

ENVIRONMENTAL PRODUCT DECLARATION

WELDED STEEL HOLLOW SECTIONS

PIPE AND TUBE PRODUCTS

AS 1450; AS/NZS 1163; ASTM A53; ASTM A500; API SPEC.5 L



3 types of section/pipe steels produced by SUNSCO.



Maruichi Sun Steel Joint Stock Company (SUNSCO) is a leading manufacturer of steel pipes and coils. It is a 100% Japanese operated steel company in Vietnam, with investments from Maruichi Steel Tube Ltd., Toyota Tsusho Corporation, and JFE Steel Corporation.

Our head office & factory is located in Binh Duong province, near Ho Chi Minh City, and we also own Maruichi Sun Steel Hanoi Limited Company in Vinh Phuc province, near Hanoi, which specializes in manufacturing of steel pipes for Automotives and Motor bikes. Our company produces and sells steel products such as:

Hot-dip 55% Al-Zn alloy coated steel coil, Prepainted hot-dip 55% Al-Zn coated steel coil, Hot-dip galvanized steel coil, Prepainted hot-dip galvanized steel coil, Electric welded Carbon steel pipe & tube, Carbon steel tube by pre-zinc coated coil.

Our products are mainly used for construction and civil works, structures, household appliances, bicycle and motorbike components and other industries.



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Welded steel hollow sections

Welded steel pipe & hollow sections (black pipe), Pre-zinc coated steel pipe(from HGI not including cold rolling process), Pre-zinc coated steel pipe(from CGI including cold rolling process)

According to ISO 14025,
and EN 15804

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL ENVIRONMENT 333 PFINGSTEN ROAD NORTHBROOK, IL 60611 HTTPS://WWW.UL.COM/ HTTPS://SPOT.UL.COM/
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	PROGRAM OPERATOR RULES V2.7 2022
MANUFACTURER NAME AND ADDRESS	Maruichi Sun Steel Joint Stock Company (SUNSCO) DT743, Dong Tac Quarter, Tan Dong Hiep Ward, Di An City, Binh Duong Province, Vietnam
DECLARATION NUMBER	4791184719.101.2
DECLARED PRODUCT & DECLARED UNIT OR DECLARED UNIT	Welded steel pipe & hollow sections (black pipe), Pre-zinc coated steel pipe (from HGI not including cold rolling process), Pre-zinc coated steel pipe(from CGI including cold rolling process), 1 metric ton
REFERENCE PCR AND VERSION NUMBER	EN 15804:2012+A2:2019+AC: 2021, Sustainability of construction works – Environmental product declarations - Core rules for the product category of construction products. IBU Product Category Rules for Building - Related Products and Services - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019 v1.4. IBU Part B: Requirements on the EPD for Structural steels v.10 2024. UL Part A: Life Cycle Assessment Calculation Rules and Report Requirements, v 4.0
DESCRIPTION OF PRODUCT APPLICATION/USE	Welded Steel Hollow Sections are used for wide applications such as construction and civil works, structures, household appliances, bicycle and motorbike components and other industries.
PRODUCT RSL DESCRIPTION (IF APPL.)	Not applicable.
MARKETS OF APPLICABILITY	Global
DATE OF ISSUE	December 12, 2024
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-specific
EPD SCOPE	Cradle to gate with modules C1–C4 and module D (A1–A3, C and D)
YEAR(S) OF REPORTED PRIMARY DATA	2023
LCA SOFTWARE & VERSION NUMBER	OpenLCA
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent 3.10
LCIA METHODOLOGY & VERSION NUMBER	EN 15804+A2 EF v3.1
The PCR review was conducted by:	Institut Bauen und Umwelt e.V.
	PCR Peer Review Panel
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Skye Tang, UL Solutions <i>Skye Tang</i>
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	CECEP Eco Product Development Research Center
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Jim Mellentine, Thrive ESG <i>James H. Mellentine</i>

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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.

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1. Product Definition and Information

1.1. Description of Company/Organization

Maruichi Sun Steel Joint Stock Company (SUNSCO) is a leading manufacturer of steel pipes and coils. It is a 100% Japanese-operated steel company in Vietnam, with investments from Maruichi Steel Tube Ltd., Toyota Tsusho Corporation, and JFE Steel Corporation.

Our head office & factory is located in Binh Duong province, near Ho Chi Minh City, and we also own Maruichi Sun Steel Hanoi Limited Company in Vinh Phuc province, near Hanoi, which specializes in manufacturing of steel pipes for automotives and Motor bikes.

Our mission is to contribute to the society by supplying superior quality products.

Under our group corporate slogan “Everywhere Maruichi,” we strive to meet the increasing demands for quality products in Vietnam and abroad. With the Japan Industrial Standard (JIS) in our backbone, we have been working to spread our “Maruichi SunSCO quality” throughout the world, and our products had touched on the people’s lives in area as far as North America and North Africa.

As a global company, we cater to the needs and standards of many countries, such as ASTM, AS, API, BS, MS, SNI, just to name few. Every day, we are creating the synergy between the Japanese ingenuity and Vietnamese diligence which is realized in every aspect of our company, from raw material procurement to production management, quality control to business management.

With our dedicated Japanese and Vietnamese members, we wish to deliver the products that exceeds the expectation of our valued customers.

We sincerely appreciate your giving us the opportunity to be of your service.

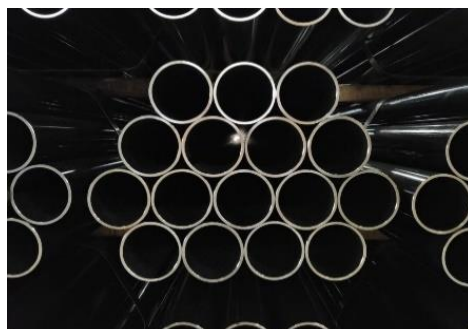
1.2. Product Description

1.2.1 Product 1: Welded Steel Pipe & Hollow Section (Black Pipe)

AS/NZS 1163 - Square Hollow Section (SHS) , Rectangular Hollow Section (RHS), & Circular Hollow Section (CHS), API Spec.5L - Line Pipe produced by the SUNSCO are included within the scope of this EPD.

1.2.1.1 Product 1

The pipe & hollow section has good ductility, capable of weldability and fabrication, manipulating and using easily.





