



Environmental Product Declaration

Statement of Verification

CARES EPD No.: 0094

Issue 01

This is to verify that the

Environmental Product Declaration

Provided by:

CARES

Is in accordance with the requirements of:

EN ISO 14025:2010 and EN 15804:2012 + A2:2019/AC2021

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



This declaration is for: Carbon Steel Reinforcing Bar
(Secondary production route – Scrap/EAF) – Sector Average

Company address:

Pembroke House
21 Pembroke Road
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LadinCamci

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26 September 2026

Signed for CARES

Operator

Date of this Issue

26 September 2026

25 September 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

Environmental Product Declaration

EPD Number: CARES EPD 0094

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 EPD Tool version 3.2 SPHERA SOLUTIONS UK LIMITED The Innovation Centre Warwick Technology Park, Gallows Hill, Warwick, Warwickshire CV34 6UW UK www.sphera.com
Declared/Functional Unit	1 tonne of carbon steel reinforcing bars manufactured by the secondary (scrap-based) production route
Applicability/Coverage	Sector Average
EPD Type	Cradle to Gate with options, Modules C1-C4, and Module D
Background database	MLC (GaBi) Databases 2025.1 (Sphera, 2025)

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)



Environmental Product Declaration

Comparability

Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019/AC2021. 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/AC2021 for further guidance.

This declaration reports a weighted average for the participating manufacturers listed below. It is not a manufacturer-specific declaration and shall not be used to represent, or to compare, the environmental performance of any individual participating manufacturer, for which the relevant manufacturer-specific EPD should be used.

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.

Manufacturing sites

This declaration covers eighteen manufacturing sites, each producing carbon steel reinforcing bar by the secondary (scrap-based, Electric Arc Furnace) route, and each holding a valid manufacturer-specific EPD.

Manufacturing Process Step	Participating manufacturer / manufacturing site	Data reference period
ALPA Acierie et Laminoirs de Paris	ZI Limay Porcheville, 78440 Gargenville, France	01/01/2025 – 31/12/2025
Ann Joo Steel Berhad	Lot 1236, Prai Industrial Estate, 13600 Prai, Penang, Malaysia	01/11/2024 – 31/10/2025
Çolakoglu Metalurji A.Ş.	Rüzgarlıbahçe Mahallesi, Çam Pınarı Sokak, No: 1 İç Kapı No: 16, 34805 Beykoz, İstanbul, Türkiye	01/01/2025 – 31/12/2025
Diler Demir Çelik Endüstri ve Ticaret A.Ş.	Dilovası Organize Sanayi Bölgesi, 1. Kısım, Dicle Cd. No: 30, Dilovası, Kocaeli 41455, Türkiye	01/01/2025 – 31/12/2025
Ekinciler Demir ve Çelik Sanayii A.Ş.	Sarıseki Mh. İskenderun Organize Sanayi Bölgesi, İkinci Bulvarı No: 3/1, 31200 İskenderun, Hatay, Türkiye	01/01/2025 – 31/12/2025
Guangdong Yuehua Iron & Steel Group Co., Ltd	Racecourse, Yinghong Town, Yingde, Qingyuan City, Guangdong Province, China	01/01/2025 – 31/12/2025
HABAŞ A.Ş.	Sanayi Caddesi No: 26, 35800 Bozköy, Aliağa, İzmir, Türkiye	01/01/2025 – 31/12/2025
İÇDAŞ Çelik Enerji Tersane ve Ulaştırım Sanayi A.Ş.	Değirmencik Köyü, 17950 Biga, Çanakkale, Türkiye	01/01/2025 – 31/12/2025
İzmir Demir Çelik Sanayi A.Ş.	Nemrut Caddesi No: 2, Horozgediği, 35807 Aliağa, İzmir, Türkiye	01/01/2025 – 31/12/2025
Kaptan Demir Çelik Endüstrisi ve Ticaret A.Ş.	Sultanköy Mah. Seymen Yolu Cad. No: 30, Marmara Ereğlisi, Tekirdağ, Türkiye	01/01/2025 – 31/12/2025
Kardemir Çelik Sanayi A.Ş.	Bozköy Mah. 2 Cad. No: 24, 35800 Aliağa, İzmir, Türkiye	01/01/2025 – 31/12/2025
Kroman Çelik Sanayii A.Ş.	Emek Mah. Aşıroğlu Cad. No: 155, 41700 Darıca, Kocaeli, Türkiye	01/01/2025 – 31/12/2025



Environmental Product Declaration

Manufacturing Process Step	Participating manufacturer / manufacturing site	Data reference period
Megasider Zaragoza, S.A.U.	PTR José López Soriano, Avda. de José López Soriano Nº 100, 50720 La Cartuja Baja, Zaragoza, España	01/01/2024 – 31/12/2024
Muscat Steel Industries Co LLC	Road No. 4D, Post Box 111, Postal Code 124, Rusayl, Sultanate of Oman	01/01/2024 – 31/12/2024
Southern Steel Berhad	2723, Lorong Perusahaan 12, Kawasan Perusahaan Bebas Peral, 13600 Peral, Pulau Pinang, Malaysia	01/07/2024 – 30/06/2025
Wuxi Zhongtuo Metal Technology Manufacturing Co., Ltd.	No. 55, Xicheng Road, Xiangang Sub-District, 21442 Jiangyin City, China	01/01/2024 – 31/12/2024
Yazıcı Demir Çelik San. ve Turizm Tic. A.Ş.	İskenderun Organize Sanayi Bölgesi, 31218 Sarıseki, İskenderun, Hatay, Türkiye	01/01/2025 – 31/12/2025
Yeşilyurt Demir Çelik Endüstri ve Liman İşletmeleri A.Ş.	Cumhuriyet Mahallesi, Akal Caddesi No: 1, Tekkeköy, Samsun 55300, Türkiye	01/01/2025 – 31/12/2025

