ENVIRONMENTAL PRODUCT DECLARATION

STEEL BARS AND COIL FOR CONCRETE REINFORCED

EPD REPORT

STEEL BARS and COIL FOR CONCRETE REINFORCED	
	

TUNG HO STEEL ENTERPRISE CORP.

From its beginnings in "Tung Ho Hang" to today's Tung Ho Steel Enterprise Corporation, the company has always made trustworthiness the company's spiritual essence in its business. The company's core business values and objectives are embodied in the pursuit of exceptional contributions to society.

Trustworthiness does not merely represent the company's trustworthiness in relation to outside parties, customers, and society, but also signifies trustworthiness in its employees and in itself.

In response to global warming, in order to effectively mitigate the impacts of climate change, Tung Ho Steel is actively promoting energy conservation and CO_2 reductions, as well as proactively disclosing the carbon footprint information for its products. Through product carbon footprint inventory, it is possible to learn about the greenhouse gas emissions throughout a product's lifecycle. This enables effective problem identification and implementation of low-carbon and energy-conserving design philosophies to increase service competitiveness.

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BAR and COIL widely applied in building structure and public construction, as well as other industrial structures.

CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION ULCOM/EPD

According to ISO 14025 and EN 15804

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL ENVIRONMENT 333 PFINGSTEN ROAD HTTPS://WWW.UL.COM/ NORTHBROOK, IL 60611 HTTPS://SPOT.UL.COM/
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	PROGRAM OPERATOR RULES V2.7 2022
MANUFACTURER NAME AND ADDRESS	TUNG HO STEEL ENTERPRISE CORP. Headquater 6F., No.9, Sec. 1, Chang-an E. Rd., Taipei City 10441, Taiwan https://www.tunghosteel.com/EN/HomeEg/Index Site for which this EPD is representative: Taoyuan Works Address: NO.116, Caota, Neighbor 8, Baozhang Vil., Guanyin Township, Taoyuan County 32847, Taiwan Contact person: Ming Chin Wu u39wmc@tunghosteel.com
DECLARATION NUMBER	4791881457.101.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	STEEL BARS and COIL FOR CONCRETE REINFORCED Declared Unit: 1 metric ton of STEEL BARS and COIL FOR CONCRETE REINFORCED
REFERENCE PCR AND VERSION NUMBER	Construction Products, PCR 2019:14 version 2.0.1
DESCRIPTION OF PRODUCT APPLICATION/USE	STEEL BARS and COIL FOR CONCRETE REINFORCED BAR and COIL widely applied in building structure and public construction, as well as other industrial structures.
PRODUCT RSL DESCRIPTION (IF APPL.)	-
MARKETS OF APPLICABILITY	Local and international
DATE OF ISSUE	December 30, 2025
PERIOD OF VALIDITY	December 30, 2030
EPD TYPE	Product-specific
RANGE OF DATASET VARIABILITY	Mean
EPD SCOPE	Cradle to gate
YEAR(S) OF REPORTED PRIMARY DATA	2024
LCA SOFTWARE & VERSION NUMBER	SimaPro 10.2.0.0
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent 3.8, Ecoinvent 3.11, Ecoinvent system processes, EF database 3.1, USLCI, USLCI+, AGRIBALYSE 3, EU & DK Input Output Database
LCIA METHODOLOGY & VERSION NUMBER	EN 15804 + A2 (adapted) V1.03, Cumulative Exergy Demand V1.09, AWARE V1.07, EDIP 2003 V1.07

The PCR review was conducted by:	The International EPD System LCA-lab srl, SAPI srl info@environdec.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Skye Tang, UL Solutions Skye Tang.
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	C.C.Sustain ESG Solution Co., Ltd.

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This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:

Ik-Kim, Smart-Eco

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

From its beginnings in“Tung Ho Hang”to today's Tung Ho Steel Enterprise Corporation, the company has always made trustworthiness the company's spiritual essence in its business. The company's core business values and objectives are embodied in the pursuit of exceptional contributions to society.

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1.2. Product Description

Product Identification

STEEL BARS and COIL FOR CONCRETE REINFORCED

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Product Specification

Rebar refers to the building material used in reinforced concrete and prestressed reinforced concrete. The varieties of rebar produced by Tung Ho Steel include: Round bar, Deformed Steel Re-Bar, and Screwed Re-Bar, which are primarily applied in building projects including high-rises, factories, public construction, and social welfare initiatives.

In 2010, Tung Ho Steel introduced direct hot rolling machines, with annual capacity up to 1.2 million tons, which is capable of producing rebar in various international standards, including CNS560, JIS3112, ASTM A615/A706, AS/NZS4671, CSA G30, and BS4449.

Other production research and development:

1. Ultra-high Tensile SD685/SD785 rebar: Can be applied in high-rise buildings and significantly enhance the buildings' ability to resist earthquakes.

