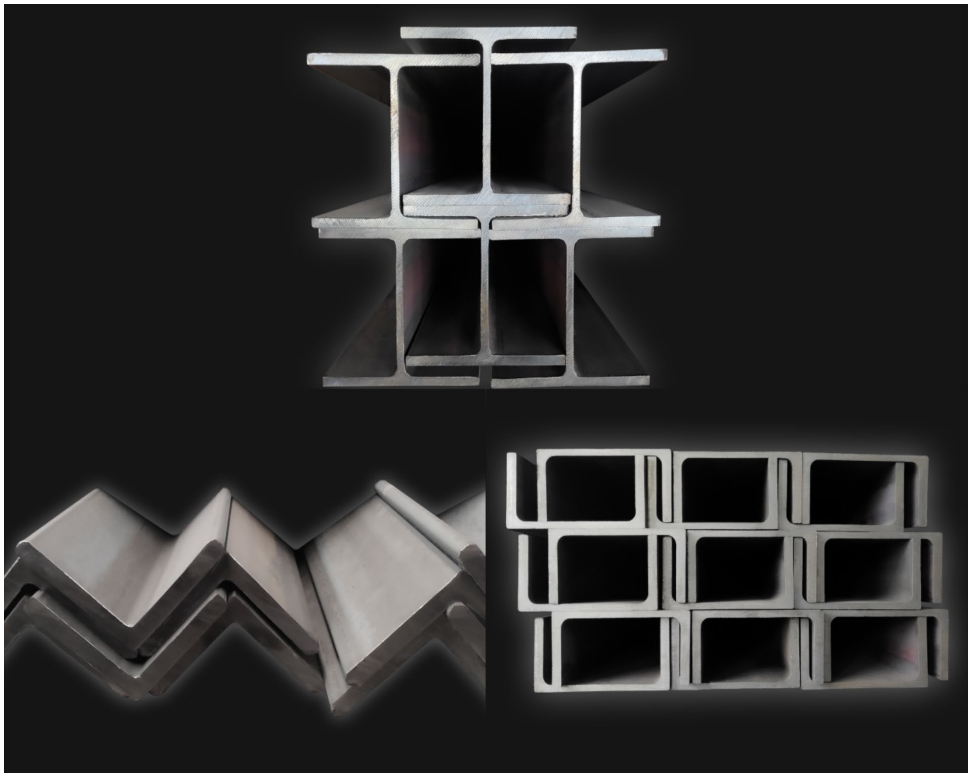
ENVIRONMENTAL PRODUCT DECLARATION

PY VINA HOT ROLLED STRUCTURAL STEEL SECTION

H-BEAMS
ANGLES
CHANNELS



POSCO YAMATO VINA STEEL JSC (PY VINA) is a joint venture of POSCO – the world best Steel maker (51% Stake), Yamato Kogyo – Global Section specialist (30% Stake), and Siam Yamato Steel – Thailand No.1 H-beam Steel manufacturer (19% Stake). PY VINA has production capacity over 1.0 million metric ton per year.

PY VINA has been developing eco-friendly technology for steel industry. We contribute to create a material-cycle society through scrap-based steel production. We are also continuously trying to reduce the use of resources and energy in our manufacturing processes as actively introducing eco-friendly facilities.

As the No.1 section steel manufacturer in Vietnam, PY VINA will provide high-quality products and services to support community development, secure the safety of people and contribute to the prosperity of human society and sustainable development of Vietnam.

