Environmental Product Declaration

Statement of Verification

CARES EPD No.: 0081

Issue 01

This is to verify that the

Environmental Product Declaration

Provided by:

Yangchun New Iron and Steel Co Ltd.

Is in accordance with the requirements of:

EN 15804:2012 + A2:2019 and EN ISO 14025:2010

and CARES PCR for Type III EPD of Semi-Finished and Finished Steel Products, February 2025

This declaration is for:

Carbon Steel Reinforcing Bar (Primary production route – Iron Ore)

Company address:

Nanshan Industrial Zone,
Tanshui Town
Yangchun City
529629
China

YANGCHUN NEW IRON AND STEEL

LadinCamci	Ladin Camci	09 June 2026
Signed for CARES	Operator	Date of this Issue
09 June 2026		08 June 2029
First Issue Date		Expiry Date

The validity of this Environmental Product Declaration can be verified by contacting CARES on +44 (0)1732 450 000 or visiting CARES website https://www.carescertification.com/certification-schemes/environmental-product-declarations.

CARES, Pembroke House, 21 Pembroke Road, Sevenoaks, Kent TN13 1XR

Environmental Product Declaration

EPD Number: CARES EPD 0081

General Information

EPD Programme Operator	CARES Pembroke House, 21 Pembroke Road, Sevenoaks, Kent, TN13 1XR UK www.carescertification.com
Applicable Product Category Rules	CARES Product Category Rules (PCR) for Type III Environmental Product Declaration (EPD) of Semi-Finished and Finished Steel Products, February 2025
Commissioner of LCA study	CARES Pembroke House, 21 Pembroke Road, Sevenoaks, Kent, TN13 1XR UK www.carescertification.com
LCA consultant/Tool	CARES SimaPro10.2 Expert Software system for life cycle assessment, developed by PRé Sustainability (PRé Sustainability B.V., 2024) https://pre-sustainability.com/
Declared/Functional Unit	Declared Unit 1 tonne of carbon steel reinforcing bar manufactured by the Blast Furnace/Basic Oxygen Furnace (BF/BOF) production route
Applicability/Coverage	Manufacturer-specific product produced at a single plant of one manufacturer
EPD Type	Cradle to Gate with options, Modules C1-C4, and Module D
Background database	ecoinvent 3.11, EN 15804 LCI database

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b]) Third party verifier: Dr Jane Anderson
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability

Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019 for further guidance

Information modules covered

Product Stage			Construction 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 materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, Recovery and/or Recycling potential
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: Checks indicate the Information Modules Declared, ND indicates Not Declared.

Manufacturing site

Yangchun New Iron and Steel Co Ltd.
Nanshan Industrial Zone,
Tanshui Town
Yangchun City
529629
China

Construction Product:

Product Description

The product consists of steel reinforcing bars (rebar) with a ribbed surface profile, manufactured in accordance with the standards listed in the References section. Reinforcing bars provide the tensile capacity that concrete lacks, enabling reinforced concrete to resist tension, bending, and cyclic loads while maintaining ductility and structural integrity. Their deformed surface ensures reliable bond and load transfer to the surrounding concrete in elements such as beams, slabs, columns, and foundations for buildings and civil engineering works.

In accordance with the requirements of EN 15804+A2, it is declared that the reinforcing steel bars and their associated packaging materials (steel wires or straps) are composed entirely of inorganic metallic substances and do not contain any biogenic carbon.

The declared unit is 1 tonne of carbon steel reinforcing bar manufactured from the blast furnace/basic oxygen furnace (BF/BOF) production route.

Technical Information

Property	Value, Unit
Production route	BF-BOF
Density	7850 kg/m^3
Modulus of elasticity	200000 N/mm^2
Weldability (C_{eq})	max 0.50 %
Yield strength (as per BS 4449:2005+A3:2016)	min 500 N/mm^2 – max 650 N/mm^2
Tensile strength (as per BS 4449:2005+A3:2016)	min 540 N/mm^2 (Tensile strength/Yield Strength ≥ 1.08)
Agt (% total elongation at maximum force as per BS 4482:2005)	min 5 %
Surface geometry (Relative rib area, fR as per BS 4449:2005+A3:2016)	min 0.040 for Bar Size >6mm & ≤12mm & min 0.056 for Bar size>12
Re-bend test (as per BS 4449:2005+A3:2016)	Pass
Fatigue test (as per BS 4449:2005+A3:2016)	Pass
Recycled content (as per ISO 14021:2016/Amd:2021)	19.8 (Including internal and external scrap) 18.8 (Including external scrap only)

Technical Information details are as per relevant product standards listed in References section

Main Product Contents

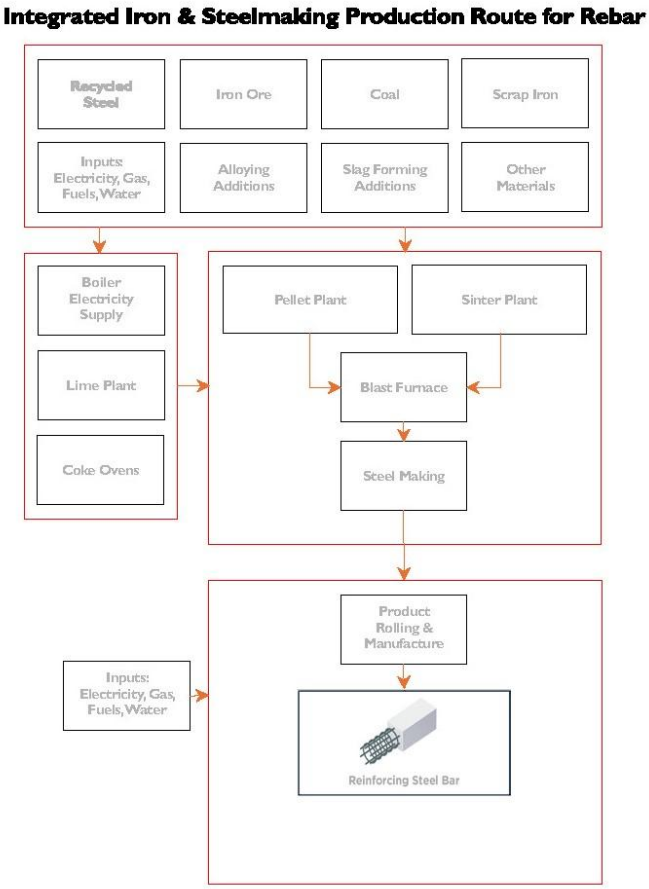
Material/Chemical Input	%
Fe	97
C, Mn, Si, V, Ni, Cu, Cr, Mo and others	3

