MEGASA

## Environmental Product Declaration

EN ISO 14025:2010 / UNE 36904-1:2018 / EN 15804:2012+A2:2019

# Hot-rolled ribbed steel proceeding from an electric arc furnace using 100% renewable energy


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The declaration holder is responsible for the content and, throughout the period of validity, for keeping the supporting documentation that justifies the data and statements included.

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## UNE 36904-1:2018

The European EN 15804:2012+A2:2019 Standard serves as the basis for the PCR.

Independent verification of the declaration and data in accordance with the EN ISO 14025:2010 Standard

☐ Internal ☑ External

Verification body:

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# 1 GENERAL INFORMATION

## 1.1. The organisation

The MEGASA GROUP is a family business specializing in the production and distribution of long steel products.

The Group has more than a thousand employees, distributed among its different production plants and distribution units in the Iberian Peninsula and France.
With an installed capacity of more than three million tonnes, MEGASA uses an electric arc furnace to produce a wide range of long steels: ribbed round, wire rod, electrowelded mesh and merchant and structural sections.

**SN Seixal, Siderurgia Nacional, S.A.**

SN Seixal, Siderurgia Nacional, S.A. located in the surroundings of Lisbon, specializes in the manufacture of ribbed products, wire rod of low, medium and high carbon, and steel fabric. Thanks to its flexibility, it can offer ribbed steel products in different presentations: bar, wild coil and spool.

**SN Maia Siderurgia Nacional, S.A.**

SN Maia produces steel rebar.
The factory is located in Maia, near the city of Oporto (Portugal) and 15 km from the port of Leixoes. It is the large factory of the group for what refers to the production of steel rebars.

**Megasa Siderúrgica, S.L.**

Founded in 1953, it is located in Narón, northwest of the province of A Coruña (Spain) in a strategic geographical position, just 9 km from the port of Ferrol. It produces ribbed steel in bar and wild coil with a wide range of grades.

**Megasider Zaragoza, S.A.U.**

In 2016, Megasider Zaragoza, S.A.U. joined the Megasa Group. Recently relocated to the outskirts of the city, it is in a strategic logistics situation in the northeast of the Iberian Peninsula with very good communications with the most outstanding industrial areas of the country, as well as with France.
This factory specializes in the production of merchant sections, with a wide range of dimensions and grades. It completes its offer with ribbed products and some structural sections.

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## 1.2. Scope of the declaration

This environmental product declaration describes environmental information relating to the life cycle of cradle-to-door production with options of the hot-rolled ribbed steel, made through an electric arc furnace using 100% renewable energy, by the MEGASA GROUP in its factories of:

- Carretera de Castilla, 802-820 - 15570 Narón (España)
- Avenida de José López Soriano, 100, 50007, Zaragoza, (España)
- Rua Siderurgia s/n, 4425-514 S. Pedro Fins, Maia (Portugal)
- Rua Independência Nacional 10, 2840-996 Aldeia de Paio Pires, Seixal, (Portugal)

The role played by the product system under study is the production of hot-rolled steel in the Seixal plant (Portugal) for use as a structural element in the construction sector.

## 1.3. Life cycle and compliance

The EPD has been developed and verified in accordance with the UNE-EN ISO 14025:2010, UNE-EN 36904-1 and UNE-EN 15804:2012+A2:2019 Standards.

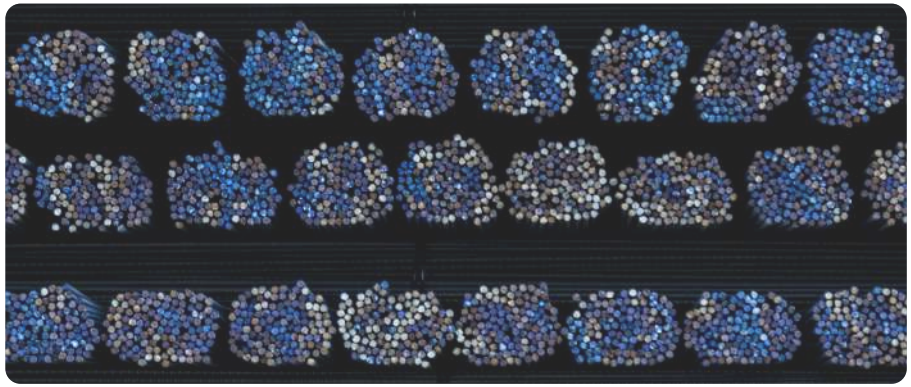
| | |
|---|---|
| **Heading** | Iron and Steel industry. Environmental Product Declarations. Product Category Rules. Steel products for structures. Part 1: Basic products |
| **Register / Version** | UNE-EN 36904-1 |
| **Issuing date** | 2018 |
| **Administrator** | AENOR |

The EPD includes the life cycle stages indicated in Table 1-2. The EPD is of the cradle-to-door type with options.

