

## Statement of Verification

BREG EN EPD No.: 000080

Issue 7

ECO EPD Ref. No. 000276

This is to verify that the

### Environmental Product Declaration

provided by:

Yesilyurt Demir Celik End. Ve Liman Isletmeleri Ltd.  
Sti. (member of UK CARES)

**BRE** Global  
**Verified**  
**EPD**

is in accordance with the requirements of:

**EN 15804:2012+A1:2013**

and

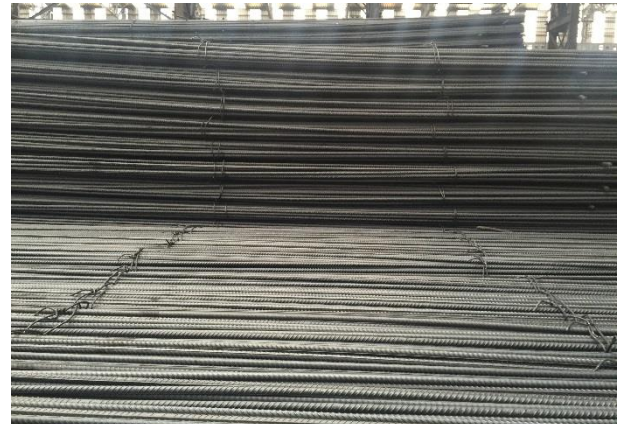
**BRE Global Scheme Document SD207**

This declaration is for:

**Carbon Steel reinforcing Bar (secondary production route-  
scrap)**

### Company Address

Cumhuriyet Mahallesi, Akal Sokak, No3  
Tekkekoy  
Samsun  
55300



*Emma Baker*

Emma Baker  
Operator

05 December 2022  
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## Environmental Product Declaration

**EPD Number: 000080**

### General Information

| EPD Programme Operator  | Applicable Product Category Rules   |
|---|---|
| BRE Global<br>Watford, Herts<br>WD25 9XX<br>United Kingdom  | BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013 |
| Commissioner of LCA study   | LCA consultant/Tool   |
| UK CARES<br>Pembroke House<br>21 Pembroke Road<br>Sevenoaks<br>Kent, TN13 1XR<br>UK   | UK CARES EPD Tool<br>thinkstep UK Ltd<br>Euston Tower - Level 33, 286<br>Euston Road<br>London, NW1 3DP<br>www.thinkstep.com                            |
| Declared/Functional Unit  | Applicability/Coverage  |
| 1 tonne of carbon steel reinforcing bars manufactured by the secondary (scrap-based) production route as used within concrete structures for a commercial building.   | Manufacturer-specific product   |
| EPD Type  | Background database   |
| Cradle to Gate with options   | GaBi  |
| Demonstration of Verification   |   |
| CEN standard EN 15804 serves as the core PCR <sup>a</sup>   |   |
| Independent verification of the declaration and data according to EN ISO 14025:2010<br><input type="checkbox"/> Internal <input checked="" type="checkbox"/> External   |   |
| (Where appropriate <sup>b</sup> ) Third party verifier:<br>Dr Fei Zhang   |   |
| a: Product category rules<br>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+A1:2013. 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+A1:2013 for further guidance |   |

## Information modules covered

| Product                             |                                     |                                     | Construction                        |                                     | Use stage                           |                                     |                                     |                                     |                                     |                                     |                                     | End-of-life                         |                                     |                                     |                                     | Benefits and loads beyond the system boundary |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---|
|                                     |                                     |                                     |                                     |                                     | Related to the building fabric      |                                     |                                     |                                     |                                     | Related to the building             |                                     |                                     |                                     |                                     |                                     |   |
| 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    |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>           |

Note: Ticks indicate the Information Modules declared.

