

## ENVIRONMENTAL PRODUCT DECLARATION

# HOT-ROLLED STEEL COIL

UNITED STATES STEEL CORPORATION

BIG RIVER STEEL, 2027 EAST STATE 198, OSCEOLA, ARKANSAS 72370



**United States Steel**

United States Steel Corporation (U. S. Steel) is a leading steel producer with operations in the U.S. and Central Europe. With a renewed emphasis on innovation, U. S. Steel serves the automotive, construction, appliance, energy, containers, and packaging industries with high value-added steel products.

In addition to being ISO 14001 certified, U. S. Steel is committed to reducing emissions in their operations, and is implementing innovative best practice solutions to improve their environmental performance and reduce energy consumption.



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# ENVIRONMENTAL PRODUCT DECLARATION



Hot-Rolled Steel Coil  
Carbon Steel Sheets



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According to ISO 14025  
and ISO 21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	ASTM INTERNATIONAL 100 BARR HARBOR DRIVE P.O. BOX C700 WEST CONSHOHOCKEN, PA 19428-2959, USA HTTPS://WWW.ASTM.ORG/	 ASTM INTERNATIONAL
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	ASTM Program Operator Rules. Version: 8.0, Revised 04/29/20	
MANUFACTURER NAME AND ADDRESS	United States Steel Corporation, 2027 State Hwy 198, Osceola, AR 72370	
DECLARATION NUMBER	EPD 441	
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	Hot-Rolled Steel Coil, 1 metric ton	
REFERENCE PCR AND VERSION NUMBER	Part A: Life Cycle Assessment Calculation Rules and Report Requirements, UL Environment, UL 10010, v3.2, 2018; and Part B: Designated Steel Construction Product EPD Requirements, UL Environment, UL 10010–34, v2.0, 2020	
DESCRIPTION OF PRODUCT APPLICATION/USE	Hot-rolled steel coil used in automotive, construction, appliance, energy, containers, and packaging industries	
PRODUCT RSL DESCRIPTION (IF APPL.)	N/A	
MARKETS OF APPLICABILITY	North America	
DATE OF ISSUE	June 23, 2023	
PERIOD OF VALIDITY	5 years	
EPD TYPE	Product-specific	
RANGE OF DATASET VARIABILITY	site-specific, mean	
EPD SCOPE	Cradle-to-gate	
YEAR(S) OF REPORTED PRIMARY DATA	2021	
LCA SOFTWARE & VERSION NUMBER	GaBi v10.6	
LCI DATABASE(S) & VERSION NUMBER	GaBi 2022.2	
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1	

The PCR review was conducted by:	Dr. Tom Gloria, Chair, Industrial Ecology Associates
This declaration was independently verified in accordance with ISO 14025: 2006. <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL	Tim Brooke, ASTM International Lindita Bushi, PhD., Athena Sustainable Materials Institute Trinity Consultants, Inc.
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Tim Brooke, ASTM International Lindita Bushi, PhD., Athena Sustainable Materials Institute

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## LIMITATIONS

**Exclusions:** EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

**Accuracy of Results:** EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

**Comparability:** EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only 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. See Section 3.10 for additional EPD comparability guidelines.

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# ENVIRONMENTAL PRODUCT DECLARATION



Hot-Rolled Steel Coil  
Carbon Steel Sheets



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## 1. Product Definition and Information

### Description of Company/Organization

U. S. Steel operates Big River Steel in Osceola, Arkansas. Big River Steel manufactures products from secondary steel (i.e. steel scrap) via electric arc furnace (EAF), using up to 90% scrap per heat. The Big River Steel facility is a Flex Mill® which merges the wide product mix and superior grade capabilities of an integrated mill with the nimbleness and technological advancements of a mini mill.

This environmental product declaration (EPD) represents hot-rolled steel coil produced via an electric arc furnace (EAF) from U. S. Steel's Big River Steel mill.

### Product Description

The hot-rolled steel coil is produced to a variety of standards. For a full list of standards, please refer to Big River Steel's website<sup>1</sup>. In addition, Big River Steel supplies steel to various customer specific standards.

