Alliance Steel (M) Sdn. Bhd.
联合钢铁（大马）集团公司

Alliance Steel (M) Sdn. Bhd.

ENVIRONMENTAL PRODUCT DECLARATION

Steel billets & blooms

Jalan Gebeng By PASS, 26080
Kawasan Industrial Malaysia-China Kuantan,
Kuantan, Pahang, Malaysia

In accordance with ISO 14025 and EN 15804:2012+A2:2019

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration Number	EC-EPD-31- 2025-0004
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Valid to	16 / 12 / 2030

Steel Billets

Steel Blooms

www.epditaly.it

EPD created with Steel LCA Tool

EPD OWNER	
Name of the company	Alliance Steel (M) Sdn. Bhd. (ASSB)
Registered office	Jalan Gebeng By PASS, 26080 Kawasan Industrial Malaysia-China Kuantan, Kuantan, Pahang, Malaysia
Contacts for information on the EPD	

PROGRAM OPERATOR	
EPDItaly	Via Gaetano De Castillia n° 10 - 20124 Milano, Italy

INFORMATION ON THE EPD	
Product name (s)	Steel billets & blooms
Site (s)	Jalan Gebeng By PASS, 26080 Kawasan Industrial Malaysia-China Kuantan, Kuantan, Pahang, Malaysia
Short description and technical information of the product (s)	Steel billets & blooms are both forms of crude steel, produced through the same processes, and serve as fundamental materials in the steel industry, primarily used in construction.
Field of application of the product (s)	Steel billets & blooms are semi-finished products used as feedstock for rolling, forging, casting products. They serve as the basis for manufacturing construction steel, automotive components, machinery parts, and structural profiles across diverse industrial applications.
Product (s) reference standards (if any)	
CPC Code (number) https://unstats.un.org/unsd/classifications/Econ	UN CPC 41

VERIFICATION INFORMATION	
PCR (title, version, date of publication or update)	CEN standard EN 15804 serves as the Core Product Category Rules (PCR) PCR for Construction products: ICMQ-001/15 rev 3.2 (according to EN 15804+A2). Publication at 03/11/2025
EPDItaly Regulation (version, date of publication or update)	EPDItaly Regulations Rev 6.0 Issue date: 30/10/2023
Project Report LCA	Life cycle assessment of steel billets & blooms products for ASSB Ver. 1.0 Submit date: 16/06/2025
Independent Verification Statement	The PCR review was performed by ICMQ S.p.A. - info@epditaly.it. Independent verification of the declaration and data, carried out according to ISO 14025: 2010. Internal ☑ External Third party verification carried out by: ICMQ S.p.A., via Gaetano De Castillia n ° 10 - 20124 Milan, Italy. Accredited by Accredia.
Comparability Statement	Environmental statements published within the same product category, but from different programs, may not be comparable. In particular, EPDs of construction products may not

	be comparable if they do not comply with EN 15804: 2012 + A2: 2019.
Liability Statement	The EPD Owner releases EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence. EPDItaly disclaims any responsibility for the information, data and results provided by the EPD Owner for life cycle assessment.

COMPANY INFORMATION	
Description of the organisation:	Founded in April 2014, Alliance Steel (M) Sdn. Bhd. is located in Kuantan, the capital of Pahang State and the biggest city of East Coast Economic Region, near to Kuantan Port, facing the South China Sea. Alliance Steel (M) Sdn. Bhd. is a private joint-stock foreign enterprise jointly invested by Fujian Wugang Group Co., Ltd. And Guangxi Shenglong Metallurgical Co., Ltd,. This project is a key project and the first entrant in the Malaysia-China Kuantan Industrial Park, which was personally promoted by the leaders of China and Malaysia and jointly developed by the two governments. The main leaders of China and Malaysia personally participated in witnessing the signing ceremony of the project. Alliance Steel is a multinational enterprise integrating production, processing, distribution, and trade. It is also the most technologically advanced steel enterprise in Malaysia, offering a full range of products and specifications. The first phase of the project involved a total investment of about 1.6 billion US dollars, covering an area of 710 acres, and with more than 4,100 employees. Alliance Steel mainly produces steel billets & blooms, steel bars, wire rods and H-beams, with a production capacity of 4.0 million tons.
Name and location of production site:	Jalan Gebeng By PASS, 26080 Kawasan Industrial Malaysia-China Kuantan, Kuantan, Pahang, Malaysia