2. Compact Coil: Small volume, no axial twist, easily loaded and shipped, and conserving of materials

Manufacturing Process

The manufacturing process includes electric arc furnace steelmaking, Steel refining, Continuous casting, hot rolling, piling & bunding, Deformed bar& Compact bar in coil, etc. The quality management system is ISO 9001. The environmental management system is ISO 14001. The occupational safety management system is ISO 45001. The energy management system is ISO 50001.

Flow Diagram

Steel scrap and other raw materials → Electric arc furnace steelmaking → Steel refining → Continuous casting → Steel billets →

Steel billets reheating → Hot rolling → Piling & Bunding → Deformed bar&Compact bar in coil → Delivery

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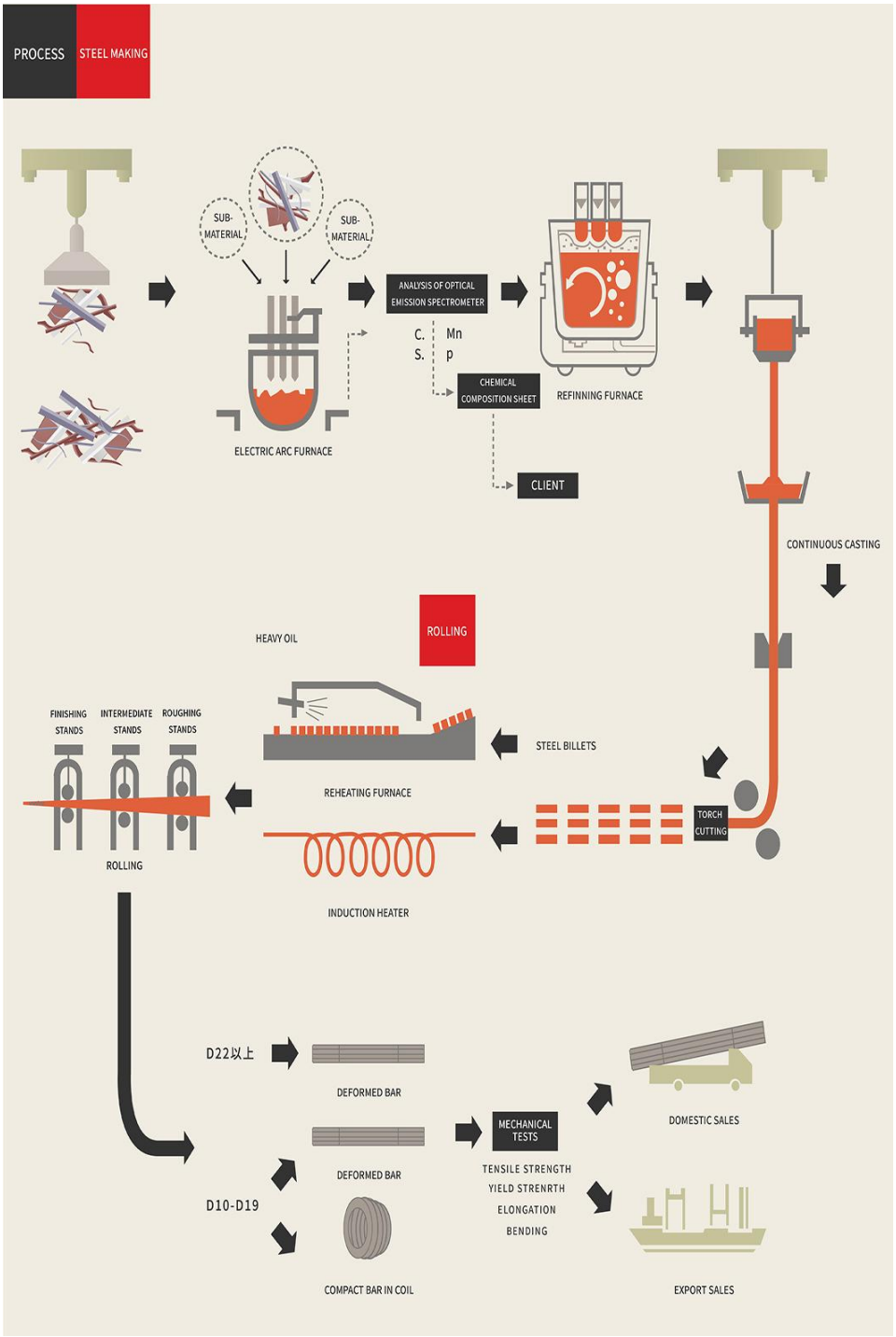

Figure 1. Flow diagram of STEEL BARS and COIL FOR CONCRETE REINFORCED manufacturing process

1.3. Application

STEEL BARS and COIL FOR CONCRETE REINFORCED

BAR and COIL widely applied in building structure and public construction, as well as other industrial structures.

1.4. Declaration of Methodological Framework

This EPD follows the Product Category Rules (PCR) in accordance with EN 15804+A2. The declared boundary is cradle-to-gate (Modules A1–A3), covering raw material extraction and processing, upstream transport, and manufacturing. Use-stage (B modules) and end-of-life modules (C, D) are excluded in this declaration.