The ASTM Program Operator for Product Category Rules (PCR) and Environmental Product Declarations (EPDs), General Program Instructions, Version: 8.0, Revised 04/29/20, requires the identification of the UNSPSC code and the appropriate Construction Specification Institute (CSI) / Construction Specifications Canadian (CSC) classification for the declared products. Steel product produced by Big River Steel is categorized as follows:

- CSI MasterFormat Code: 05 00 00 Metals
- UNSPSC Code: 302640 Carbon Steel Sheets

### Application

U. S. Steel serves the automotive, construction, appliance, energy, containers, and packaging industries with high value-added steel products.

### Declaration of Methodological Framework

The scope of the EPD is cradle-to-gate, including raw material extraction and processing, upstream transportation, and product manufacture (Modules A1, A2, and A3).

### Technical Requirements, Properties of Declared Product as Delivered, and Material Composition

Steel is an alloy of iron and carbon containing less than 2% carbon and 1% manganese and small amounts of silicon, phosphorus, sulphur, oxygen, and trace alloys. These alloying elements improve the chemical and physical properties of steel, such as strength, ductility, durability, and corrosion resistance. There are more than 3,500 different grades of steel with many different physical, chemical, and environmental properties. Technical data for the studied product can be found in the table below.

<sup>1</sup> <https://bigriversteel.com/wp-content/uploads/2020/01/BRS1903-ProdCapabilities-1-HotRoll-010820.pdf>



# ENVIRONMENTAL PRODUCT DECLARATION



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Hot-Rolled Steel Coil  
Carbon Steel Sheets

According to ISO 14025  
and ISO 21930:2017

Table 1. Technical data for steel product

NAME	VALUE	UNIT
Melting Point	1510	°C
Density	7850	kg/m <sup>3</sup>
Iron Content	> 86	%
Aluminum Content	≤ 2	%
Chromium content	≤ 2	%
Copper content	≤ 1	%
Manganese content	≤ 3	%
Molybdenum content	≤ 2.5	%
Nickel content	≤ 1	%
Silicon Content	≤ 2	%

## Manufacturing

Big River Steel uses electric arc furnace (EAF) technology to produce steel from recycled scrap metal. Scrap metal is received via barge, truck, and rail and is inspected and sorted into on-site scrapyards. Scrap is moved from the scrapyard into the EAFs for melting and refining. Each EAF consists of the furnace shell, roof, and the electrical transformer. Typically, the EAF contains a “hot heel,” which is a small amount of molten steel from the previous heat (batch of steel), to assist in the rapid melting of the new scrap additions. Electric current is applied via large carbon electrodes to melt the scrap. The electrodes are consumed in the melting process. Supplemental heat is provided to the EAF by oxy-fuel natural gas fired burners. Additives are introduced during the melting process to maintain the optimal steel melting conditions. Lime is added as a fluxing agent to assist in the removal of unwanted constituents. Injection carbon and oxygen forms carbon monoxide bubbles which agitate and convert the slag to a frothy consistency. This practice enhances the removal of impurities in the steel as well as optimizing the energy input between electrical and chemical energy sources.

Once the target melt conditions have been reached for the given heat, a ladle is placed at the tapping side of the EAF, the furnace is de-energized, and the molten steel is poured into the ladle. The ladle is then transferred to an intermediate steel processing unit or ladle metallurgical furnace (LMF). The LMF is used to refine the chemistry and temperature of the molten steel. Additives such as various fluxes and alloys are added to meet the required chemistry for the heat of steel, while electricity provides energy for heating and temperature control. Once the desired chemistry and temperature are met, the ladle is sent to the caster.

The EAF and LMF generate particulate matter emissions from the processes which are controlled by a baghouse. This baghouse also captures ancillary fugitive emissions from other processes in the melt shop such as natural gas combustion for preheating of ladles, drying of ladle refractory, preheating of the tundish, etc.

The Ruhrstahl Heraeus (RH) degasser uses snorkels along with a vacuum to recirculate the molten metal and force further decarburization beyond what can be done in the EAF. This creates a more homogenous heat to produce cleaner, more formable steel. The forced decarburization system produces low residual levels of carbon, nitrogen and hydrogen. A boiler and several small burners/dryers are natural gas fired combustion sources that support the RH Degasser process. The RH Degasser is equipped with a flare to control carbon monoxide (CO) off gases.