Manufacturing Process

Integrated steelworks are complicated operations comprising multiple production processes as described below.

- Boilers/CHP: generates the steam used on site and some of the electricity (the remainder is sourced from the consumption mix of the Southern China regional grid, with an emission factor of 0.576 kgCO_2e/kWh). This process also supplies the blast air used in the blast furnace.
- Air separation unit: Generates the gases and compressed air used in the production process (e.g. nitrogen, oxygen, hydrogen, argon, etc.).
- Lime plant: 'Quicklime and dolomite are externally purchased and transported to site for use as fluxes in the blast furnace and basic oxygen furnace. No on-site lime calcination is carried out.
- Coke ovens: Metallurgical coke is externally purchased from third-party suppliers and transported to the site by road, rail, and sea. It serves as the primary reducing agent in the blast furnace and as a fuel in the sinter plant. Coke ovens are not operated on site.
- Sinter plant: Agglomerates iron ore fines with other materials (e.g. lime and limestone) to form nodules of iron rich material that are suitable for charging into the blast furnace.
- Blast furnace: Ferrous rich materials (sinter, iron ore, pellets and steel scrap), slag-forming materials (such as limestone), reducing agents (such as coke) and fuels (such as blast furnace gas and natural gas) with process gases and blast air generates molten iron ("hot metal") and slag and blast furnace gas (which is used as fuel in various site operations). The hot metal also undergoes desulphurisation to remove this unwanted element from the product.
- Steelmaking: covers the basic oxygen furnace (BOF) and secondary steelmaking steps in which the carbon content of the hot metal is reduced, and alloying materials are added to give the desired physical properties to the finished steel, which are formed into billets. BOF gas is also generated and is used as a fuel in various site operations. Slags are also generated from these processes, some of which are recycled in the sinter plant.
- Rolling mills: Converts the steel billets into the final products from the steel mill such as reinforcing bars, wire rod and steel profiles. Offcuts, mill scale, etc. are recycled within the steelworks.

Process flow diagram



Construction Installation

Processing and proper use of reinforcing steel products depends on the application and should be made in accordance with generally accepted practices, standards and manufacturing recommendations.

During transport and storage of reinforcing steel products the usual requirement for securing loads is to be observed.

Use Information

The composition of the reinforcing steel products does not change during use.

Reinforcing steel products do not cause adverse health effects under normal conditions of use.

No risks to the environment and living organisms are known to result from the mechanical destruction of the reinforcing steel product itself.

End of Life

Reinforcing steel products are not reused at end of life but can be recycled to the same (or higher/lower) quality of steel depending upon the metallurgy and processing of the recycling route.

Reinforcing steel has a high end-of-life recovery rate. For this EPD, a recycling rate of 92% and landfill rate of 8% have been modelled as the baseline scenario, reflecting the unrecoverable fraction remaining in crushed concrete rubble [SteelConstruction.info 2012].

Life Cycle Assessment Calculation Rules

The Life Cycle Impact Assessment (LCIA) has been carried out using the characterisation method described in EN 15804+A2. The characterisation factors from Environmental Footprint v3.1 (EF 3.1) was applied.

Declared unit description

The declared unit is 1 tonne of carbon steel reinforcing bar manufactured by the blast furnace/basic oxygen furnace (BF/BOF) production route

