

ENVIRONMENTAL PRODUCT DECLARATION

VINA KYOEI CONSTRUCTION STEEL

DEFORMED STEEL BARS

PLAIN ROUND BARS

WIRE RODS



Deformed bars, Plain round bars, Wire rods are 3 types of products produced by Vina Kyoei Steel.



VINA KYOEI STEEL CO., LTD is a joint venture between Kyoei Steel Ltd., Mitsui & Co. Ltd., Marubeni-Itochu Steel Pte Ltd., and Vietnam Steel Corporation – JSC. Specializing in construction steel, it produces deformed bars, plain round bars, and wire rods (6mm to 51mm) that meet standards like TCVN, JIS, ASTM, and BS, used in civil and industrial projects.

With nearly 1 million tons of annual production, Vina Kyoei Steel focuses on technological innovation and sustainability, switching from oil to gas to reduce CO₂ emissions. The company ensures rigorous safety measures and is certified with ISO 14001:2015 for environmental management and ISO 45001:2018 for worker safety.

As a leading steel producer, Vina Kyoei Steel contributes to Vietnam's economic and sustainable development.



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Deformed steel bars, Plain round bars, Wire rods

According to ISO 14025,
and ISO 21930:2017

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	Vina Kyoel Steel Co. Ltd. Phu My 1 Industrial zone, Phu My ward, Phu My town, Ba Ria - Vung Tau province, Vietnam
DECLARATION NUMBER	4791361050.101.1
DECLARED PRODUCT & DECLARED UNIT OR DECLARED UNIT	Construction Steels (Deformed bars, Plain round bars, Wire rods), 1 metric ton
REFERENCE PCR AND VERSION NUMBER	IBU PCR - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report IBU Part B: Requirements on the EPD for Structural steels v.10 2024
DESCRIPTION OF PRODUCT APPLICATION/USE	Construction steels are used for wide applications ranging from infrastructure construction to residential and commercial building projects, and even industrial works.
PRODUCT RSL DESCRIPTION (IF APPL.)	Not applicable
MARKETS OF APPLICABILITY	Global
DATE OF ISSUE	January 8, 2025
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 v2.3.1
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent 3.10
LCIA METHODOLOGY & VERSION NUMBER	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 
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:	Vicki Rybl, WAP 

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

Vina Kyohei Steel Co., Ltd. is a leading manufacturer of high-quality steel products in Vietnam. Established in January 1994 as a joint venture between Kyohei Steel, Mitsui & Co., Marubeni-Itochu Steel, and Vietnam Steel Corporation, we began commercial operations in January 1996. Our product range includes Deformed Bars, Threaded Deformed Bars and Couplers, Plain Round Bars, Wire Rods, Plain round bars, and Steel Billets, with an annual production capacity of nearly 1 million metric tons.

Our factory, located in Ba Ria - Vung Tau province, spans over 17 hectares and is equipped with state-of-the-art machinery imported from Japan. We continuously invest in training our workforce to meet the highest operational and maintenance standards, ensuring the delivery of top-quality products at competitive prices.

At Vina Kyohei Steel, we are committed to environmental protection and sustainability. By transitioning from heavy oil to gas in our reheating furnace, we have significantly reduced CO2 emissions. We have earned ISO 14001:2015 for environmental management and ISO 45001:2018 for occupational health and safety, alongside ISO 9001:2015 for quality management. Moreover, we are the first steel company in Vietnam to receive JIS certification from the Japan Quality Assurance Organization.

With a blend of Japanese technology and Vietnamese expertise, Vina Kyohei Steel contributes to Vietnam's sustainable development, delivering products that meet both domestic and international standards. We are dedicated to exceeding customer expectations and supporting the country's continued growth and prosperity.



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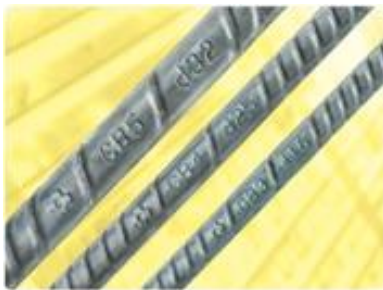
According to ISO 14025,
and ISO 21930:2017

1.2. Product Description

Product Identification

Construction Steels, in 3 types, Deformed steel bars, Plain round bars, Wire rods

Deformed steel bars, Plain round bars, Wire rods, with diameters ranging from 6mm to 51mm, used as concrete reinforcement in the construction of residential, commercial and industrial projects. The construction steels will be cut, bent, tied or welded according to specific construction technical requirements depending on each different project.