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posco Yamato
VINA STEEL

Hot Rolled Structural Section Steel
H-Beam, Angels, Channels

CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

According to ISO 14025, and ISO 21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment www.ul.com 333 Pfingsten Rd, Northbrook, IL 60062 www.spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	Program Operator Rules v 2.7 2022
MANUFACTURER NAME AND ADDRESS	POSCO YAMATO VINA STEEL JOINT STOCK COMPANY N1 Street, Phu My 2 IZ, Phu My Ward, Phu My Town, Ba Ria Vung Tau Province, Vietnam
DECLARATION NUMBER	4790599058.101.1
DECLARED PRODUCT & DECLARED UNIT OR DECLARED UNIT	Hot rolled structural steel section (H- Beams, Angles, Channels), 1 metric ton
REFERENCE PCR AND VERSION NUMBER	ISO 21930:2017; UL Part B: Designated Steel Construction v.2.0 August 2020 with UL Part A v.4.0 2022
DESCRIPTION OF PRODUCT APPLICATION/USE	Section Steels are used for wide applications ranging from motor vehicles to construction, bridges and even basic research efforts.
PRODUCT RSL DESCRIPTION (IF APPL.)	Not applicable.
MARKETS OF APPLICABILITY	Construction material
DATE OF ISSUE	June 1, 2023
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-specific
EPD SCOPE	Cradle to gate (A1-A3)
YEAR(S) OF REPORTED PRIMARY DATA	2021
LCA SOFTWARE & VERSION NUMBER	eFootprint V1.0
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent 3.8, CLCD 0.8
LCIA METHODOLOGY & VERSION NUMBER	TRACI version 2.1, CML2001

The PCR review was conducted by:	UL Environment PCR Review Panel epd@ul.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☐ EXTERNAL	Cooper McCollum Cooper McCollum, UL Environment
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Chengdu IKE Environmental Technology Co., Ltd.
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	James Mellentine, Thrive ESG

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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.

posco Yamato
VINA STEEL

CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

Hot Rolled Structural Section Steel
H-Beams, Angels, Channels

According to ISO 14025, and ISO 21930:2017

1. Product Definition and Information

1.1. Description of Company/Organization

POSCO YAMATO VINA STEEL JSC (PY VINA) is a joint venture of POSCO – the world best Steel maker (51% Stake) , Yamato Kogyo – Global Section specialist (30% Stake), and Siam Yamato Steel – Thailand No.1 H-beam Steel manufacturer (19% Stake). PY VINA has production capacity over 1.0 million metric ton per year.

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1.2. Product Description

Product Identification

Hot rolled structural steel section, in 3 types, H-Beams, Angles, and Channels.

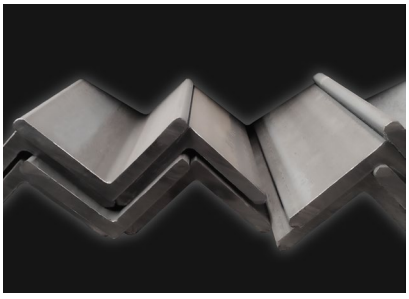
H-Beams are widely used in civil or large structures such as plants, high-rise buildings.

Angles are used for supports, trusses, reinforcement materials for common structures, electrical poles and etc.

Channels are used for reinforcement and hardening in general architectural works.

H-Beams

Channels



Angles

Product Specification

Hot rolled structural steel section

- H-Beams
- Angles
- Channels

Complies with Korean Standard (KS D 3503, KS D 3515, KS D3866, KS F 4603)

Complies with Japanese Industrial Standard (JIS G 3101, JIS G 3106, JIS G 3136)

Complies with American Society for Testing Material (ASTM A36, ASTM A572, ASTM A992, ASTM A6)

Complies with Australian Standard and New Zealand Standard (AS/NZS 3679.1)

Complies with European Standard (EN 10025)

Complies with National Standard of the Republic of China (CNS 2473, CNS 2947, CNS 13812)

For more details of technical specifications such as: dimensions, properties and steel grade of steel sections, please visit: https://pyvina.com/