## Manufacturing site(s)

Yesilyurt Demir Celik End. ve Liman Isletmeleri Ltd. Sti. (member of UK CARES)

Cumhuriyet Mahallesi, Akal Sokak, No:3  
 Tekkekoy  
 Samsun  
 55300  
 Turkey

## Construction Product:

### Product Description

Reinforcing steel bar (according to product standards listed in Sources of Additional Information) that is obtained from scrap, melted in an Electric Arc Furnace (EAF) followed by hot rolling.

The declared unit is 1 tonne of carbon steel reinforcing bars as used within concrete structures for a commercial building.

## Technical Information

| Property  | Value, Unit  |
|---|--|
| Production route  | EAF  |
| Density   | 7850 kg/m <sup>3</sup>   |
| Modulus of elasticity   | 200000 N/mm <sup>2</sup>   |
| Weldability (Ceq)   | max 0.50 %   |
| Yield strength (as per BS 4449:2005)                            | min 500 N/mm <sup>2</sup>  |
| Tensile strength (as per BS 4449:2005)                          | min 540 N/mm <sup>2</sup><br>(Tensile strength/Yield Strength $\geq$ 1.08) |
| Surface geometry (Relative rib area, $f_R$ as per BS 4449:2005) | min 0.040 for Bar Size >6mm & $\leq$ 12mm<br>min 0.056 for Bar Size >12    |
| Agt (% total elongation at maximum force as per BS 4449:2005)   | min 5 %  |
| Re-bend test (as per BS 4449:2005)                              | Pass   |
| Fatigue test (as per BS 4449:2005)                              | Pass   |
| Recycled content (as per ISO 14021:2016)                        | 96.9 %   |

## Main Product Contents

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

## Manufacturing Process

Scrap metal is melted in an electric arc furnace to obtain liquid steel. This is then refined to remove impurities and alloying additions can be added to give the required properties.

Hot metal (molten steel) from the EAF is then cast into steel billets before being sent to the rolling mill where they are rolled and shaped to the required dimensions for the finished bars and coils of reinforcing steel.

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 requirements 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 bar 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.

It is a high value resource so efforts are made to recycle steel scrap rather than disposing of it at EoL. A recycling rate of 92% is typical for reinforcing steel bar products.

## Life Cycle Assessment Calculation Rules

### Declared / Functional unit description

The declared unit is 1 tonne of carbon steel reinforcing bars manufactured by the secondary (scrap-based) production route as used within concrete structures for a commercial building (i.e. 1 tonne in use, accounting for losses during fabrication and installation, not 1 tonne as produced).

### System boundary

The system boundary of the EPD follows the modular design defined by EN 15804. This is a cradle to gate – with all options EPD and thus covers all modules from A1 to C4 and includes module D as well.

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.

### Data sources, quality and allocation

Data Sources: Manufacturing data of the period 01/01/2017-31/12/2017 has been provided by Yesilyurt Demir Celik End. ve Liman Isletmeleri Ltd. Sti. (member of UK CARES).

Data Quality: Data quality can be described as good. Background data are consistently sourced from thinkstep databases. The primary data collection was thorough, considering all relevant flows and these data have been verified by UK CARES.

Allocation: EAF slag and mill scale are produced as co-products from the steel manufacturing process. Impacts are allocated between the steel, the slag and the mill scale based on economic value.

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 GaBi datasets documentation (/GaBi 8 2019/).