Deformed steel bars



Plain round bars



Wire rods

Product Specification

Construction Steel

- Deformed steel bars
- Plain round bars
- Wire rods

Complies with Vietnamese Standard (TCVN 1651-2:2018)

Complies with Japanese Industrial Standard (JIS G 3112-2020, JIS G 3101-2020)

Complies with American Society for Testing and Materials (ASTM A 615M-22)

Complies with Australian and New Zealand Standard (AS/NZS 4671:2019)

For more details of technical specifications such as: dimensions, properties, and steel grades of the steel products, please visit: www.vinakyoeisteel.com.vn

Flow Diagram

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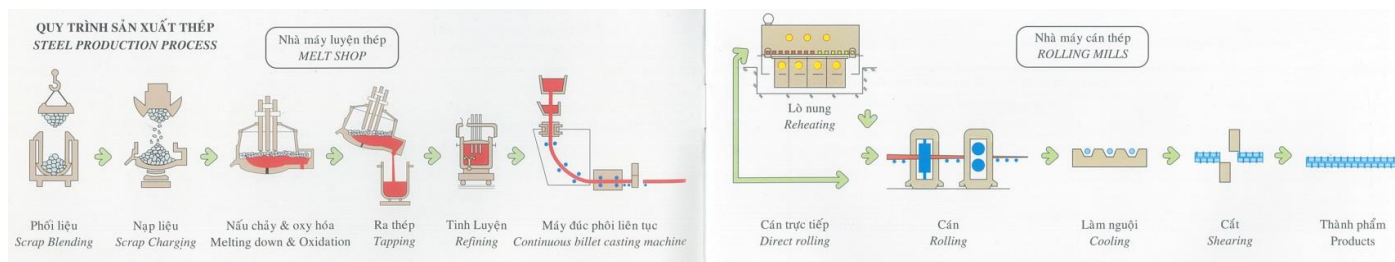


Figure 1 Vina Kyouei Steel's construction steel products (including deformed bars, plain round bars, and wire rods) making process flow chart

Product Average

The manufacturing process of three products are similar and activity data are representative for total products. The company-level data to create a production-weighted average across products based on production volume are used to determine the mass of the declared unit and reference flow for the LCA.

This EPD can represent annual average environmental performance of company specific individual product reported in this EPD manufactured in Vina Kyouei Steel in 2023.

1.3.Application

Vina Kyouei Steel Co. Ltd. manufactures construction steel products including deformed bars, plain round bars and wire rods used as a reinforcement device in concrete. Typical applications are in the construction of buildings, bridges, roads and other civil works (infrastructure, superstructures etc.).

The potential communication objects of this EPD report include two groups: firstly, Vina Kyouei Steel itself and other related personnels; secondly, internal and external project stakeholders, including upstream raw material suppliers, downstream customers and consumers, local governments and environmental 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 IBU PCR - 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.

1.5.Technical Requirements

The target construction steels are mainly made from steel scraps. The following table refers to construction steel properties.

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Table 1. Technical data of Deformed steel bars

NAME	VALUE	UNIT
Density	7,850	kg/m ³
Modulus of elasticity	n/a	N/mm ²
Coefficient of thermal expansion	1.016	10-6K ⁻¹
Thermal conductivity	45	W/(mK)
Melting point	1,371-1,593	°C
Minimum yield strength	300	Mpa
Minimum tensile strength	450	Mpa
Minimum elongation	14	%

Table 2. Technical data of Plain round bars

NAME	VALUE	UNIT
Density	7,850	kg/m ³
Modulus of elasticity	n/a	N/mm ²
Coefficient of thermal expansion	1.016	10-6K ⁻¹
Thermal conductivity	45	W/(mK)
Melting point	1,371-1,593	°C
Minimum yield strength	300	Mpa
Minimum tensile strength	440	Mpa
Minimum elongation	16	%

Table 3. Technical data of Wire rods

NAME	VALUE	UNIT
Density	7,850	kg/m ³
Modulus of elasticity	n/a	N/mm ²
Coefficient of thermal expansion	1.016	10-6K ⁻¹
Thermal conductivity	45	W/(mK)
Melting point	1,371-1,593	°C
Minimum yield strength	240	Mpa
Minimum tensile strength	380	Mpa



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Minimum elongation	20	%
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1.6.Properties of Declared Product as Delivered

Vina Kyoei Steel Ltd.'s construction steel products have a traditional standard length of 11.7 meters in the Vietnamese market. However, we can also produce steel bars with a length of 12 meters or shorter depending on customer requirements for domestic and export markets. Steel products are packed in bundles with an average weight of 2.6-2.7 tons/bundle for rebars of 11.7 meters long.

1.7.Material Composition

Base Materials/Ancillary Materials

The basic raw material used in the production of deformed steel bars, plain bars, and wire rods is Steel Scrap. Alloying elements such as Carbon and manganese are added to the steel. Other elements like Al may be present in Steel.

Maximum content on the following elements as established by Their Respective Standards:

- **Deformed Steel Bars** (Standards: TCVN 1651-2, 2018 & AS/NZS 4671, 2019):
 - %Carbon: 0.32
 - %Silicon: 0.55
 - %Manganese: 1.80
 - %Phosphorus: 0.05
 - %Sulfur: 0.05
- **Plain Bars** (Standard: JIS G 3101, 2020& AS/NZS 3679.1, 2016):
 - %Carbon: 0.25
 - %Silicon: 0.50
 - %Manganese: 1.60
 - %Phosphorus: 0.04
 - %Sulfur: 0.04
- **Wire Rods** (Standard: TCVN 1651-1, 2018):
 - %Carbon: -
 - %Silicon: -
 - %Manganese: -
 - %Phosphorus: 0.05
 - %Sulfur: 0.05

These products do not contain any materials or substances for which there exists a route to exposure that leads to humans or plants/animals in the environment to such materials or substances at levels above those considered safe for human health. This ensures the safety of the product during its entire lifecycle from manufacturing to end-use. These specified limits ensure that each product category meets its required performance criteria while adhering to environmental and safety regulations detailed in their respective standards.

