8.50e-2	2.29e+0	4.44e+0
POCP	kg O3 eq	3.64e+1	2.14e+1	2.96e+1	8.74e+1
ADPF	MJ	5.93e+2	1.24e+2	7.77e+2	1.49e+3

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.

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. 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 t of product.

Indicator	Unit	A1	A2	A3	A1A2A3
RPRE	MJ	4.47e+2	9.48e+0	2.66e+2	7.22e+2
RPRM	MJ	0	0	0	0
NRPRE	MJ	7.99e+3	8.63e+2	1.34e+4	2.23e+4
NRPRM	MJ	7.59e+2	0	0	7.59e+2
SM	kg	0	0	1.01e+3	1.01e+3
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
RE	MJ	0	0	0	0
FW	m3	0	0	2.57e-1	2.57e-1

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 t of product.

Indicator	Unit	A1	A2	A3	A1A2A3
HWD	kg	0	0	8.58e-5	8.58e-5
NHWD	kg	0	0	6.60e-1	6.60e-1
HLRW	kg	0	0	0	0
ILLRW	kg	0	0	0	0
CRU	kg	0	0	0	0
MR	kg	0	0	2.34e+1	2.34e+1
MER	kg	0	0	0	0
EE	MJ	0	0	0	0

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.

Interpretation

Interpretation is the last phase of an LCA, although it is typically done iteratively to inform and refine the goal and scope. In this section, the results are examined based on the data quality and consistency. Key assumptions are reviewed to ensure that conclusions and recommendations are consistent with the goal and scope. It should be noted that LCA results are based on a relative approach and indicate potential environmental effects therefore do not predict actual impacts on category impacts. Based on the results and study assumptions, methods and data, the cradle-to-gate impacts for the steel plate product using slabs produced via EAF are split between A1, raw material supply (40% - 51%) and A3, manufacturing (34% - 52%), with the remainder coming from A2, transportation to factory (2% - 24%).

Environmental Activities and Certifications

Certification
ISO 14001
ISO 9001

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