**System limits. Information modules considered**

| | | | |
|---|---|---|---|
| **Product stage** | A1 | Supply of raw materials | X |
| | A2 | Transport to factory | X |
| | A3 | Manufacturing | X |
| **Construction** | A4 | Transport to construction site | X |
| | A5 | Installation / construction | MNE |
| **Stage of use** | B1 | Use | MNE |
| | B2 | Maintenance | MNE |
| | B3 | Repairing | MNE |
| | B4 | Replacement | MNE |
| | B5 | Rehabilitation | MNE |
| | B6 | Energy use in service | MNE |
| | B7 | Water use in service | MNE |
| **End of life** | C1 | Deconstruction / demolition | X |
| | C2 | Transport | X |
| | C3 | Waste treatment | X |
| | C4 | Elimination | X |
| | D | Potential of reuse, recovery and/or recycling | X |

**X** = Module included in the LCA; **NR** = Not relevant module; **MNE** = Module not evaluated



The EPD may not be comparable to those developed in other Programs or in accordance with other reference documents; in particular, it may not be comparable to Declarations not developed and verified in accordance with the UNE-EN 15804 Standard.

Similarly, EPDs may not be comparable if the data source is different (e.g., databases), not all relevant information modules are included, or they are not based on the same scenarios.

The comparison of construction products must be done with the same function, applying the same unit declared and at the level of the building (or architectural or engineering work), that is, including the behaviour of the product throughout its life cycle, as well as the specifications of section 6.7.2 of the UNE-EN ISO 14025 Standard.

## 1.4. Differences when comparing with previous versions of the present EPD

There are no versions prior to the present EPD.

# 2 THE PRODUCT

## 2.1. Product identification

The EPD is applicable to hot-rolled ribbed steel for construction, produced in an electric arc furnace using 100% renewable energy.

The MEGASA Group elaborates high ductility steel and special ductility steel, the latter being designed specifically for structures subject to seismic forces, providing greater security against brittle fractures.

Ribbed steel, together with concrete, constitutes reinforced concrete, which is one of the most used constructive elements in the sector.

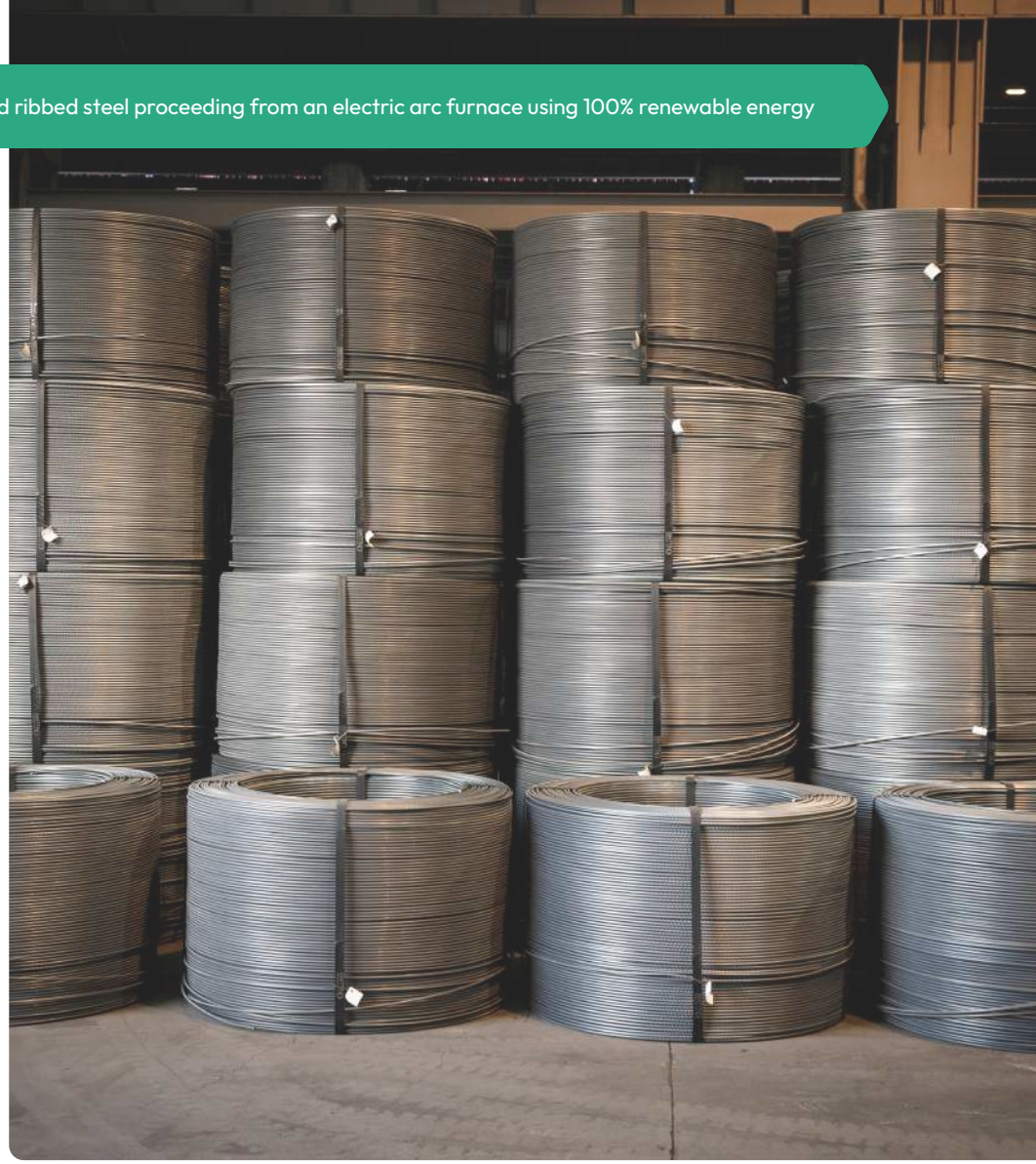
This product is supplied in diameters from 6mm up to the possibility of 40mm, in different presentations (bar, coil, spooled coil or spool).