PRODUCT INFORMATION	
Product name:	Steel billets & blooms
Product identification:	Steel billets & blooms are both forms of crude steel, produced through the same processes. As semi-finished products, they serve as feedstock for rolling, forging, and seamless tube production, and are commonly used in the construction, machinery manufacturing, automotive, and energy industries.
Product features:	Steel billets & blooms differ in terms of their features. Steel billets typically have a 150 mm × 150 mm square cross-section, with lengths ranging from 10 meters to 12 meters Steel blooms can have either square or rectangular

	cross-sections, with sizes ranging from 165 mm × 165 mm, 230 mm × 230 mm， 230 mm × 350 mm, 320 mm × 410 mm, to 320 mm × 510 mm. The 165 mm × 165 mm blooms typically range in length from 10 meters to 12 meters, while the others range from 5.5 meters to 11 meters.
Product description:	Steel billets & blooms are produced through the processes of ironmaking. They are semi-finished products derived from pig iron produced in a blast furnace and undergo further treatment in a converter, refining, and casting processes. Steel billets & blooms exhibit high hardness and strength, but lower ductility and toughness. Typically, they require further processing through hot rolling, cold rolling, or forging to improve their properties. Steel billets & blooms are widely used in construction, machinery manufacturing, automotive, and energy industries, serving as primary raw materials for producing various steel products
Product compostition information:	

Composition	Steel billets & blooms
C	0.08% - 0.3%
Si	⩽ 0.03% - 0.2%
Mn	0.25% - 1%
P	⩽ 0.035%
S	⩽ 0.035%

GENERAL INFORMATION

LCA information

LCA report: Life cycle assessment of steel billets & blooms products for ASSB Ver. 1.0

Software: Steel LCA Tool Ver. 1.4, August 28, 2025 - Qualified LCA tool

LCA practitioner: Ling Zhang, E-c digital, zhangling@ecdigit.com; Yifei Wang, E-c digital, yangjx@ecdigital.com.

Declared unit: 1metric ton of steel billets & blooms product produced in Malaysia

Time representativeness: Primary data covers a period of 01.01.2024 to 31.12.2024, with all secondary data used <3 years difference to year of study.

Type of EPD: EPD of steel billets & blooms products, based on the average results of the product group.

Description of system boundaries: The system boundary of this LCA study covers the cradle to gate stage (A1 to A3) plus end-of-life (C1-C4) and benefits and loads beyond the system boundary (D), because other life cycle stages are dependent on scenarios and are better developed for specific building or construction works.