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Figure 1: Diagram of welded steel pipe& hollow section (Black pipe)

1.2.1.2 Product 1 Specification

- AS 1450
- AS/NZS 1163
- ASTM A53
- ASTM A500
- API Spec. 5L

1.2.1.3 Product 1 Average

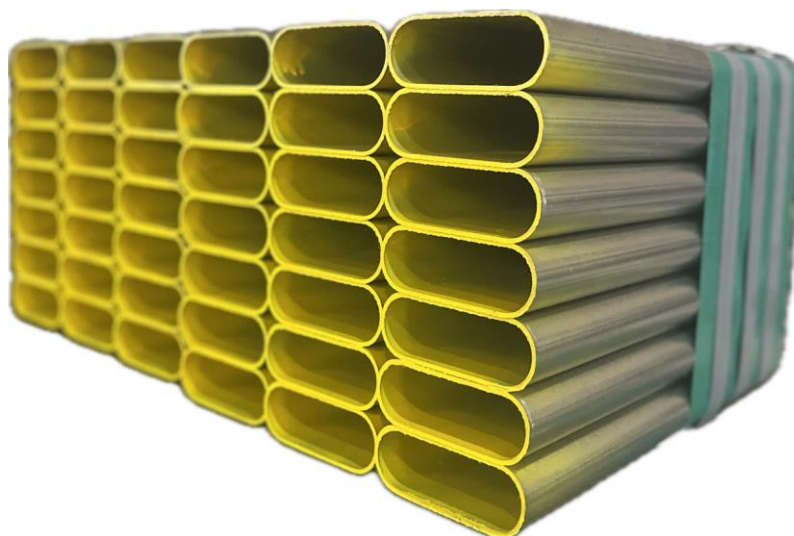
The EPD is intended to represent a manufacturer's average for Welded Steel Hollow Sections. The average is weighted based on the mass of product manufactured at Maruichi Sun Steel Joint Stock Company' s facility throughout 2023. Key technical properties are shown in Table 1.

1.2.2 Product 2: Pre-zinc coated steel pipe (from HGI: not including cold rolling process)

AS1163 - Square Hollow Section (SHS) & Rectangular, Hollow Section (RHS), AS1163 - Circular Hollow Section (CHS), AS1163 - Oval Pipe produced by SUNSCO are included within the scope of this EPD.

1.2.2.1 Product 2 Identification

Pre-zinc pipe is a steel tube coated with a protective zinc coating on the surface. The thickness of the galvanized layer is controlled depend on customer needs. The Pre-zinc pipe has excellent durability with its corrosion resistance. The zinc coating protects the product from corrosive effects such as water, weather, etc., creating resistance to corrosion.





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Figure 2: Diagram of Pre-zinc pipe (from HGI; not including cold rolling process)

1.2.2.2 Product 2 Specification

·AS/NZS 1163

1.2.2.3 Product 2 Average

The EPD is intended to represent a manufacturer's average for pre-zinc coated steel pipe (from HGI not including cold rolling process). The average is weighted based on the mass of product manufactured at Maruichi Sun Steel Joint Stock Company's facility throughout 2023. Key technical properties are shown in Table 1.

1.2.3 Product 3: Pre-zinc pipe (from CGI: including cold rolling process)

The product information of Pre-zinc pipe (from CGI: including cold rolling process) and Product 2 shown in section 1.2.2 are basically the same, except that in the manufacturing process, the pipe is subjected to cold rolling process before galvanizing.



Figure 3: Diagram of Pre-zinc pipe (from CGI: including cold rolling process)

For more details of technical specifications such as: dimensions, properties and steel grad, please visit:
<https://maruichisunsteel.com/>

1.3.Application

Steel products covered by this EPD known as a material used in the civil construction industry, home appliances, furniture, etc and steel pipes are also widely used in making water supply and drainage pipes.

The potential communication objects of this EPD report include two groups: firstly, MARUICHI SUN STEEL JOINT STOCK COMPANY itself and other related personnels; secondly, internal and external project stakeholders, including upstream raw material suppliers, downstream customers and consumers, local governments and environmental

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NGOs. The results of the report and related analysis can be used for the following purposes:

Disclosure of product life cycle results is a part of corporate environmental protection and social responsibility and is also a necessary step towards the international market. The results of this study will provide a good way for external stakeholders and third parties to provide detailed information and data support, as well as effective communication between business partners (business-to-business) and their related parties.

1.4. Declaration of Methodological Framework

This EPD report adopts the Life Cycle Assessment (LCA) method stipulated in the international standards ISO14040/14044, EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products, IBU PCR - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report, and Part B: Requirements of the EPD for Structural steels as the research approaches. This EPD is product-specific and covers from cradle to gate with modules C1–C4 and module D (A1–A3, C and D)

1.5. Technical Requirements

The target steel products are mainly made from hot-rolled steel coil. The following table refers to steel products properties.

Table 1. Technical data

NAME	VALUE	UNIT
Density	7,850	kg/m ³
Modulus of elasticity	210,000	N/mm ²
Coefficient of thermal expansion	11	10-6K ⁻¹
Thermal conductivity	53	W/(mK)
Melting point	1,370	°C
Minimum yield strength	235, 290,350	Mpa
Minimum tensile strength	415,430,500	Mpa
Minimum elongation	16	%
Tensile strength	415-700	N/mm ²

Performance data of the product is in accordance with the declaration of performance with respect to its essential characteristics according to EN10025, hot rolled products of structural steels. Further product standards are e.g.: ASTM, A36, A572, JIS G 3106 and G 3132.

1.6. Properties of Declared Product as Delivered

The product can be supplied directly to a job site or end user or fabricated (i.e., cut or otherwise modified) by a fabricator. Depending on the intended application, the delivery terms and dimensions may change (Width: 50mm-300mm; Height: 100mm~700mm; Thickness: 5.0mm~25.0mm).



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1.7.Material Composition

The basic raw material for the production of target product is hot-rolled steel coil. In addition, auxiliary raw materials are added such as forming oil to increase production efficiency.

Table 2. Material Composition

ELEMENT	CONTENT
Iron	≈97%
Carbon	≤0.3%
Manganese	≤1.7%
Silicon	≤0.55%
Phosphorus	≤0.04%
Sulfur	≤0.045%
Chromium	≤0.5%
Others (Sn, V, Nb, Al, B, Ni, Cr, Mo, Ti)	≤0.2%

The product for authorization contains substances on the ECHA list of substances of very high concern (SVHC) (14 July2021) above 0.1 % by mass: No.

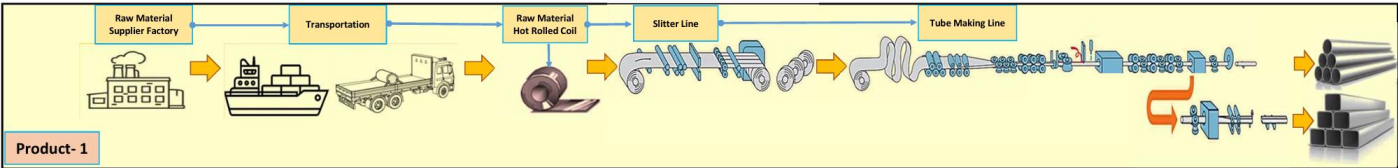
The product contains further carcinogenic, mutagenic, reprotoxic (CMR) substances of category 1A or 1B that not in the candidate list, above 0.1 mass % in at least one subproduct: No.