### 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 BRE guidelines are fulfilled.

## LCA Results

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

| Parameters describing environmental impacts               |                                      |      | GWP                       | ODP              | AP                        | EP   | POCP                                    | ADPE         | ADPF                     |
|---|--------------------------------------|------|---------------------------|------------------|---------------------------|--|---|--------------|--------------------------|
|   |                                      |      | kg CO <sub>2</sub> equiv. | kg CFC 11 equiv. | kg SO <sub>2</sub> equiv. | kg (PO <sub>4</sub> ) <sup>3-</sup> equiv. | kg C <sub>2</sub> H <sub>4</sub> equiv. | kg Sb equiv. | MJ, net calorific value. |
| 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 | 812                       | 9.85E-07         | 3.87                      | 0.396                                      | 0.228                                   | 7.55E-05     | 9.73E+03                 |
| Construction process stage                                | Transport                            | A4   | 16.4                      | 2.71E-15         | 3.59E-02                  | 8.93E-03                                   | -1.15E-02                               | 1.26E-06     | 222                      |
|   | Construction                         | A5   | 92.9                      | 9.85E-08         | 0.406                     | 4.44E-02                                   | 1.85E-02                                | 8.92E-06     | 1.14E+03                 |
| 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                        |
| End of life   | Deconstruction, demolition           | C1   | 2.05                      | 2.89E-16         | 2.97E-03                  | 4.22E-04                                   | 3.27E-04                                | 5.71E-08     | 28.3                     |
|   | Transport                            | C2   | 39.6                      | 6.44E-15         | 0.127                     | 3.19E-02                                   | -3.33E-02                               | 2.94E-06     | 536                      |
|   | Waste processing                     | C3   | 0                         | 0                | 0                         | 0  | 0                                       | 0            | 0                        |
|   | Disposal                             | C4   | 1.19                      | 6.92E-15         | 7.14E-03                  | 8.09E-04                                   | 5.57E-04                                | 4.38E-07     | 16.7                     |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D    | 522                       | -3.27E-12        | 1.22                      | 0.108                                      | 0.159                                   | -3.22E-05    | 4.15E+03                 |

GWP = Global Warming Potential;  
 ODP = Ozone Depletion Potential;  
 AP = Acidification Potential for Soil and Water;  
 EP = Eutrophication Potential;

POCP = Formation potential of tropospheric Ozone;  
 ADPE = Abiotic Depletion Potential – Elements;  
 ADPF = Abiotic Depletion Potential – Fossil Fuels;

## LCA Results (continued)

| Parameters describing resource use, primary energy        |                                      |      | 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 | 1.23E+03  | 0    | 1.23E+03  | 9.83E+03 | 0     | 9.83E+03 |
| Construction process stage                                | Transport                            | A4   | 12.9      | 0    | 12.9      | 223      | 0     | 223      |
|   | Construction                         | A5   | 161       | 0    | 161       | 1.15E+03 | 0     | 1.15E+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        |
| End of life   | Deconstruction, demolition           | C1   | 8.73E-02  | 0    | 8.73E-02  | 28.4     | 0     | 28.4     |
|   | Transport                            | C2   | 29.6      | 0    | 29.6      | 537      | 0     | 537      |
|   | Waste processing                     | C3   | 0         | 0    | 0         | 0        | 0     | 0        |
|   | Disposal                             | C4   | 2.18      | 0    | 2.18      | 17.2     | 0     | 17.2     |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D    | -4.33E+02 | 0    | -4.33E+02 | 3.93E+03 | 0     | 3.93E+03 |

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)

| Parameters describing resource use, secondary materials and fuels, use of water |                                      |      |          |                           |                           |                |
|---|--------------------------------------|------|----------|---------------------------|---------------------------|----------------|
|   |                                      |      | SM       | RSF                       | NRSF                      | FW             |
|   |                                      |      | kg       | MJ<br>net calorific value | MJ<br>net calorific value | m <sup>3</sup> |
| 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 | 1.18E+03 | 5.97E-03                  | 2.82E-02                  | 3.36           |
| Construction process stage  | Transport                            | A4   | 0        | 0                         | 0                         | 2.19E-02       |
|   | Construction                         | A5   | 118      | 5.97E-04                  | 2.82E-03                  | 0.381          |
| 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              |
| End of life   | Deconstruction, demolition           | C1   | 0        | 0                         | 0                         | 2.02E-04       |
|   | Transport                            | C2   | 0        | 0                         | 0                         | 0.05           |
|   | Waste processing                     | C3   | 0        | 0                         | 0                         | 0              |
|   | Disposal                             | C4   | 0        | 0                         | 0                         | 4.34E-03       |
| Potential benefits and loads beyond the system boundaries                       | Reuse, recovery, recycling potential | D    | 0        | 0                         | 0                         | 0.408          |