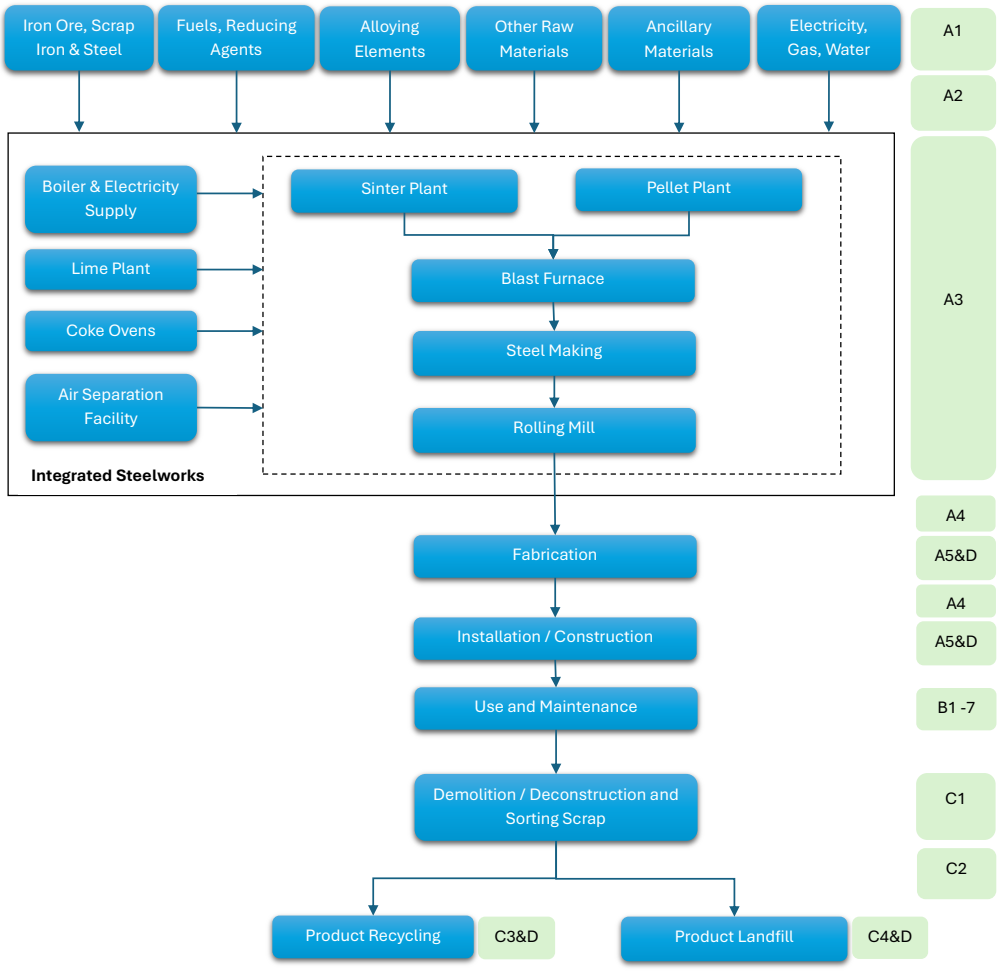
System boundary

The system boundary of the EPD follows the modular design defined by EN 15804+A2. Type of this EPD is cradle to gate – with options, modules C1-C4 and module D.

Impacts and aspects related to losses/wastage such as production, transport and waste processing and end-of-life stage of lost waste products and materials are considered in the modules in which the losses/wastage occur.

Once steel scrap has been collected for recycling it is considered to have reached the end of waste state.

Overview of Product System for Carbon Steel Reinforcing Bar



Data sources and quality

The selection of data and the data quality requirements have been provided according to the requirements of BS EN 15941:2024.

Manufacturing data of the period 01/01/2025 – 31/12/2025 has been provided by Yangchun New Iron and Steel Co Ltd. operating on the geographical area noted in Manufacturing Site. A brief description of technology and inputs for the product is given in Manufacturing Process and in simplified Process Flow Diagram.

The primary data collection was thorough, considering all relevant flows and these data were verified during the audit conducted by CARES in February 2026, including also the verification of mass balance, to ensure that data for all the inputs and outputs for the process over the period of data collection have been collected, and that the unit process data will comply with the cut-off rules of EN 15804. The EPD covers end-of-life in China.

Background data are consistently sourced from the ecoinvent v3.11 using the Allocation, cut-off, EN15804 system model.

The selection of the background data for electricity generation is in line with the CARES PCR 2025. Country or region-specific power grid mixes are selected from ecoinvent 3.11, EN 15804 LCI database; thus, consumption grid mix of Southern China has been selected to suit specific manufacturing location, and also for fabrication, installation and demolishing location. The implemented carbon footprint emission factor of Southern China consumption grid mix is 0.576 $kgCO_2$ eq/kWh.

There wasn't any data from different LCI/LCA databases used considering that the overall consistency of the study has not been adversely affected.

Schemes applied for data quality assessment was as per EN 15804:2012+A2:2019, Annex E, Table E.1 — Data quality level and criteria of the UN Environment Global Guidance on LCA database development.

Geographical Representativeness	: Good
Technical Representativeness	: Good
Time Representativeness	: Very Good

Allocation

This EPD applies the recycled content (cut-off) approach within the system boundary (Modules A1–A3 and C1–C4). The impacts of primary production are attributed to the share of primary material inputs. Secondary material inputs (external scrap) are modelled burden-free at the point of entry into the system, with only collection, sorting, and transport burdens included — without upstream burdens from the previous product life cycle. Internal scrap generated and consumed within the plant is treated as a closed loop within Module A3 and does not generate Module D credits. No substitution credits are assigned within Modules A through C. Potential net benefits from end-of-life recycling beyond the system boundary are reported in Module D only, using the avoided burden (substitution) approach

Steel production (modules A1-A3) is a complex process and generates many co-products including:

- Slags and sludges from the blast furnace, basic oxygen furnace and secondary steelmaking processes
- Energy rich gases from the blast furnace, basic oxygen furnace, secondary steelmaking processes
- Dusts and sludges from the blast furnace, basic oxygen furnace and secondary steelmaking, sintering and pelletising processes
- Scrap iron and steel from the blast furnace, basic oxygen furnace, secondary steelmaking and rolling mill processes
- Mill scale from the basic oxygen furnace, secondary steelmaking and rolling mill processes

Most of these co-products are recycled within the steel mill itself and these internal loops have been included in the LCA model. The balance of inputs and outputs is not always closed and where excess material is generated no credits are modelled in module D for material leaving the system following EN 15804+A2 (section 6.3.4.2). Similarly, where recycling occurs outside the steelworks, transport to the recycler is included, but no credits are awarded for secondary material leaving the system boundary. Instead, all benefits and loads are cut off after the transport step. This cut-off approach is more conservative than EN 15804 section 6.3.4.2, which states that "Flows leaving the system at the end-of-waste boundary of the product stage (A1-A3) shall be allocated as co-products."