1.5. Technical Requirements

Technical Data

Table 1. Technical data for product

NAME	VALUE	UNIT
Density	7,850	kg/m^3
Modulus of elasticity	2.1	N/mm^2
Coefficient of thermal expansion	1.2	$10^{-5}/℃$
Thermal conductivity	58	W/(mK)
Melting point	1,493	°C
Electrical conductivity at 20°C	1,030	$Ω^{-1}m^{-1}$
Minimum yield strength (für low carbon steel)	280	N/mm^2
Minimum tensile strength (für low carbon steel)	420	N/mm^2
Minimum elongation (für Bleche)	≧18	%
Tensile strength	≧440	N/mm^2

1.6. Properties of Declared Product as Delivered

The declared reinforcing bars are delivered at the factory gate and may be supplied directly to construction sites or processing plants for fabrication. The products include the following types and dimensions:

Table 2. Product Delivery Specifications

NAME	DIAMETER	LENGTH	COIL WEIGHT
Plain Bar	8 mm – 57 mm	1 M – 18 M	-
Deformed Bar	CNS 560 D10 – D57 JIS G3112 D8 – D51 BS 4449 8 mm – 50 mm AS/NZS 4671 10 mm – 40 mm ASTM A615 #3 – #18 A706 N3 – N18 KS D3504 D10 – D35 CSA 400W 10 mm – 55 mm	1 M – 18 M	-
Screwing Bar	CNS 560 D19 – D57	1 m – 18 m	-

Compact Bar in Coil	D10 – D19	-	2T ~ 3T
Steel Bar for Machine	12 mm – 40 mm	-	-

1.7. Material Composition

The typical composition of the low alloyed is presented in the following table.

Table 3. Typical composition of the low alloyed

ELEMENT	TYPICAL CONTENT
Iron	97.8%
Carbon	0.11%
Manganese	0.55%
Silicon	0.20%
Phosphorus	0.02%
Sulfur	0.02%
Copper	0.35%
Others(Sn, V, Nb, Al, B, Ni, Cr, Mo, Ti)	0.81%
Total	100%

The products do not contain any hazardous substances listed in the “Candidate List of Substances of Very High Concern for Authorisation” (SVHC) exceeding 0.1% of the weight of the product.

1.8. Manufacturing

The STEEL BARS FOR REINFORCED CONCRETE. SD280、SD280W、SD420、SD420W、SD490W、SD550W、SD690, ETC. production flow is: Steel scrap and other raw materials → Electric arc furnace steelmaking → Steel refining → Continuous casting → Hot rolling → Piling & bunding →Deformed bar& Compact bar in coil → Delivery

1.9. Packaging

The STEEL BARS and COIL FOR CONCRETE REINFORCED are packaged by wire rods for delivery.

1.10. Transportation

Raw materials are delivered to Taoyuan Works via land, sea, and air, with transportation distances modeled based on supplier and manufacturing locations. Waste materials are transported solely by land.

1.11. Product Installation

This inventory calculation covers stages A1 to A3, and the scope of the inventory does not include Product Installation.

1.12. Use

This inventory calculation covers stages A1 to A3, and the scope of the inventory does not include Use.

1.13. Reference Service Life and Estimated Building Service Life

This inventory calculation covers stages A1 to A3, and the scope of the inventory does not include Reference Service Life and Estimated Building Service Life.

1.14. Reuse, Recycling, and Energy Recovery

STEEL BARS and COIL FOR CONCRETE REINFORCED is easy to recycling, but it is not suggested to be re-used as structural elements.

1.15. Disposal

The European Waste Index code for STEEL BARS and COIL FOR CONCRETE REINFORCED is ewc-code-17-04-05– iron and steel.

2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

Declared Unit: 1 metric ton of STEEL BARS and COIL FOR CONCRETE REINFORCED

Table 4. Declared unit

NAME	VALUE	UNIT
Declared unit	1	ton
Thickness (des Bleches)	10 ~ 32	mm
Density	7,850	kg/m^3
Conversion factor to 1 kg	1,000	kg/ton

2.2. System Boundary

This is a cradle to gate EPD. The following life cycle stages were considered:

A1 – Raw material supply.

A2 – Transport.

A3 – Manufacturing.

*Not including “CONSTRUCTION PROCESS STAGE”, “USE STAGE” and “END OF LIFE STAGE”.

2.3. Estimates and Assumptions

The life cycle assessment does not include estimates and assumptions.

2.4. Cut-off Criteria

Life Cycle Inventory data for 100% of total inflows (mass and energy) to the upstream and core module have been included. Company infrastructure, employee's transportation and administrative activities were kept out of the scope of this study.

2.5. Data Sources

The material, energy, transportation, waste treatment and air emission data colleted are from the year 2024, and the major data source is from the ERP system of Taoyuan Works. The LCA software used for this study is SimaPro 10.2.0.0, the LCI databases include Ecoinvent 3.8, Ecoinvent 3.11, Ecoinvent system processes, EF database 3.1, USLCI, USLCI+, AGRIBALYSE 3, EU & DK Input Output Database.