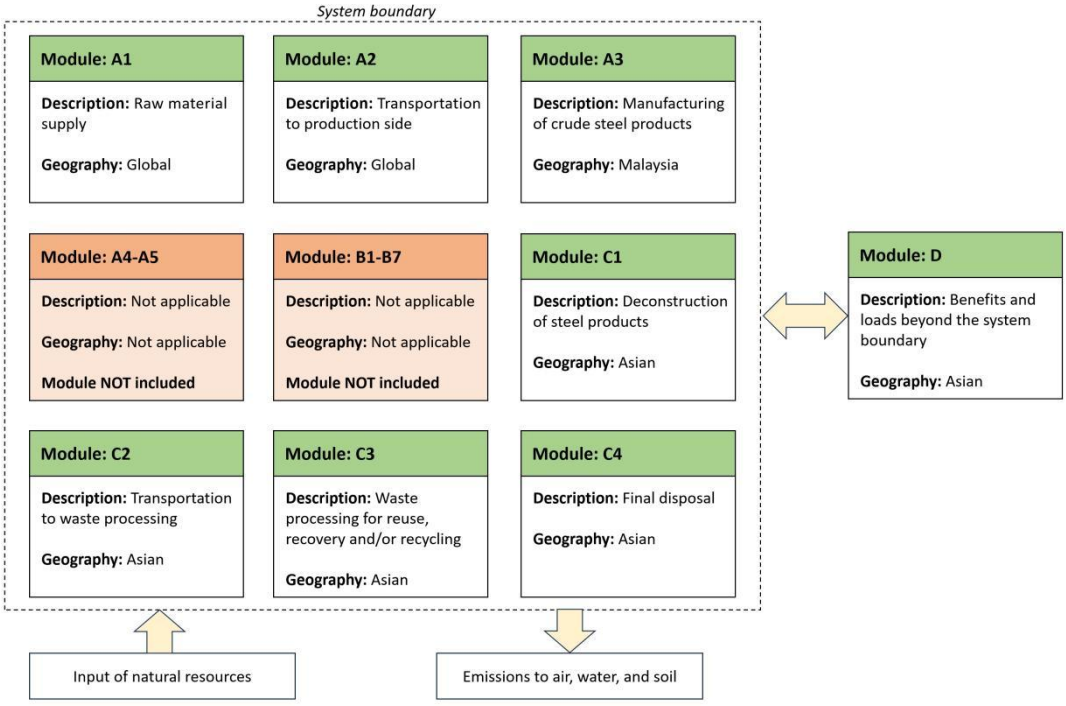

Figure 1: System boundary

Product system description:

ASSB produce steel billets & blooms products for use in the construction industry. In this EPD, the system boundary was defined as cradle-to-gate (modules A1-A3) with options C1-C4 plus module D as described below and presented in the process flow in Figure 1 above:

• *A1 raw materials supply:* This stage includes the extraction or production of purchased raw materials (e.g., iron concentrate, pellet ore, iron ore), purchased energy (e.g., coal, coke), and auxiliary materials (e.g., limestone, alloys). The carbon footprint of purchased electricity (GWP100) is 0.843 kg CO_2-eq/kWh.

• *A2 transportation:* All raw materials, including iron ore and limestone, are transported to the ASSB site via road and sea routes.

• *A3 manufacturing:* This stage encompasses the production processes within the ASSB production system, which is divided into the main production system and the energy production system. The main production system includes steel-making processes such as sintering, pelletizing, blast furnace, converter, and continuous casting. The energy production system covers processes like desalinated water production, self-generated power systems.

• *C1-C4 end of life:* At end of life, the building is deconstructed, with assumptions and scenario analysis outlined in Table 1. Scrap steel reinforcement mesh from demolition is sorted and waste processing in module C3 is modelled by background data "treatment of waste reinforcement steel, sorting plant" from Ecoinvent 3.10 database.

Table 1: Scenario and additional technical information of end-of-life stage

Scenario	Parameter	Value	Unit
C1	Energy required for deconstruction, diesel	24	MJ
C2	Transport to waste processing by Truck	50	km
C3	Background data: treatment of waste reinforcement steel, sorting plant	-	-
C4	Waste for recycling - Recovered steel from crushed concrete	92	%
	Waste for final disposal - sent to landfill	8	%

• *D benefits and loads:* Benefits and loads are assigned to the net scrap steel generated over the product lifecycle, calculated by the difference between end-of-life recycled scrap and scrap input in manufacturing. These are based on the recycling burdens and the benefits of avoided primary production.

Goal of study:

The goal of this study was to create an environmental profile for reporting in an EPD of the steel billets & blooms products, aimed at better understanding its life-cycle environmental impacts.

Intended use:

This LCA study enables ASSB to assess the relative environmental impact contributions of all processes within the product lifecycle. Consequently, it provides insights into the environmental impact distribution across the product system under investigation, helping to pinpoint critical areas where targeted mitigation measures can be implemented.

Allocation:

Allocation, as defined in EN 15804, involves dividing input or output flows between multiple product systems. In this study, allocation is minimized by subdividing processes and collecting specific data for each sub-process.

Where process division is possible but data are unavailable, inputs and outputs are distributed to reflect the physical relationships between products, based on how inputs and outputs change with product quantity.