Flow Diagram

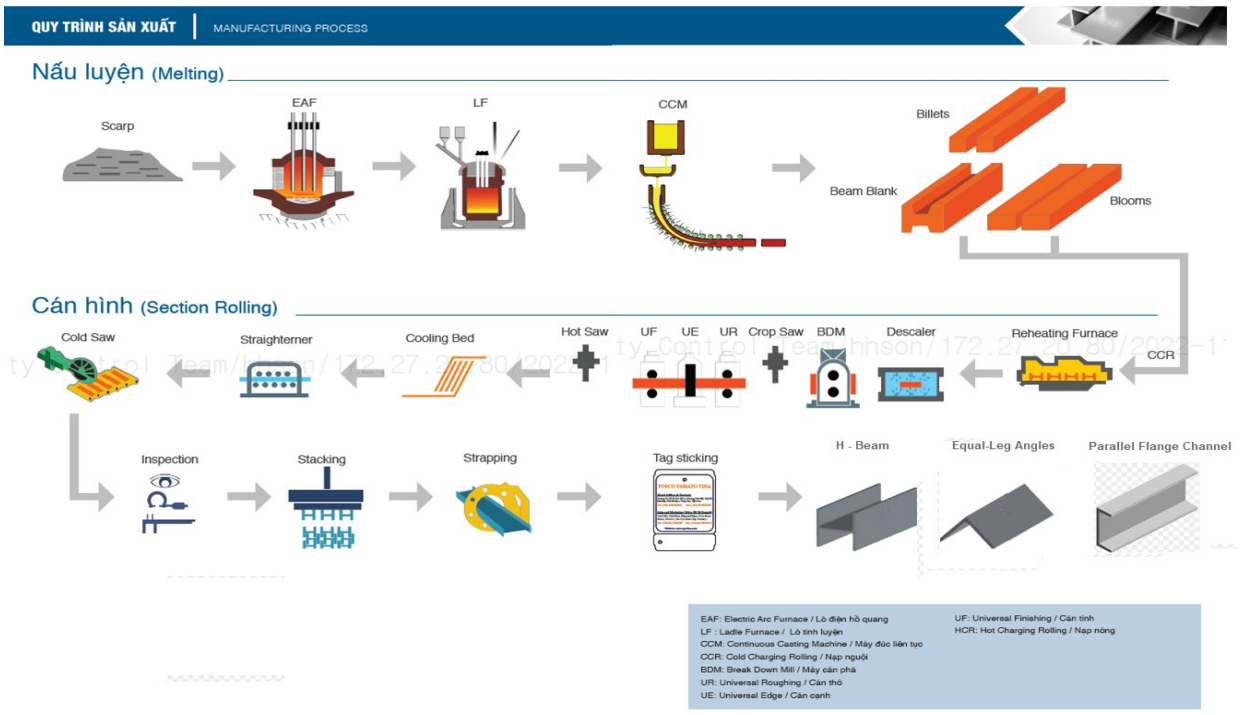


Figure 1 Flow diagram of hot rolled section steel

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 PY VINA in 2021.

1.3. Application

Hot rolled structural steel section, in 3 types, H-Beams, Angles, and Channels.

H-Beams are widely used in civil or large structures such as plants, high-rise buildings.

Angles are used for supports, trusses, reinforcement materials for common structures, electrical poles and etc.

Channels are used for reinforcement and hardening in general architectural works.

The potential communication objects of this EPD report include two groups: firstly, PY VINA 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 enterprises and their related parties.

1.4. Declaration of Methodological Framework

This EPD report adopts Life Cycle Assessment (LCA) method specified in the international standard ISO14040/14044, ISO 21930:2017, Product Category Rule (PCR) Guidance for Building-Related Products and Services -Part B: Designated Steel Construction, and Product Category Rule (PCR) Guidance for Building-Related Products and Services – Part A: Life Cycle Assessmeny Calculation Rules and Report Requirements as the research methods.

This EPD is product-specific and is cradle to gate. The underlying LCA upon which this EPD is based included the following life cycle modules: Raw Material supply (A1); Inbound Transportation (A2); Manufacturing (A3).

1.5. Technical Requirements

Density of product: 7,850 kg/m3

CONTENTS	VALUE	UNIT
Density	7,850	Kg/m³
Melting point	1,530	^{0}C
Minimum yield strength	235, 355	Mpa
Minimum tensile strength	400, 490	Mpa
Minimum elongation	17	%
Tensile strength	400-700	Mpa

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: 50 mm - 300 mm, Height: 100 mm - 700 mm, Thickness: 5.0 mm - 25.0 mm)

1.7. Material Composition

The basic raw material for the production of section steel is scrap metal. In addition, auxiliary raw materials are added such as quicklime and ferrous alloy(Fe-Si) to increase production efficiency. They 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.