Biocides have been added to the construction product, or the product has been treated with biocides (a treated product pursuant to the Biocidal Product Regulation (EU) No.528/2012): No.

1.8.Manufacturing

The manufacturing location is in Vietnam. Primary data from the manufacturing facility are used for the underlying life cycle assessment. Results provided in this EPD are based on the total value of the manufacturing facility.

All three types of products mainly consist of Hot-rolled steel coil. Product 1 in the figure below is Welded Steel Pipe and Hollow Sections, product 2 is pre-galvanized pipe (from HGI: without cold rolling process), product 3 is pre galvanized pipe (from CGI: with cold rolling process), the detailed process flow of each product is shown in the figure below:



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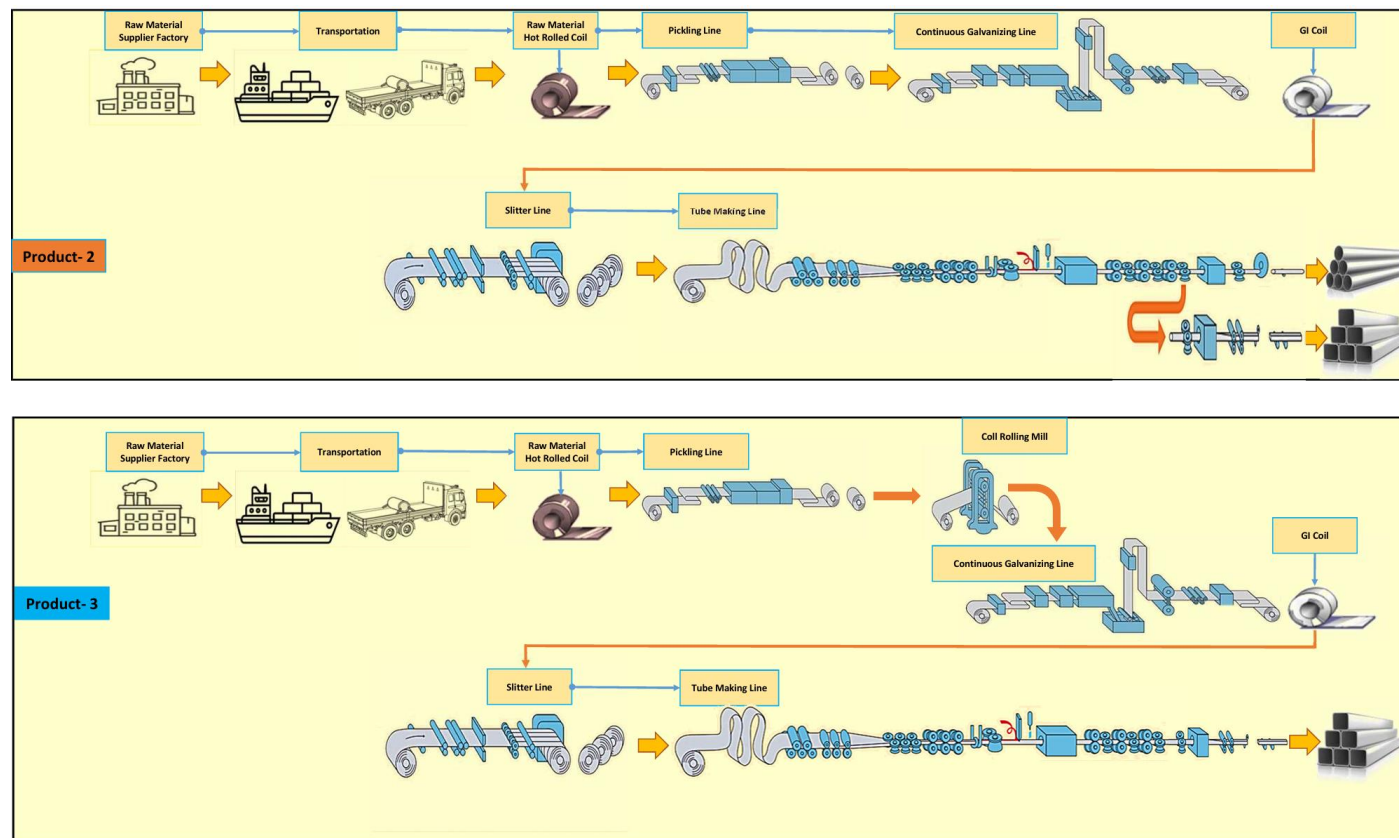


Figure 4 Process flow of manufacturing

1.9.Environment and health during manufacturing

No measures relating to safety, health and environment protecting during the manufacturing process extending beyond national guidelines are required.

1.10.Packaging

The packaging materials are included in the EPD report, that is, plastic ends protector and steel strapping for bunding and finished product sale.

1.11.Transportation

In this study, all the materials are considered their environmental impact of transportation. All the transportation data are provided by Maruichi Sun Steel Joint Stock Company, and obtained from google map measurement.

1.12.Product Installation

Welded steel pipes and hollow sections are raw materials for construction and other applications. For these products declared in the EPD report, there is no special installation process for the products, which are generally installed by



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means of a diesel-powered hoist, but this study does not involve an installation phase.

1.13.Use

Welded steel pipes and hollow sections are raw materials for construction and other applications. They are non- /low alloyed steel products generated by alloying iron with other metals and non metals (esp. carbon). Iron is the main component of the products. During usage, no changes in material composition shall occur. Use stage is not included in the EPD report.

1.14.Environment and health during use

The intended use of welded steel hollow sections do not pose a hazard to health or the environment in any known way.

1.15.Reference Service Life and Estimated Building Service Life

Welded steel hollow sections are raw materials for construction and other applications. Reference Service Life and Estimated Building Service Life is not considered in the EPD report.

1.16.Extraordinary effects

Fire

The material is class A1, i.e. not flammable per EN 13501.
The material does not emit fumes or fire-gases

Table 2. Fire protection

NAME	VALUE
Building material class acc. /EN 13501-1/	A1

Water

The steel is stable to water, insoluble and does not emit substances in water. In case of flooding, no impacts are to be expected. Steel can corrode in the presence of oxygen in the water (=slow oxidation).

Mechanical destruction

Due to the ductility of steel, hot-rolled steel structures react resilient in the event of unforeseeable mechanical destruction: In case of a tensile load necking will occur before cracking. In case of lasting high compression load, components of steel may buckle or bulge. No splintering or breaking edges shall result.

1.17.Reuse, Recycling, and Energy Recovery

At the end of life, these products are assumed to be 95% recycled (based on the figures of Word Steel Association). It is assumed that no waste processing is needed the product already reaching the end-of-waste state after the product be recycled. Recycling has already been calculated in module D.