Criteria for Inclusion in This Declaration

A manufacturing site is covered by this declaration where all of the following apply: the site produces carbon steel reinforcing bar to the product standards listed in the References section; liquid steel is produced on site in an Electric Arc Furnace from a metallic charge in which steel scrap is the primary input; the operator holds a valid manufacturer-specific EPD prepared under the CARES Product Category Rules; and verified foreground data are available for a continuous twelve-month period.

All participating sites produce liquid steel in an Electric Arc Furnace. No participating site produces steel by the induction furnace route, and reinforcing bar produced by that route is not covered by this declaration.

Sites that roll reinforcing bar exclusively from purchased billet, without on-site steelmaking, are not covered by this declaration. Where a participating site supplements billet cast on site with purchased billet, the reinforcing bar rolled from that billet is covered, and the purchased billet is modelled according to the production route of the supplying steelworks as described in the Manufacturing Process and Data sources sections.

A number of participating sites also produce steel products other than reinforcing bar, including wire rod, sections and flat products. Only the data allocated to reinforcing bar have been included in this declaration; other products are outside its scope and are not represented by the declared results.

Construction Product:

Product Description

The product consists of steel reinforcing bars 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 bars manufactured by the Secondary (scrap based) production route.



Environmental Product Declaration

Technical Information

Property	Value, Unit
Production route	Scrap - EAF
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 4449:2005+A3:2016)	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 of the declared product (as per ISO 14021:2016/Amd:2021) ²⁾	90.8 %
Recycled content of billet cast at the participating sites (as per ISO 14021:2016/Amd:2021)	97.4 % (Including internal and external scrap) 94.4 % (Including external scrap only)

- 1) Technical information is as given in the relevant product standards listed in the References section. Where participating manufacturers declare to more than one product standard, the values stated represent the requirements common to the declared grades.
- 2) Recycled content of the declared product: Total recycled content, all declared rebar, including rebar rolled from purchased billet

Main Product Contents

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

Manufacturing Process

This declaration covers reinforcing bar produced by the secondary route. The process description below is generic and represents the technologies operated by the participating manufacturers. Individual sites differ in the configuration of particular process steps, and the declared results are a production-weighted average across those configurations.

Steel scrap constitutes the primary metallic charge and is melted in an Electric Arc Furnace (EAF). Where required, the charge is supplemented with direct reduced iron, hot briquetted iron or pig iron to dilute residual tramp elements and meet product quality specifications. The molten steel is transferred to a Ladle Furnace (LF) for secondary metallurgical refining, comprising chemical composition adjustment by ferroalloy addition, temperature homogenisation and inclusion control. The refined liquid steel is continuously cast into billets via a Continuous Casting Machine (CCM).

At some participating sites, part of the billet requirement is met by billet purchased from external suppliers. Purchased billet quantities have been entered separately according to the production route of the supplying steelworks, distinguishing billet produced by the secondary (scrap-based, Electric Arc Furnace) route, billet produced by the primary (Blast Furnace / Basic Oxygen Furnace) route, and billet produced by the Direct Reduced Iron / Electric Arc Furnace route. Each quantity is accounted for in Module A1 using the background dataset corresponding to its route, together with its transport to the rolling site in Module A2.

Billets are brought to the required rolling temperature either by direct charging from the continuous casting machine, where casting and rolling are operated as a continuous sequence at a single integrated site, or by reheating in a billet reheating furnace. Both configurations are represented among the participating sites, and fuel consumption associated with reheating is included within Module A3 where it arises.



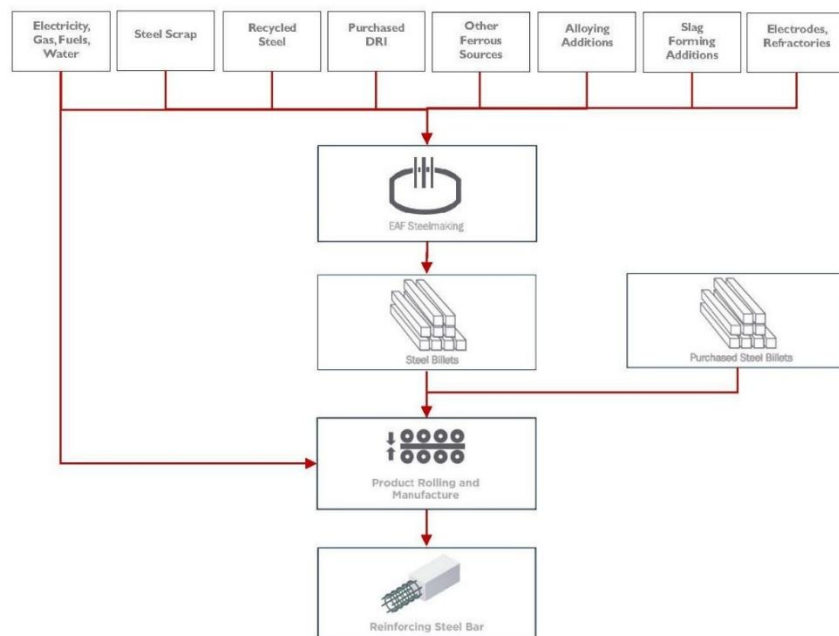
Environmental Product Declaration

The billets are progressively reduced in cross-section through roughing, intermediate and finishing mill stands to achieve the specified diameter and surface geometry. The specified yield strength and ductility class are developed by quench-and-self-tempering following the finishing pass, by micro-alloying, or by a combination of the two, according to the grade produced. The bars are cut to length on a cold shear, collected on a cooling bed, straightened and bundled.