The value of the steel product far exceeds the value of the cut off secondary material streams, meaning that co-product allocation would typically allocate a very large share (approaching 100%) to the main product and a very low share (approaching 0%) to the co-products. As such, the difference in results between the cut-off and co-product allocation approaches will be small.

There are the following exceptions to this approach:

- Rolling mill products — the energy, material inputs, and environmental burdens associated with the independent wire rod mill have been systematically excluded from the foreground inventory. The internally produced steel billet is treated as an intermediate feedstock, and all upstream impacts from raw materials, ironmaking, and steelmaking are fully integrated into the life cycle inventory results for the rebar product. No allocation between rebar and wire rod is required, as the wire rod mill data were not included in the system boundary.
- Pre-consumer steel scrap is produced as co-product from the steel manufacturing processes. This co-product is internally recycled.
- As internal scrap is recycled in a closed loop within the plant boundary, it does not generate recycling credits in Module D. Module D credits arise only from net surplus scrap generated beyond what is consumed by the manufacturing process. This is, from fabrication losses (A5), installation losses (A5), and end-of-life recovery (C1).
- Post-consumer scrap is an input to steelmaking processes and is assumed to be free of burdens as once steel scrap has been collected for recycling it is considered to have reached the end of waste state. Hence, only transport impacts associated with importing the scrap are considered.

Allocation of background data (energy and materials) taken from the ecoinvent 3.11, EN 15804 LCI database.

All impacts associated with solid and liquid waste disposal are allocated to steel products. This includes transport and landfill or wastewater treatment processes (modules A & C).

Cut-off criteria

For the processes within the system boundary, all available energy and material flow data have been included in the model. In cases where no matching life cycle inventories are available to represent a flow, proxy data have been applied based on conservative assumptions regarding environmental impacts. Burdens relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary. As no material or energy flows were knowingly omitted, the requirements of the PCR have been met (CARES PCR 2025).

The mass of steel wire or strap used for binding the product coil is less than 1 % of the total mass of the product.

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Core environmental impact indicators									
Life Cycle Stage	Impact Category		GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	kg P eq
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	2.45E+03	2.44E+03	8.80E+00	1.77E-01	2.92E-05	6.11E+00	7.37E-03
Construction process stage	Transport	A4	4.30E+01	4.30E+01	9.59E-03	7.22E-04	1.00E-06	8.20E-02	2.77E-05
	Construction	A5	2.73E+01	2.73E+01	5.24E-03	4.53E-04	6.27E-07	3.55E-02	4.12E-05
Use stage	Use	B1	0	0	0	0	0	0	0
	Maintenance	B2	0	0	0	0	0	0	0
	Repair	B3	0	0	0	0	0	0	0
	Replacement	B4	0	0	0	0	0	0	0
	Refurbishment	B5	0	0	0	0	0	0	0
	Operational energy use	B6	0	0	0	0	0	0	0
	Operational water use	B7	0	0	0	0	0	0	0
%92 Recycling / %8 Landfill Scenario									
End of life	Deconstruction, demolition	C1	2.27E+00	2.27E+00	3.99E-04	9.35E-05	3.46E-08	2.10E-02	2.14E-06
	Transport	C2	3.03E+01	3.03E+01	6.73E-03	5.11E-04	7.03E-07	6.17E-02	1.95E-05
	Waste processing	C3	0	0	0	0	0	0	0
	Disposal	C4	1.86E-01	1.85E-01	5.06E-04	1.16E-05	2.85E-09	1.68E-03	1.78E-07
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.63E+03	-1.62E+03	-5.85E+00	-1.18E-01	-1.94E-05	-4.06E+00	-4.90E-03
100% Landfill Scenario									
End of life	Deconstruction, demolition	C1	2.27E+00	2.27E+00	3.99E-04	9.35E-05	3.46E-08	2.10E-02	2.14E-06
	Transport	C2	2.35E+00	2.35E+00	5.27E-04	3.89E-05	5.51E-08	3.61E-03	1.51E-06
	Waste processing	C3	0	0	0	0	0	0	0
	Disposal	C4	2.32E+00	2.32E+00	6.33E-03	1.46E-04	3.56E-08	2.10E-02	2.23E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	3.58E+02	3.57E+02	1.29E+00	2.58E-02	4.26E-06	8.91E-01	1.08E-03
100% Recycling Scenario									
End of life	Deconstruction, demolition	C1	2.27E+00	2.27E+00	3.99E-04	9.35E-05	3.46E-08	2.10E-02	2.14E-06
	Transport	C2	3.62E+01	3.62E+01	8.05E-03	6.10E-04	8.41E-07	7.38E-02	2.33E-05
	Waste processing	C3	0	0	0	0	0	0	0
	Disposal	C4	0	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.80E+03	-1.80E+03	-6.48E+00	-1.30E-01	-2.15E-05	-4.49E+00	-5.43E-03

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
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; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Core environmental impact indicators