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)

| Other environmental information describing waste categories |                                      |      | 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 | 1.29E-02 | 27.2     | 3.62E-02 |
| Construction process stage                                  | Transport                            | A4   | 1.25E-05 | 1.81E-02 | 3.03E-04 |
|   | Construction                         | A5   | 1.30E-03 | 12.5     | 4.41E-03 |
| 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        |
| End of life   | Deconstruction, demolition           | C1   | 3.40E-09 | 3.45E-03 | 3.34E-05 |
|   | Transport                            | C2   | 2.84E-05 | 4.15E-02 | 7.23E-04 |
|   | Waste processing                     | C3   | 0        | 0        | 0        |
|   | Disposal                             | C4   | 2.94E-07 | 80.1     | 2.31E-04 |
| Potential benefits and loads beyond the system boundaries   | Reuse, recovery, recycling potential | D    | 2.61E-06 | 8.20E+00 | -0.084   |

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

## LCA Results (continued)

| Other environmental information describing output flows – at end of life |                                      |      |     |     |     |                       |
|--|--------------------------------------|------|-----|-----|-----|-----------------------|
|  |                                      |      | CRU | MFR | MER | EE                    |
|  |                                      |      | kg  | kg  | kg  | MJ per energy carrier |
| 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 | 0   | 0   | 0   | 0                     |
| Construction process stage   | Transport                            | A4   | 0   | 0   | 0   | 0                     |
|  | Construction                         | A5   | 0   | 120 | 0   | 0                     |
| 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                     |
| End of life  | Deconstruction, demolition           | C1   | 0   | 0   | 0   | 0                     |
|  | Transport                            | C2   | 0   | 0   | 0   | 0                     |
|  | Waste processing                     | C3   | 0   | 920 | 0   | 0                     |
|  | Disposal                             | C4   | 0   | 0   | 0   | 0                     |
| Potential benefits and loads beyond the system boundaries                | Reuse, recovery, recycling potential | D    | 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 |
| A4 – Transport to the building site            | Transport to the fabricators and 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.  |       |         |
|  | Truck trailer - Fuel  | L/km  | 1.56    |
|  | Distance  | km    | 350     |
|  | Capacity utilisation (including empty returns)  | %     | 85      |
| A5 – Installation in the building              | Fabrication into reinforcing 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      |
| B1 - Use                                       | No impacts occur during use.  |       |         |
| B2 – Maintenance                               | No maintenance required   |       |         |
| B3 – Repair                                    | No repair process required  |       |         |
| B4 – Replacement                               | No replacement considerations required  |       |         |
| 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. The Concrete Society follows the definitions provided in BS EN 1990, which specifies “building structures and other common structures” as having a lifetime of 50 years (The Concrete Society, n.d.; BSI, 2005). On this basis, the RSL for this EPD is assumed to be 50 years.   |       |         |
|  | Reference service life  | Years | 50      |
| B6 – Use of energy;<br>B7 – Use of water       | No water or energy required during use stage related to the operation of the building   |       |         |
| C1 to C4<br>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. This stage comprises: de-construction, demolition; transport to waste processing; waste processing for reuse, recovery and/or recycling; disposal  |       |         |
|  | Waste for recycling - Recovered steel from crushed concrete   | %     | 92      |