Reinforcing bars are packaged into bundles secured with steel wire or steel strap binding. Neither the reinforcing bar products nor the binding materials contain any biogenic content.

Process flow diagram

Scrap/EDF route & Purchased Billet – Rebar Production



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.

A recycling rate of 92% is adopted for the primary end-of-life scenario in this EPD, with 100% landfill and 100% recycling declared as alternative scenarios per CARES PCR requirements.



Life Cycle Assessment Calculation Rules

This EPD uses the "Cut-off by Classification" method, also known as the recycled content method. It assigns the environmental impacts of primary material production to the initial user. Recyclable materials enter the recycling process without burdens, and secondary materials only bear the impacts of recycling.

This method promotes recycling by making producers responsible for waste management. It supports a circular economy by reducing the environmental impacts of primary material production.

This approach follows ISO 14040 and ISO 14044 standards for Life Cycle Assessments.

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

Declared unit description

1 tonne of carbon steel reinforcing bars manufactured by the secondary (scrap-based) 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, covering Modules A1-A5, C1-C4, and D.

Impacts and aspects related to losses/wastage (i.e. 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.

Scrap is considered to reach end-of-waste after collection and processing to a defined scrap quality suitable for recycling, consistent with the applied modelling approach.

Data sources, quality and allocation

Averaging Procedure:

Foreground data for each participating manufacturer were collected and modelled separately in the CARES EPD Tool version 3.2, producing a complete set of module-level LCA results per manufacturer under identical methodological settings. The sector average declared in this EPD is the arithmetic mean of those manufacturer-specific results weighted by the annual finished reinforcing bar output of each participating site over its own data reference period.

Finished reinforcing bar output is used as the weighting basis for every declared indicator and for every module, so that the declared values represent the environmental performance of one tonne of reinforcing bar as actually produced across the participating sites. Total finished reinforcing bar output covered by the average is 12,574,125 tonnes.

The participating manufacturers hold manufacturer-specific CARES EPDs issued at different dates, a number of which were generated using earlier versions of the CARES EPD Tool. To ensure methodological and background-data consistency across the average, the foreground data of every participating manufacturer have been re-run through a single version of the CARES EPD Tool, version 3.2, on MLC (GaBi) Databases 2025.1. The results averaged in this declaration are therefore those re-run results, and they may differ from the values published in the corresponding manufacturer-specific EPDs where those were generated on an earlier tool version.

No participating manufacturer contributes results to more than one weighting entry, and no manufacturer-specific results have been excluded from the average.

Data Sources and Quality:

Data selection and data quality evaluation were performed in accordance with BS EN 15941:2024, considering temporal, geographical and technological representativeness and prioritising specific data over generic data where available.

Data Sources:

Foreground manufacturing data for carbon steel reinforcing bar production were provided by each participating manufacturer for the reference period stated against that manufacturer in the participating manufacturers section and are representative of the corresponding manufacturing site. Fifteen participating manufacturers provided data for a twelve-month period ending in 2025 and three provided data for the 2024 calendar year. Foreground data



Environmental Product Declaration

collection was carried out to meet the cut-off rules of EN 15804:2012+A2:2019/AC:2021. Foreground data were checked for completeness and plausibility, including mass balance verification, and were verified by CARES during the audit of each participating manufacturer.

The manufacturing technology and key inputs are described in the Manufacturing Process section and the simplified Process Flow Diagram.

Background datasets are consistently sourced from MLC (GaBi) Databases 2025.1 (Sphera, 2025), selecting country or region-specific datasets where available and appropriate. No data from other LCI or LCA databases have been used, so that the overall consistency of the study is not adversely affected.

Billet purchased from external suppliers has been modelled according to the production route of the supplying steelworks. Purchased billet produced by the secondary (scrap-based, Electric Arc Furnace) route, by the primary (Blast Furnace / Basic Oxygen Furnace) route and by the Direct Reduced Iron / Electric Arc Furnace route has in each case been modelled using the corresponding route-specific dataset from MLC (GaBi) Databases 2025.1 (Sphera, 2025), as implemented in the CARES EPD Tool.

Electricity modelling:

The selection of background data for electricity generation is in line with the CARES PCR 2025. For participating manufacturing sites located in the European Union, the national residual grid mix has been applied to the electricity consumed in the operations under the control of the declarant, so that electricity attributes claimed through contractual instruments elsewhere are not double counted. For downstream processes not under the control of the declarant, including fabrication, installation, deconstruction and end-of-life transport, the national consumption grid mix has been applied.

For participating manufacturing sites located outside the European Union, the country consumption grid mix has been applied to both the manufacturing operations and the downstream scenarios. Country or region-specific grid mixes were available for every participating location, and no proxy grid dataset has been used in this study.