The typical composition of the low alloyed is presented as below:

ELEMENT	TYPICAL CONTENT
Iron	97.98%

Carbon	0.172%
Manganese	1.254%
Silicon	0.253%
Phosphorus	0.017%
Sulfur	0.011%
Copper	0.198%
Others (Sn, V, Nb, Al, B, Ni, Cr, Mo, Ti)	0.115%
Total	100%

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 section steels are mainly consist of scraps, for instance, heavy scrap, light scrap, shredded scrap, PNS scrap, Busheling/shindachi etc. The manufacturing processes of 3 products are the same, including EAF, LF, CCM, CCR, BDM, UR, UE, UF, Cooling bed, Straightener, Cold saw, inspection, stacking, strapping etc. The flow chart can be seen as follows:

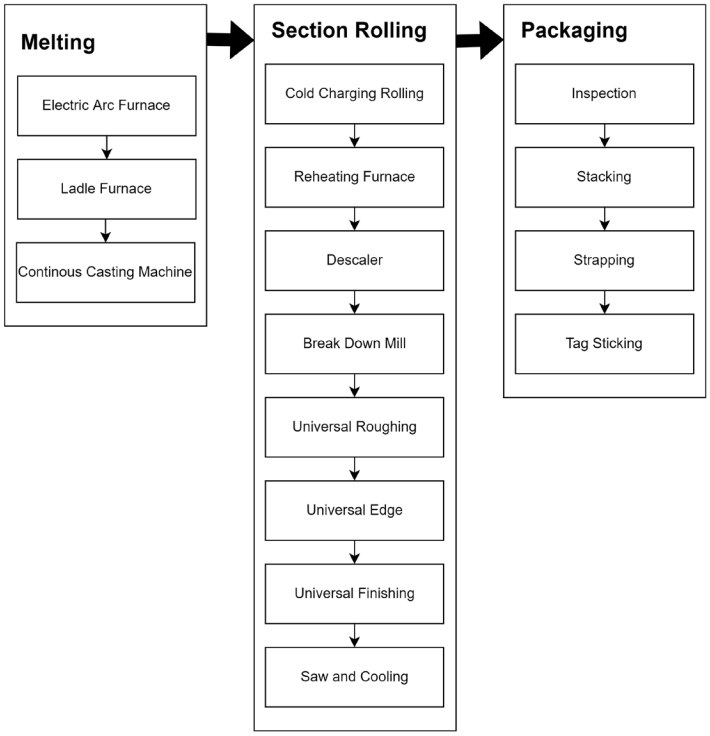


Figure 2 Flow chart of hot rolled section steel manufacturing

1.9. Packaging

The packaging materials are included in the EPD report, that is, label, and steel band for bunding and finished product sale.

1.10. Transportation

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

1.11. Product Installation

Structural section steels are raw materials for construction and other applications. For these producted declared in the EPD report, products have no installation process.

1.12. Use

Structural section steels are raw materials for construction and other applications. Use stage is not included in the EPD report.

1.13. Reference Service Life and Estimated Building Service Life

Structural section steels are raw materials for construction and other applications. Reference Service Life and Estimated Building Service Life is not considered in the EPD report.

1.14. Reuse, Recycling, and Energy Recovery

In this study, the system boundary is cradle to gate so recycling and energy recovery is not included in the EPD. In basis of the UL PCR, the Polluter Pays Principle (PPP) are followed when it comes to secondary materisl 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.

1.15. Disposal

Structural section steels are raw materials for construction and other applications. The system boundary of the study is cradle to gate so that end-of-life (disposal) stage is not included in this EPD report.

2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

The declared unit for this report is defined as: the production of one metric ton of H-Beams, Angles, Channels Hot Rolled Structural Section Steel.