2.6. Data Quality

The collected data were checked for plausibility and consistancy. Good data quality can be assumed. Data quality assessment per information module is provided in the following table.

Table 5. Raw material supply module data quality assessment

DATA	TIME RELATED COVERAGE	GEOGRAPHICAL COVERAGE	TECHNOLOGICAL COVEGARE	DATA SOURCE	MEASURED OR ESTIMATED
Raw materials consumption	2024	Taiwan	Modern	Tung Ho	M
Distance of Waste transportation to disposal site	2024	Taiwan	Modern	Tung Ho	M
Energy and materials consumption of waste processing in disposal site, as well as waste and generated emissions	2024	Taiwan	Modern	Tung Ho	M&E
Fuels consumption and emissions related to electricity generation and distribution in Taiwan	2024	Taiwan	Modern	Tung Ho	M&E
Energy consumption and generation of emissions related to natural gas production in Taiwan	2024	Taiwan	Modern	Tung Ho	M&E
Energy and materials consumption to raw materials production for tne Manufacturing	2024	Taiwan	Modern	Tung Ho	M&E

Table 6. Transportation module data quality assessment

DATA	TIME RELATED COVERAGE	GEOGRAPHICAL COVERAGE	TECHNOLOGICAL COVEGARE	DATA SOURCE	MEASURED OR ESTIMATED
Distance of waste and others raw materials transportation	2024	Taiwan	Not Applicable	Tung Ho	M
Distance of auxiliary items	2024	Taiwan	Not Applicable	Tung Ho	M

transportation					
Consumption of materials and energy and emissions related to the transport requirements of raw materials and auxiliary inputs	2024	Taiwan	World average	Ecoinvent	M&E

Table 7. Manufacture module data quality assessment

DATA	TIME RELATED COVERAGE	GEOGRAPHICAL COVERAGE	TECHNOLOGICAL COVEGARE	DATA SOURCE	MEASURED OR ESTIMATED
Consumption of auxiliary items	2024	Taiwan	Modern	Tung Ho	M&E
Energy and materials consumption of auxiliary items production	2024	Taiwan	Modern	Tung Ho	M&E
Waste generation	2024	Taiwan	Modern	Tung Ho	M
Waste treatment process	2024	Taiwan	Modern	Tung Ho	M&E
Air emissions and waste water generation	2024	Taiwan	Modern	Tung Ho	M&E
Distance of waste transportation	2024	Taiwan	Modern	Tung Ho	M&E
Requirements of waste transportation	2024	Taiwan	Modern	Tung Ho	M&E

2.7. Period under Review

From January 1st to December 31st, 2024.

2.8. Allocation

There are no credits from recycling or energy recovery of packaging materials and production waste. On the other hand, this is a “cradle to gate” study, so there are no credits from recycling or energy recovery from the end of life of the product.

Table 8. Allocation principles

STYLE FOR DISTRIBUTION	ALLOCATION (%)	REMARK
input billet for mill / steel make output billet	98.75%	steel make
all for rolling mill	100.00%	rolling mill
input billet for mill / input billet for mill+sale billet+transfer billet	99.98%	total plant

3. Life Cycle Assessment Results

Table 9. 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	x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

(X = included in LCA; MND = Module Not Declared).

3.1. Life Cycle Impact Assessment Results

Table 10. Impact Assessment Results

EN 15804 + A2 (ADAPTED) V1.03	UNIT (PER TON)	A1	A2	A3	A1-A3
Global warming potential - total (GWP-total)	kg CO2 eq.	2.74E+02	6.17E+01	3.99E+02	7.35E+02
Global warming potential - fossil fuels (GWP-fossil)	kg CO2 eq.	2.72E+02	6.17E+01	3.99E+02	7.33E+02
Global warming potential - biogenic (GWP-biogenic)	kg CO2 eq.	2.12E+00	3.81E-02	-8.24E-01	1.34E+00
Global warming potential - land use and land use change (GWP-luluc)	kg CO2 eq.	1.39E-01	4.08E-02	4.28E-01	6.08E-01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	1.91E-06	4.55E-08	2.84E-07	2.24E-06
Acidification potential, accumulated exceedance (AP)	mol H+ eq.	1.66E+00	1.85E+00	1.44E+00	4.95E+00
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	1.14E-01	2.15E-03	3.66E-01	4.83E-01
Eutrophication potential - marine (EP-marine)	kg N eq.	2.98E-01	4.55E-01	3.39E-01	1.09E+00
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	3.21E+00	5.06E+00	2.85E+00	1.11E+01
Photochemical ozone creation	kg NMVOC eq.	9.85E-01	1.32E+00	8.18E-01	3.12E+00

potential (POCP)					
Abiotic depletion potential - non-fossil resources (ADPE)	kg Sb eq.	3.45E-04	9.54E-05	2.55E-04	6.95E-04
Abiotic depletion potential - fossil resources (ADPF)	MJ, net calorific value	3.25E+03	8.09E+02	5.75E+03	9.81E+03
Water (user) deprivation potential (WDP)	m3 world eq. deprived	5.76E+01	1.53E+00	1.04E+02	1.63E+02