The Compact Strip Production (CSP) unit combines casting and hot rolling into one facility. The casting section receives ladles from the melt shop, where the ladle is opened, and the molten steel pours through a refractory tube into a tundish. Steel is poured from the tundish through another refractory tube into the mold, which is water-cooled



ASTM INTERNATIONAL

# ENVIRONMENTAL PRODUCT DECLARATION



ASTM INTERNATIONAL

Hot-Rolled Steel Coil  
Carbon Steel Sheets

According to ISO 14025  
and ISO 21930:2017

and made of copper, and where solidification starts. The strand is cooled via air-mist sprays and finishes solidifying. At the exit of the caster, individual slabs are cut from the strand with a shear and directly fed into a natural gas-fired tunnel furnace which raises and equalizes the slab temperature. Slabs are processed through the rolling mill, where the rolls make the steel thinner and longer as well as control the shape and profile of the steel. The steel undergoes surface inspection and cooling before being wound up in the downcoiler. The final product is hot rolled steel.

Hot rolled material that requires further processing is sent through the pickle line tandem cold mill (PLTCM). The pickling section immerses the steel strip in a hydrochloric acid solution to remove scale from the hot rolled steel. Oil is then applied to the steel to protect it. Some steel products are sold in this state as hot rolled pickled and oiled (HRPO) steel or they can be further processed either at Big River Steel or another finishing facility. Pickling operations are supported by a natural gas fired steam boiler and are controlled by a dust collector (for controlling particulate emissions generated by uncoiling, flattening, and scale breaking) as well as wet scrubber (to control hydrochloric acid fumes).

## Packaging

Packaging at the Big River facility falls below the cut-off criteria and therefore it is not included in the LCA for this EPD.

## 2. Life Cycle Assessment Background Information

### Functional or Declared Unit

The declared unit is one (1) metric ton of hot-rolled steel coil.

### Boundary

Per the PCR, this cradle-to-gate analysis provides information on the Product Stage of the steel product life cycle, including modules A1, A2, and A3. Product delivery, installation and use, and product disposal (modules A4 – A5, B1 – B7, C1 – C4, and D) have not been included.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
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
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND



ASTM INTERNATIONAL

# ENVIRONMENTAL PRODUCT DECLARATION



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Carbon Steel Sheets



ASTM INTERNATIONAL

According to ISO 14025  
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## Estimates and Assumptions

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The underlying study was conducted in accordance with the PCR. While this EPD has been developed by industry experts to best represent the product system, real life environmental impacts of fabricated steel products may extend beyond those defined in this document.

All raw materials and energy inputs have been modeled using Life Cycle Inventory (LCI) data that best represents actual production. As available, site-specific information for raw materials, raw material transportation, energy use, resource use, and emissions was used to represent an annual average. In cases where raw material LCI data was not available, proxy materials were chosen that have readily available LCI.

## Cut-off Criteria

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Per the PCR, processes or flows contributing less than 1% of the total environmental impact indicator for each impact or mass input to the system may be excluded from the LCA for this EPD. Processes or flows contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory.

The mass input of any excluded flow is less than 1% of the total mass input streams into the system and the cumulative mass input of all of the omitted streams is less than 5% of the total mass input streams. Therefore, no data gaps were allowed which were expected to significantly affect the outcome of the indicator results.

## Data Sources

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The LCA model was created using the GaBi Software system for life cycle engineering, version 10.6, developed by Sphera (Sphera, 2022). Background life cycle inventory data for raw materials and processes were obtained from the GaBi 2022.2 database, including the 2022 Professional Database and the Extension Database XVII: Full US 2022. Primary manufacturing data and fabrication data were provided by U. S. Steel.

## Data Quality

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A variety of tests and checks were performed by the LCA practitioner throughout the project to ensure high quality of the completed LCA. Checks included an extensive review of project-specific LCA models as well as the background data used.