2.2. System Boundary

The LCA study is conducted for cradle-to-gate, from the extraction of raw materials from nature to the end of product production. 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 (if any)
  - Transportation of waste-to-landfill waste to landfill as well as disposal in landfill (if any)
- Manufacturing (A3)
  - Electricity and combustion of natural gas and coals (combustion and associated emissions)
  - Generating of elctrcicty, and natural gas from primary energy resources used in manufacturing
  - Manufacturing of products and co-products
  - Manufacturing of packaging, including their extraction, manufacturing and transport

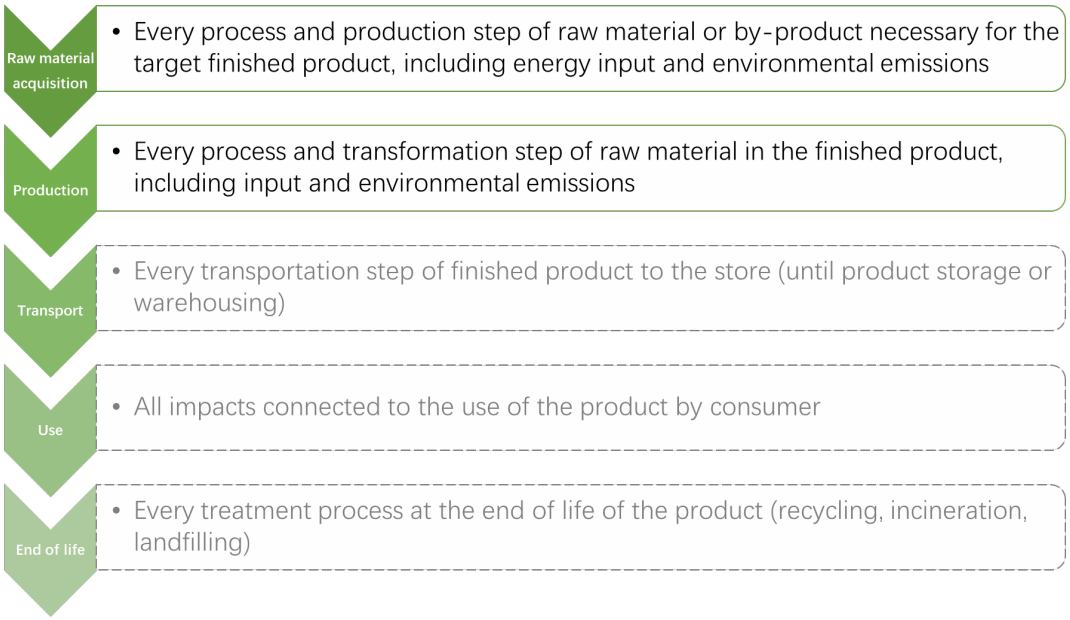


Figure 3 System Boundary – included and excluded process

2.3. Estimates and Assumptions

In this study, all the activity data are primary data and obtained from enterprise after collecting and reviewing. Inbound transportation distance is assumed to 150km which could bring uncertainty of the final results.

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. liquid argon.

Regarding multi-products systems, the environmental impacts of 3 kinds of section steels are allocated by physical property (mass) distribution method, which brings a certain subjectivity in the selection of the allocation method. The mass allocation method is calculated as follows:

$$Allocation\ factor = \frac{annual\ production\ volume_{\ i}}{\sum_{n=1}^{4} annual\ production\ volume_{\ n}}$$

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 reults in this study.

2.5. Data Sources

In this study, the company-specific data collection of the enterprise was investigated in November 2022. The corresponding data collection and data clean-up was done in December 2022. The activity data provided by enterprise represents the true production status of PY VINA in whole 2021 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 and CLCD database. Data from these databases are highly reviewed and widely used in international LCA studies.

The CLCD and 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., which are mainly from Ecoinvent database, and CLCD databases plays a role as supplement.

2.6. 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 PY VINA in 2021 while all the background data are obtained from database in lastest 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. From table 2.4, the background data chosen are representative.

The LCA model in this study includes raw material acquisition, product production (from cradle to gate), which fulfills the definition of system boundary in this study. The CLCD and 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. Consistent statistical standards are also adopted for all background data, in which unified core models were established in the development of CLCD database and detailed documentation was carried out to ensure a streamlined and consistent data collection process.

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

2.7. Period under Review

The activity data (primary data) collected from the manufacturing facility and provided by enterprise are representative for the calendar year 2021.

2.8. Allocation

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.