Table 11. Additional voluntary environmental impact indicators (OPTIONAL)

PARAMETER	UNIT (PER TON)	A1	A2	A3	A1-A3
Particulate matter emissions (PM)	Disease incidence	2.19E-05	2.29E-06	3.43E-06	2.76E-05
Ionizing radiation, human health (IRP)	kBq U235 eq.	9.98E+04	3.72E+00	7.42E+01	9.99E+04
Eco-toxicity - freshwater (ETP-fw)	CTUe	9.10E+02	2.02E+02	1.11E+03	2.23E+03
Human toxicity, cancer effect (HTP-c)	CTUh	1.62E-07	6.99E-09	1.32E-08	1.83E-07
Human toxicity, non-cancer effects (HTP-nc)	CTUh	2.62E-07	9.22E-09	6.28E-08	3.34E-07
Land use related impacts/Soil quality (SQP)	dimensionless	7.37E+02	1.69E+02	4.91E+02	1.40E+03

3.2. Life Cycle Inventory Result

Table 12. Resource Use

PARAMETER	UNIT (PER TON)	A1	A2	A3	A1-A3
Use of renewable primary energy as energy carrier (PERE)	MJ, net calorific value	2.25E+02	6.09E+00	1.82E+02	413.578
Use of renewable primary energy resources used as raw materials (PERM)	MJ, net calorific value	1.11E+02	2.67E+00	1.17E+02	230.083
Total use of renewable primary energy (PERT)	MJ, net calorific value	3.36E+02	8.77E+00	2.99E+02	643.662
Use of non renewable primary energy as energy carrier (PENRE)	MJ, net calorific value	3.49E+03	8.68E+02	6.45E+03	10806.525
Use of non renewable primary energy resources used as raw materials (PENRM)	MJ, net calorific value	2.45E+02	7.28E+00	1.29E+01	265.350
Total use of non renewable primary energy resource (PENRT)	MJ, net calorific value	3.58E+03	8.76E+02	1.93E+02	4649.591
Use of secondary material (SM)	kg	1.08E+03	0.00E+00	0.00E+00	1082.883
Use of renewable secondary fuels (RSF)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.000
Use of non-renewable secondary fuels (NRSF)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.000
RE (recovered energy)	[MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.000
Net use of fresh water (FW)	m3	6.16E+01	1.61E+00	1.05E+02	168.121

Table 13. Output Flows and Waste Categories

PARAMETER	UNIT (PER TON)	A1	A2	A3	A1-A3
Hazardous waste disposed (HWD)	kg	2.56E-03	8.80E-04	3.09E-03	6.53E-03
Non-hazardous waste disposed (NHWD)	kg	1.13E+03	7.72E+00	2.27E+01	1.16E+03
HLRW(High-level radioactive waste, conditioned,to final repository	[kg] or [m3]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW(Intermediate- and low-level radioactive waste, conditioned,to final repository	[kg] or [m3]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed (RWD)	kg	2.50E-02	5.63E-03	1.88E-02	4.94E-02
Components for re-use (CRU)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (MFR)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery (MER)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy (EEE)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy (EET)	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 14. Carbon Emissions and Removals

PARAMETER	UNIT (PER TON)	A1	A2	A3	A1-A3
BCRP(Biogenic Carbon Removal from Product)	kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP (Biogenic Carbon Emission from Product)	kg CO2	0.00E+00	0.00E+00	2.87E-01	2.87E-01
BCRK (Biogenic Carbon Removal from Packaging)	kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK (Biogenic Carbon Emission from Packaging)	kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW(Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes)	kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE (Calcination Carbon Emissions)	kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR (Carbonation Carbon Removals)	kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR (Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes)	kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00

4. LCA Interpretation

The highest proportion of GWP-total(Global warming potential total) impact of the product is module A3(Manufacturing), 54.26%. The highest proportion of GWP-fossil(Global warming potential fossil fuels) impact of the product is module A3(Manufacturing), 54.45%. The highest proportion of GWP-biogenic(Global warming potential biogenic) impact of the product is module A1(raw material supply), 158.76%. The highest proportion of GWP-luluc(GWP from land use and land use change) impact of the product is module A3(Manufacturing), 70.44%. The highest proportion of ODP(Depletion potential of the stratospheric ozone layer) impact of the product is module A1(raw material supply), 85.30%. The highest proportion of AP(Acidification potential, accumulated exceedance) impact of the product is module A2 (Transportation), 37.48%. The highest proportion of EP-freshwater(Eutrophication, fraction of nutrients reaching freshwater end compartment) impact of the product is module A3(Manufacturing), 75.89%. The

highest proportion of EP-marine(Eutrophication, fraction of nutrients reaching marine end compartment) impact of the product is module A2 (Transportation), 41.68%. The highest proportion of EP-terrestrial(Eutrophication, accumulated exceedance) impact of the product is module A2 (Transportation), 45.52%. The highest proportion of POCP(Formation potential of tropospheric ozone photochemical oxidants) impact of the product is module A2 (Transportation), 42.19%. The highest proportion of ADP- minerals & metals(Abiotic depletion potential for non-fossil resources) of the product is module A1(raw material supply), 49.62%. The highest proportion of ADP-fossil(Abiotic depletion potential for fossil resources) of the product is module A3(Manufacturing), 58.61%.The highest proportion of WDP(Water (user) deprivation potential, deprivation weighted water consumption) impact of the product is module A3(Manufacturing), 63.81%.