Life Cycle Stage	Impact Category		EP-marine	EP-terrestrial	POCP	ADP-mineral & metals	ADP-fossil	WDP
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m^3 world eq deprived
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	1.01E+00	1.17E+01	6.01E+00	2.08E-04	2.63E+04	8.85E+02
Construction process stage	Transport	A4	1.84E-02	2.02E-01	1.25E-01	1.14E-06	5.90E+02	4.68E-01
	Construction	A5	8.33E-03	9.02E-02	6.98E-02	6.10E-07	4.06E+02	8.99E-01
Use stage	Use	B1	0	0	0	0	0	0
	Maintenance	B2	0	0	0	0	0	0
	Repair	B3	0	0	0	0	0	0
	Replacement	B4	0	0	0	0	0	0
	Refurbishment	B5	0	0	0	0	0	0
	Operational energy use	B6	0	0	0	0	0	0
	Operational water use	B7	0	0	0	0	0	0
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	9.89E-03	1.08E-01	3.23E-02	7.96E-08	2.97E+01	3.74E-02
	Transport	C2	1.39E-02	1.52E-01	9.03E-02	8.00E-07	4.15E+02	3.29E-01
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	7.90E-04	8.65E-03	2.59E-03	6.43E-09	2.43E+00	3.53E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.74E-01	-7.75E+00	-4.00E+00	-1.38E-04	-1.75E+04	-5.88E+02
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	9.89E-03	1.08E-01	3.23E-02	7.96E-08	2.97E+01	3.74E-02
	Transport	C2	8.07E-04	8.80E-03	6.28E-03	6.31E-08	3.24E+01	2.57E-02
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	9.87E-03	1.08E-01	3.24E-02	8.03E-08	3.03E+01	4.41E-02
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	1.48E-01	1.70E+00	8.78E-01	3.04E-05	3.83E+03	1.29E+02
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	9.89E-03	1.08E-01	3.23E-02	7.96E-08	2.97E+01	3.74E-02
	Transport	C2	1.66E-02	1.82E-01	1.08E-01	9.57E-07	4.96E+02	3.93E-01
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-7.46E-01	-8.58E+00	-4.43E+00	-1.53E-04	-1.93E+04	-6.51E+02

ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption.
The results of the three environmental impact indicators above shall be used with care as the uncertainties on these results are high or as there is limited experienced with these indicators.

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
PM = Particulate matter.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts

Life Cycle Stage	Impact Category		PM	IRP	ETP-fw	HTP-c	HTP-nc	SQP
			disease incidence	kBq U^{235} eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	7.25E-05	5.59E+00	1.78E+03	2.61E-07	4.51E-06	1.68E+03
Construction process stage	Transport	A4	3.32E-06	5.64E-02	2.37E+01	2.97E-09	3.65E-07	7.51E-01
	Construction	A5	1.48E-06	2.58E-01	1.45E+01	1.75E-09	1.70E-07	7.90E-01
Use stage	Use	B1	0	0	0	0	0	0
	Maintenance	B2	0	0	0	0	0	0
	Repair	B3	0	0	0	0	0	0
	Replacement	B4	0	0	0	0	0	0
	Refurbishment	B5	0	0	0	0	0	0
	Operational energy use	B6	0	0	0	0	0	0
	Operational water use	B7	0	0	0	0	0	0
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	6.04E-07	2.47E-03	8.52E-01	1.22E-10	2.24E-09	5.04E-02
	Transport	C2	2.33E-06	3.96E-02	1.67E+01	2.10E-09	2.55E-07	5.28E-01
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	4.93E-08	3.40E-04	7.00E-02	1.04E-11	2.04E-10	2.99E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-4.82E-05	-3.72E+00	-1.18E+03	-1.74E-07	-3.00E-06	-1.11E+03
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	6.04E-07	2.47E-03	8.52E-01	1.22E-10	2.24E-09	5.04E-02
	Transport	C2	1.84E-07	3.10E-03	1.30E+00	1.60E-10	2.02E-08	4.11E-02
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	6.16E-07	4.25E-03	8.74E-01	1.30E-10	2.55E-09	3.73E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	1.06E-05	8.16E-01	2.59E+02	3.81E-08	6.58E-07	2.45E+02
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	6.04E-07	2.47E-03	8.52E-01	1.22E-10	2.24E-09	5.04E-02
	Transport	C2	2.78E-06	4.74E-02	1.99E+01	2.51E-09	3.05E-07	6.31E-01
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-5.34E-05	-4.11E+00	-1.31E+03	-1.92E-07	-3.32E-06	-1.23E+03

IRP = Potential human exposure efficiency relative to U235; 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.

HTP-nc = Potential comparative toxic unit for humans; and
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
SQP = Potential soil quality index.
The results of the four environmental impact indicators above shall be used with care as the uncertainties on these results are high or as there is limited experienced with these indicators.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use

Life Cycle Stage	Impact Category		PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	1.51E+03	0	1.51E+03	2.63E+04	0	2.63E+04
Construction process stage	Transport	A4	1.47E+00	0	1.47E+00	5.90E+02	0	5.90E+02
	Construction	A5	7.61E-01	0	7.61E-01	4.06E+02	0	4.06E+02
Use stage	Use	B1	0	0	0	0	0	0
	Maintenance	B2	0	0	0	0	0	0
	Repair	B3	0	0	0	0	0	0
	Replacement	B4	0	0	0	0	0	0
	Refurbishment	B5	0	0	0	0	0	0
	Operational energy use	B6	0	0	0	0	0	0
	Operational water use	B7	0	0	0	0	0	0
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	6.47E-02	0	6.47E-02	2.97E+01	0	2.97E+01
	Transport	C2	1.03E+00	0	1.03E+00	4.15E+02	0	4.15E+02
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	6.66E-02	0	6.66E-02	2.43E+00	0	2.43E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.01E+03	0	-1.01E+03	-1.75E+04	0	-1.75E+04
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	6.47E-02	0	6.47E-02	2.97E+01	0	2.97E+01
	Transport	C2	8.05E-02	0	8.05E-02	3.24E+01	0	3.24E+01
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	8.33E-01	0	8.33E-01	3.03E+01	0	3.03E+01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	2.21E+02	0	2.21E+02	3.84E+03	0	3.84E+03
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	6.47E-02	0	6.47E-02	2.97E+01	0	2.97E+01
	Transport	C2	1.23E+00	0	1.23E+00	4.96E+02	0	4.96E+02
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.11E+03	0	-1.11E+03	-1.94E+04	0	-1.94E+04