1.18.Disposal

Based on the figures of Word Steel Association (WSA), the recycling rate of steel is around 95%. Based on this, 5% of





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the steel is assumed to be landfilled and this landfilling impact is considered at end-of-life stage(C1-C4). Waste code according to European Waste Catalogue EWC: 1704 05 - iron and steel.

2. Life Cycle Assessment Background Information

2.1. Declared Unit

The declared unit for this report is defined as: the production of one metric ton of Welded steel pipe & hollow sections (black pipe), pre-zinc coated steel pipe (from HGI), pre-zinc coated steel pipe(from CGI).

2.2. System Boundary

The LCA study is conducted for cradle-to-gate with modules C1–C4 and module D (A1–A3, C and D). This system boundary covers the following stages:

- Raw material supply (A1)
 - Extraction and processing of raw materials
 - Collection and processing of recycled materials used as input for manufacturing the product
- Transportation (A2)
 - Transportation of all input materials to manufacturing facilities
 - Transportation of fuels and consumable materials used in manufacturing
 - Transportation of waste-to-landfill waste to landfill as well as disposal in landfill (if any)
- Manufacturing (A3)
 - Electricity and combustion of natural gas, diesel oil, LPG (combustion and associated emissions)
 - Generating of electricity, and natural gas from primary energy resources used in manufacturing
 - Manufacturing of products
 - Manufacturing of packaging, including their extraction, manufacturing and transport
- De-construction, demolition (C1): It has been assumed that for the demolition phase for welded steel hollow sections the use of the following machines is possible: lattice boom crane, forklift, hydraulic crane and crawler loader with construction machinery operation specific use that varies from 17 to 21 minutes per ton. This study assumes that half an hour of crane operation is performed per functional unit with a diesel mobile crane.
- Transport to waste processing (C2): This step includes the transport of waste product. The average distance was assumed 100 km by truck from demolition site to a waste or recycling area.
- Waste processing for reuse, recovery and/or recycling (C3): It is assumed that no waste processing is needed after the product reaches its end-of-life. Recycling has already been calculated in module D, so the impact of this stage is considered zero.
- Removal (C4): Based on the figures of World Steel Association (WSA), the recycling rate of steel is around 95%. Based on this, 5% of the steel is assumed to be landfilled and this landfilling impact is considered at this stage.
- Module D: The credit includes the recycling burden and the credit of replacing virgin pig iron.

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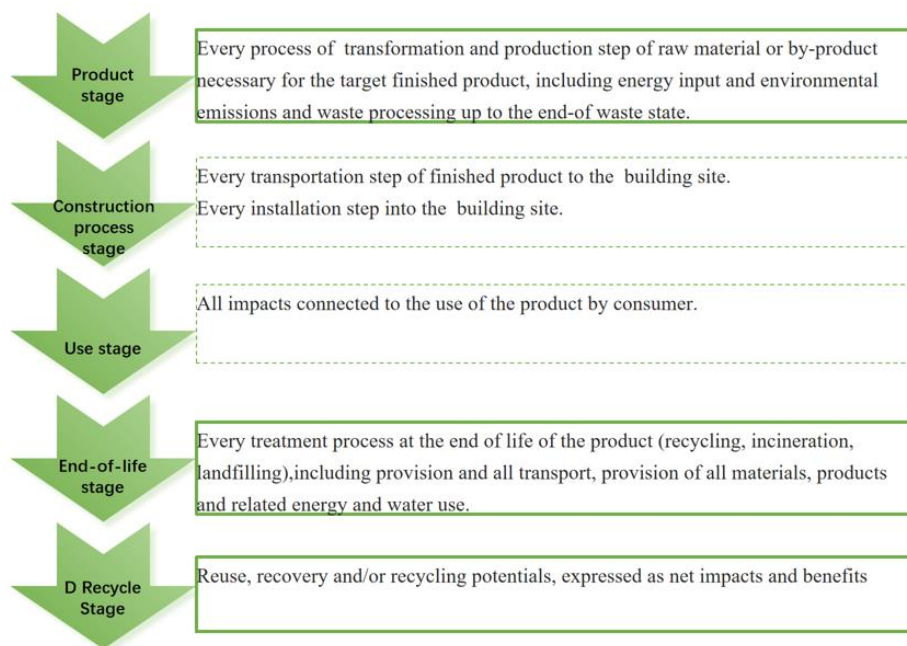


Figure 3 System Boundary – included and excluded process

Table 3 indicates the considered life cycle stages and information modules. The system boundary of this EPD is cradle to gate with modules C1–C4 and module D (A1–A3, C and D). All other information modules are not declared (MND). All declared modules are indicated with an "X".

Table 3. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT- ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type: cradle to gate with option modules	Required			Excluded							Optional				Optional		



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Declared Module	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
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2.3. Estimates and Assumptions

In this study, all the activity data are primary data and obtained from enterprise after collecting and reviewing.

Model building and calculation conforms to the LCA method requirements, and the accuracy of the evaluation results can be basically guaranteed.

The raw material Teck marker PSG-W (Marking Ink) and Yushiroken former ER53(Formong oil) were used in the production of Welded steel pipe & hollow sections (black pipe) in an amount of approximately 0.001% and 0.2%which were not in the background database, so they were substituted with organic chemical from Econinvent database.

The raw material Yushiroken former (Mill coolant) and PK-4910NV (Sunface cleaner) were used in the production of Pre-zinc coated steel pipe (from HGI not including cold rolling process) in an amount of approximately 0.08% and 0.04% which were not in the background database, so they were substituted with organic chemical from Econinvent database.

The raw material Yushiroken former (Mill coolant) and PK-4910NV (Sunface cleaner) were used in the production of Pre-zinc coated steel pipe (from CGI including cold rolling process) in an amount of approximately 2.3% and 1.6% which were not in the background database, so they were substituted with organic chemical from Econinvent database.

The equipment supplies Shell Tellus S2 MX 46 (Hydraulic oil) was used in the production of three target products in an amount of approximately 0.01% which was not in the background database, so they were substituted with lubricating oil from Econinvent database.

The production process of some raw materials is not investigated because of the restriction of research time and control of supply chain, which leads a certain deviation from the actual situation. It is suggested that in the case of enough research time and availability of primary data, further investigation of the production process of raw materials can improve the quality of data and provide data support for enterprises to promote collaborative improvement in the supply chain, e.g. hot-rolled steel coil.

In this study, modules C1–C4 and module D scenario assumptions were made based on PCR requirements and other published EPD reports.