1.8.Manufacturing

The manufacturing location is in Vietnam at the Phu My 1 Industrial zone, Phu My ward, Phu My town, Ba Ria - Vung Tau province. 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.



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All three types of construction steel products (deformed bars, plain round bars, and wire rods) are mainly produced from steel scrap. The basic manufacturing process is as follows: steel scrap is fed into the electric arc furnace and then the product is steel billet, steel billet is fed into the reheating furnace through the rolling process (or directly to rolling line) and becomes finished steel products such as deformed bars, plain round bars and wire rods. The flow chart can be seen as follows:

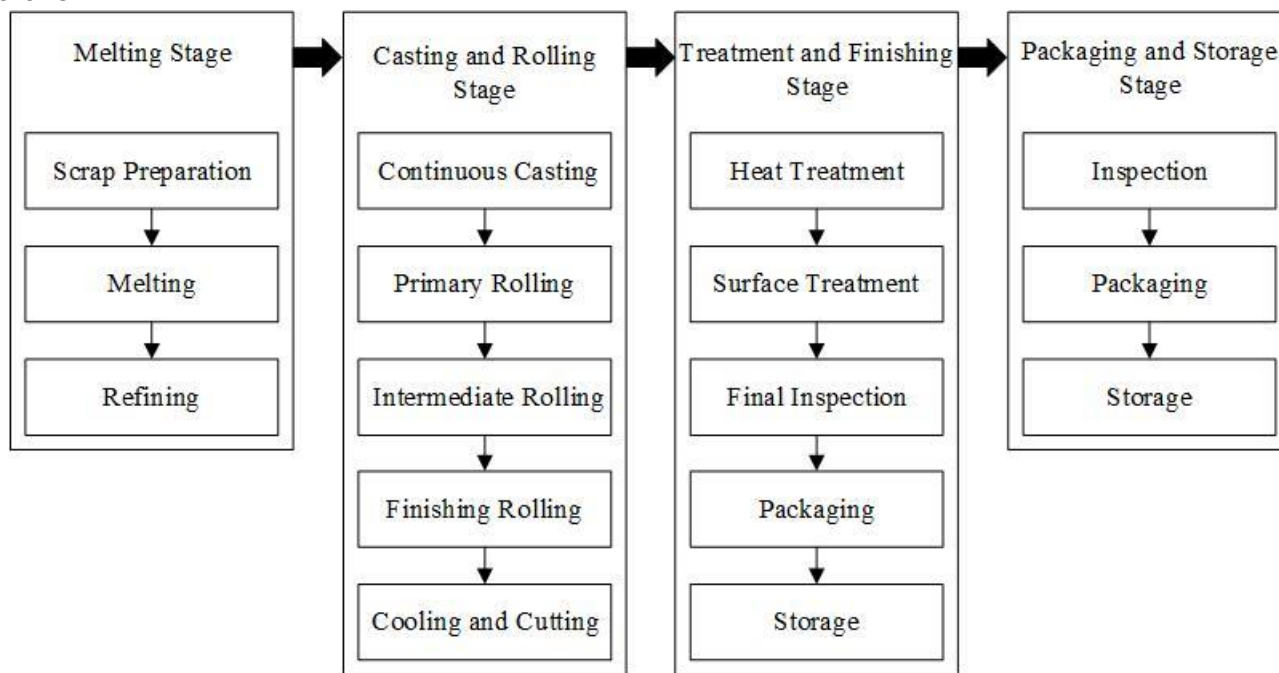


Figure 2 STEEL MAKING PROCESS FLOW CHART

1.9.Environment and health during manufacturing

Measures related to health protection are: providing full personal protective equipment for all workers in the area, periodically conducting environmental monitoring to monitor the situation and working conditions in the production area and reporting to the government environmental control agency, providing annual general health check-ups and occupational health check-ups, paying hazardous allowances and promoting healthy drinks for workers.

Dust generated is collected and transferred to industrial waste treatment units, solid waste is transferred to professional environmental treatment companies for industrial waste treatment, gaseous waste is closely monitored to ensure control within allowable levels and prevent risks and to report to government authorities for monitoring, water used to cool equipment is collected and filtered for re-circulation reuse.

Quality and environmental and occupational health management systems ISO 9001, ISO 14001, ISO 45001

1.10.Packaging

The products are packed in bundles with an average weight of 2.6 to 2.7 tons per bundle for the rebars' length of 11.7 m. Each bundle is tied at 4 points by steel wire rods, the length of the steel bundle normally 11.7m, it can be shorter than 11.7 m or longer up to 12.0 m. The main component of the steel bundle is carbon steel.

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The steel bundles are lifted by overhead crane and placed on trucks or placed in containers for transporting to customers.

1.11. Transportation

In this study, all the materials are considered their environmental impact of transportation. All the transportation data are provided by Vina Kyoei Steel, and obtained from google map measurement.