No contributing manufacturing site has claimed electricity attributes from Guarantees of Origin, Renewable Energy Certificates or equivalent contractual instruments for the electricity declared in this EPD. All electricity is declared on a location-based grid mix as set out above.

Electricity accounts for more than 30 % of the total energy use in Modules A1–A3. The global warming potential of the electricity used in the foreground processes and in the other processes under the direct control of the participating manufacturers is therefore declared below, together with the grid mixes applied. Emission factors are taken from MLC (GaBi) Databases 2025.1 (Sphera, 2025) and include grid losses; for electricity from renewable sources, grid losses are accounted for within the grid mix.

Location of participating sites	Grid mix applied to operations under the control of the declarant	GWP-total of electricity kg CO ₂ eq per kWh
France	Residual mix	0.053
Spain	Residual mix	0.421
Türkiye	Consumption mix	0.559
China (South grid)	Consumption mix	0.549
China (East grid)	Consumption mix	0.767
Malaysia	Consumption mix	0.778
Oman	Consumption mix	0.602
France	Residual mix	0.053
Production-weighted average		0.548

The production-weighted average global warming potential of the electricity supplied to the participating manufacturing sites is 0.548 kg CO₂ eq per kWh. Where a residual mix is applied to the operations under the control of the declarant, the corresponding national consumption mix is applied to downstream processes: 0.080 kg CO₂ eq per kWh for France and 0.237 kg CO₂ eq per kWh for Spain.

The energy carriers used at the participating sites are grid electricity, natural gas, liquefied petroleum gas and, at individual sites, other fuel oils and process gases, used for billet reheating where it occurs, ladle and tundish



Environmental Product Declaration

preheating, cutting and ancillary heating. Solid carbon inputs to the Electric Arc Furnace, comprising graphite electrodes, charge and injection carbon, are declared as material inputs rather than as energy carriers.

Data Quality:

Data quality was assessed and reported with respect to geographical, technological and time representativeness and prioritising specific over generic data. Foreground data were site-specific and based on a continuous 12-month period (2025) and were verified during the CARES audit in March 2026. Background data are consistently sourced from MLC (GaBi) Databases 2025.1 (Sphera, 2025).

There isn't any data from different LCI/LCA databases are used considering that the overall consistency of the study is not adversely affected.

Schemes applied for data quality assessment was as per EN 15804:2012+A2:2019/AC2021, Annex E, Table E.1 — Data quality level and criteria of the UN Environment Global Guidance on LCA database development. No poor or very poor data was found during the assessment of relevant data.

Data quality level and criteria of the UN Environment Global Guidance on LCA database development:

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

Allocation:

Electric Arc Furnace slag and mill scale are produced as co-products of the steel manufacturing processes. Impacts are allocated between the steel and these co-products on the basis of economic value, since the co-products are of definite value and are freely and readily traded. The combined revenue generated from mill scale and slag is below 1 % of the revenue of the product at current market prices.

Production losses of steel during the production process are recycled in a closed loop offsetting the requirement for external scrap. Specific information on allocation within the background data is given in the MLC (GaBi) Databases 2025.1 (Sphera, 2025).

Recycled Content

Recycled content has been determined in accordance with ISO 14021:2016/Amd:2021 on the basis of the metallic quantities charged to the Electric Arc Furnace at each participating site. For billet cast at the participating sites, recycled content has been determined both including and excluding internally arising scrap, giving production-weighted averages of 97.4 % and 94.4 % respectively.

Where reinforcing bar is rolled from billet purchased from external suppliers, the split between internally arising and externally sourced scrap was not available from all billet suppliers. For these quantities the total recycled content of the purchased billet has been used, and where supplier-specific data were not available the relevant CARES sector average recycled content derived from published scrap/EAF, DRI/EAF and BF/BOF EPDs has been applied. This use of published sector average values is limited to the recycled content declaration; the life cycle impacts of purchased billet are modelled from route-specific background datasets, as described in the Data sources section. For this reason, the recycled content declared for the product as a whole is stated as a total recycled content only and is 90.8 % across all declared reinforcing bar. The reasons for the difference between this figure and the recycled content declared in the previously published sector average declaration are set out under Relationship to previously published CARES sector average declarations.

Cut-off criteria

On the input side all flows entering the system and comprising more than 1% in total mass or contributing more than 1% to primary energy consumption are considered. All inputs used as well as all process-specific waste and process emissions were assessed. For this reason, material streams which were below 1% (by mass) were captured as well. In this manner the cut-off criteria according to the PCR requirements are fulfilled).