2.4. Cut-off Criteria

- This study adopts the data selection criteria described in ISO 14040/14044, and these selection criteria are as follows:
- All energy consumption should be included.
 - Less than 1% of the weight of the product ordinary material consumption can be ignored, or the material consumption of a high purity substance which is less than 0.1% of the weight of the total product can be ignored. Nevertheless, the total ignored consumption cannot exceed 5% of the total weight of the product.
 - All environmental emissions associated with the specific type of environmental impact should be included, the report will stipulate in which cases the data is not available or missing.
 - In principle, all environmental emissions associated with the specific type of environmental impact should be included, the report will stipulate in which cases the data is not available or missing.
 - General solid waste that it's less than 1% of total solid waste discharge can be ignored.
 - The consumption and emissions of road and plant infrastructure, equipment in various processes, personnel in



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the plant and living facilities are excluded from the study.

No known flows were deliberately excluded that may cause significant change in the results in this study.

2.5. Data Sources

In this study, the company-specific data collection of the enterprise was investigated in August 2024. The activity data provided by enterprise represents the true production status of MARUICHI SUN STEEL JOINT STOCK COMPANY in whole 2023 year.

In order to meet the requirements of data quality and ensure the reliability of the calculation results, the primary data in this study is the data directly provided by the manufacturer and the supplier.

When primary data are not available, secondary data (also known as background data) representing regional averages and specific technical conditions should be selected as far as possible. Secondary data in this study are collected from Ecoinvent database. Data from these databases are highly reviewed and widely used in international LCA studies.

The Ecoinvent database are used to obtain LCI secondary data and average data for upstream (raw material production) processes, such as raw materials, auxiliaries, packaging materials, energy, resources etc.

2.6. Power mix during production stage

Since the production location of MARUICHI SUN STEEL JOINT STOCK COMPANY's factory is in Vietnam, the background data set of the electricity selected during the production stage (A1-A3) is: market for electricity, medium voltage. This electricity model is from Ecoinvent 3.10, with data representative of Vietnam. GWP-GHG impact of the used electricity mix is 0,663kg CO₂-eq/kWh.

2.7. Data Quality

The data quality of this study can be evaluated from four aspects, precision, completeness, consistency and data representativeness.

In this study, the activity data of the enterprise are all from enterprise statistics or on-site measured data, with high precision.

The production site is in DT743, Dong Tac Quarter, Tan Dong Hiep Ward, Di An City, Binh Duong, Vietnam. All the primary data represent the true general production status of MARUICHI SUN STEEL JOINT STOCK COMPANY in 2023 while all the background data are obtained from database in latest version.

In terms of choosing optional datasets, technical representative, time representative, and geographical representative are taken into consideration. Technical representative has the top priority, and the rest of two representativeness can be judged case by case.

The LCA model in this study includes raw material acquisition, product production, etc. which fulfills the definition of system boundary in this study. The Ecoinvent database used to obtain LCI secondary data and average data for upstream (raw material production) processes, contain mining, manufacturing and transportation processes of major energy sources, basic raw materials and chemicals, which meets the requirements of the integrity of background databases.

Consistent statistical standards are adopted for all primary data, namely, primary data are carried out according to unit process and output per unit. Detailed quantitative quality assessment can be found in the LCA report.

In short, the data used in this study meets the data quality requirements and the results are reliable.



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2.8. Period under Review

The activity data (primary data) collected from the manufacturing facility and provided by enterprise are representative for the calendar year 2023.

2.9. Allocation

Allocation of co-products

Economic allocation was applied to allocate the main product and the steel scrap (as co-product) coming out the manufacturing. Furthermore, long-term contracts for the sale of the co-products exist, and the negotiated prices are therefore not subject to market dynamics.

For Product 1:1t Welded steel pipe & hollow sections (black pipe) corresponds to 0.08956t scarp, according to the agreed sales price provided by the manufacturer, its distribution ratio is 0.9618: 0.0382

For Product 2:1t Pre-zinc coated steel pipe (from HGI not including cold rolling process) corresponds to 0.08778t scarp, according to the agreed sales price provided by the manufacturer, its distribution ratio is 0.9595: 0.0405

For Product 3:1t Pre-zinc coated steel pipe (from CGI including cold rolling process) corresponds to 0.1t scarp, according to the agreed sales price provided by the manufacturer, its distribution ratio is 0.9586: 0.0414

Multi-input processes

MARUICHI SUN STEEL JOINT STOCK COMPANY also produce other steel product in addition to three target products included in this report. The manufacturer does not track its energy consumption or process materials in sufficient granularity to allow for a direct correlation to a particular product; therefore, onsite energy, emissions, waste, and process materials were allocated by mass of production.

EoL allocation

The recovered steel scrap generated during the C1-C4 stage that is not looped back to the manufacture (leaving product system that assumes have passed the end-of-waste state), goes to module D. To be conservative, the further downstream processes such as steel scrap be sorted and pressed into blocks and ready to be used for other specific purposes be included as burden in the module D. After that the recycled steel has been modelled to avoid use of primary materials (pig iron), the quality correction factor is assumed to be 0.75.

2.10. Biogenic carbon content

Since the mass of biogenic carbon containing materials in the product and packaging is less than 5 % of the mass of the product and packaging, the declaration of biogenic carbon content be omitted.

3. Life Cycle Assessment Scenarios

Scenario assumptions are provided in Table 4 and Table 5.

Table 4. End of life (C1-C4)

NAME	VALUE	UNIT
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ENVIRONMENTAL PRODUCT DECLARATION



Welded steel hollow sections

Welded steel pipe & hollow sections (black pipe), Pre-zinc coated steel pipe (from HGI not including cold rolling process), Pre-zinc coated steel pipe (from CGI including cold rolling process)

According to ISO 14025,
and EN 15804

Assumptions for scenario development (description of demolition, collection, recovery, disposal method and transportation)			
Demolition process (use diesel mobile Crane)	Fuel Consumption	8	liters/hour
	Working Time	0.5	hour/t
Waste transport	Lorry	/	/
	Distance	100	km
Collection process	Collected separately	1000	kg
	Collected with mixed construction waste	0	kg
Disposal	Reuse	0	kg
	Recycling	950	kg
	Landfill	50	kg
	Incineration	0	kg
	Incineration with energy recovery	0	kg
	Energy conversion efficiency rate	/	%
Removals of biogenic carbon (excluding packaging)		0	kg CO ₂

Table 5. Reuse, recovery and/or recycling potentials (D), relevant scenario information-energy

NAME	VALUE	UNIT
Scraps from waste treatment of waste steel structure from C3	950	kg
Replaced virgin pig iron in the next life cycle	665	kg

4. Life Cycle Assessment Results

4.1. Life Cycle Impact Assessment Results

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Table 7. Core Environmental Impact Category Indicators Assessment Results- Welded steel pipe& hollow section per metric ton