**CPC code:** 4214 - Bars and rods, hot-rolled, of iron or steel.

## 2.2. Product composition

The manufacturer declares the following composition:

| Product composition | % in weight |
|---|---|
| **Post-consumer scrap** | 81 - 82 % |
| **Pre-consumer scrap** | 18 – 19 % |



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During the product life cycle, no hazardous substances of the “Candidate List of Substances of Very High Concern (SVHC) for authorisation” was used in a percentage greater than 0.1% of the product weight.

## 2.3. Product characteristics

| Standards - Ribbed steel | |
|---|---|
| UNE 36068 | Weldable ribbed steel bars for structural use meant to reinforce concrete |
| UNE 36065 | Weldable ribbed steel bars with special ductility characteristics for reinforcement of concrete |
| BS 4449:2005 | Steel for reinforcement of concrete. Weldable reinforcing steel. Bar, coil and decoiled product. Specification |
| EN 10080 | Steel for reinforcement of concrete. Weldable reinforcing steel. General |
| EN 1992-1-1 | Eurocode 2 part 3.2 and appendix C |
| DIN 488 | Reinforcing steel – Reinforcing steel bars |
| NF A35-080 | Steel for reinforcement of concrete - Weldable steels - Part 1: bars and coils |
| LNEC E449 | Steel bars A400NR for reinforcement of concrete |
| LNEC E450 | Steel bars A500NR for reinforcement of concrete |
| LNEC E455 | Steel bars A400NR with special ductility for reinforcement of concrete |
| LNEC E460 | Steel bars A500NR with special ductility for reinforcement of concrete |
| ASTM A615/615M | Standard specification for deformed and plain Carbon-Steel bars for concrete reinforcement |
| ASTM A706/706M | Standard specification for deformed and plain Low-Alloy Steel bars for concrete reinforcement |
| BRL0501 + NEN 6008 | Steel for reinforcement of concrete |

The chemical composition and remaining characteristics have been established in the different product Standards of application:

| Standards - Ribbed steel | |
|---|---|
| SS 212540 | Products specification for SS-EN 10080:2005 - Steel for reinforcement of concrete – Weldable reinforcing steel |
| NS 3576-2 | Steel for reinforcement of concrete – Dimensions and properties – Part 2: Ribbed steel B500NB |
| NS 3576-3 | Steel for reinforcement of concrete – Dimensions and properties – Part 2: Ribbed steel B500NC |
| SFS 1300 | Reinforcing steel. Minimum requirements for weldable reinforcing steel and welded fabrics |
| NBN A 24-30 | Steel products. Steel for reinforcement |
| PN-H-93220 | Steel for reinforcement of concrete. Weldable reinforcing steel B500SP - Ribbed bars and wires |
| NM 01.4.097 | Steel products - Reinforcing steel for concrete - Weldable bars and coils with bonding action [MORROCO] |
| G30.18-90 | Carbon Steel bars for concrete reinforcement |
| NMX-B-506-CANA-CERO | Steel industry - Ribbed steel wire for reinforcement of concrete - test specifications and methods |
| NMX-B-A457-CANA-CERO | Steel industry - Low-alloy ribbed steel wire for reinforcement of concrete - test specifications and methods |
| NTP 341.031 | Concrete. Carbon steel bar, ribbed or plain, for reinforcement of concrete. Specifications [PERU] |
| AS/NZS 4671 | Steel for reinforcement of concrete |

# 3 INFORMATION RELATIVE TO LCA

## 3.1. Life cycle assessment

The Report of life cycle assessment for the EPD relative to the steel products of MEGASA GROUP, dated July 2023, was elaborated by the company Abaleo S.L. with the databases Ecoinvent 3.9 (January 2023) and Environmental Footprint 3.1 and the SimaPro 9.5.0.0 software, which is the most updated version available when the LCA was prepared.

To prepare the study, the data from the plants in Spain (Narón and Zaragoza) and Portugal (Maia and Seixal) have been taken into account.