Primary data represents production in the United States at Big River Steel. Production data has been collected by U. S. Steel directly from the production sites and are average values for the year 2021 (12 consecutive months of averaged data as required for manufacturer specific data sets). The data has been measured and verified internally. The data is assumed to be the most relevant according to current conditions and production practices. An electricity provider specific dataset, via the local utility company Entergy, was used to represent the Big River facility's energy consumption. Proxy datasets were used as needed for raw material inputs to address lack of data for a specific material or for a specific geographical region. These proxy datasets were chosen for their technological representativeness of the actual materials.

## Period under Review

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Primary data collected represent production during the 2021 calendar year. This analysis is intended to represent production in 2021.

# ENVIRONMENTAL PRODUCT DECLARATION



ASTM INTERNATIONAL

Hot-Rolled Steel Coil  
Carbon Steel Sheets

According to ISO 14025  
and ISO 21930:2017

## Allocation

Per ISO 21930 and the PCR, this is an attributional LCA and as such, no allocation using system expansion was performed. Allocation of background data (energy and materials) taken from the GaBi 2021 databases is documented online at <http://www.gabi-software.com/international/support/gabi/>.

Big River Steel's Melt Shop produces steel and slag. All slag is sold as-is. All steel continues onto the rolling mill to be rolled into steel product. The slag and steel product are considered co-products of the product system resulting from a joint co-production process. Therefore, this study allocated the environmental burden upstream of the rolling mill between the slag and steel only.

## 3. Life Cycle Assessment Results

LCA results are relative expressions and do not predict actual impacts, the exceeding of thresholds, safety margins or risks.

### Life Cycle Impact Assessment Results

Table 2. LCIA results, per 1 metric ton of hot-rolled steel coil

PARAMETER	UNIT	A1	A2	A3	Total
GWP 100 (excl. biogenic carbon)	kg CO <sub>2</sub> eq.	9.01E+02	6.28E+01	2.10E+02	1.17E+03
GWP 100 (incl. biogenic carbon)	kg CO <sub>2</sub> eq.	9.01E+02	6.29E+01	2.15E+02	1.18E+03
ODP	kg CFC 11 eq.	1.49E-08	6.29E-13	1.24E-11	1.49E-08
AP	kg SO <sub>2</sub> eq.	2.50E+00	1.35E+00	2.19E-01	4.07E+00
EP	kg N eq.	9.29E-02	5.50E-02	1.37E-02	1.62E-01
SFP	kg O <sub>3</sub> eq.	4.00E+01	2.90E+01	5.12E+00	7.41E+01
ADP <sub>fossil</sub>	MJ surplus, LHV	6.97E+02	1.07E+02	7.92E+01	8.84E+02

a. GWP-100 are based on TRACI with IPCC 2013

These six impact categories (GWP, ODP, AP, EP, SFP, and ADP fossil) 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.

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.



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# ENVIRONMENTAL PRODUCT DECLARATION



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Hot-Rolled Steel Coil  
Carbon Steel Sheets

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## Life Cycle Inventory Results

Table 3. Resource use results, per 1 metric ton of hot-rolled steel coil

PARAMETER	UNIT	A1	A2	A3	Total
RPR <sub>E</sub>	MJ LHV	3.24E+02	3.31E+01	3.45E+00	3.60E+02
RPR <sub>M</sub>	MJ LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPR <sub>E</sub>	MJ LHV	1.03E+04	8.46E+02	5.40E+02	1.17E+04
NRPR <sub>M</sub>	MJ LHV	6.95E+02	0.00E+00	0.00E+00	6.95E+02
SM	kg	7.01E+02	0.00E+00	0.00E+00	7.01E+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 <sup>3</sup>	1.25E+00	7.67E-02	2.91E-02	1.35E+00

Table 4. Output flows and waste categories results, per 1 metric ton of hot-rolled steel coil

PARAMETER	UNIT	A1	A2	A3	Total
HWD	kg	0.00E+00	0.00E+00	6.60E+00	6.60E+00
NHWD	kg	0.00E+00	0.00E+00	3.70E+00	3.70E+00
HLRW	kg	5.06E-05	1.22E-05	5.79E-07	6.34E-05
ILLRW	kg	4.30E-04	1.14E-04	5.67E-06	5.49E-04
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00

## 4. LCA Interpretation

The impact assessment results indicate that Module A1, i.e. upstream processing and manufacturing of raw materials, is the key contributor to a majority of global warming potential, ozone depletion potential impacts, acidification potential, smog formation potential, and abiotic resource depletion potential of fossil energy resources. The below figure presents the relative contribution of the A1, A2, and A3 modules to the total.