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resource

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use						
Life Cycle Stage	Impact Category		SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	2.64E+02	0	0	2.09E+01
Construction process stage	Transport	A4	0	0	0	1.14E-02
	Construction	A5	0	0	0	2.13E-02
Use stage	Use	B1	0	0	0	0
	Maintenance	B2	0	0	0	0
	Repair	B3	0	0	0	0
	Replacement	B4	0	0	0	0
	Refurbishment	B5	0	0	0	0
	Operational energy use	B6	0	0	0	0
	Operational water use	B7	0	0	0	0
%92 Recycling / %8 Landfill Scenario						
End of life	Deconstruction, demolition	C1	0	0	0	9.00E-04
	Transport	C2	0	0	0	8.03E-03
	Waste processing	C3	0	0	0	0
	Disposal	C4	0	0	0	8.84E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	4.01E+02	0	0	-1.39E+01
100% Landfill Scenario						
End of life	Deconstruction, demolition	C1	0	0	0	9.00E-04
	Transport	C2	0	0	0	6.26E-04
	Waste processing	C3	0	0	0	0
	Disposal	C4	0	0	0	1.11E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	1.18E+02	0	0	3.05E+00
100% Recycling Scenario						
End of life	Deconstruction, demolition	C1	0	0	0	4.04E-04
	Transport	C2	0	0	0	0
	Waste processing	C3	0	0	0	0
	Disposal	C4	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	1.11E+03	0	0	1.08E+00

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing waste categories					
Life Cycle Stage	Impact Category		HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	1.42E+01	3.89E+02	3.25E-03
Construction process stage	Transport	A4	2.32E-02	1.91E+00	3.54E-05
	Construction	A5	9.34E-02	2.39E+00	2.04E-04
Use stage	Use	B1	0	0	0
	Maintenance	B2	0	0	0
	Repair	B3	0	0	0
	Replacement	B4	0	0	0
	Refurbishment	B5	0	0	0
	Operational energy use	B6	0	0	0
	Operational water use	B7	0	0	0
%92 Recycling / %8 Landfill Scenario					
End of life	Deconstruction, demolition	C1	3.12E-03	1.07E-01	1.39E-06
	Transport	C2	1.64E-02	1.34E+00	2.48E-05
	Waste processing	C3	0	0	0
	Disposal	C4	2.52E-04	9.03E-03	1.86E-07
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-9.44E+00	-2.59E+02	-2.16E-03
100% Landfill Scenario					
End of life	Deconstruction, demolition	C1	3.12E-03	1.07E-01	1.39E-06
	Transport	C2	1.25E-03	1.04E-01	1.95E-06
	Waste processing	C3	0	0	0
	Disposal	C4	3.15E-03	1.13E-01	2.32E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	2.07E+00	5.68E+01	4.75E-04
100% Recycling Scenario					
End of life	Deconstruction, demolition	C1	3.12E-03	1.07E-01	1.39E-06
	Transport	C2	1.96E-02	1.60E+00	2.97E-05
	Waste processing	C3	0	0	0
	Disposal	C4	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.04E+01	-2.86E+02	-2.39E-03

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing output flows – at end of life								
Life Cycle Stage	Impact Category		CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0	0	0	0	0	0
Construction process stage	Transport	A4	0	0	0	0	0	0
	Construction	A5	0	1.18E+02	0	0	0	0
Use stage	Use	B1	0	0	0	0	0	0
	Maintenance	B2	0	0	0	0	0	0
	Repair	B3	0	0	0	0	0	0
	Replacement	B4	0	0	0	0	0	0
	Refurbishment	B5	0	0	0	0	0	0
	Operational energy use	B6	0	0	0	0	0	0
	Operational water use	B7	0	0	0	0	0	0
%92 Recycling / %8 Landfill Scenario								
End of life	Deconstruction, demolition	C1	0	920	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	0	0	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	0	1.00E+03	0	0	0	0
	Transport	C2	0	0	0	0	0	0
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0	0	0