3. Life Cycle Assessment Scenarios

The system boundary of this EPD report is cradle to gate so there is no evaluation of use stage (transport to the building site, installation into the building, reference service life) and end-of-life stage (maintenance, repair, replacement, refurbishment, operational energy use and operational water use, end of life, reuse, recovery and/or recycling potentials) and other relevant scenario information.

4. Life Cycle Assessment Results

Table 1 indicates the considered life cycle stages and information modules. The system boundary of this EPD is cradle to gate so that only product stage is considered in the EPD. All other information modules are not declared (MND). All declared modules are indicated with an "X".

Table 1. 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 w/ EOL	Required			Excluded									Optional				Excluded
Declared Module	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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 2. Impact Assessment Results for H-Beams per metric ton

TRACI v2.1 & CML v4.0	TOTAL	A1	A2	A3
GWP 100 [kg CO_2 eq]	1.01E+03	1.63E+02	5.34E+01	7.93E+02
ADPfossil [MJ, LHV]	1.54E+04	3.89E+03	7.92E+02	1.07E+04
AP [kg SO_2 eq]	5.86E+00	1.22E+00	8.09E-01	3.83E+00
EP [kg N eq]	2.53E+00	4.81E-01	6.55E-02	1.98E+00
ODP [kg CFC-11 eq]	5.29E-05	1.93E-05	1.21E-05	2.15E-05
SFP [kg O_3 eq]	1.01E+02	2.81E+01	1.48E+01	5.82E+01
POCP [kg ethene eq]	1.92E-01	2.54E-02	1.90E-02	1.48E-01

Table 3. Impact Assessment Results for Angle per metric ton

TRACI v2.1 & CML v4.0	TOTAL	A1	A2	A3
GWP 100 [kg CO_2 eq]	1.07E+03	1.72E+02	5.64E+01	8.38E+02
ADPfossil [MJ, LHV]	1.62E+04	4.11E+03	8.37E+02	1.13E+04
AP [kg SO_2 eq]	6.19E+00	1.28E+00	8.54E-01	4.05E+00
EP [kg N eq]	2.67E+00	5.08E-01	6.92E-02	2.10E+00
ODP [kg CFC-11 eq]	5.59E-05	2.04E-05	1.28E-05	2.28E-05
SFP [kg O_3 eq]	1.07E+02	2.97E+01	1.56E+01	6.15E+01
POCP [kg ethene eq]	2.03E-01	2.68E-02	2.01E-02	1.56E-01

Table 4. Impact Assessment Results for Channel per metric ton

TRACI v2.1 & CML v4.0	TOTAL	A1	A2	A3
GWP 100 [kg CO_2 eq]	1.02E+03	1.65E+02	5.38E+01	8.00E+02
ADPfossil [MJ, LHV]	1.55E+04	3.93E+03	7.99E+02	1.08E+04
AP [kg SO_2 eq]	5.91E+00	1.23E+00	8.16E-01	3.87E+00
EP [kg N eq]	2.55E+00	4.85E-01	6.61E-02	2.00E+00
ODP [kg CFC-11 eq]	5.34E-05	1.95E-05	1.22E-05	2.17E-05
SFP [kg O_3 eq]	1.02E+02	2.84E+01	1.49E+01	5.87E+01
POCP [kg ethene eq]	1.94E-01	2.56E-02	1.92E-02	1.49E-01

[GWP 100 - Global Warming Potential]; [ODP – Ozone Depletion Potential]; [AP – Acidification Potential]; [EP – Eutrophication Potential]; [POCP – Photochemical Oxidant Creation Potential]; [ADPfossil – Abiotic Resource Depletion Potential of non-renewable (fossil) resoures]; [SFP – Smog Formation Potential]