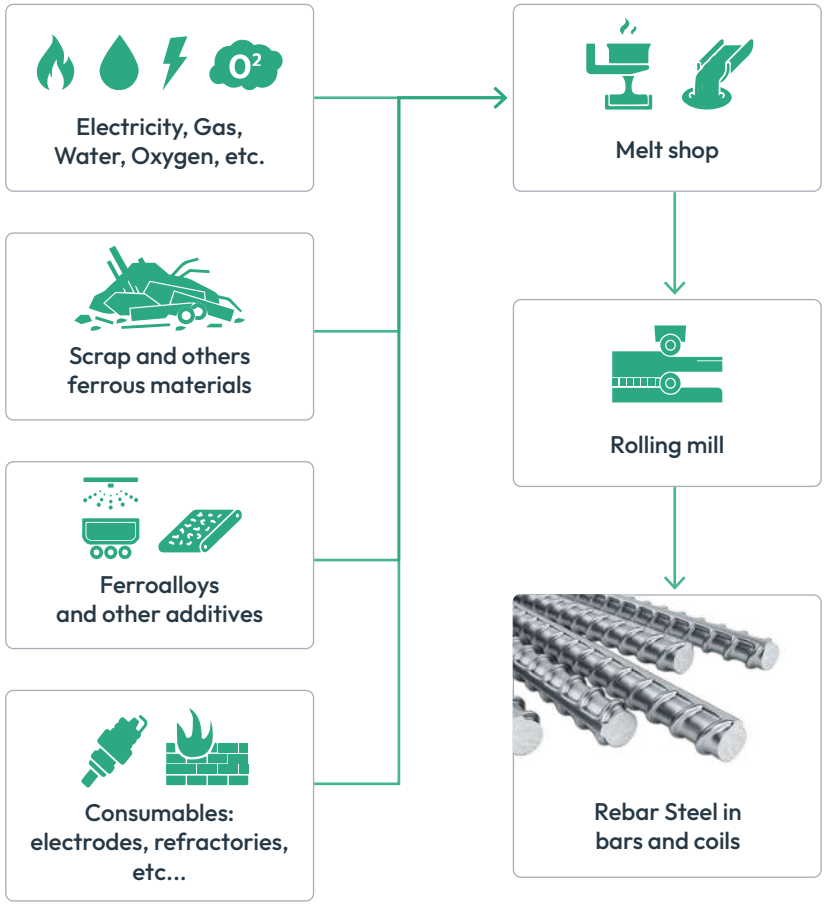
The LCA study followed both the recommendations and requirements of the international ISO 14040:2006, ISO 14044:2006, UNE 36904-1:2018 and UNE-EN 15804:2012+A2:2019 Standards.