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	2.66E+03	3.17E+00	1.54E+01	0.00E+00	3.15E-01	-5.64E+02
GWP-luluc	kg CO ₂ eq	1.30E+00	7.70E-04	5.19E-03	0.00E+00	1.61E-04	-8.01E-02
GWP-biogenic	kg CO ₂ eq	1.41E+00	7.83E-04	2.56E-03	0.00E+00	7.66E-05	7.49E-02
GWP-fossil	kg CO ₂ eq	2.62E+03	3.16E+00	1.53E+01	0.00E+00	3.13E-01	-5.61E+02
ADP-fossil ²	MJ, net calorific value	2.81E+04	1.80E+02	2.19E+02	0.00E+00	7.67E+00	-5.72E+03
ADP-minerals&metals ²	kg Sb eq	1.55E-02	2.18E-06	4.75E-05	0.00E+00	4.89E-07	1.23E-03
EP-freshwater	kg P eq	1.03E+00	1.81E-04	1.05E-03	0.00E+00	2.59E-05	-2.13E-01
POCP	Kg NMVOC eq	9.29E+00	2.89E-02	1.06E-01	0.00E+00	3.30E-03	-1.58E+00
AP	mol H ⁺ eq	1.15E+01	1.22E-02	6.88E-02	0.00E+00	2.22E-03	-1.75E+00

ENVIRONMENTAL PRODUCT DECLARATION



Welded steel hollow sections

Welded steel pipe & hollow sections (black pipe), Pre-zinc coated steel pipe (from HGI not including cold rolling process), Pre-zinc coated steel pipe (from CGI including cold rolling process)

According to ISO 14025,
and EN 15804

EP-terrestrial	mol N _{eq}	2.65E+01	2.08E-02	2.94E-01	0.00E+00	9.22E-03	-4.48E+00
EP-marine	kg N _{eq}	2.56E+00	1.98E-03	2.70E-02	0.00E+00	8.44E-04	-4.19E-01
ODP	Kg CFC 11 _{eq}	1.50E-05	2.74E-07	3.07E-07	0.00E+00	9.04E-09	-2.04E-06
WDP ²	m ³ world _{eq.} deprived	1.07E+03	2.54E-01	1.09E+00	0.00E+00	2.14E-02	-3.10E+01

Table 8. Core Environmental Impact Category Indicators Assessment Results- Pre-zinc pipe(from HGI) per metric ton

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ _{eq}	2.93E+03	3.17E+00	1.54E+01	0.00E+00	3.15E-01	-5.64E+02
GWP-luluc	kg CO ₂ _{eq}	1.46E+00	7.70E-04	5.19E-03	0.00E+00	1.61E-04	-8.01E-02
GWP-biogenic	kg CO ₂ _{eq}	1.67E+00	7.83E-04	2.56E-03	0.00E+00	7.66E-05	7.49E-02
GWP-fossil	kg CO ₂ _{eq}	2.88E+03	3.16E+00	1.53E+01	0.00E+00	3.13E-01	-5.61E+02
ADP-fossil ²	MJ, net calorific value	3.12E+04	1.80E+02	2.19E+02	0.00E+00	7.67E+00	-5.72E+03
ADP-minerals&metals ²	kg Sb _{eq}	4.42E-02	2.18E-06	4.75E-05	0.00E+00	4.89E-07	1.23E-03
EP-freshwater	kg P _{eq}	1.11E+00	1.81E-04	1.05E-03	0.00E+00	2.59E-05	-2.13E-01
POCP	Kg NMVOC _{eq}	1.06E+01	2.89E-02	1.06E-01	0.00E+00	3.30E-03	-1.58E+00
AP	mol H ⁺ _{eq}	1.41E+01	1.22E-02	6.88E-02	0.00E+00	2.22E-03	-1.75E+00
EP-terrestrial	mol N _{eq}	3.12E+01	2.08E-02	2.94E-01	0.00E+00	9.22E-03	-4.48E+00
EP-marine	kg N _{eq}	2.99E+00	1.98E-03	2.70E-02	0.00E+00	8.44E-04	-4.19E-01
ODP	Kg CFC 11 _{eq}	1.86E-05	2.74E-07	3.07E-07	0.00E+00	9.04E-09	-2.04E-06
WDP ²	m ³ world _{eq.} deprived	1.10E+03	2.54E-01	1.09E+00	0.00E+00	2.14E-02	-3.10E+01

Table 9. Core Environmental Impact Category Indicators Assessment Results- Pre-zinc pipe(from CGI) per metric ton

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ _{eq}	3.60E+03	3.17E+00	1.54E+01	0.00E+00	3.15E-01	-5.64E+02
GWP-luluc	kg CO ₂ _{eq}	1.91E+00	7.70E-04	5.19E-03	0.00E+00	1.61E-04	-8.01E-02
GWP-biogenic	kg CO ₂ _{eq}	2.10E+00	7.83E-04	2.56E-03	0.00E+00	7.66E-05	7.49E-02
GWP-fossil	kg CO ₂ _{eq}	3.54E+03	3.16E+00	1.53E+01	0.00E+00	3.13E-01	-5.61E+02
ADP-fossil ²	MJ, net calorific value	4.11E+04	1.80E+02	2.19E+02	0.00E+00	7.67E+00	-5.72E+03
ADP-minerals&metals ²	kg Sb _{eq}	6.21E-02	2.18E-06	4.75E-05	0.00E+00	4.89E-07	1.23E-03
EP-freshwater	kg P _{eq}	1.33E+00	1.81E-04	1.05E-03	0.00E+00	2.59E-05	-2.13E-01
POCP	Kg NMVOC _{eq}	1.30E+01	2.89E-02	1.06E-01	0.00E+00	3.30E-03	-1.58E+00
AP	mol H ⁺ _{eq}	1.71E+01	1.22E-02	6.88E-02	0.00E+00	2.22E-03	-1.75E+00
EP-terrestrial	mol N _{eq}	3.77E+01	2.08E-02	2.94E-01	0.00E+00	9.22E-03	-4.48E+00
EP-marine	kg N _{eq}	3.55E+00	1.98E-03	2.70E-02	0.00E+00	8.44E-04	-4.19E-01
ODP	Kg CFC 11 _{eq}	2.97E-05	2.74E-07	3.07E-07	0.00E+00	9.04E-09	-2.04E-06
WDP ²	m ³ world _{eq.} deprived	1.70E+03	2.54E-01	1.09E+00	0.00E+00	2.14E-02	-3.10E+01

Acronyms: GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals & metals

ENVIRONMENTAL PRODUCT DECLARATION



Welded steel hollow sections

Welded steel pipe & hollow sections (black pipe), Pre-zinc coated steel pipe (from HGI not including cold rolling process), Pre-zinc coated steel pipe (from CGI including cold rolling process)

According to ISO 14025,
and EN 15804

= Abiotic depletion potential for non-fossil resources ; ADP-fossil = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption; LVH=Lower Heating value

4.2. Additional Environmental Impact Category Indicators Assessment Results

Table 10. Additional Environmental Impact Category Indicator Results- Welded steel pipe& hollow section per metric ton