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



Environmental Product Declaration

LCA Results

(ND = 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	4.04E+02	4.04E+02	0.35	0.303	1.37E-09	1.32	2.65E-04
	Transport	A2	71.7	71.5	0.081	0.103	7.48E-12	2.07	4.24E-05
	Manufacturing	A3	4.45E+02	4.43E+02	1.17	0.777	2.52E-09	1.24	2.79E-04
	Total (of product stage)	A1-3	9.21E+02	9.18E+02	1.60	1.18	3.90E-09	4.62	5.86E-04
Construction process stage	Transport	A4	25.4	25.1	0.048	0.266	3.04E-12	0.038	6.96E-05
	Construction	A5	1.08E+02	1.07E+02	0.200	0.216	4.59E-10	0.506	8.52E-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	2.18	2.18	1.79E-03	7.76E-05	2.04E-13	0.008	3.41E-07
	Transport	C2	48.4	47.8	0.090	0.477	5.75E-12	0.120	1.26E-04
	Waste processing	C3	0	0	0	0	0	0	0
	Disposal	C4	1.23	1.22	3.96E-05	0.005	3.40E-12	0.009	1.82E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	2.51E+02	2.51E+02	-0.059	0.122	1.28E-10	0.576	8.75E-05
100% Landfill Scenario									
End of life	Deconstruction, demolition	C1	2.18	2.18	1.79E-03	7.76E-05	2.04E-13	0.008	3.41E-07
	Transport	C2	2.23	2.20	0.004	0.023	2.67E-13	0.003	6.11E-06
	Waste processing	C3	0	0	0	0	0	0	0
	Disposal	C4	15.3	15.3	4.95E-04	0.063	4.25E-11	0.108	2.27E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	2.26E+03	2.26E+03	-0.527	1.10	1.15E-09	5.19	7.89E-04
100% Recycling Scenario									
End of life	Deconstruction, demolition	C1	2.18	2.18	1.79E-03	7.76E-05	2.04E-13	0.008	3.41E-07
	Transport	C2	52.4	51.8	0.097	0.516	6.22E-12	0.131	1.36E-04
	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	76.2	76.1	-0.018	0.037	3.89E-11	0.175	2.66E-05

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



Environmental Product Declaration

LCA Results

(ND = 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	m³ world eq deprived
Product stage	Raw material supply	A1	0.266	2.90	0.825	6.45E-05	3.93E+03	25.0
	Transport	A2	0.488	5.34	1.39	2.21E-06	8.51E+02	0.160
	Manufacturing	A3	0.279	3.53	0.795	2.67E-05	5.82E+03	1.66E+02
	Total (of product stage)	A1-3	1.03	11.8	3.01	9.34E-05	1.06E+04	1.91E+02
Construction process stage	Transport	A4	0.016	0.164	0.033	1.71E-06	329	0.103
	Construction	A5	0.116	1.33	0.334	1.04E-05	1.26E+03	23.8
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	0.003	0.032	0.008	4.82E-08	28.3	0.010
	Transport	C2	0.054	0.580	0.129	3.15E-06	626	0.191
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	2.26E-03	0.025	0.007	7.57E-08	16.0	0.132
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.139	1.49	0.465	2.48E-06	1.90E+03	1.76
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	0.003	0.032	0.008	4.82E-08	28.3	0.010
	Transport	C2	1.40E-03	0.015	0.003	1.50E-07	28.8	0.009
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	0.028	0.308	0.085	9.46E-07	200	1.65
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	1.25	13.4	4.19	2.24E-05	1.71E+04	15.9
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	0.003	0.032	0.008	4.82E-08	28.3	0.010
	Transport	C2	0.058	0.630	0.129	3.41E-06	678	0.207
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	0	0	0.007	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.042	0.453	0.465	7.53E-07	5.76E+02	0.533

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.



Environmental Product Declaration

LCA Results

(ND = 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	1.67E-05	8.69	7.28E+02	2.03E-07	2.25E-06	6.05E+02
	Transport	A2	3.59E-05	0.151	6.91E+02	1.03E-08	2.57E-07	57.6
	Manufacturing	A3	1.87E-05	22.2	7.44E+04	8.15E-08	1.75E-06	7.09E+02
	Total (of product stage)	A1-3	7.13E-05	31.0	7.58E+04	2.95E-07	4.27E-06	1.37E+03
Construction process stage	Transport	A4	3.76E-07	0.060	4.26E+02	5.73E-09	3.23E-07	146
	Construction	A5	7.76E-06	3.53	7.68E+03	3.28E-08	5.57E-07	1.98E+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	4.98E-08	2.88E-03	26.1	5.32E-10	6.30E-09	0.064
	Transport	C2	1.45E-06	0.113	7.92E+02	1.07E-08	5.87E-07	262
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	1.08E-07	0.019	13.8	2.13E-10	7.98E-09	3.96
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	8.50E-06	-3.30	2.96E+02	3.99E-07	-3.03E-07	-1.54E+02
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	4.98E-08	2.88E-03	26.1	5.32E-10	6.30E-09	0.064
	Transport	C2	3.23E-08	0.005	37.4	5.03E-10	2.84E-08	12.8
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	1.35E-06	0.235	173	2.67E-09	9.98E-08	49.5
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	7.65E-05	-29.7	2.67E+03	3.59E-06	-2.73E-06	-1.39E+03
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	4.98E-08	2.88E-03	26.1	5.32E-10	6.30E-09	0.064
	Transport	C2	1.57E-06	0.123	858	1.16E-08	6.36E-07	284
	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	2.59E-06	-1.00	90.0	1.21E-07	-9.18E-08	-46.7

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 experience with these indicators.