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# ENVIRONMENTAL PRODUCT DECLARATION

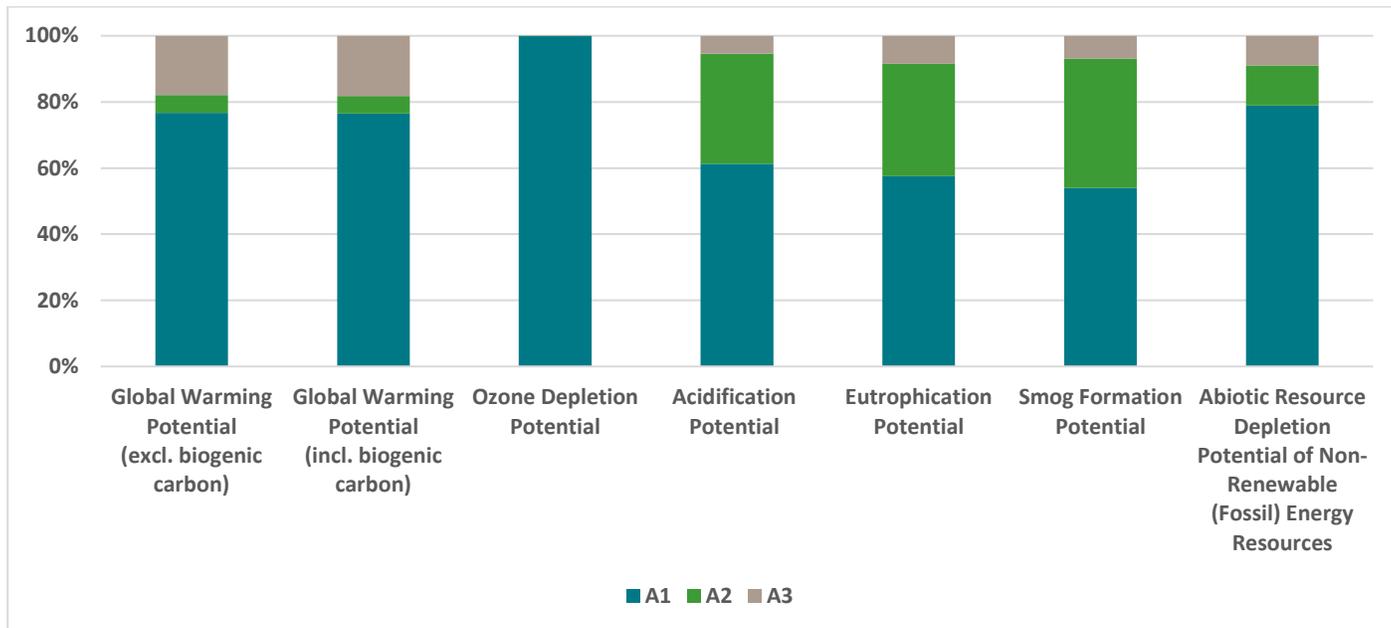


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Hot-Rolled Steel Coil  
Carbon Steel Sheets

According to ISO 14025  
and ISO 21930:2017

Figure 1. Hot-Rolled Steel Coil Dominance Analysis



## 5. Additional Environmental Information

### Health and Safety

U. S. Steel has a longstanding commitment to the health and safety of every person who works in their facilities. U. S. Steel’s goal is to maintain a sustainable, zero-harm culture that’s supported by leadership and owned by an engaged and highly skilled workforce. U. S. Steel empowers their employees with the capabilities and resources needed to assess, reduce, and eliminate workplace risks and hazards and appreciate their dedication to safety.

U. S. Steel set a goal to achieve ISO 45001 certification at Big River Steel by the end of 2023 and at the balance of their operating facilities starting in 2024. ISO 45001 specifies occupational health and safety standards to help reduce accidents in the workplace and provides tools to continuously improve safety performance..