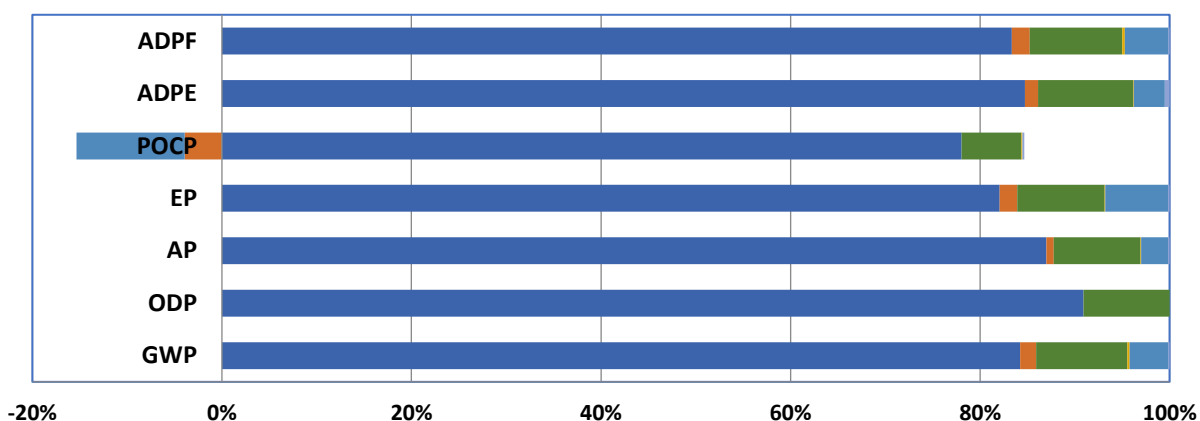
### Scenarios and additional technical information

| Scenario | Parameter   | Units             | Results |
|----------|---|-------------------|---------|
|          | 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   | L/km              | 1.56    |
|          | Transport to waste processing by Truck – Distance   | km                | 463     |
|          | Transport to waste processing by Truck – Capacity utilisation   | %                 | 85      |
|          | Transport to waste processing by Truck – Density of Product   | kg/m <sup>3</sup> | 7850    |
|          | Transport to waste processing by Container ship - Fuel consumption  | L/km              | 0.00401 |
|          | 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/m <sup>3</sup> | 7850    |
| Module D | <p>It is assumed that 92% of the steel used in the structure is recovered for recycling, while the remainder is landfilled.</p> <p>“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 EAF and that is collected for recycling at end of life.</p> <p>The resulting scrap credit/burden is calculated based on the global “value of scrap” approach (/worldsteel 2011).</p> |                   |         |

## Summary, comments and additional information

### Interpretation

Scrap-based carbon steel rebar of Yesilyurt Demir Celik End. ve Liman Isletmeleri Ltd. Sti. (member of UK CARES) is made via the EAF 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. For GWP for instance, A1-A3 impacts account for 84.22% overall life cycle impacts for this category.



|        | GWP    | ODP    | AP     | EP     | POCP    | ADPE   | ADPF   |
|--------|--------|--------|--------|--------|---------|--------|--------|
| ■ A1-3 | 84.22% | 90.91% | 86.99% | 82.08% | 112.55% | 84.72% | 83.35% |
| ■ A4   | 1.70%  | 0.00%  | 0.81%  | 1.85%  | -5.68%  | 1.41%  | 1.90%  |
| ■ A5   | 9.64%  | 9.09%  | 9.13%  | 9.20%  | 9.13%   | 10.01% | 9.77%  |
| ■ C1   | 0.21%  | 0.00%  | 0.07%  | 0.09%  | 0.16%   | 0.06%  | 0.24%  |
| ■ C2   | 4.11%  | 0.00%  | 2.85%  | 6.61%  | -16.44% | 3.30%  | 4.59%  |
| ■ C3   | 0.00%  | 0.00%  | 0.00%  | 0.00%  | 0.00%   | 0.00%  | 0.00%  |
| ■ C4   | 0.12%  | 0.00%  | 0.16%  | 0.17%  | 0.27%   | 0.49%  | 0.14%  |

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CARES SRC Steel for the Reinforcement of Concrete Scheme. Appendix 1-N - Quality and operations assessment schedule for carbon steel bars for the reinforcement of concrete for use in nuclear applications and other mega projects including inspection and testing requirements - <http://www.ukcares.com/approved-companies> - Certificate number of conformance to BS4449 at the time of LCA study – 180902

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