Environmental Product Declaration

LCA Results

(ND = 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	4.42E+02	0	4.42E+02	3.93E+03	0	3.93E+03
	Transport	A2	13.1	0	13.1	8.51E+02	0	8.51E+02
	Manufacturing	A3	2312.2	0	2312.2	5.82E+03	0	5.82E+03
	Total (of product stage)	A1-3	2.77E+03	0	2.77E+03	1.06E+04	0	1.06E+04
Construction process stage	Transport	A4	24.2	0	24.2	3.29E+02	0	3.29E+02
	Construction	A5	3.47E+02	0	347.3	1.26E+03	0	1.26E+03
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	0.107	0	0.107	28.3371003	0	28.3371003
	Transport	C2	43.6	0	43.6	626	0	626
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	3.09	0	3.09	16	0	16
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2.99E+02	0	-2.99E+02	1.90E+03	0	1.90E+03
100% Landfill Scenario								
End of life	Deconstruction, demolition	C1	0.107	0	0.107	28.3	0	28.3
	Transport	C2	2.12	0	2.12	28.8	0	28.8
	Waste processing	C3	0	0	0	0	0	0
	Disposal	C4	38.7	0	38.7	200	0	200
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2.70E+03	0	-2.70E+03	1.71E+04	0	1.71E+04
100% Recycling Scenario								
End of life	Deconstruction, demolition	C1	0.107	0	0.107	28.3	0	28.3
	Transport	C2	47.2	0	47.2	678	0	678
	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	-90.7	0	-9.07E+01	5.76E+02	0	5.76E+02

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



Environmental Product Declaration

LCA Results

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Parameters describing resource use						
Life Cycle Stage	Impact Category		SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m³
Product stage	Raw material supply	A1	18.0	0	0	0.890
	Transport	A2	0	0	0	0.009
	Manufacturing	A3	1.06E+03	0	0	4.187
	Total (of product stage)	A1-3	1.08E+03	0	0	5.09
Construction process stage	Transport	A4	0	0	0	0.012
	Construction	A5	1.07E+02	0	0	0.601
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	2.95E-04
	Transport	C2	0	0	0	0.021
	Waste processing	C3	0	0	0	0
	Disposal	C4	0	0	0	0.004
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	1.03E+03	0	0	0.146
100% Landfill Scenario						
End of life	Deconstruction, demolition	C1	0	0	0	2.95E-04
	Transport	C2	0	0	0	1.02E-03
	Waste processing	C3	0	0	0	0
	Disposal	C4	0	0	0	0.048
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	1.31
100% Recycling Scenario						
End of life	Deconstruction, demolition	C1	0	0	0	2.95E-04
	Transport	C2	0	0	0	0.023
	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	1.12E+03	0	0	0.044

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

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



Environmental Product Declaration

LCA Results

(ND = 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	7.97E-07	4.83	0.066
	Transport	A2	3.02E-08	0.075	1.09E-03
	Manufacturing	A3	2.75E-06	47.0	0.132
	Total (of product stage)	A1-3	3.58E-06	52.0	0.199
Construction process stage	Transport	A4	1.19E-08	0.043	4.32E-04
	Construction	A5	4.40E-07	14.8	0.022
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	7.77E-10	0.005	2.27E-05
	Transport	C2	2.26E-08	0.081	8.18E-04
	Waste processing	C3	0	0	0
	Disposal	C4	3.51E-09	80.1	1.70E-04
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-7.11E-07	3.86	-0.032
100% Landfill Scenario					
End of life	Deconstruction, demolition	C1	7.77E-10	0.005	2.27E-05
	Transport	C2	1.04E-09	0.004	3.80E-05
	Waste processing	C3	0	0	0
	Disposal	C4	4.38E-08	1.00E+03	0.002
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.41E-06	34.7	-0.284
100% Recycling Scenario					
End of life	Deconstruction, demolition	C1	7.77E-10	0.005	2.27E-05
	Transport	C2	2.45E-08	0.087	8.86E-04
	Waste processing	C3	0	0	0
	Disposal	C4	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2.16E-07	1.17	-0.010

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



Environmental Product Declaration

LCA Results

(ND = 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	0	0	0	0	0	0
	Transport	A2	0	0	0	0	0	0
	Manufacturing	A3	0	0	0	0	0	0
	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	1.10E+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 and not return empty in modules beyond A3.		
	Truck trailer - Fuel	litre/km	1.56
	Distance	km	350
	Capacity utilisation (including empty returns)	%	61
	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). The country consumption grid mix corresponding to each participating manufacturing location has been applied to fabrication and installation. 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. In the primary scenario 92 % of the reinforcing steel is assumed to be recycled and 8 % sent to landfill [STEELCONSTRUCTION.INFO 2012]. 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. Alternative scenarios of 100 % landfill and 100 % recycling are additionally declared.		
	Waste for recycling - Recovered steel from crushed concrete	%	92
	Waste for energy recovery - Energy recovery is not considered for this study as most end-of-life steel scrap is recycled, while the remainder is landfilled	-	-
	Waste for final disposal - Unrecoverable steel lost in crushed concrete and sent to landfill	%	8
	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	%	61
	Transport to waste processing by Truck - Density of Product	kg/m ³	7850



Environmental Product Declaration

Scenarios and additional technical information

Scenario	Parameter	Units	Results
	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	%	53
	Transport to waste processing by Container ship – Density of Product	kg/m ³	7850
Module D	It is assumed that 92% of the steel used in the structure is recovered for recycling, while the remainder is landfilled. "Benefits and loads beyond the system boundary" (module D) accounts for the environmental benefits and loads resulting from net steel scrap that is used as raw material in the steel plant and that is collected for recycling at end of life. The balance between total scrap arisings recycled from fabrication, installation and end of life and 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. This study is concerned with the secondary production route, and more scrap is required as input to the system than is recovered at end of life. The net effect of this is that module D mainly models the burdens associated with the scrap input (secondary material) to the steelmaking process. The resulting scrap credit/burden is calculated based on the global "value of scrap" approach (/worldsteel 2011).		
	Recycled Content	kg	909
	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

Scrap based reinforcing steel product of covered by this declaration is made via the Electric Arc Furnace production route. The bulk of the environmental impacts and primary energy demand is attributed to the manufacturing phase, covered by information modules A1-A3 of EN 15804:2012+A2:2019/AC2021.