Our products that we make extend our commitment to safety far beyond our own walls. Big River Steel is the only steel manufacturer to partner with the Center for Collision Safety and Analysis (CCSA) at George Mason University. The engineers and research scientists at CCSA use advanced technology to develop computational models to analyze the safety performance of materials, including steel, used in vehicles. Together with CCSA, Big River Steel is working to make sure steel continues to enhance the safety of everyone on the road today and in the vehicles of the future.

### Environmental Activities and Certifications

Additional environmental activities and certifications are discussed in the following subsections. More information on U. S. Steel’s certifications and environmental initiatives can be found at <https://www.ussteel.com/sustainability/certifications>.



# ENVIRONMENTAL PRODUCT DECLARATION



Hot-Rolled Steel Coil  
Carbon Steel Sheets



According to ISO 14025  
and ISO 21930:2017

**LEED Certified:** In March of 2017, Big River Steel became the first LEED (Leadership in Energy and Environmental Design) certified steel production facility in the nation thanks to environmental sustainability efforts and energy efficiency performance. In addition to the mill building, the employee services building, administrative building, and warehouse have also received LEED certification.

**Responsible Steel™ Certified Site:** In April 2022, Big River Steel became the first steel mill in North America to receive ResponsibleSteel™ site certification.

**ISO 14001:2015 Environmental Management System:** Many of U. S. Steel's major production facilities, including Gary Works, Mon Valley Works, Great Lakes Works, Granite City Works, USS Košice, and Big River Steel have Environmental Management Systems that are certified to ISO 14001 — the framework for the measurement and improvement of environmental impacts. U. S. Steel is committed to reducing emissions in their operations, and is implementing innovative best practice solutions to improve their environmental performance and reduce energy consumption.

**Air:** U. S. Steel is committed to environmental progress and strives for 100% compliance with all federal, state, and local agencies' rules, regulations, and permit conditions, even as the regulations become more stringent.

Using 2018 as baseline year, U. S. Steel has set a goal to reduce corporate NOx emissions intensity by 10% by 2030. U. S. Steel plans to achieve this NOx goal by:

- Continuing to implement its Best for All® strategy;
- Shutting down Clairton Coke Batteries facilities 1-3 in early 2023;
- Following its enhanced maintenance and fuel use strategy; and
- Establishing tracking metrics.

U. S. Steel has a greenhouse gas target of 20% reduction in greenhouse gas intensity by 2030 from a 2018 baseline, as well as a 2050 net-zero goal. Both targets are based on Scope 1 and Scope 2 emissions. In addition to these corporate goals, Big River Steel has established a GHG emissions reduction target to reduce its GHG emissions intensity by 5% by 2030 compared to a 2020 baseline year. An annual milestone of 0.5% reduction will be monitored. Additionally, Big River Steel has established a goal to reduce its imported electricity GHG emissions intensity by 12% by 2030 compared to a 2020 baseline year. An annual milestone of 1.2% reduction will be monitored.

**Water:** U. S. Steel facilities use an abundance of water for cooling and process purposes. U. S. Steel is committed to reducing its water consumption and have implemented conservation practices to further this effort. Many of its processes use water-recycling systems that return water for reuse in operations, drastically reducing the amount of water brought into plants. In addition, Big River Steel maintains a Water Stewardship Plan with the goal to minimize water consumption, water discharges, and to reduce the environmental impact of the facility on local water resources.

**Waste:** Recycling helps reduce reliance on landfills and improves sustainability through raw material and resource management. Every year, U. S. Steel recycles substantial quantities of scrap metal and other steelmaking coproducts and byproducts.

Steel has always been eminently recyclable, so U. S. Steel has a long history of recycling. In 2021, U. S. Steel recycled over 5.2 million metric tons of purchased and produced steel scrap. Because of steel's physical properties, products can be recycled at the end of their useful life without loss of quality, contributing to steel's high recycling rate and affordability.