For joint co-production processes that cannot be subdivided, allocation reflects the primary purpose of the process. When co-products differ by ≤25% in revenue, allocation is based on physical properties (e.g., mass, volume); otherwise, economic value is used. Flows with inherent properties, such as energy content, are allocated according to physical flows regardless of economic considerations.

For ASSB's steel billets & blooms, co-products like blast furnace slag, liquid argon, and nitrogen, considered end-of-waste, are allocated using economic value from the Ecoinvent database and ASSB.

Cut-off criteria:

The exclusion of inputs and outputs followed these guidelines:

All available data for a unit process are included; any data gaps are conservatively estimated with average or generic data, with assumptions fully documented.

For incomplete data, per EN 15804, cut-off criteria allow for excluding up to 1% of renewable/non-renewable primary energy use and 1% of total mass per unit process. Neglected input flows per module (e.g., A1-A3, C1-C4, D) are limited to 5% of energy use and mass.

Particular care is taken to include materials or processes with potential significant emissions across declared LCIA categories.

Data Quality:

Data quality has been assessed and validated during data collection process.

Data quality requirements followed those of ISO 14040/44, EN 15804:2012+A2:2019 and PCR for Construction products: ICMQ-001/15 rev 3.2 (according to EN 15804+A2). To ensure the quality of data was sufficient data quality checks were completed on key data parameters by data quality indicators using a data quality matrix and assigning scores between 1 (best) and 5 (worst). The range of scores for primary and secondary data used in this study can be summarized as:

- Temporal representativeness: Excellent
- Technological representativeness: Very good
- Geographical representativeness: Very good
- Precision: Very good

Database(s) and LCA software used:

Secondary data are from the Ecoinvent v3.10, cut-off by classification. The LCA model was developed with "Steel LCA Tool" version 1.4 of 28.08.2025, developed by EC Digital and verified by ICMQ.

Life cycle impact assessment method (LCIA):

This study applies the EF 3.1 impact assessment methods. EF 3.1 characterization factors are considered to be the most robust and up-to-date available for the European context, are widely used and respected within the LCA community, and are required for Product Environmental Footprint studies and Environmental Product Declarations under EN 15804+A2.

Table 2 Modules declared in the LCA research of steel billets & blooms products

Included modules in the life cycle assessment	Product Stage	X	A1	Raw material supply
		X	A2	Transport
		X	A3	Manufacturing
	Construction Stage	MND	A4	Transport from the gate to the site
		MND	A5	Assembly
	Use Stage	MND	B1	Use
		MND	B2	Maintenance
		MND	B3	Repair
		MND	B4	Replacement
		MND	B5	Refurbishment
		MND	B6	Operational energy use
		MND	B7	Operational water use
	End of Life Stage	X	C1	De-construction demolition
		X	C2	Transport
		X	C3	Waste processing
		X	C4	Disposal
	Benefits and loads beyond the product system boundary	X	D	Reuse-Recovery-Recycling potential
Note: X=Declared Module, MND=Module not Declared in this LCA study				

Environmental performance:

Table 3 Results of environmental impacts by stage (1 metric ton of steel billets & blooms products)