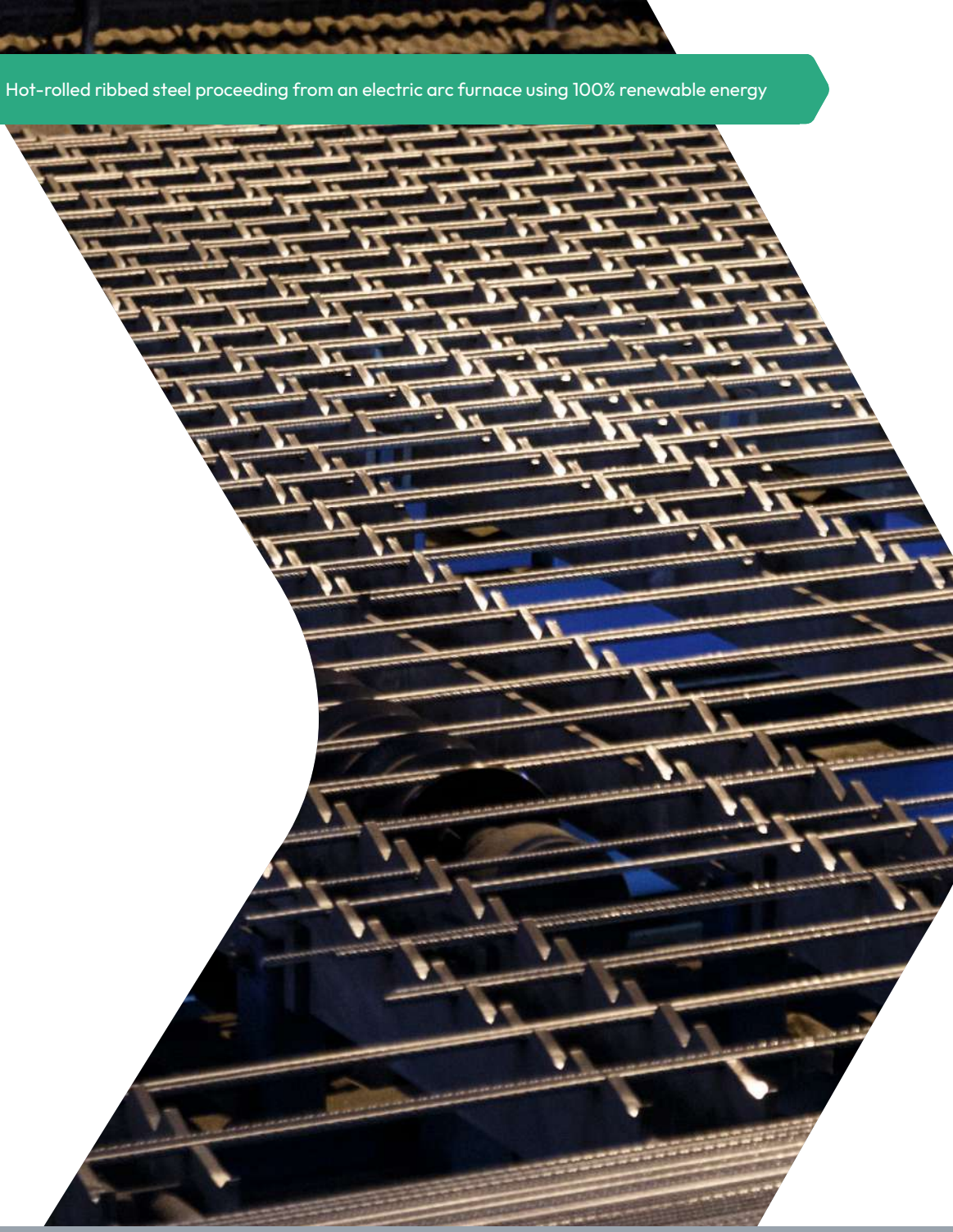
## 3.2. Scope of the study

The scope of the EPD is the cradle-to-door production with options (modules A1-A3, A4, C and D) of the ribbed steel elaborated by the MEGASA GROUP for use as structural systems in the construction sector.

The specific data of the manufacturing process come from the Spanish plants (Narón and Zaragoza) and the Portuguese ones (Maia and Seixal), corresponding to the year 2022.
The LCA does not include the following:

- All equipment with a service life superior to 3 years.
- The construction of plant buildings; other capital goods.
- Staff work travel; the staff's travel to or from work.
- Research and development activities.





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## 3.3. Declared unit

The declared unit is one tonne of product, including its distribution packaging.

## 3.4. Allocation criteria

According to the criteria of the reference standard:

- Where possible, the product system has been extended to avoid the allocation of environmental impacts of co-products.
- When it was not possible to avoid the allocation, an allocation of the inputs and outputs of the system has been made (based on mass).

It has not been necessary to apply economic allocation criteria.

## 3.5. Cut-off rule

In accordance with the criteria of the reference standard, the gross weight/volume of all materials used in the manufacturing process has been included in the LCA, so that at least 99% of the weight of the product unit is obtained.
There has been no exclusion of either material or energy consumption.

## 3.6. Representativeness, quality and selection of data

To model the steel manufacturing process of the MEGASA GROUP's ribbed steel, the factories' production data for the year 2022 have been used, which is a period considered representative of an average production. From these factories, the following data have been obtained: consumption of material and energy; emissions to air and discharges to water; distances from suppliers; waste generation and waste management.

When necessary, the Ecoinvent 3.9 (January 2023) and Environmental Footprint 3.1 databases have been used, which are the latest versions available at the time of the LCA. For the inventory data, the most up-to-date version of SimaPro 9.5.0.0 software available at the time of the study has been used to model the LCA and to calculate the environmental impact categories requested by the reference standard.

For the selection of the most representative processes, the following criteria have been applied:

- They had to be representative data of the technological development actually applied in the manufacturing processes. If case of no information available, representative data of an average technology have been chosen.
- They had to be geographical data as close as possible and, where appropriate, regionalized means.
- They had to be the most current data possible.

To assess the quality of the primary data of the production for the product under study, the criteria of semi-quantitative evaluation of the data quality proposed by the European Union in its Guide to the Environmental Footprint of Products and Organisations are applied. The results obtained are as follows:

- Very good integrity. Score 1
- Good methodological suitability and coherence. Score 2.
- Very good temporal representativeness. Score 1.
- Very good technological representativeness. Score 1.
- Very good geographical representativeness. Score 1.
- Very low data uncertainty. Score 1.

According to the previous data, the Data Quality Rating (DQR) takes the following value: 7/6 = 1.17, which indicates that the quality of the data is excellent.

To better understand the data quality assessment carried out, it is indicated that the score of each of the criteria varies from 1 to 5 (the lower the score, the more quality) and that the following table is applied to obtain the final score:

| Overall Data Quality Rating (DQR) | Overall data quality level |
|---|---|
| ≤ 1.6 | Excellent quality |
| 1.6 a 2.0 | Very good quality |
| 2.0 a 3.0 | Good quality |
| 3 a 4.0 | Reasonable quality |
| > 4 | Insufficient quality |

# 4 LIMITS TO THE SYSTEM, SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

The product system studied in the Life Cycle Assessment of the ribbed steel produced by the MEGASA GROUP is cradle-to-door with options. The following steps of production were studied:

## Module A1: Production of raw materials

This module includes the production process of raw materials, which considers:

- Extraction of resources and production of raw materials.
- Transport to the processing/production centres of raw materials.
- Energy and fuel consumption during the production of raw materials.
- The consumption of other resources (such as water), during the production of raw materials.
- The generation of waste and emissions to the air and discharges to water and soil, during the production of raw materials.
- The production of the electricity used in the manufacturing process.
- The scrap enters the plant as a residue, where it is processed as a secondary raw material.

## Module A2: Transport

The transport by lorry, ship and train of all raw materials has been considered from the production sites (suppliers) to the Megasa Group's plants in Spain (Narón and Zaragoza) and Portugal (Maia and Seixal). The transport distances of the raw materials have been calculated based on the locations showing in the databases of the purchasing and sales departments. Scrap enters the plant as waste, so its transport corresponds to the previous product system.