In 2021, U. S. Steel recycled 235,299 metric tons of steel slag. Slag is a highly sustainable product that is used in place of natural aggregates, such as limestone and gravel, in numerous construction and product applications. Steel slag can be used in cement manufacturing and asphalt mixes and is also recycled in applications such as landfill daily cover and internal haul roads, phosphorus removal in wastewater treatment, ground water remediation, reactive barrier



# ENVIRONMENTAL PRODUCT DECLARATION



Hot-Rolled Steel Coil  
Carbon Steel Sheets



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and ISO 21930:2017

walls, and agricultural applications, including as a liming agent and micronutrient in fertilizer. Use of steel slag in place of mined and quarried rock and mineral aggregates saves these natural resources and reduces the impact to the environment.

U. S. Steel also works with outside organization to repurpose our used equipment. Examples include transforming used conveyor belts into rubber mats and used tires from our mining mobile equipment into feeding and water troughs for livestock. At USSK, construction waste like concrete, debris, and ceramics from reconstruction and modernization projects is reused by third parties, a recycling effort that has continuously minimized the use of landfills.

U. S. Steel recycles several other materials from the byproduct, steelmaking, and steel finishing operations. In 2021, 8,808 metric tons of process materials from the cokemaking byproducts plant were collected and returned directly to coke ovens. Carbon, iron, and steel bearing residuals, such as coal and coke fines, taconite pellet fines, blast furnace and steel furnace air pollution control dusts and sludges are used to produce sinter and briquettes, which are then used as feedstocks for ironmaking and steelmaking, respectively. This included the production of approximately 4.8 million metric tons of sinter, which was used in the blast furnaces, along with 142,151 metric tons of briquettes that was used in the blast furnaces and Basic Oxygen Process (BOP) furnaces.

An additional 114,715 metric tons of mill scale not used internally to make sinter or briquettes was sold to cement manufacturers, which use the mill scale for its iron content, a critical ingredient in cement.

Hydrochloric acid, which is used in steel pickling operations to remove heavy iron oxide rust from the surface of steel coils to prepare the coils for surface coating, results in an iron oxide rich material called spent pickle liquor. The spent pickle liquor is recycled by being sent to a recycling plant to regenerate the hydrochloric acid and return it to plants for reuse in pickling, or it is sold for beneficial use as a wastewater treatment chemical.

**Biodiversity:** In 2022, as part of U. S. Steel's commitment to protecting biodiversity, a Biodiversity Management Plan was developed to manage biodiversity risks and adverse impacts at Big River Steel. U. S. Steel is committed to respecting protected and conserved areas and will continue to manage potential adverse impacts on biodiversity. The plan provides guidance to environmental staff for monitoring the property and designated mitigation areas to ensure that the integrity of the present biodiversity is adequate, while identifying issues. Facility activities with potential environmental impacts may include construction, manufacturing operations, truck hauling, discharges, dredging, filling, clearing, and grubbing. The plan may be used to assist with the management of biodiversity for other sites owned/operated by U. S. Steel.

## 6. References

ISO. (2006). ISO 14044:2006/Amd.1:2017/Amd.2:2020: Environmental management - Life cycle assessment - Requirements and guidelines.

ISO. (2009). ISO 14040/Amd.1:2020: Environmental management - Life cycle assessment - principles and frameworks.

ISO. (2006). ISO 14025: Environmental labels and declarations - Type III environmental declarations - principles and procedures.

ISO. (2017). ISO 21930: Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.

U. S. Steel. (2022). 2021 Recycled Content Averages for U. S. Steel Steel Mill Products.

U. S. Steel. (2023). LIFE CYCLE ASSESSMENT - Hot Rolled, Cold Rolled, and Galvanized Products: Background LCA Report in Support of an Environmental Product Declaration.



# ENVIRONMENTAL PRODUCT DECLARATION



Hot-Rolled Steel Coil  
Carbon Steel Sheets



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## 7. Contact Information

### Study Commissioner



United States Steel Corporation  
600 Grant Street  
Pittsburgh, PA 15219  
Ph: (412) 433-1121  
[www.ussteel.com/](http://www.ussteel.com/)

### LCA Practitioner



Trinity Consultants, Inc.  
12700 Park Central Drive, Suite 2100  
Dallas, TX 75251  
<https://www.trinityconsultants.com/>