1.12. Product Installation

Vina Kyoei Steel's construction steel products (deformed bars, plain round bars, and wire rods) are mainly used as concrete reinforcement in construction. For these products declared in the EPD report, there is no special installation process for the products. They are generally installed by means of construction equipment such as cranes and hoists depending on the site requirements, but this study does not involve an installation phase.

1.13. Use

Operations are carried out at normal temperature and environment, by persons knowledgeable about steel materials and the use of steel materials in construction. Use stage is not included in this EPD report.

1.14. Environment and health during use

Steel products should be stored and used in a dry and cool place without water or other liquids coming into contact with them so that there will be no harm to health. There is only one risk that can cause accidents to workers because the specific gravity of steel is very large and steel can conduct electricity.

1.15. Reference Service Life and Estimated Building Service Life

Vina Kyoei Steel's construction steel products (deformed bars, plain round bars, and wire rods) are mainly used for concrete reinforcement in construction and other applications. In general, the service life for building construction may be assumed to be 50 years and regulation class 4 for the installed state of rebars, taking into account appropriate guidelines and using the EN 1990 standard. However, the service life of the installed rebars can be considerably longer due to the material properties. Additionally, the product aging is stated as 80 years.

Reference Service Life and Estimated Building Service Life is not considered in this EPD report.

1.16. Reuse, Recycling, and Energy Recovery

The rebars used in the building are finally recycled when the building is demolished and the steel rebars and concrete are separated. Reinforcing steel can be 100% recycled back into the manufacturing process. The steel is demolished together with the concrete and recycled. The other waste products can be disposed of normally or go into the reprocessing of the old concrete. Recycling has already been considered in the relevant calculations for these product's life cycle assessment.

In this study, it is conservatively assumed that 95% of the products are recycled at the end of life (based on the figures of World Steel Association).

1.17. Disposal

Based on the figures of World Steel Association (WSA), the recycling rate of steel is around 95%, 5% of the steel is assumed to be landfilled and this landfilling impact is considered at end-of-life stage (C1-C4).



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The waste code according to AVV for the disposal of steel and iron corresponding to the category construction and demolition waste is 1704 05.

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 deformed bars, plain round bars, and wire rods.

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 materials for recycling externally
 - Transportation of waste-to-landfill waste to landfill as well as disposal in landfill
- Manufacturing (A3)
 - Electricity and combustion of natural gas (combustion and associated emissions)
 - Generating of electricity from primary energy resources, and natural gas used in manufacturing
 - Manufacturing of products and by-products
 - Manufacturing of packaging, including their extraction, manufacturing and transport
- De-construction, demolition (C1): It has been assumed that for the demolition phase for a steel structure 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.
- Disposal (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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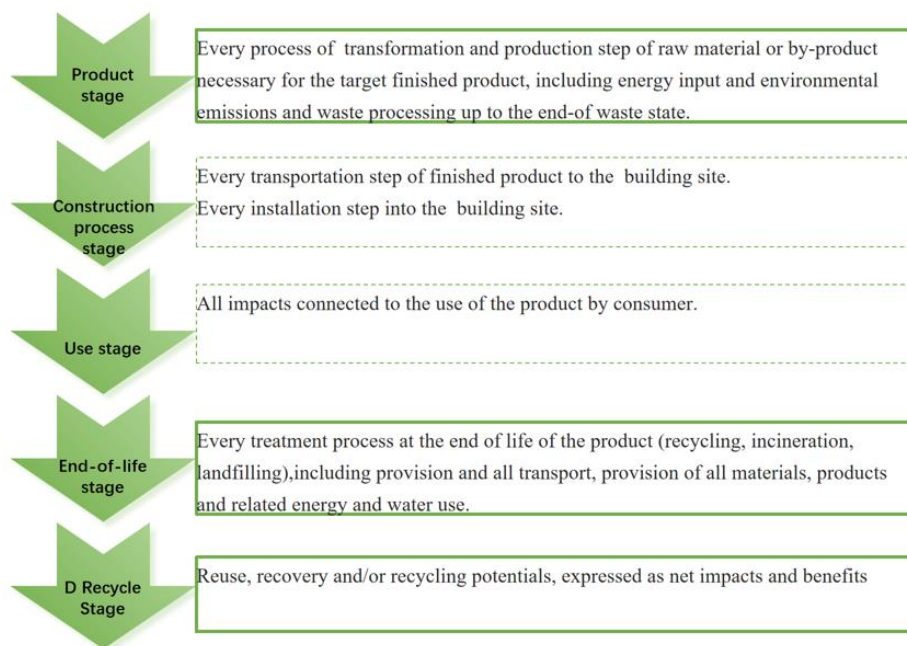


Figure 2 System Boundary – included and excluded process

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 4. 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 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. ferro alloys.

At the end of life, Vina Kyohei Steel's construction steel products (deformed bars, plain round bars, and wire rods) are assumed to be 95% recyclable (based on the figures of Word Steel Association).

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 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 2024. The activity data provided by enterprise represents the true production status of Vina Kyohei 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





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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 Vina Kyoei'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, namely, 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 Ba Ria Vung Tau Province, Vietnam. All the primary data represent the true general production status of Vina Kyoei 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.