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## Module A3: Manufacturing

At this stage, the consumption of auxiliary materials in the production (auxiliary materials and general plant consumption) has been considered; the production of the necessary packaging to distribute the product to customers and its transport to the plant; emissions to air and water, as well as transport to the manager of the waste generated during this stage of the life cycle. The following co-products are generated in the production process: black slag and mill scale

The transport distances of the waste have been calculated based on the locations showing in the databases of the purchasing and sales departments.

## Module A4: Transport to the place of use

The transport of the finished product from the plants where the steel is made up to the customer has been considered, with data from the year 2022, distinguishing the means of transport used: lorry, ship or train.

| Parameter | | Quantity (per unit declared) |
|---|---|---|
| **Litres of diesel** | Lorry EURO 5 (max. weight authori. 15.79 t) | 0.0451 l/tkm |
| | Ship | 0.0026 l/tkm |
| | Train | 0.0129 l/tkm |
| **Average distance** | Lorry EURO 5 | 710.63 km |
| | Ship | 2146.61 km |
| | Train | 357.61 km |
| **Load factor (including empty return)** | | 50% |
| **Bulk density of products transported** | | - |
| **Useful capacity factor** | | - |

## Module C1 – Deconstruction / demolition

For the LCA it has been taken into account that the deconstruction modulus (C1) is not considered relevant for quantitative analysis. The consumption of material and energy for the deconstruction and extraction of the MEGASA GROUP's steel products are included in the framework of the building or civil works of which they form part.

## Module C2: Transport to the place of waste treatment/ recovery

It is considered that, at the end of its useful life, the product under study is transported to the point of waste management by road, ship or train. The average transport of the scrap received by the MEGASA GROUP's plants, authorized as a waste treatment facility for recovery operations (R4 – recycling or recovery of metals and metal compounds), has been considered.

## Module C3 - Waste treatment, and Module C4 - Waste elimination

The waste scenario considered establishes that the products under study are sent to recycling for the recovery of steel as a secondary material.

| Parameter | Value (per unit declared) | |
|---|---|---|
| **Demolition** | The consumption of material and energy for the deconstruction and extraction of the Megasa Group's steel products are included in the framework of the building or civil works of which they form part. | |
| **Recovery system, specified by type** | 0 kg for reuse. | |
| | 1000 kg for recycling. | |
| | 0 kg for energy recovery. | |
| **Elimination, specified by type** | 0 kg for final disposal (landfill): | |
| **Assumptions for scenario development (transport)** | Transport of waste up to manager: | Lorry EURO 5: 106.18 km |
| | | Ship: 1598.59 km |
| | | Train: 349.23 km |

## Module D – Charges and benefits beyond the limit of the system

Module D includes the potential for reuse and recycling expressed as net charges and benefits relative to secondary material recovered when leaving the product system, calculating material substitution effects only for the resulting net output stream from the product stage; the secondary material used as input in the product stage (A1-A3) has been excluded, considering only the % of non-secondary raw material that reaches the waste conditions.

## Life cycle assessment. - UNE EN 15804

| A1 a A3 | | | A4 a A5 | | B1 a B7 | | | | | | | C1 a C4 | | | | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product stage | | | Stage of construction process | | Stage of use | | | | | | | End-of-life stage | | | | Charges and benefits beyond the limit of the system |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | X | MNE | MNE | MNE | MNE | MNE | MNE | MNE | MNE | X | X | X | X | X |
| Supply of raw materials | Transport | Manufacturing | Transport | Construction / installation process | Use | Maintenance | Repairing | Replacement | Rehabilitation | Energy use in service | Water use in service | Deconstruction, demolition | Transport | Waste treatment | Waste elimination | Potential of reuse, recovery and/or recycling |
| | | | Scenario | Scenario | Scenario | Scenario | Scenario | Scenario | Scenario | Scenario | Scenario | Scenario | Scenario | Scenario | Scenario | |

**X:** Module evaluated. / **MNE:** Module not evaluated.

# 5 DECLARATION OF THE ENVIRONMENTAL PARAMETERS OF LCA AND LCI

## Environmental impact parameters for 1 tonne of ribbed steel produced with 100% renewable energy

Environmental impact parameters defined in the UNE-EN 15804 Standard.