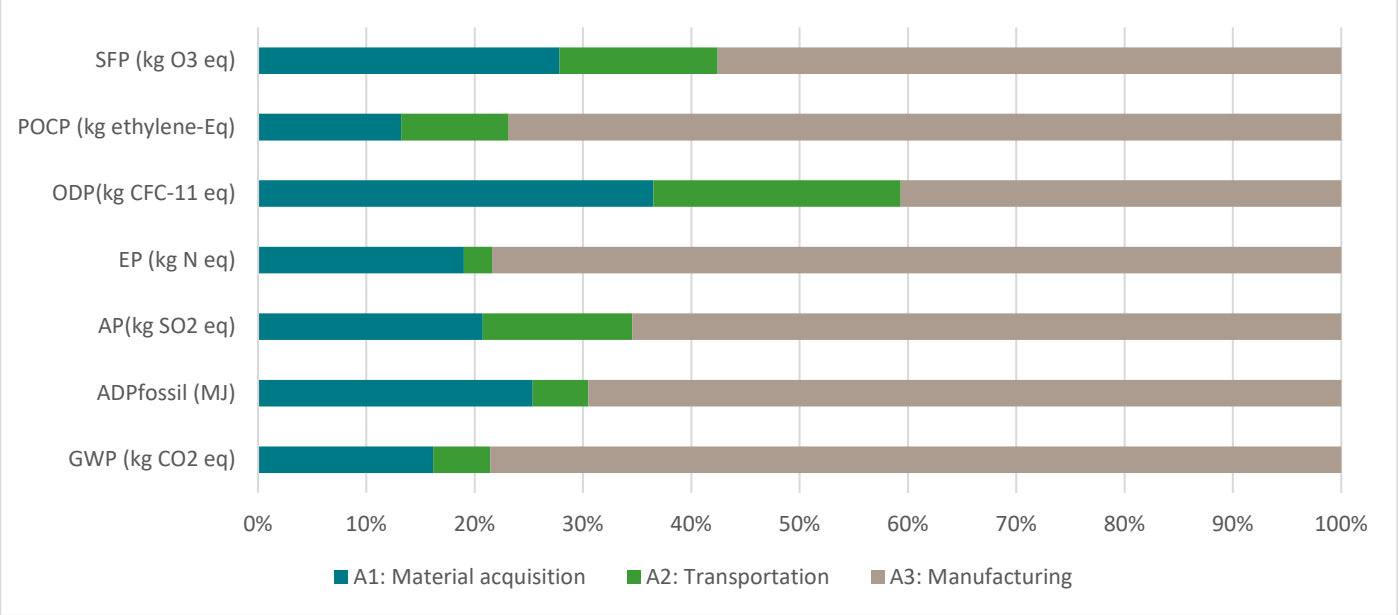


Figure 4 Share of Life Cycle Stages

4.2. Life Cycle Inventory Results

Table 5. Resource Use /per metric ton

PARAMETER	A1	A2	A3
RPR_E [MJ, LHV]	0	0	0
RPR_M [MJ, LHV]	0	0	0
RPR_T [MJ, LHV]	0	0	0
$NRPR_E$ [MJ, LHV]	1.49E+04	0	5.27E+02
$NRPR_M$ [MJ, LHV]	0	0	0
$NRPR_T$ [MJ, LHV]	1.49E+04	0	5.27E+02
SM [kg]	1.20E+03	0	0
RSF [MJ, LHV]	0	0	0
NRSF [MJ, LHV]	0	0	0
RE [MJ, LHV]	0	0	0
FW [m^3]	3.67E+00	0	1.37E+00

[RPRE – Renewable primary energy used as energy carrier (fuel)]; [RPRM - Renewable primary resources with energy content as material]; [RPRT – Renewable primary energy total]; [NRPRE – Non-renewable primary resources used as energy carrier (fuel)]; [NRPRM – Non-renewable primary resources with energy content used as material]; [NRPRT – Non-renewable primary energy total]; [SM – Secondary materials]; [RSF – Renewable secondary fuels]; [NRSF – Non-renewable secondary fuels]; [RE – Recovered energy]; [FW – Use of net fresh water resources]

Table 6. Output Flows and Waste Categories per metric ton

PARAMETER	A1	A2	A3
HWD [kg]	N/A	N/A	3.72E-01
NHWD [kg]	N/A	N/A	2.90E+02
HLRW [kg] or [m^3]	0	0	0
ILLRW [kg] or [m^3]	0	0	0
CRU [kg]	0	0	0
MR [kg]	0	0	0
MER [kg]	0	0	0
EE [MJ, LHV]	0	0	0