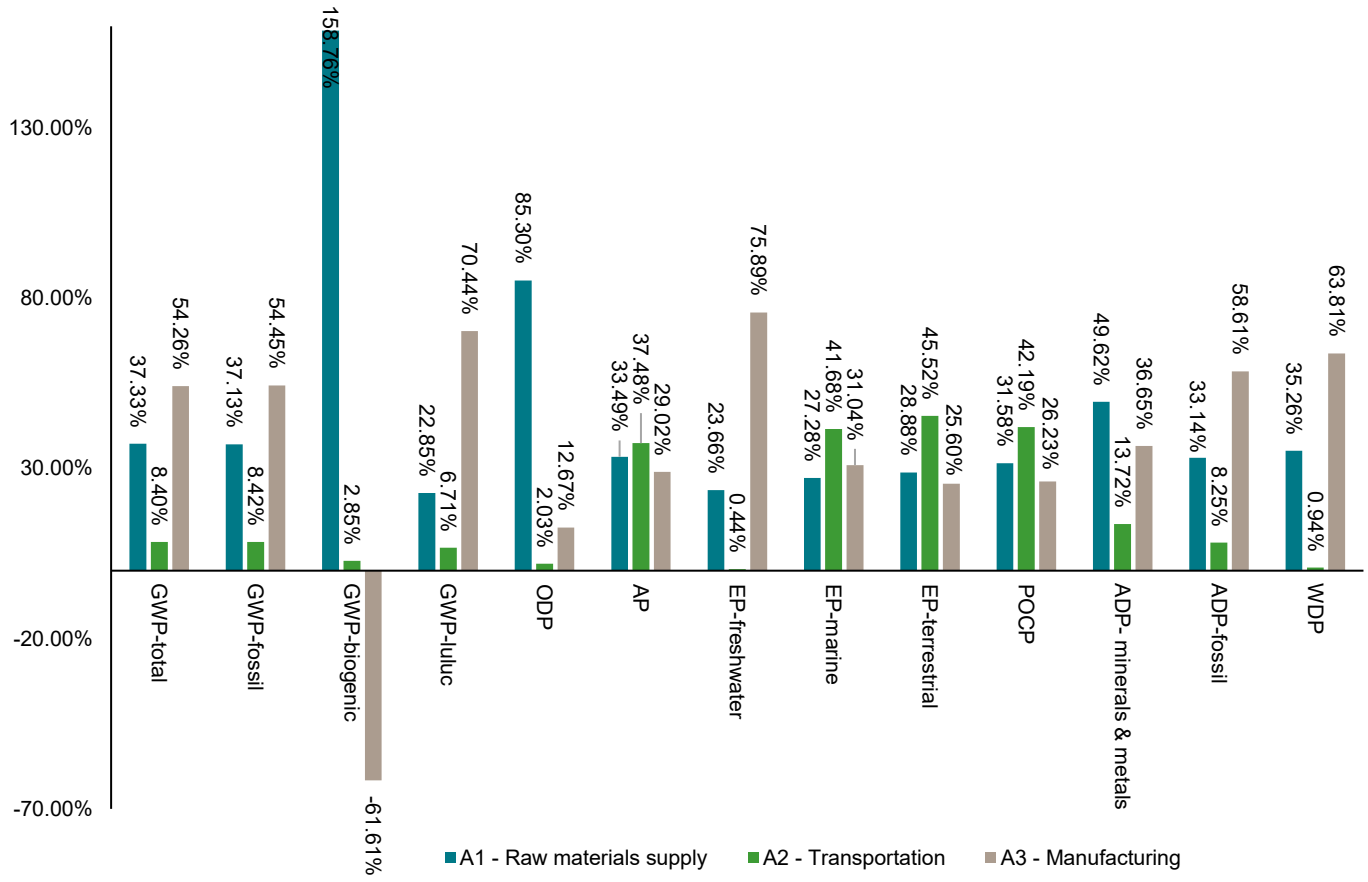

Figure 2. RESULTS OF THE LCA - ENVIRONMENTAL IMPACT

Sensitivity Check

The study considered sensitivities of most uncertain and significant aspects of the data set, including “Input of CaO”, “Transportation distance of scrap” and “Input of electricity”. After adjusting 20% on each item and check the changes of each LCA result, the results of sensitivity check is as shown on the tables below.