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

Multi-input processes

Vina Kyoei also produce steel billet 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.



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EoL allocation

In basis of the EN 15804, the Polluter Pays Principle (PPP) should be followed when it comes to secondary material input so that cut-off allocation was used to treat scrap inputs, that is no burdens were allocated across the system boundary with secondary material. At the same time, the metal-containing waste (slag, steel dust, mill scale, etc.) generated during the production stage of A1 - A3 is not allocated with credit due to the cut-off allocation was used, only the environmental burden of downstream disposal is taken into account.

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 0.7.

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 5 and Table 6.

Table 5. End of life (C1-C4)

NAME		VALUE	UNIT
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 6. Reuse, recovery and/or recycling potentials (D), relevant scenario information-energy

NAME	VALUE	UNIT
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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- Deformed steel bars per metric ton (EN 15804+A2 Method V1.03)

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	9.88E+02	3.17E+00	1.54E+01	0.00E+00	3.15E-01	-5.64E+02
GWP-luluc	kg CO ₂ eq	5.72E-01	7.70E-04	5.19E-03	0.00E+00	1.61E-04	-8.01E-02
GWP-biogenic	kg CO ₂ eq	4.33E-01	7.83E-04	2.56E-03	0.00E+00	7.66E-05	7.49E-02
GWP-fossil	kg CO ₂ eq	9.77E+02	3.16E+00	1.53E+01	0.00E+00	3.13E-01	-5.61E+02
ADP-fossil ²	MJ, net calorific value	1.24E+04	1.80E+02	2.19E+02	0.00E+00	7.67E+00	-5.72E+03
ADP-minerals&metals ²	kg Sb eq	2.74E-03	2.18E-06	4.75E-05	0.00E+00	4.88E-07	1.23E-03
EP-freshwater	kg P eq	2.72E-01	1.81E-04	1.05E-03	0.00E+00	2.59E-05	-2.12E-01
POCP	kg NMVOC eq	4.62E+00	2.89E-02	1.06E-01	0.00E+00	3.30E-03	-1.58E+00
AP	mol H ⁺ eq	7.33E+00	1.21E-02	6.88E-02	0.00E+00	2.21E-03	-1.75E+00
EP-terrestrial	mol N eq	1.58E+01	2.08E-02	2.94E-01	0.00E+00	9.22E-03	-4.48E+00
EP-marine	kg N eq	1.38E+00	1.98E-03	2.70E-02	0.00E+00	8.44E-04	-4.19E-01
ODP	kg CFC 11 eq	9.77E-06	2.73E-07	3.07E-07	0.00E+00	9.04E-09	-2.04E-06
WDP ²	m ³ world eq. deprived	1.53E+02	2.54E-01	1.09E+00	0.00E+00	2.14E-02	-3.10E+01

Table 8. Core Environmental Impact Category Indicators Assessment Results- Plain round bars per metric ton (EN 15804+A2 Method V1.03)

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	1.04E+03	3.17E+00	1.54E+01	0.00E+00	3.15E-01	-5.64E+02
GWP-luluc	kg CO ₂ eq	5.89E-01	7.70E-04	5.19E-03	0.00E+00	1.61E-04	-8.01E-02
GWP-biogenic	kg CO ₂ eq	4.77E-01	7.83E-04	2.56E-03	0.00E+00	7.66E-05	7.49E-02
GWP-fossil	kg CO ₂ eq	1.03E+03	3.16E+00	1.53E+01	0.00E+00	3.13E-01	-5.61E+02
ADP-fossil ²	MJ, net calorific value	1.29E+04	1.80E+02	2.19E+02	0.00E+00	7.67E+00	-5.72E+03
ADP-minerals&metals ²	kg Sb eq	2.78E-03	2.18E-06	4.75E-05	0.00E+00	4.88E-07	1.23E-03
EP-freshwater	kg P eq	2.94E-01	1.81E-04	1.05E-03	0.00E+00	2.59E-05	-2.12E-01
POCP	kg NMVOC eq	5.07E+00	2.89E-02	1.06E-01	0.00E+00	3.30E-03	-1.58E+00
AP	mol H ⁺ eq	8.58E+00	1.21E-02	6.88E-02	0.00E+00	2.21E-03	-1.75E+00
EP-terrestrial	mol N eq	1.80E+01	2.08E-02	2.94E-01	0.00E+00	9.22E-03	-4.48E+00
EP-marine	kg N eq	1.55E+00	1.98E-03	2.70E-02	0.00E+00	8.44E-04	-4.19E-01
ODP	kg CFC 11 eq	1.03E-05	2.73E-07	3.07E-07	0.00E+00	9.04E-09	-2.04E-06
WDP ²	m ³ world eq. deprived	1.66E+02	2.54E-01	1.09E+00	0.00E+00	2.14E-02	-3.10E+01



ENVIRONMENTAL PRODUCT DECLARATION



Construction Steel

Deformed steel bars, Plain round bars, Wire rods

According to ISO 14025,
and ISO 21930:2017

Table 9. Core Environmental Impact Category Indicators Assessment Results- Wire rods per metric ton (EN 15804+A2 Method V1.03)