Impact indicators	Unit	Product stage				De-construction demolition	Transport	Waste process	Disposal	Reuse-Recovery-Recycling potential
		A1	A2	A3	A1:A3	C1	C2	C3	C4	D
GWP	kg CO_2 eq	3.07E+02	1.34E+02	9.59E+02	1.40E+03	2.41E+00	9.59E+00	6.56E+01	5.01E-01	-8.47E+02
GWP, b	kg CO2 eq	-5.52E+00	-2.67E-02	-7.53E-02	-5.62E+00	2.40E-04	2.90E-05	9.38E-03	5.18E-05	4.31E+00
GWP, f	kg CO2 eq	3.12E+02	1.34E+02	9.59E+02	1.40E+03	2.40E+00	9.58E+00	6.56E+01	5.00E-01	-8.53E+02
GWP, ghg	kg CO2 eq	3.13E+02	1.34E+02	9.59E+02	1.41E+03	2.40E+00	9.59E+00	6.56E+01	5.01E-01	-8.50E+02
GWP, luluc	kg CO2 eq	6.55E-01	6.84E-02	8.88E-02	8.13E-01	2.09E-04	3.90E-03	9.19E-03	2.60E-04	9.35E-01
ODP	kg CFC-11 eq	3.38E-06	1.99E-06	2.66E-07	5.64E-06	3.66E-08	1.40E-07	9.70E-07	1.43E-08	1.48E-06
AE, a	mol H+ eq	1.70E+00	3.25E+00	7.80E-02	5.02E+00	2.17E-02	2.20E-02	5.81E-01	3.54E-03	-2.91E+00
P	kg P eq	6.11E-01	5.89E-03	2.48E-03	6.19E-01	7.00E-05	7.57E-04	3.09E-03	4.15E-05	-2.54E-01
N	kg N eq	5.04E-01	8.15E-01	2.02E-02	1.34E+00	1.01E-02	5.10E-03	2.66E-01	1.35E-03	-6.54E-01
AE, t	mol N eq	4.49E+00	9.04E+00	2.04E-01	1.37E+01	1.10E-01	5.50E-02	2.91E+00	1.47E-02	-8.54E+00
POCP	kg NMVOC eq	1.33E+00	2.50E+00	1.37E-01	3.96E+00	3.29E-02	3.07E-02	8.66E-01	5.28E-03	-2.53E+00
ADP, e	kg Sb eq	7.25E-04	1.79E-04	8.67E-05	9.91E-04	8.62E-07	3.20E-05	3.84E-05	7.94E-07	-8.26E-03
ADP, f	MJ, net calorific value	1.33E+04	1.70E+03	1.22E+02	1.51E+04	3.15E+01	1.35E+02	8.57E+02	1.23E+01	-7.32E+03
WDP	m3 world eq. deprived	7.00E+01	5.81E+00	1.44E+02	2.20E+02	7.70E-02	6.12E-01	2.63E+00	3.43E-02	-1.94E+02
PM	Disease incidence	1.19E-04	5.92E-06	1.28E-05	1.38E-04	6.16E-07	7.13E-07	1.62E-05	8.06E-08	-7.63E-05
IRP	kBq U235 eq	1.68E+01	1.13E+00	3.42E-01	1.83E+01	1.41E-02	1.12E-01	7.42E-01	7.82E-03	-1.78E+01
CTUe	CTUe	1.10E+04	3.31E+02	2.25E+02	1.15E+04	4.46E+00	3.62E+01	1.25E+02	1.68E+00	-3.08E+04
CTUh, c	CTUh	2.83E-05	6.34E-07	6.63E-08	2.90E-05	9.39E-09	5.04E-08	2.51E-07	2.25E-09	-1.01E-04
CTUh, nc	CTUh	2.60E-06	5.83E-07	1.14E-06	4.33E-06	4.27E-09	8.69E-08	1.38E-07	2.20E-09	-1.29E-05
SQP	dimensionless	2.81E+03	4.67E+02	4.55E+01	3.32E+03	2.20E+00	8.15E+01	7.88E+01	2.41E+01	-3.05E+03

Acronyms

GWP	Climate change: global warming potential, total (GWP100)	*POCP*	Formation potential of tropospheric ozone
GWP, f	Climate change: global warming potential, fossil (GWP100)	*ADP, e*	Abiotic depletion potential for non-fossil resources: minerals & metals
GWP, b	Climate change: global warming potential, biogenic (GWP100)	*ADP, f*	Abiotic depletion potential for fossil resources

GWP, luluc	Climate change: land use and land use change-global warming potential (GWP100)	*WDP*	Water (user) deprivation potential, deprivation-weighted water consumption
GWP, ghg	Climate change: global warming potential, excluding biogenic uptake, emission and storage (GWP100)	*PM*	Potential incidence of disease due to PM emissions
ODP	Ozone depletion potential	*IRP*	Ionizing radiation, potential human exposure efficiency relative to U235
AE, a	Acidification potential, Accumulate Exceedance	*CTUh*	Potential comparative toxic unit for ecosystems: fresh water
P	Eutrophication potential, fraction of nutrients reaching freshwater end compartment	*CTUh, c*	Potential comparative toxic unit for humans: cancer effects
N	Eutrophication potential, fraction of nutrients reaching marine end compartment	*CTUh, nc*	Potential comparative toxic unit for humans: non-cancer effects
AE, t	Eutrophication potential, Accumulate Exceedance	*SQP*	Land use related impacts: potential soil quality index

*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.