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
ETP-fw ²	CTUe	7.87E+04	9.05E+00	5.61E+01	0.00E+00	1.03E+00	-4.97E+04
HTP-c ²	CTUh	2.39E-04	1.30E-08	1.03E-07	0.00E+00	1.41E-09	-1.89E-04
HTP-nc ²	CTUh	5.25E-05	1.56E-08	1.56E-07	0.00E+00	1.37E-09	-4.10E-06
SQP ²	Dimensionless	8.19E+03	1.08E+01	1.64E+02	0.00E+00	1.51E+01	-5.33E+02
PM	Disease incidence	2.25E-04	1.13E-07	1.48E-06	0.00E+00	5.04E-08	-3.59E-05
IRP ¹	kBq U235 _{eq}	8.68E+01	8.06E-02	2.90E-01	0.00E+00	4.89E-03	-4.34E+00

Table 11. Additional Environmental Impact Category Indicators Results- Pre-zinc pipe (from HGI) per metric ton

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
ETP-fw ²	CTUe	8.28E+04	9.05E+00	5.61E+01	0.00E+00	1.03E+00	-4.97E+04
HTP-c ²	CTUh	2.25E-04	1.30E-08	1.03E-07	0.00E+00	1.41E-09	-1.89E-04
HTP-nc ²	CTUh	5.69E-05	1.56E-08	1.56E-07	0.00E+00	1.37E-09	-4.10E-06
SQP ²	Dimensionless	8.41E+03	1.08E+01	1.64E+02	0.00E+00	1.51E+01	-5.33E+02
PM	Disease incidence	2.18E-04	1.13E-07	1.48E-06	0.00E+00	5.04E-08	-3.59E-05
IRP ¹	kBq U235 _{eq}	9.48E+01	8.06E-02	2.90E-01	0.00E+00	4.89E-03	-4.34E+00

Table 12. Additional Environmental Impact Category Indicators Results- Pre-zinc pipe (from CGI) per metric ton

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
ETP-fw ²	CTUe	9.52E+04	9.05E+00	5.61E+01	0.00E+00	1.03E+00	-4.97E+04
HTP-c ²	CTUh	2.41E-04	1.30E-08	1.03E-07	0.00E+00	1.41E-09	-1.89E-04
HTP-nc ²	CTUh	6.65E-05	1.56E-08	1.56E-07	0.00E+00	1.37E-09	-4.10E-06
SQP ²	Dimensionless	1.03E+04	1.08E+01	1.64E+02	0.00E+00	1.51E+01	-5.33E+02
PM	Disease incidence	2.56E-04	1.13E-07	1.48E-06	0.00E+00	5.04E-08	-3.59E-05
IRP ¹	kBq U235 _{eq}	1.32E+02	8.06E-02	2.90E-01	0.00E+00	4.89E-03	-4.34E+00

Acronyms: PM = Potential incidence of disease due to PM emissions; IRP = Potential Human exposure efficiency relative to U235; Potential Comparative Toxic Unit for ecosystems; HTP-c = Potential Comparative Toxic Unit for humans; HTP-nc = Potential Comparative Toxic Unit for humans; SQP = Potential Soil quality index

Disclaimer 1: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ENVIRONMENTAL PRODUCT DECLARATION



Welded steel hollow sections

Welded steel pipe & hollow sections (black pipe), Pre-zinc coated steel pipe (from HGI not including cold rolling process), Pre-zinc coated steel pipe (from CGI including cold rolling process)

According to ISO 14025,
and EN 15804

4.3. Life Cycle Inventory Results

Table 13. Resource Use- Welded steel pipe& hollow section

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
PENRE	MJ, LHV	2.86E+04	2.24E+01	2.22E+02	0.00E+00	7.22E+00	-1.08E+04
PERE	MJ, LHV	2.49E+03	4.40E-01	2.49E+00	0.00E+00	6.27E-02	-2.30E+02
PENRM	MJ, LHV	4.65E+02	1.46E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, LHV	3.33E+04	1.68E+02	2.22E+02	0.00E+00	7.22E+00	-1.08E+04
PERT	MJ, LHV	2.49E+03	4.40E-01	2.49E+00	0.00E+00	6.27E-02	-2.30E+02
FW	m ³	1.58E+01	5.61E-03	2.57E-02	0.00E+00	7.90E-03	-2.38E+00
SM	kg	4.12E+02	7.48E-03	6.79E-02	0.00E+00	1.52E-03	9.89E+02
RSF	MJ, LHV	2.62E-01	1.33E-04	8.32E-04	0.00E+00	3.96E-05	-2.26E-02
NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	MJ, LHV	2.14E+01	4.93E-03	2.83E-02	0.00E+00	7.50E-04	-1.90E+00

Table 14. Resource Use- Angel Pre-zinc pipe (from HGI)

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
PENRE	MJ, LHV	3.12E+04	2.24E+01	2.22E+02	0.00E+00	7.22E+00	-1.08E+04
PERE	MJ, LHV	2.96E+03	4.40E-01	2.49E+00	0.00E+00	6.27E-02	-2.30E+02
PENRM	MJ, LHV	1.09E+03	1.46E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, LHV	3.29E+04	1.68E+02	2.22E+02	0.00E+00	7.22E+00	-1.08E+04
PERT	MJ, LHV	2.96E+03	4.40E-01	2.49E+00	0.00E+00	6.27E-02	-2.30E+02
FW	m ³	1.90E+01	5.61E-03	2.57E-02	0.00E+00	7.90E-03	-2.38E+00
SM	kg	3.90E+02	7.48E-03	6.79E-02	0.00E+00	1.52E-03	9.89E+02
RSF	MJ, LHV	2.50E-01	1.33E-04	8.32E-04	0.00E+00	3.96E-05	-2.26E-02
NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	MJ, LHV	2.20E+01	4.93E-03	2.83E-02	0.00E+00	7.50E-04	-1.90E+00

Table 15. Resource Use- Pre-zinc pipe (from CGI)

INDICATOR	UNIT	A1-A3	C1	C2	C3 缺失	C4	D
PENRE	MJ, LHV	3.94E+04	2.24E+01	2.22E+02	0.00E+00	7.22E+00	-1.08E+04
PERE	MJ, LHV	3.61E+03	4.40E-01	2.49E+00	0.00E+00	6.27E-02	-2.30E+02
PENRM	MJ, LHV	3.22E+03	1.46E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, LHV	4.26E+04	1.68E+02	2.22E+02	0.00E+00	7.22E+00	-1.08E+04
PERT	MJ, LHV	3.61E+03	4.40E-01	2.49E+00	0.00E+00	6.27E-02	-2.30E+02
FW	m ³	3.33E+01	5.61E-03	2.57E-02	0.00E+00	7.90E-03	-2.38E+00
SM	kg	4.15E+02	7.48E-03	6.79E-02	0.00E+00	1.52E-03	9.89E+02