[HWD – Hazardous waste disposed]; [NHWD – Non-hazardous waste disposed]; [HLRW – High-level radioactive waste, conditioned, to final repository]; [ILLRW – Intermediate – and low-level radioactive, conditioned, to final repository]; [CRU – Components for re-use]; [MR – Materials for recycling]; [MER – Materials for energy recovery]; [EE – Exported energy]

Table 7. Carbon Emissions and Removals per metric ton

PARAMETER	A1	A2	A3
BCRP [kg CO2]	0	0	0
BCEP [kg CO2]	0	0	0
BCRK [kg CO2]	0	0	0
BCEK [kg CO2]	0	0	0
BCEW [kg CO2]	0	0	0
CCE [kg CO2]	0	0	0
CCR [kg CO2]	0	0	0
CWNR [kg CO2]	0	0	0

[BCRP – Biogenic Carbon Removal from Product]; [BCEP – Biogenic Carbon Emission from Product]; [BCRK – Biogenic Carbon Removal from Packaging]; [BCEK – Biogenic Carbon Emission from Packaging]; [BCEW – Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Producstion Processes]; [CCE – Calcination Carbon Emissions]; [CCR – Carbonation Carbon Removals]; [CWNR – Carbon Emissions from Combustion of Waste from Combustion of Waste from Non-Renewable Sources used in Production Processes]

5. LCA Interpretation

This research meets the requirements of ISO14040/14044, and the product LCA modeling, calculation and analysis are completed by the eFootprint software system of Chengdu IKE Environmental Technology Co., Ltd. The underlying LCA upon which this EPD is based considered the following six environmental impact categories: Global Warming Potential (GWP 100); Ozone Depletion Potential (ODP); Acidification Potential (AP); Eutrofication Potential (EP); Smog Formation Potential (POCP); and Abiotic Resource Depletion Potential of non-fossil resources.

The on-site production data is provided by PY VINA. The authenticity, accuracy and reliability of enterprise data would be guaranteed by the manufacturer.

The boundary of this study is cradle to gate, and the product life cycle considers all the processes investigated on-site,

including melting (EAF, LF, CCM), section rolling (CCR, BDM, UR, UE, UF), cooling, straighterner, cold saw, inspection, and stacking and so on. 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, Ca-Si, and Fe-V, their environmental impacts are also estimated little influence on the final results, leading a neglation of their impacts. The neglected data and the model conforms 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 and CLCD databases.

Since it is the first time for PY VINA to conduct environmental declaration for its products, there's no existing manufacturer-specific EPD for comparability. According to Product Category Rules for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements, benchmarks are not included in this EPD. Subsequent manufacturer-specific EPD can be benchmarked against this one following requirements mentioned in ISO 21930.

Due to the process-similarity of three products reported in the EPD, comparison can be done among section steels. Among three types of section steels, Angles always has the highest value in all environmental impact categories while H-beam always has the lowest values.

6. Additional Environmental Information

6.1. Environment and Health During Manufacturing

Hot rolled structural steel manufacturing maintain quality management systems.

6.2. Environment and Health During Installation

No environment and health related impacts are expected during installation.

6.3. Extraordinary Effects

No extraordinary effects or environmental impacts are expected due to dustruction of these products by fire, water or mechanical means.

6.4. Delayed Emissions

No delayed emissions are expected from these products.

6.5. Environmental Activities and Certifications

Environmental policy at Posco Yamato Vina company has achieved remarkable outcomes.

- Starting from 2021, we have been participated in the worldsteel Climate Action data collection programme.
- On March 29, 2021, 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 Posco Yamato Vina has been widely communicated to all employees.

Environmental management activities at Posco Yamato:

- 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 utilises 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:
Posco Yamato Vina recognizes that water is an important and essential natural resource for our business and the communities in which we operate. PYV 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 PYV

The production wastewater treatment system is 140 m3/h
- The water after the treatment system is used for closed circulation cooling.
- Operation mode: Continuous, synchronous with production line

More information on PYVINA's certifications and environmental activities can be found at https://pyvina.com/

6.6. Further Information

Additional information on steel product can be found at https://pyvina.com/

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