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	**Parameter**	**Units**	**Results**
Module A4 Transport to the Building Site	On leaving the steelworks the reinforcing steel products are transported to a fabricator where they are converted into constructional steel forms suitable for the installation site, then transported on to the construction site, including provision of all materials and products. Road transport distance for rolled steel to fabricators and road transport distance for steel construction forms to site are assumed to be 100 km and 250 km, respectively. Only the one-way distance is considered as it is assumed that the logistics companies will optimise their distribution. As per the Sphera modelling assumption:		
	One-way transport to fabricator by truck trailer (34-40 t gross-weight) - Fuel	litre/km	1.56
	Distance	km	350
	Capacity utilisation (filled to the capacity)	%	85
	Bulk density of transported products	kg/m^3	7850
Module A5 Installation in the Building	The fabrication process is a relatively simple unit process and accounts for the transformation of the rolled steel product into construction steel forms. The operations in this unit process are primarily cutting and welding. As such, other inputs to the process include electricity, thermal energy, and cutting gases. Other outputs of this process are steel scrap and wastewater (where applicable). Consumption grid mix of Southern China has been selected to suit specific fabrication and installation location. Fabrication into structural steel products and installation in the building; including provision of all materials, products, and energy, as well as waste processing up to the end-of-waste state or disposal of final residues during the construction stage. Installation of the fabricated product into the building is assumed to result in 10% wastage (determined based on typical installation losses reported by the WRAP Net Waste Tool [WRAP 2017]). It is assumed that fabrication requires 15.34 kWh/tonne finished product, and that there is a 2% wastage associated with this process.		
	Ancillary materials for installation - Waste material from fabrication, losses per tonne of construction steel forms	%	2
	Energy Use - Energy per tonne required to fabricate construction steel forms	kWh	15.34
	Waste materials from installation wastage	%	10
Module B2 Maintenance	No maintenance required.		
Module B3 Repair	No repair process required.		
Module B4 Replacement	No replacement considerations required.		
Module B5 Refurbishment	No refurbishment process required.		
Reference Service Life	Reinforcing steel products are used in the main building structure so the reference service life will equal the lifetime of the building. BS EN 1990 specifies "building structures and other common structures" as having a lifetime of 50 years. On this basis, the RSL for this EPD is assumed to be 50 years.		
Module B6 Use of Energy	No energy required during use stage related to the operation of the building.		
Module B7 Use of Water	No water required during use stage related to the operation of the building.		
Modules C1 to C4 End of life	The end-of-life stage starts when the construction product is replaced, dismantled or deconstructed from the building or construction works and does not provide any further function. The recovered steel is transported for recycling while a small portion is assumed to be unrecoverable and remains in the rubble which is sent to landfill. 92% of the reinforcing steel is assumed to be recycled and 8% is sent to landfill [STEELCONSTRUCTION.INFO 2012]. The EPD covers transport to, and end-of-life in China. Once steel scrap is generated through the deconstruction activities on the demolition site it is considered to have reached the "end of waste" state. No further processing is required so there are no impacts associated with this module. Hence no impacts are reported in module C3.		
	Waste for recycling - Recovered steel from crushed concrete	%	92
	Waste for energy recovery	%	-
	Waste for final disposal - Unrecoverable steel lost in crushed concrete and sent to landfill	%	5
	Portion of energy assigned to rebar from energy required to demolish building, per tonne	MJ	24
	Transport to waste processing by Truck - Fuel consumption	litre/km	1.56
	Transport to waste processing by Truck – Distance	km	463
	Transport to waste processing by Truck – Capacity utilisation (filled to the capacity)	%	90

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
	Transport to waste processing by Truck – Density of Product	kg/m³	7850
	Transport to waste processing by Container ship - Fuel consumption	litre/km	0.0041
	Transport to waste processing by Container ship - Distance	km	158
	Transport to waste processing by Container ship – Capacity utilisation	%	50
	Transport to waste processing by Container ship – Density of Product	kg/m³	7850
Module D	It is assumed that 92% of the steel used in the structure is recovered for recycling at end of life, while the remaining 8% is landfilled. Module D accounts for the environmental benefits and loads resulting from net steel scrap that is used for recycling at end of life. The balance is calculated between total scrap arisings recycled from fabrication losses (A5), installation losses (A5), and end-of-life recovery (C1), minus scrap consumed by the manufacturing process (internally sourced scrap is not included in this calculation). These benefits and loads are calculated by including the burdens of recycling and the benefit of avoided primary production. A large amount of net scrap is generated over the life cycle as the BF/BOF production route is primarily from virgin sources and there is a very high end of life recycling rate for this product. Benefits and loads associated with this scrap are calculated by including the burdens of recycling process and accounting for the avoided primary production. As a result, module D reports the credits associated with the scrap output. The resulting scrap credit/burden is calculated based on the global "value of scrap" approach (/worldsteel 2011).		
	Recycled Content	kg	188
	Re-used Content	kg	0
	Recovered for recycling	kg	920
	Recovered for re-use	kg	0
	Recovered for energy	kg	0

Summary, comments and additional information

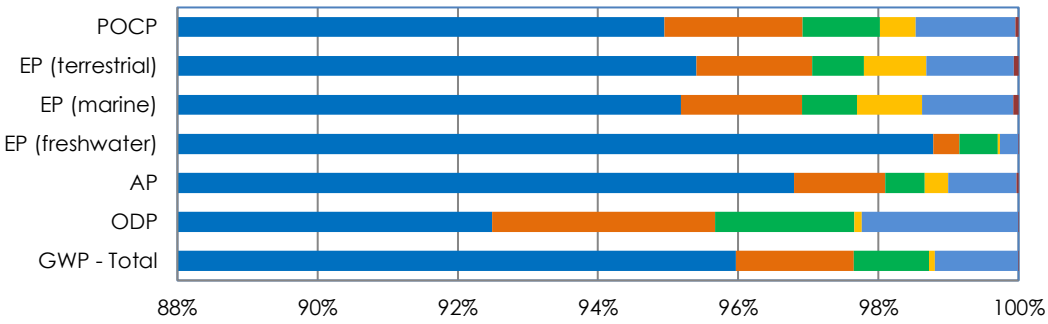
Interpretation

The production stage (A1-A3) is the most important module for climate change, eutrophication freshwater, resource use (mineral and metals) and resource use (energy carriers) as well as water scarcity.

Within the production stage (A1–A3), the blast furnace route (ironmaking) accounts for approximately 77% of the climate change impact, steelmaking (basic oxygen furnace and secondary steelmaking) contributes approximately 16%, and the rolling mill approximately 7%. These proportions reflect the energy- and carbon-intensive nature of iron ore reduction in the blast furnace, driven primarily by coke and pulverised coal injection (PCI) consumption. The main environmental hotspots are therefore the use of fossil reducing agents in the blast furnace (A1-A3) and the associated combustion of internally generated process gases (blast furnace gas and basic oxygen furnace gas) in the boiler system.

Installation (A5) also shows significant impacts in all categories; this is mainly due to the additional steel material required to account for losses during fabrication and installation. Impacts from transport to the fabricators and installation site (A4) are also noticeable.

Module D presents a significant credit in all impact categories, except for ODP. Impacts from other life cycle stages are negligible in comparison.