ENVIRONMENTAL PRODUCT DECLARATION



Welded steel hollow sections

Welded steel pipe & hollow sections (black pipe), Pre-zinc coated steel pipe (from HGI not including cold rolling process), Pre-zinc coated steel pipe (from CGI including cold rolling process)

According to ISO 14025,
and EN 15804

RSF	MJ, LHV	3.02E-01	1.33E-04	8.32E-04	0.00E+00	3.96E-05	-2.26E-02
NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	MJ, LHV	4.68E+01	4.93E-03	2.83E-02	0.00E+00	7.50E-04	-1.90E+00

Acronyms: PENRE = Use of non-renewable primary energy excluding nonrenewable primary energy resources used as raw material; PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw material; PENRM = Use of non-renewable primary energy resources used as raw material; PERM = Use of renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials); PERT = Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials); FW = Net use of fresh water; SM = Use of secondary materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; RE=Recovered energy; LVH=Lower Heating value

Table 16. Output Flows and Waste Categories - Welded steel pipe& hollow section

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
HWD	kg	9.60E+02	4.54E-02	2.99E-01	0.00E+00	7.67E-03	-9.45E+01
NHWD	kg	1.08E+04	5.66E-01	4.80E+00	0.00E+00	1.08E-01	-1.96E+03
RWD	kg	2.23E-02	1.22E-03	1.33E-03	0.00E+00	4.79E-05	-9.84E-03
MER	kg	9.06E-03	2.77E-06	1.30E-05	0.00E+00	1.71E-07	-3.11E-04
MFR	kg	5.74E-01	1.73E-04	6.62E-04	0.00E+00	1.44E-05	-8.53E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	8.01E+00	4.95E-02	1.56E-01	0.00E+00	1.08E-02	-3.15E+00
EEE	MJ	1.34E+01	5.86E-03	3.63E-02	0.00E+00	1.35E-03	-6.57E-01

Table 17. Output Flows and Waste Categories - Pre-zinc pipe(from HGI)

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
HWD	kg	9.39E+02	4.54E-02	2.99E-01	0.00E+00	7.67E-03	-9.45E+01
NHWD	kg	1.07E+04	5.66E-01	4.80E+00	0.00E+00	1.08E-01	-1.96E+03
RWD	kg	2.46E-02	1.22E-03	1.33E-03	0.00E+00	4.79E-05	-9.84E-03
MER	kg	9.02E-03	2.77E-06	1.30E-05	0.00E+00	1.71E-07	-3.11E-04
MFR	kg	7.58E-01	1.73E-04	6.62E-04	0.00E+00	1.44E-05	-8.53E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	8.87E+00	4.95E-02	1.56E-01	0.00E+00	1.08E-02	-3.15E+00
EEE	MJ	1.31E+01	5.86E-03	3.63E-02	0.00E+00	1.35E-03	-6.57E-01

Table 18. Output Flows and Waste Categories - Pre-zinc pipe(from CGI)

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
HWD	kg	1.03E+03	4.54E-02	2.99E-01	0.00E+00	7.67E-03	-9.45E+01
NHWD	kg	1.22E+04	5.66E-01	4.80E+00	0.00E+00	1.08E-01	-1.96E+03
RWD	kg	3.42E-02	1.22E-03	1.33E-03	0.00E+00	4.79E-05	-9.84E-03
MER	kg	1.20E-02	2.77E-06	1.30E-05	0.00E+00	1.71E-07	-3.11E-04
MFR	kg	9.45E-01	1.73E-04	6.62E-04	0.00E+00	1.44E-05	-8.53E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	1.30E+01	4.95E-02	1.56E-01	0.00E+00	1.08E-02	-3.15E+00



ENVIRONMENTAL PRODUCT DECLARATION



Welded steel hollow sections

Welded steel pipe & hollow sections (black pipe), Pre-zinc coated steel pipe (from HGI not including cold rolling process), Pre-zinc coated steel pipe (from CGI including cold rolling process)

According to ISO 14025,
and EN 15804

EEE	MJ	3.38E+01	5.86E-03	3.63E-02	0.00E+00	1.35E-03	-6.57E-01
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Acronyms: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; MER = Materials for energy recovery; MFR = Material for recycling; CRU = Components for reuse; ETE = Exported thermal energy; EEE = Exported electricity energy

5. LCA Interpretation

This research meets the requirements of ISO14040/14044, EN 15804 and the product LCA modeling, calculation and analysis are completed by the OpenLCA software.

The on-site production data is provided by MARUICHI SUN STEEL JOINT STOCK COMPANY. The authenticity, accuracy and reliability of enterprise data would be guaranteed by the manufacturer.

The boundary of this study is cradle to gate with modules C1–C4 and module D (A1–A3, C and D), and the product life cycle considers all the production processes investigated on-site. Wastewater treatment process is ignored due to the estimated low environmental impact. Due to the restriction of the database and the low usage of label, etc, their environmental impacts are also estimated little influence on the final results, leading a neglect of their impacts. The neglected data and the model conform to cut-off rules.

The LCI data of raw materials, additives, packaging materials, energy, resources, etc. used in the report is mainly derived from the Ecoinvent databases.

Since it is the first time for MARUICHI SUN STEEL JOINT STOCK COMPANY to conduct environmental declaration for its products, there's no existing manufacturer-specific EPD for comparability.

6. Additional Environmental Information

6.1. Delayed Emissions

No delayed emissions are expected from these products.

6.2. Environmental Activities and Certifications

Environmental policy at Maruichi Sun Steel Joint Stock Company has achieved remarkable outcomes.

- On Feb 2, 2010, we have been assessed and certified as meeting the requirements of ISO14001:2008. We upgraded to ISO14001:2015 since 2017 and maintain the certificate until now.

- Our policy of environment, with “co-existence, co-development of earth, nature and human being” as our basic value, we make efforts to be its liaison.

Environmental management activities:

- Comply with environmental laws, review the entire process and implement continuous environmental improvement.
- Minimize contaminants by introducing clean production lines and optimal prevention techniques.
- Create a civilization that efficiently recycles, makes use of waste products, and utilizes natural resources.
- Reduce greenhouse gas emissions and take the lead in developing a low-carbon green environment by using clean energy and applying green techniques.
- Publicize the results of environmental management, ensure transparency in management and aim for sustainability.

More information on Maruichi Sun Steel Joint Stock Company's certifications and environmental activities can be found

ENVIRONMENTAL PRODUCT DECLARATION



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According to ISO 14025,
and EN 15804

at <https://www.maruichisunsteel.com>

6.3. Further Information

Additional information on steel product can be found at <https://www.maruichisunsteel.com>

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8. Contact Information

8.1 Study Commissioner



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ENVIRONMENTAL PRODUCT DECLARATION



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According to ISO 14025,
and EN 15804

8.2 LCA Practitioner



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