The interpretation of the results has been carried out considering the methodology- and data-related assumptions and limitations declared in the EPD. This interpretation section focuses on the environmental impact categories as well as the primary energy demand indicators only.

The relationship between the results declared here and those of the previously published sector average declaration is addressed under Relationship to previously published CARES sector average declarations.

Global Warming Potential (GWP)

The majority of the life cycle GWP impact occurs in the production phase (A1-A3). A1-A3 impacts account for 82.23% overall life cycle impacts for this category. The most significant contributions to production phase impacts are the upstream production of raw materials used in the steelmaking process, generation/supply of electricity and the production/use of fuels on site. Fabrication, installation and the end-of-life processes covered in C1-C4 make a minimal contribution to GWP. For overall climate change impacts, carbon dioxide emissions account for the majority of impacts with methane being the second most significant contributor.

Ozone Depletion Potential (ODP)

The majority of impacts are associated with the production phase (A1-3). Significant contributions to production phase impact come from the emission of ozone depleting substances during the upstream production of raw materials/pre-products as well as those arising from electricity production. Module D shows a very small credit even though scrap burdens are being assessed in this phase. This is explained because ODP emissions are linked to grid electricity production used.

Acidification Potential (AP)

Acidification potential is generally driven by the production of sulphur dioxide and nitrogen oxides through the combustion of fossil fuels, particularly coal and crude oil products. The majority of the lifecycle AP impact occurs in the production phase (A1-A3), similar to GWP. The major contributors to production phase AP impacts comes from energy resources used in the production of the raw materials and pre-products for the steelmaking process and from transportation. Fabrication, installation and the end-of-life processes classed under C1-C4 make minimal contributions.

Eutrophication Potential (EP)

Eutrophication is driven by nitrogen and phosphorus containing emissions and as with GWP and AP is often strongly linked with the use of fossil fuels. The major eutrophication impacts occur in the production phase (A1-A3). Significant contributions to production phase impact comes from the production of raw materials and transport. Fabrication, installation and the end-of-life processes classed under C1-C4 again make minimal contributions.

Photochemical Ozone Creation Potential (POCP)

POCP tends to be driven by emissions of carbon monoxide, nitrogen oxides (NOx), sulphur dioxide and NMVOCs. The production phase is the dominant phase of the lifecycle with regards to POCP impacts. Again, these are all emissions commonly associated with the combustion of fuels. Significant contributors to POCP are the upstream production of raw materials/pre-products and transport, directly linked to fossil fuel combustion. It should be noted that the impacts for steel recycling in module D is almost of the same magnitude as the production phase impacts.



Environmental Product Declaration

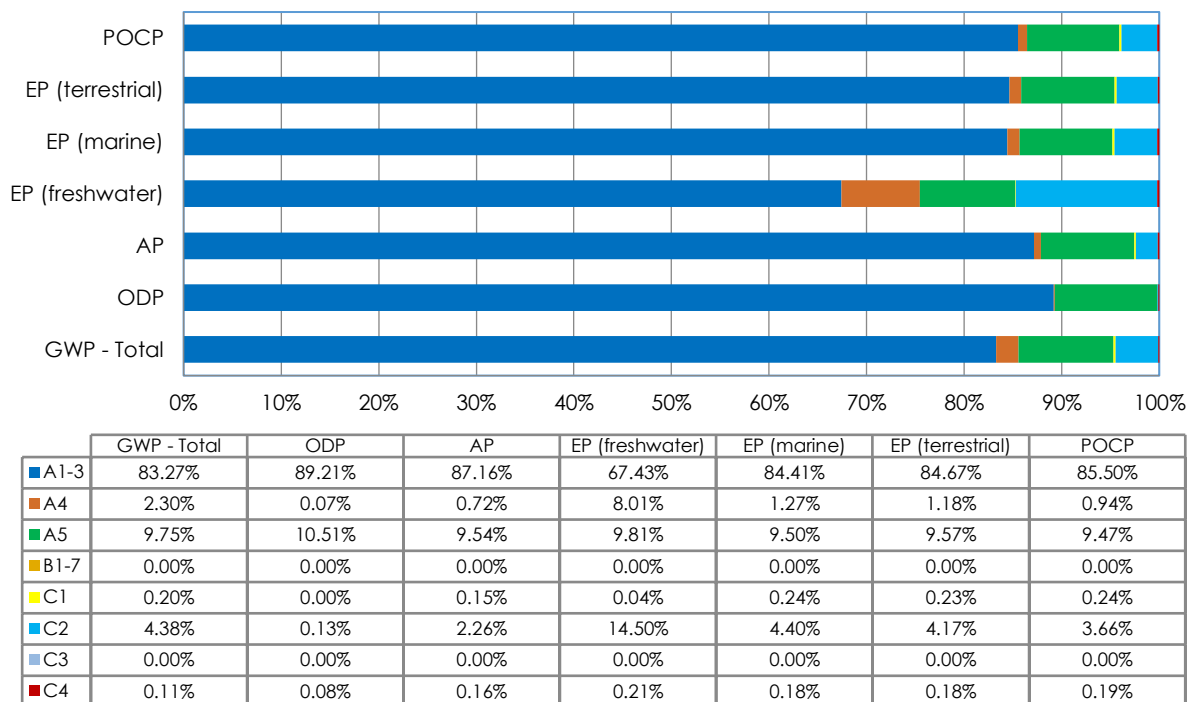


Figure 1 - shows the relative contribution of each life cycle stage to different environmental indicators for the carbon steel reinforcing bar products manufactured by the secondary (scrap based) production route