Table 5. Sensitivity Analysis for Stage A1

Impact Category	Item of Sensitivity Check	The current LCA result	The LCA result after adjusting 20% on input of CaO	Sensitivity(%)
GWP-total(Global warming potential total)	Input of CaO	7.35E+02	7.42E+02	0.93%
GWP-fossil(Global warming potential fossil fuels)	Input of CaO	7.33E+02	7.39E+02	0.92%
GWP-biogenic(Global warming potential biogenic)	Input of CaO	1.34E+00	1.39E+00	4.27%
GWP-luluc(GWP from land use and land use change)	Input of CaO	6.08E-01	6.09E-01	0.10%
ODP(Depletion potential of the stratospheric ozone layer)	Input of CaO	2.24E-06	2.24E-06	0.06%
AP(Acidification potential, accumulated exceedance)	Input of CaO	4.95E+00	4.96E+00	0.17%
EP-freshwater(Eutrophication, fraction of nutrients reaching freshwater end compartment)	Input of CaO	4.83E-01	4.83E-01	0.04%
EP-marine(Eutrophication, fraction of nutrients reaching marine end compartment)	Input of CaO	1.09E+00	1.09E+00	0.16%
EP-terrestrial(Eutrophication, accumulated exceedance)	Input of CaO	1.11E+01	1.11E+01	0.17%
POCP(Formation potential of tropospheric ozone photochemical oxidants)	Input of CaO	3.12E+00	3.13E+00	0.23%
ADP- minerals & metals(Abiotic depletion potential for non-fossil resources)	Input of CaO	6.95E-04	6.97E-04	0.18%
ADP-fossil(Abiotic depletion potential for fossil resources)	Input of CaO	9.81E+03	9.84E+03	0.29%
WDP(Water (user) deprivation potential, deprivationweighted water consumption)	Input of CaO	1.63E+02	1.63E+02	0.02%

Table 15. Sensitivity Analysis for Stage A2

Impact Category	Item of Sensitivity Check	The current LCA result	The LCA result after adjusting 20% on transportation distance of scrap	Sensitivity(%)
GWP-total(Global warming potential total)	Transportation distance of scrap	7.35E+02	7.38E+02	0.49%
GWP-fossil(Global warming potential fossil fuels)	Transportation distance of scrap	7.33E+02	7.36E+02	0.49%
GWP-biogenic(Global warming potential biogenic)	Transportation distance of scrap	1.34E+00	1.34E+00	0.10%
GWP-luluc(GWP from land use and land use change)	Transportation distance of scrap	6.08E-01	6.11E-01	0.40%
ODP(Depletion potential of the stratospheric ozone layer)	Transportation distance of scrap	2.24E-06	2.24E-06	0.11%
AP(Acidification potential, accumulated exceedance)	Transportation distance of scrap	4.95E+00	5.06E+00	2.36%
EP-freshwater(Eutrophication, fraction of nutrients reaching freshwater end compartment)	Transportation distance of scrap	4.83E-01	4.83E-01	0.02%
EP-marine(Eutrophication, fraction of nutrients reaching marine end compartment)	Transportation distance of scrap	1.09E+00	1.12E+00	2.62%
EP-terrestrial(Eutrophication, accumulated exceedance)	Transportation distance of scrap	1.11E+01	1.14E+01	2.86%
POCP(Formation potential of tropospheric ozone photochemical oxidants)	Transportation distance of scrap	3.12E+00	3.20E+00	2.65%

ADP- minerals & metals(Abiotic depletion potential for non-fossil resources)	Transportation distance of scrap	6.95E-04	7.00E-04	0.71%
ADP-fossil(Abiotic depletion potential for fossil resources)	Transportation distance of scrap	9.81E+03	9.86E+03	0.47%
WDP(Water (user) deprivation potential, deprivationweighted water consumption)	Transportation distance of scrap	1.63E+02	1.63E+02	0.05%

Table 16. Sensitivity Analysis for Stage A3

Impact Category	Item of Sensitivity Check	The current LCA result	The LCA result after adjusting 20% on input of electricity	Sensitivity(%)
GWP-total(Global warming potential total)	Input of electricity	7.35E+02	8.06E+02	9.68%
GWP-fossil(Global warming potential fossil fuels)	Input of electricity	7.33E+02	8.04E+02	9.72%
GWP-biogenic(Global warming potential biogenic)	Input of electricity	1.34E+00	1.17E+00	-12.86%
GWP-luluc(GWP from land use and land use change)	Input of electricity	6.08E-01	6.75E-01	11.00%
ODP(Depletion potential of the stratospheric ozone layer)	Input of electricity	2.24E-06	2.27E-06	1.28%
AP(Acidification potential, accumulated exceedance)	Input of electricity	4.95E+00	5.23E+00	5.80%
EP-freshwater(Eutrophication, fraction of nutrients reaching freshwater end compartment)	Input of electricity	4.83E-01	5.40E-01	11.88%
EP-marine(Eutrophication, fraction of nutrients reaching marine end compartment)	Input of electricity	1.09E+00	1.15E+00	5.25%
EP-terrestrial(Eutrophication, accumulated exceedance)	Input of electricity	1.11E+01	1.16E+01	4.47%
POCP(Formation potential of tropospheric ozone photochemical oxidants)	Input of electricity	3.12E+00	3.26E+00	4.60%
ADP- minerals & metals(Abiotic depletion potential for non-fossil resources)	Input of electricity	6.95E-04	7.34E-04	5.50%
ADP-fossil(Abiotic depletion potential for fossil resources)	Input of electricity	9.81E+03	1.08E+04	9.74%
WDP(Water (user) deprivation potential, deprivationweighted water consumption)	Input of electricity	1.63E+02	1.72E+02	5.60%