| Ribbed steel - renewable. Unit declared: 1 tonne | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **A4** | **C1** | **C2** | **C3** | **C4** | **D** |
| GWP-total | kg CO2 eq | 8.85E+01 | 7.45E+00 | 8.57E+01 | 1.82E+02 | 4.60E+01 | 0.00E+00 | 4.45E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-fossil | kg CO2 eq | 8.40E+01 | 7.45E+00 | 8.56E+01 | 1.77E+02 | 4.60E+01 | 0.00E+00 | 4.45E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-biogenic | kg CO2 eq | 3.24E+00 | 4.26E-04 | 1.00E-01 | 3.34E+00 | 2.60E-03 | 0.00E+00 | 2.36E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-luluc | kg CO2 eq | 1.24E+00 | 1.65E-04 | 1.60E-02 | 1.26E+00 | 1.05E-03 | 0.00E+00 | 1.34E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| ODP | kg CFC-11 eq | 3.87E-06 | 1.52E-07 | 7.03E-07 | 4.73E-06 | 9.22E-07 | 0.00E+00 | 7.72E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| AP | mol H+ eq | 3.10E-01 | 5.81E-02 | 7.21E-02 | 4.40E-01 | 4.39E-01 | 0.00E+00 | 6.79E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EP-freshwater | kg P eq | 3.38E-03 | 5.76E-06 | 3.76E-04 | 3.76E-03 | 3.54E-05 | 0.00E+00 | 3.20E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EP-marine | kg N eq | 6.25E-02 | 1.68E-02 | 6.65E-02 | 1.46E-01 | 1.28E-01 | 0.00E+00 | 2.10E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EP-terrestrial | mol N eq | 6.95E-01 | 1.83E-01 | 2.94E-01 | 1.17E+00 | 1.40E+00 | 0.00E+00 | 2.31E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| POFP | kg NMVOC eq | 3.29E-01 | 5.67E-02 | 2.15E-01 | 6.00E-01 | 4.17E-01 | 0.00E+00 | 6.45E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| ADP-minerals&-metals 2 | kg Sb eq | 3.67E-05 | 2.26E-07 | 1.36E-05 | 5.05E-05 | 1.34E-06 | 0.00E+00 | 1.17E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| ADP-fossil 2 | MJ, v.c.n. | 1.60E+03 | 9.72E+01 | 2.11E+02 | 1.91E+03 | 5.97E+02 | 0.00E+00 | 5.71E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| WDP 2 | m3 eq | 1.08E+02 | 8.80E-02 | 6.07E+01 | 1.69E+02 | 5.37E-01 | 0.00E+00 | 5.00E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

- **GWP-total.** Global warming potential.
- **GWP-fossil.** Global warming potential of fossil fuels.
- **GWP-biogenic.** Biogenic global warming potential.
- **GWP-luluc.** Global warming potential of land use and land-use changes.
- **ODP.** Stratospheric ozone depletion potential.
- **AP.** Acidification potential, accumulated surplus.
- **EP-freshwater.** Eutrophication potential, fraction of nutrients reaching the final freshwater compartment.
- **EP-marine.** Eutrophication potential, fraction of nutrients reaching the final seawater compartment.
- **EP-terrestrial.** Eutrophication potential, accumulated surplus.
- **POFP.** Potential for formation of photochemical oxidants.
- **ADP-minerals&metals.** Abiotic resource depletion potential for non-fossil resources.
- **APD-fossil.** Abiotic resource depletion potential for fossil resources.
- **WDP.** Water deprivation potential (user), water weighted deprivation consumption.

## Additional parameters of environmental impact defined in the UNE-EN 15804 Standard.

| Ribbed steel - renewable. Unit declared: 1 tonne | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Unit | A1 | A2 | A3 | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
| PM | Incidence of diseases | 1.27E-05 | 4.40E-07 | 2.08E-06 | 1.52E-05 | 2.72E-06 | 0.00E+00 | 3.09E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| IRP [1] | kBq U235 eq | 5.22E+00 | 1.47E-02 | 4.01E-01 | 5.63E+00 | 8.91E-02 | 0.00E+00 | 7.21E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| ETP-fw [2] | CTUe | 4.28E+02 | 4.39E+01 | 2.45E+02 | 7.16E+02 | 2.74E+02 | 0.00E+00 | 2.89E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| HTP-c [2] | CTUh | 1.29E-06 | 6.22E-10 | 6.36E-07 | 1.93E-06 | 3.93E-09 | 0.00E+00 | 3.83E-09 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| HTP-nc [2] | CTUh | 5.26E-07 | 4.64E-08 | 5.20E-06 | 5.77E-06 | 2.64E-07 | 0.00E+00 | 1.70E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| SQP [2] | Pt | 5.38E+02 | 1.77E-01 | 7.93E+02 | 1.33E+03 | 1.07E+00 | 0.00E+00 | 8.94E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

- **PM.** Potential incidence of diseases due to emissions of particulate matter.
- **IRP.** Human potential exposure efficiency relative to U235.
- **ETP-fw.** Comparative potential of toxic unit for ecosystems - freshwater.
- **HTP-c.** Comparative potential of toxic unit for ecosystems - carcinogenic effects.
- **HTP-nc.** Comparative potential of toxic unit for ecosystems - non-carcinogenic effects.
- **SQP.** Soil quality potential index.

### Note 1

This impact category deals primarily with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials, is not measured in this parameter either.

### Note 2

The results of this environmental impact indicator should be used with caution as the uncertainties of the results are high and experience with this parameter is limited.