	GWP - Total	ODP	AP	EP (freshwater)	EP (marine)	EP (terrestrial)	POCP
A1-3	95.97%	92.49%	96.80%	98.78%	95.18%	95.41%	94.95%
A4	1.68%	3.17%	1.30%	0.37%	1.73%	1.65%	1.97%
A5	1.07%	1.99%	0.56%	0.55%	0.78%	0.74%	1.10%
C1	0.09%	0.11%	0.33%	0.03%	0.93%	0.89%	0.51%
C2	1.18%	2.23%	0.98%	0.26%	1.30%	1.24%	1.43%
C3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
C4	0.01%	0.01%	0.03%	0.00%	0.07%	0.07%	0.04%

Figure 1 - shows the relative contribution of each life cycle stage to different environmental indicators for the carbon steel reinforcing bars manufactured by the BF/BOF production route

Production Stage Contribution Analysis

Scope & indicator:

This analysis explains the production stage A1–A3 using Climate change – total (GWP-total) for the declared unit. It is an interpretive view of hotspots; the module-level tables in LCA Results remain the authoritative values.

Method: EN 15804+A2; CFs: EN 15804 reference package EF 3.1.

Results and reconciliation:

Values represent A1–A3 only. The sum of step contributions equals the A1–A3 Climate change – total reported in the LCA Results tables. Process steps are analytical groupings within A1–A3 and are provided for interpretation; the module-level values remain the authoritative results in the EPD.

Manufacturing Process Step	GWP-total kg CO2 eq	Share of A1–A3 %
Iron Making (Hot Metal Production)	1.89E+03	77.0
Steelmaking	393	16.0
Rolling	172	7.0
Total (A1-A3)	**2.45+E03**	**100.0**

References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A2:2019. London, BSI, 2019.

BSI. Environmental labels and declarations. Self-declared environmental claims (Type II environmental labelling). BS EN ISO 14021:2016+A1:2021. London, BSI, 2022

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

BSI. Environmental management – Life cycle assessment – Principles and framework. BS EN ISO BS EN ISO 14040:2006+A1:2020. London, BSI, 2020.

BSI. Environmental management – Life cycle assessment – requirements and guidelines. BS EN ISO 14044:2006+A2:2020. London, BSI, 2020.

BSI. Sustainability of construction works. Data quality for environmental assessment of products and construction work. Selection and use of data. BS EN 15941:2024. London, 2024.

BSI. Sustainability of construction works. Environmental product declarations. Communication format business-to-business. BS EN 15942:2021. London, 2021.

BSI. Eurocode. Basis of structural and geotechnical design. BS EN 1990:2023. London, 2023.

Demolition Energy Analysis of Office Building Structural Systems, Athena Sustainable Materials Institute, 1997

The Concrete Society, Design working life (concrete.org.uk)

PRé Sustainability (2025). SimaPro LCA Software (Version 10.2). Amersfoort, The Netherlands International Energy Agency (IEA). (2025, 04 08). Energy system of China - 2023. Retrieved from https://www.iea.org/countries/china

Kreißig, J. und J. Kümmel (1999): Baustoff-Ökobilanzen. Wirkungsabschätzung und Auswertung in der Steine-Erden-Industrie. Hrsg. Bundesverband Baustoffe Steine + Erden e.V.

U.S. Geological Survey, Mineral Commodity Summaries, Iron and Steel Slag, January 2014

U.S. Geological Survey. (2017). Mineral Commodity Summaries 2017. U.S. Department of the Interior

Sanson, M. a. (2014). Reuse and recycling rates of UK steel demolition arisings. Proceedings of the Institution of Civil Engineers - Engineering Sustainability.

SteelConstruction.info; The recycling and reuse survey, 2012
http://www.steelconstruction.info/The_recycling_and_reuse_survey

Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data; German version CEN/TR 15941

REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

WRAP (2017). WRAP (Waste & Resources Action Programme) Net Waste Tool

worldsteel Association - Life cycle inventory methodology report for steel products, 2017

CARES SRC Steel for the Reinforcement of Concrete Scheme. Appendix 1 – Quality and operations assessment schedule for carbon steel bars for the reinforcement of concrete including inspection and testing requirements - http://www.ukcares.com/approved-companies - Certificate number of conformance to BS4449 at the time of LCA study – 260301

CARES SSRC Singapore Steel for the Reinforcement of Concrete Scheme - Appendix 1 Quality and operations assessment schedule for Singapore Standard (SS 560:2016) weldable reinforcing steel bars, coils and decoiled products for the reinforcement of concrete including inspection and testing requirements - http://www.ukcares.com/approved-companies - Certificate number of conformance to SS 560:2016 at the time of LCA study – 6051

Product certification for Steel for the Reinforcement of Concrete in accordance with CARES Hong Kong Steel for the Reinforcement of Concrete Scheme (Date of Issue: March 2024) and Appendix 1: Quality and operations assessment schedule for Hong Kong Standard (CS 2:2012) Steel Reinforcing Bars for the Reinforcement of Concrete (Date of Issue: March 2024) - http://www.ukcares.com/approved-companies - Certificate number of conformance to CS2:2012 at the time of LCA study – 7009

BS 4449:2005+A3:2016 Steel for the reinforcement of concrete. Weldable reinforcing steel. Bar, coil and decoiled product. Specification.

SS 560:2016 - Specification for steel for the reinforcement of concrete – Weldable reinforcing steel – Bar, coil and decoiled product.

CS2:2012 - Steel Reinforcing Bars for the Reinforcement of Concrete

GB1499.1-2024 Steel for the Reinforcement of Concrete - Part 1: Hot Rolled Plain Steel Bars

GB1499.2-2024 Steel for the reinforcement of concrete - Part 2: Hot rolled ribbed bars

ISO 6935-2:2019 - Steel for the reinforcement of concrete - Part 2: Ribbed bars