Table 17. information on disclaimer for environmental indicators

ILCD Classification	Indicator	Disclaimer
ILCD Type 1	Global warming potential (GWP)	none
	Depletion potential of the stratospheric ozone layer (ODP)	none
	Potential incidence of disease due to PM emissions (PM)	none
ILCD Type 2	Acidification potential, Accumulated Exceedance (AP)	none
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	none
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	none
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	none
	Formation potential of tropospheric ozone (POCP)	none

	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD Type 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP- fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP- fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

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 experienced with the indicator.

Critical review

The purpose of the project report is not a comparative assertion, but an independent disclosure, so the critical review is not performed.

5. Additional Environmental Information

5.1. Environment and Health During Manufacturing

The manufacturing process includes electric arc furnace steelmaking, Steel refining, Continuous casting, hot rolling, piling & bunding, Deformed bar& Compact bar in coil, etc. The quality management system is ISO 9001. The environmental management system is ISO 14001. The occupational safety management system is ISO 45001. The energy management system is ISO 50001.

5.2. Environment and Health During Installation

This inventory calculation covers stages A1 to A3, and the scope of the inventory does not include Environment and Health During Installation.

5.3. Extraordinary Effects

Fire

Special Fire Fighting Procedures - Do not use water on molten metal. Do not use Carbon Dioxide (CO_2). Firefighters should not enter confined spaces without wearing NIOSH/MSHA approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.

Unusual Fire or Explosion Hazards - Steel products do not present fire or explosion hazards under normal conditions. Any non-oxidized fine metal particles/ dust generated by grinding, sawing, abrasive blasting, or individual customer

processes may produce materials that the customer should test for combustibility and other hazards in accordance with applicable regulations. High concentrations of combustible metallic fines in the air may present an explosion hazard.

Water

Not relevant.

Mechanical Destruction

Not relevant.

5.4. Delayed Emissions

No delayed emissions are expected from these products.

5.5. Environmental Activities and Certifications

ISO 9001

We have established the ISO 9001 management system and set up standards for steel scrap acceptance inspection and electric furnace operation. We increase the procurement amount of domestic scrap steel based on the monthly production plan, set up the crush workshop and increase the recovery rate in the steelmaking process to reduce the consumption of raw materials and energy to further reduce the environmental impact. In 2024, the proportion of rolling and cutting head and tail materials or the ratio of scrap material recycled in furnaces was 1.70% for rebar.

Other Energy-saving and Carbon Reduction Measures

To cooperate with the development of the national GHG reduction strategy while taking into account the sustainable energy development goals of resource efficiency, energy conservation and environmental protection, Tung Ho Steel has promoted ISO 50001 energy management system, ISO 14064-1 GHG inventory, and ISO 14067 product carbon footprint certification. At the same time, we also invest capital expenditures and related manpower and material resources through the resource requirement of various energy saving programs, aiming at grasping production costs and making effective and appropriate use of energy.

ISO 14001

The Company complies with the ISO 14001 environmental management system and continues improvement of its production operation, products and services to reduce the impact on the natural environment. Tung Ho Steel continues to monitor and is devoted to air pollution prevention and control. By adopting the best available control technology （BACT）, the emission of particulate pollutants is effectively reduced.

5.6. Further Information

Additional information can be obtained from https://www.tunghosteel.com/Home/Index.

6. Supporting Documentation

LCA calculation sheet - Tung Ho Steel Enterprise Corp(Taoyuan Works) -STEEL BARS and COIL FOR CONCRETE REINFORCED

LCA report- Tung Ho Steel Enterprise Corp (Taoyuan Works)-STEEL BARS and COIL FOR CONCRETE REINFORCED

7. References

EN 15804

EN 15804:201204+A2 2019, Sustainability of construction works – Environmental product declarations - Core rules for the product category of construction products.

ISO 14025

DIN EN ISO 14025:201110, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

SimaPro

SimaPro 10.2.0.0, the LCI databases include Ecoinvent 3.8, Ecoinvent 3.11, Ecoinvent system processes, EF database 3.1, USLCI, USLCI+, AGRIBALYSE 3, EU & DK Input Output Database, and LCIA methodologies include EN 15804 + A2 Method version 1.03, EDIP2003 version 1.07, AWARE version 1.07, and Cumulated Exergy Demand method version 1.09.

Product Category Rules

Construction Products, PCR 2019:14 version 2.0.1

8. Study Commissioner

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