## Use of resources for 1 tonne of ribbed steel produced with 100% renewable energy

| Ribbed steel - renewable. Unit declared: 1 tonne | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Unit | A1 | A2 | A3 | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
| PERE | MJ, v.c.n. | 2.40E+03 | 2.41E-01 | 1.04E+01 | 2.41E+03 | 1.45E+00 | 0.00E+00 | 1.14E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERM | MJ, v.c.n. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0,00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | MJ, v.c.n. | 2.40E+03 | 2.41E-01 | 1.04E+01 | 2.41E+03 | 1.45E+00 | 0.00E+00 | 1.14E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRM | MJ, v.c.n. | 4.65E-02 | 3.82E-05 | 5.11E+01 | 5.11E+01 | 2.80E-04 | 0.00E+00 | 9.06E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRE | MJ, v.c.n. | 1.87E+03 | 9.77E+01 | 2.26E+02 | 2.20E+03 | 6.00E+02 | 0.00E+00 | 5.73E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRT | MJ, v.c.n. | 1.87E+03 | 9.77E+01 | 2.77E+02 | 2.25E+03 | 6.00E+02 | 0.00E+00 | 5.73E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| SM | kg | 1.14E+03 | 0.00E+00 | 0.00E+00 | 1.14E+03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | MJ, v.c.n. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0,00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | MJ, v.c.n. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW | m3 | 2.13E+00 | 4.03E-03 | 1.34E+00 | 3.47E+00 | 2.46E-02 | 0.00E+00 | 2.24E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

- **PERE.** Use of renewable primary energy excluding renewable primary energy resources used as raw material.
- **PERM.** Use of renewable primary energy used as raw material.
- **PERT.** Total use of renewable primary energy.
- **PENRE.** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw material.
- **PENRM.** Use of non-renewable primary energy used as raw material.
- **PENRT.** Total use of non-renewable primary energye.
- **SM.** Use of secondary materials.
- **RSF.** Use of renewable secondary fuels.
- **NRSF.** Use of non-renewable secondary fuels.
- **FW.** Net use of running water resources..

## Categories of wastes for 1 tonne of ribbed steel produced with 100% renewable energy

Parameters describing the generation of residue.

| Ribbed steel - renewable. Unit declared: 1 tonne | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Unit | A1 | A2 | A3 | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
| HWD | kg | 5.70E-03 | 6.14E-04 | 1.16E-03 | 7.47E-03 | 3.72E-03 | 0.00E+00 | 3.45E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NHWD | kg | 2.27E+01 | 5.00E-03 | 9.96E+00 | 3.27E+01 | 3.09E-02 | 0.00E+00 | 3.22E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RWD | kg | 3.99E-03 | 7.65E-06 | 2.64E-04 | 4.26E-03 | 4.58E-05 | 0.00E+00 | 3.25E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

- **HWD.** Hazardous wastes eliminated.
- **NHWD.** Non-hazardous wastes eliminated.
- **HWD.** Radioactive wastes eliminated.

## Categories of wastes for 1 tonne of ribbed steel produced with 100% renewable energy

Parameters describing the output flows.

| Ribbed steel - renewable. Unit declared: 1 tonne | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Unit | A1 | A2 | A3 | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
| CRU | kg | 0.00E+00 | 0.00E+00 | 1.33E+02 | 1.33E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MFR | kg | 0.00E+00 | 0.00E+00 | 4.03E+01 | 4.03E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 0.00E+00 | 0.00E+00 |
| MER | kg | 0.00E+00 | 0.00E+00 | 1.99E-01 | 1.99E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EE | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

- **CRU.** Components for their reuse.
- **MFR.** Materials for recycling.
- **MER.** Materials for energy valuation.
- **EE.** Exported energy.

# 6 ADDITIONAL ENVIRONMENTAL INFORMATION

## 6.1. Emissions to indoor air

The manufacturer declares that the steel products under study do not generate emissions to indoor air during their useful life.

## 6.2. Emissions to soil and water

The manufacturer declares that the steel products under study do not generate emissions either to soil or to water during their useful life.

## 6.3. Biogenic carbon content

The manufacturer declares that the steel products under study do not include materials with biological content.

The packaging with biogenic carbon used to distribute MEGASA's product is less than 1% of the weight of the product. Following the indications of the reference standard, the declaration of the biogenic carbon content of the packaging is omitted because the mass of the materials containing biogenic carbon in the packaging is less than 5% of the total mass of the product.

# 7 REFERENCES


- UNE-EN 36904-1 Standard. Iron and Steel industry. Environmental Product Declarations. Product Category Rules. Steel products for structures. Part 1: Basic products. 2018.
- UNE-EN 15804:2012+A2:2019. Sustainability in construction. Environmental Product Declarations. Basic product-category rules for construction products.
- General rules of the GlobalEPD program, 2nd revision. AENOR. February 2016.
- UNE-EN ISO 14025:2010 Environmental labels. Environmental Declarations, type III. Principles and procedures (ISO 14025:2006).
- UNE-EN ISO 14040:2006/A1:2021. Environmental Management. Life cycle assessment. Principles and reference framework. Modification 1. (ISO 14040:2006/Amd 1:2020).
- UNE-EN ISO 14044:2006/A1:2021 Standard. Environmental Management. Life cycle assessment. Requirements and guidelines. Modification 2. (ISO 14044:2006/Amd 2:2020).
- Report of life cycle assessment for the EPDs relative to the MEGASA GROUP's steel products. Drafted by Abaleo S.L, August 2023. Version 2.
- Databases: Ecoinvent 3.9.1 (January 2023) and Environmental Footprint 3.1.
- Environmental impact assessment methodologies implemented through SimaPro 9.5.0.0


MEGASA

# Environmental Product Declaration

GlobalEPD
A VERIFIED ENVIRONMENTAL DECLARATION

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