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	8.56E+02	3.17E+00	1.54E+01	0.00E+00	3.15E-01	-5.64E+02
GWP-luluc	kg CO ₂ eq	3.71E-01	7.70E-04	5.19E-03	0.00E+00	1.61E-04	-8.01E-02
GWP-biogenic	kg CO ₂ eq	4.13E-01	7.83E-04	2.56E-03	0.00E+00	7.66E-05	7.49E-02
GWP-fossil	kg CO ₂ eq	8.46E+02	3.16E+00	1.53E+01	0.00E+00	3.13E-01	-5.61E+02
ADP-fossil ²	MJ, net calorific value	1.05E+04	1.80E+02	2.19E+02	0.00E+00	7.67E+00	-5.72E+03
ADP-minerals&metals ²	kg Sb eq	3.03E-03	2.18E-06	4.75E-05	0.00E+00	4.88E-07	1.23E-03
EP-freshwater	kg P eq	2.62E-01	1.81E-04	1.05E-03	0.00E+00	2.59E-05	-2.12E-01
POCP	kg NMVOC eq	3.66E+00	2.89E-02	1.06E-01	0.00E+00	3.30E-03	-1.58E+00
AP	mol H ⁺ eq	6.76E+00	1.21E-02	6.88E-02	0.00E+00	2.22E-03	-1.75E+00
EP-terrestrial	mol N eq	1.37E+01	2.08E-02	2.94E-01	0.00E+00	9.22E-03	-4.48E+00
EP-marine	kg N eq	1.13E+00	1.98E-03	2.70E-02	0.00E+00	8.44E-04	-4.19E-01
ODP	kg CFC 11 eq	8.02E-06	2.73E-07	3.07E-07	0.00E+00	9.04E-09	-2.04E-06
WDP ²	m ³ world eq. deprived	1.59E+02	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 = 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

Note: ILCD Type 1: Indicators GWP, ODP, PM require no disclaimer; ILCD Type 2: Indicators AP, EP-freshwater, EP-marine, EP-terrestrial, POCP, IRP require no disclaimer; ILCD Type 2: IRP requires 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."; ILCD Type 3: ADP-minerals & metals, ADP-fossil, WDP, ETP-fw, HTP-c, HTP-nc, SQP require 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"

4.2. Additional Environmental Impact Category Indicators Assessment Results

Table 10. Additional Environmental Impact Category Indicators Assessment Results- Deformed steel bars per metric ton

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
ETP-fw ²	CTUe	3.81E+03	9.05E+00	5.60E+01	0.00E+00	1.03E+00	-4.97E+04
HTP-c ²	CTUh	4.99E-06	1.30E-08	1.03E-07	0.00E+00	1.41E-09	-1.89E-04
HTP-nc ²	CTUh	6.66E-06	1.56E-08	1.56E-07	0.00E+00	1.37E-09	-4.10E-06
SQP ²	Dimensionless	3.79E+03	1.08E+01	1.64E+02	0.00E+00	1.51E+01	-5.33E+02
PM	Disease incidence	7.62E-05	1.12E-07	1.48E-06	0.00E+00	5.04E-08	-3.59E-05
IRP ¹	kBq U235 eq	1.85E+01	8.06E-02	2.90E-01	0.00E+00	4.89E-03	-4.33E+00

Table 11. Additional Environmental Impact Category Indicators Assessment Results- Plain round bars per metric ton

ENVIRONMENTAL PRODUCT DECLARATION



Construction Steel

Deformed steel bars, Plain round bars, Wire rods

According to ISO 14025,
and ISO 21930:2017

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
ETP-fw ²	CTUe	3.82E+03	9.05E+00	5.60E+01	0.00E+00	1.03E+00	-4.97E+04
HTP-c ²	CTUh	4.97E-06	1.30E-08	1.03E-07	0.00E+00	1.41E-09	-1.89E-04
HTP-nc ²	CTUh	6.20E-06	1.56E-08	1.56E-07	0.00E+00	1.37E-09	-4.10E-06
SQP ²	Dimensionless	2.72E+03	1.08E+01	1.64E+02	0.00E+00	1.51E+01	-5.33E+02
PM	Disease incidence	7.08E-05	1.12E-07	1.48E-06	0.00E+00	5.04E-08	-3.59E-05
IRP ¹	kBq U235 _{eq}	1.95E+01	8.06E-02	2.90E-01	0.00E+00	4.89E-03	-4.33E+00

Table 12. Additional Environmental Impact Category Indicators Assessment Results- Wire rods per metric ton

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
ETP-fw ²	CTUe	3.10E+03	9.05E+00	5.60E+01	0.00E+00	1.03E+00	-4.97E+04
HTP-c ²	CTUh	3.58E-06	1.30E-08	1.03E-07	0.00E+00	1.41E-09	-1.89E-04
HTP-nc ²	CTUh	5.91E-06	1.56E-08	1.56E-07	0.00E+00	1.37E-09	-4.10E-06
SQP ²	Dimensionless	2.68E+03	1.08E+01	1.64E+02	0.00E+00	1.51E+01	-5.33E+02
PM	Disease incidence	5.12E-05	1.13E-07	1.48E-06	0.00E+00	5.04E-08	-3.59E-05
IRP ¹	kBq U235 _{eq}	1.74E+01	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.