Representativeness of the Average

The declared results are a production-weighted average across eighteen manufacturing sites. Individual manufacturer results vary according to grid carbon intensity at the manufacturing location, the proportion of billet purchased from external suppliers and the production route of that billet, the metallic charge composition, the rolling configuration, and site-specific energy efficiency. To indicate the dispersion that the single declared value represents, the table below reports the production-weighted standard deviation and the coefficient of variation of the manufacturer-specific results for climate change – total.

Module	Declared weighted average kg CO ₂ eq	Weighted standard deviation kg CO ₂ eq	Coefficient of variation %
A1 – Raw material supply	404	214	53
A2 – Transport	71.7	29.3	41
A3 – Manufacturing	445	80.8	18
A1–A3 – Total product stage	921	248	27

Values in kg CO₂ eq per tonne of reinforcing bar. The standard deviation is weighted by finished reinforcing bar output, on the same basis as the declared average, and the coefficient of variation is that standard deviation expressed as a percentage of the declared average. These statistics are reported for information only; the weighted average values in the LCA Results tables are the declared results of this EPD.

The dispersion is not evenly distributed between the production steps. Expressed on the same basis, the coefficient of variation of the steelmaking contribution to climate change – total is 17 %, while that of the rolling contribution is 72 %, reflecting the differing rolling configurations among the participating sites, in particular the use of direct charging from the continuous casting machine at some sites and billet reheating at others.

Users requiring results representative of a single manufacturer, a single manufacturing site or a specific supply arrangement should use the relevant manufacturer-specific EPD rather than this declaration



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 and are production-weighted on the same basis as the declared LCA results, that is by finished reinforcing bar output. The sum of the 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 CO ₂ eq	Share of A1–A3 %
Steelmaking	600.5	65.2
Rolling	320.3	34.8
Total (A1–A3)	920.8	100.0

The steelmaking step covers metallic charge supply, melting in the Electric Arc Furnace, secondary refining and continuous casting, together with the supply of purchased billet where applicable. The rolling step covers billet reheating where it occurs, hot rolling, controlled cooling and finishing

Relationship to Previously Published CARES Sector Average EPD

Sector average EPD for carbon steel reinforcing bar produced by the secondary route was previously prepared by CARES and issued under the BRE Global EPD Programme, most recently as BREG EN EPD No. 000125, covering the 2021 reporting period. This EPD is the first such sector average EPD issued by CARES as the Programme Operator.

The declared Module A1–A3 result of this EPD is higher than that of the previous EPD. The two results are not comparable and do not represent a trend in the environmental performance of the participating manufacturers. The principal reasons are set out below.

Different Population of Manufacturers

The previous declaration covered fourteen manufacturing sites in France, Portugal, Spain and Türkiye. This declaration covers eighteen sites and additionally includes sites in China, Malaysia and Oman. Ten sites are common to both declarations and eight are covered for the first time. The average, therefore, describes a different set of production locations, with a correspondingly different range of grid carbon intensities, metallic charge sources and transport distances.

Treatment and Share of Purchased Billet

Several participating sites roll part of their reinforcing bar from externally purchased billets. In this EPD, those quantities are entered separately according to the production route of the supplying steelworks, covering the secondary (scrap-based, Electric Arc Furnace), primary (Blast Furnace / Basic Oxygen Furnace) and Direct Reduced Iron / Electric Arc Furnace routes, and each is modelled with the corresponding route-specific background dataset. The difference between the two declarations is concentrated in Module A1, raw material supply, which accounts for substantially all of the increase; Module A3 manufacturing is marginally lower than in the previous declaration. The recycled content of the declared product differs between the two declarations for the same reason, as set out in the Recycled Content section.

Different Background Data and Characterisation Factors

The previous declaration used the GaBi 2021 databases and the impact assessment method current at that time. This declaration uses MLC (GaBi) Databases 2025.1 and the characterisation factors of Environmental Footprint v3.1 (EF 3.1) as required by EN 15804:2012+A2:2019/AC:2021. Changes to background datasets, including national grid mixes, and to characterisation factors affect the declared results independently of any change in manufacturing performance. The calculation rules applied to the end-of-life modules and to the other declared modules are unchanged between the two declarations.



Environmental Product Declaration

Different Product Category Rules and Programme

The previous declaration was prepared under the BRE Environmental Profiles 2013 Product Category Rules PN 514 Rev 3.0 and issued by BRE Global. This declaration is prepared under the CARES Product Category Rules of February 2025 and issued by CARES.

Users should not construct a time series from the two declarations and should not interpret the difference between them as a change in the performance of any individual participating manufacturer. Manufacturer-specific results are given in the relevant manufacturer-specific EPDs.

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Environmental Product Declaration

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