**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 unclear 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.

Table 4 Results of resource use by stage (1 metric ton products)

Impact indicators	Unit	Product stage				De-construction demolition	Transport	Waste process	Disposal	Reuse-Recovery-Recycling potential
		A1	A2	A3	A1:A3	C1	C2	C3	C4	D
PERE	MJ	3.88E+02	1.73E+01	1.23E+01	4.17E+02	1.92E-01	1.79E+00	1.00E+01	1.14E-01	-8.03E+02
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.88E+02	1.73E+01	1.23E+01	4.17E+02	1.92E-01	1.79E+00	1.00E+01	1.14E-01	-8.03E+02
PENRE	MJ	1.33E+04	1.70E+03	1.22E+02	1.51E+04	3.15E+01	1.35E+02	8.57E+02	1.23E+01	-7.32E+03
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.33E+04	1.70E+03	1.22E+02	1.51E+04	3.15E+01	1.35E+02	8.57E+02	1.23E+01	-7.32E+03
SM	kg	0.00E+00	0.00E+00	4.18E+02	4.18E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	0.00E+00	0.00E+00	2.18E+00	2.18E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Acronyms

PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	*PENRT*	Total use of non-renewable primary energy resources
PERM	Use of renewable primary energy resources used as raw materials	*SM*	Use of secondary raw materials
PERT	Total use of renewable primary energy resources	*RSF*	Use of renewable secondary fuels
PENR	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	*NRSF*	Use of non-renewable secondary fuels
PENRM	Use of non-renewable primary energy resources used as raw materials	*FW*	Use of net fresh water

Table 5 Results of output flows and waste categories by stage (1 metric ton steel billets & blooms products)

Impact indicators	Unit	Product stage				De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
		A1	A2	A3	A1:A3	C1	C2	C3	C4	D
HWD	kg	9.49E+01	2.54E+00	6.81E-01	9.81E+01	3.51E-02	2.38E-01	1.16E+00	1.36E-02	-3.38E+02
NHWD	kg	3.09E+03	3.84E+01	1.37E+01	3.14E+03	4.80E-01	4.46E+00	9.86E+01	8.03E+01	4.60E+03
RWD	kg	4.12E-03	2.77E-04	8.62E-05	4.48E-03	3.45E-06	2.74E-05	1.82E-04	1.91E-06	-4.41E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E+02	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEH	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Acronyms

HWD	Hazardous waste disposed	*MFR*	Materials for recycling
NHWD	Non-hazardous waste disposed	*MER*	Materials for energy recovery
RWD	Radioactive waste disposed	*EEE*	Exported energy, electricity
CRU	Components for re-use	*EEH*	Exported energy, heat

Reference:

1. EN 15804:2012+A2:2019

Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

2. EPDItaly Regulations Rev 6.0

3. ISO 14020:2022

Environmental statements and programmes for products – Principles and general requirements.

4. ISO 14025:2006

Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

5. ISO 14040:2021

Environmental management – Life cycle assessment – Principles and framework.

6. ISO 14044:2021

Environmental management – Life cycle assessment – Requirements and guidelines.

7. ISO 14046:2014

Environmental management – Water footprint – Principles, requirements and guidelines.

8. ISO 14067:2018

Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication.

9. PCR ICMQ-001/15 v3.2

Product Category Rules for Construction Products.

10. Steel Construction Institute. (2000). The recycling and reuse survey.

Retrieved from https://www.steelconstruction.info/The_recycling_and_reuse_survey

11. Steel LCA Tool Ver. 1.4: https://www.meta-lca.com/; E-mail: zjing@ecdigit.com

12. HiQLCD Database: https://www.hiqlcd.com/

13. Life cycle assessment of steel billets & blooms products for ASSB Ver. 1.0