4.3. Life Cycle Inventory Results

Table 13. Resource Use- Deformed steel bars

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
PENRE	MJ, LHV	6.25E+03	2.24E+01	2.22E+02	0.00E+00	7.22E+00	-1.08E+04
PERE	MJ, LHV	5.79E+02	4.40E-01	2.49E+00	0.00E+00	6.27E-02	-2.30E+02
PENRM	MJ, LHV	1.34E+03	1.46E+02	0.00E+00	-1.27E+03	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	7.59E+03	1.68E+02	2.22E+02	-7.21E+03	7.22E+00	-1.08E+04
PERT	MJ, LHV	5.79E+02	4.40E-01	2.49E+00	-5.50E+02	6.27E-02	-2.30E+02
FW	m ³	2.95E+00	5.61E-03	2.57E-02	0.00E+00	7.90E-03	-2.38E+00
SM	kg	1.91E+00	7.48E-03	6.79E-02	0.00E+00	1.52E-03	9.89E+02
RSF	MJ, LHV	2.09E-02	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	1.32E+00	4.93E-03	2.83E-02	0.00E+00	7.50E-04	-1.90E+00

Table 14. Resource Use- Plain round bars

ENVIRONMENTAL PRODUCT DECLARATION



Construction Steel

Deformed steel bars, Plain round bars, Wire rods

According to ISO 14025,
and ISO 21930:2017

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
PENRE	MJ, LHV	5.19E+03	2.24E+01	2.22E+02	0.00E+00	7.22E+00	-1.08E+04
PERE	MJ, LHV	5.51E+02	4.40E-01	2.49E+00	0.00E+00	6.27E-02	-2.30E+02
PENRM	MJ, LHV	1.72E+03	1.46E+02	0.00E+00	-1.63E+03	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	6.91E+03	1.68E+02	2.22E+02	-6.56E+03	7.22E+00	-1.08E+04
PERT	MJ, LHV	5.51E+02	4.40E-01	2.49E+00	-5.23E+02	6.27E-02	-2.30E+02
FW	m ³	2.76E+00	5.61E-03	2.57E-02	0.00E+00	7.90E-03	-2.38E+00
SM	kg	1.36E+00	7.48E-03	6.79E-02	0.00E+00	1.52E-03	9.89E+02
RSF	MJ, LHV	1.04E-02	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	1.01E+00	4.93E-03	2.83E-02	0.00E+00	7.50E-04	-1.90E+00

Table 15. Resource Use- Wire rods

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
PENRE	MJ, LHV	2.09E+03	2.24E+01	2.22E+02	0.00E+00	7.22E+00	-1.08E+04
PERE	MJ, LHV	2.50E+02	4.40E-01	2.49E+00	0.00E+00	6.27E-02	-2.30E+02
PENRM	MJ, LHV	4.22E+02	1.46E+02	0.00E+00	-4.01E+02	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	2.52E+03	1.68E+02	2.22E+02	-2.39E+03	7.22E+00	-1.08E+04
PERT	MJ, LHV	2.50E+02	4.40E-01	2.49E+00	-2.38E+02	6.27E-02	-2.30E+02
FW	m ³	1.69E+00	5.61E-03	2.57E-02	0.00E+00	7.90E-03	-2.38E+00
SM	kg	6.95E-01	7.48E-03	6.79E-02	0.00E+00	1.52E-03	9.89E+02
RSF	MJ, LHV	2.52E-03	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	3.14E-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 material; 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 - Deformed steel bars

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
HWD	kg	8.62E+01	4.54E-02	2.99E-01	0.00E+00	7.67E-03	-9.45E+01
NHWD	kg	7.86E+02	5.66E-01	4.80E+00	0.00E+00	5.01E+01	-1.96E+03
RWD	kg	1.71E-03	1.22E-03	1.33E-03	0.00E+00	4.79E-05	-9.84E-03
MER	kg	3.07E-04	2.77E-06	1.30E-05	0.00E+00	1.71E-07	-3.11E-04
MFR	kg	1.53E-01	1.73E-04	6.62E-04	9.50E+02	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





Construction Steel

Deformed steel bars, Plain round bars, Wire rods

According to ISO 14025,
and ISO 21930:2017

ETE	MJ	5.53E-01	4.95E-02	1.56E-01	0.00E+00	1.08E-02	-3.15E+00
EEE	MJ	7.70E-01	5.86E-03	3.63E-02	0.00E+00	1.35E-03	-6.57E-01

Table 17. Output Flows and Waste Categories - Plain round bars

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
HWD	kg	8.34E+01	4.54E-02	2.99E-01	0.00E+00	7.67E-03	-9.45E+01
NHWD	kg	7.31E+02	5.66E-01	4.80E+00	0.00E+00	5.01E+01	-1.96E+03
RWD	kg	1.51E-03	1.22E-03	1.33E-03	0.00E+00	4.79E-05	-9.84E-03
MER	kg	2.03E-04	2.77E-06	1.30E-05	0.00E+00	1.71E-07	-3.11E-04
MFR	kg	1.94E-01	1.73E-04	6.62E-04	9.50E+02	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	3.43E-01	4.95E-02	1.56E-01	0.00E+00	1.08E-02	-3.15E+00
EEE	MJ	6.67E-01	5.86E-03	3.63E-02	0.00E+00	1.35E-03	-6.57E-01

Table 18. Output Flows and Waste Categories - Wire rods

INDICATOR	UNIT	A1-A3	C1	C2	C3	C4	D
HWD	kg	1.54E+01	4.54E-02	2.99E-01	0.00E+00	7.67E-03	-9.45E+01
NHWD	kg	2.63E+02	5.66E-01	4.80E+00	0.00E+00	5.01E+01	-1.96E+03
RWD	kg	4.97E-04	1.22E-03	1.33E-03	0.00E+00	4.79E-05	-9.84E-03
MER	kg	7.05E-05	2.77E-06	1.30E-05	0.00E+00	1.71E-07	-3.11E-04
MFR	kg	5.99E-02	1.73E-04	6.62E-04	9.50E+02	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	9.58E-02	4.95E-02	1.56E-01	0.00E+00	1.08E-02	-3.15E+00
EEE	MJ	2.18E-01	5.86E-03	3.63E-02	0.00E+00	1.35E-03	-6.57E-01

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 Vina Kyoel. 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. 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 Vina Kyoel to conduct environmental declaration for its products, there's no existing manufacturer-specific EPD for comparability.





Construction Steel

Deformed steel bars, Plain round bars, Wire rods

According to ISO 14025,
and ISO 21930:2017

6. Additional Environmental Information

6.1. Product Extraordinary effects— Fire

The deformed bars shall be protected against the effects of fire by a sufficient concrete cover when set in concrete. The specification of the reinforced concrete component with inside installed rebars for the expected fire resistance duration and the fire resistance class is carried out in accordance with EN 13501-2

6.2. Product Extraordinary effects— Water

When installed, the product does not contribute to any contamination of the groundwater, air or soil, even due to the installation situation in normal weather conditions or even floods.

6.3. Product Extraordinary effects— Mechanical destruction

Static dimensioning taking into account the aspects of stability must be carried out on all planned structures. Building concrete items are structured with enough yield strength rebars as required specification.

6.4. Delayed Emissions

No delayed emissions are expected from these products.

6.5. Environmental Activities and Certifications

Environmental policy at Vina Kyoei Steel Co. Ltd. has achieved remarkable outcomes.

- Starting from 2023, we have been participated in the world steel Climate Action data collection programme.
- On March 29, 2023, the QUACERT conformity certification center will certify the Company's Environmental Management System for the first time. This certification will confirm that the system complies with ISO 14001: 2015 standards and that it will undergo periodic evaluation and monitoring once a year.
- The policy of quality and environment: Clean and Green with Vina Kyoei Steel Co. Ltd. has been widely communicated to all employees.

Environmental management activities at Vina Kyoei:

- 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.

ENVIRONMENTAL PROTECTION WORKS:

Obtained a certificate of eligibility for environmental protection by the Ministry of Natural Resources and Environment (MONRE) in importing scrap for use as raw production materials.

WATER TREATMENT AND REUSE:

Vina Kyoei Steel Co. Ltd. recognizes that water is an important and essential natural resource for our business and the communities in which we operate. Vina Kyoei has gone to great lengths to improve water efficiency in its processes. One hundred percent of the process water from our steelmaking operations is reused at Vina Kyoei.

The production wastewater treatment system is 140 m³/h

- The water after the treatment system is used for closed circulation cooling.

ENVIRONMENTAL PRODUCT DECLARATION



Construction Steel

Deformed steel bars, Plain round bars, Wire rods

According to ISO 14025,
and ISO 21930:2017

- Operation mode: Continuous, synchronous with production line

6.6. Further Information

More information regarding Vina Kyoei's steel products, certifications, and environmental activities can be found at www.vinakyoeisteel.com.vn/

7. References

[IPCC. \(2006\). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Geneva, Switzerland: IPCC.](#)

[IPCC. \(2019\). Climate Change 2019: The Physical Science Basis. Geneva, Switzerland: IPCC.](#)

[ISO. \(2006\). ISO 14040: Environmental management–Life cycle assessment–Principles and framework. Geneva: International Organization for Standardization.](#)

[ISO. \(2006\). ISO 14044: Environmental management–Life cycle assessment–Requirements and guidelines. Geneva: International Organization for Standardization.](#)

[ISO. \(2018\). ISO/TS 14067: Greenhouse gases–Carbon footprint of products–Requirements and guidelines for quantification and communication. Geneva: International Organization for Standardization.](#)

[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, Institute Bauen und Umwelt e.V., 2024.](#)

[IBU PCR - Part B: Requirements of the EPD for Structural steels, Institute Bauen und Umwelt e.V., 2024.](#)

[Ecoinvent database v3.10 \(2023\) http://www.ecoinvent.org/ Ecoinvent, Switzerland.](http://www.ecoinvent.org/)

[CML LCA methodology, Institute of Environmental Sciences \(CML\), Faculty of Science, University of Leiden, Netherlands](#)

8. Contact Information

8.1 Study Commissioner



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8.2 LCA Practitioner



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