# ENVIRONMENTAL PRODUCT DECLARATION

## IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

## STRUCTURAL STEEL

## MARU METALL AS

# GENERAL INFORMATION

## MANUFACTURER INFORMATION

| | |
|---|---|
| **Manufacturer** | Maru Metall AS |
| **Address** | Järvevana tee 5, Tallinn, Estonia |
| **Contact details** | metall@maru.ee |
| **Website** | www.maru.ee |

## PRODUCT IDENTIFICATION

| | |
|---|---|
| **Product name** | Structural steel products |
| **Place(s) of production** | Ardu, Estonia |

**The Building Information Foundation RTS sr**

*EPDs within the same product category but from different programmes may not be comparable.*

## EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

| | |
|---|---|
| **EPD program operator** | The Building Information Foundation RTS sr / Building Information Ltd<br>Malminkatu 16 A |
| **EPD standards** | This EPD is in accordance with EN 15804+A2 and ISO 14025 standards. |
| **Product category rules** | The CEN standard EN 15804 serves as the core PCR. In addition, the RTS PCR (English version, 26.8.2020) is used. |
| **EPD author** | Mari Kirss and Anni Oviir<br>Rangi Maja OÜ<br>Tondi 22-4, Tallinn Estonia<br>www.lcasupport.com |
| **EPD verification** | Independent verification of this EPD and data, according to ISO 14025:<br>□ Internal certification ☑ External verification |
| **Verification date** | 27 October 2021 |
| **EPD verifier** | Ipek Goktas<br>One Click LCA<br>www.oneclicklca.com |
| **EPD number** | RTS_157_21 |
| **Publishing date** | 10 November 2021 |
| **EPD valid until** | 08 November 2026 |

Jessica Karhu
RTS EPD Committee secretary

Laura Apilo
Managing Director

# PRODUCT INFORMATION

The studied product is an average of all variations.

## PRODUCT DESCRIPTION

This EPD represents primed and surface coated steel structures including trusses, columns, beams, bracings, railings and secondary steel elements. The production process is similar for all products, main variation is in the raw materials. The fabricated structures comply with the requirements of the European Union and are CE marked. These steel structures are welded and painted at Maru Metall factory in Ardu, Estonia.

## PRODUCT APPLICATION

Structural steel is used for a frame structure for private, public and industrial buildings, stadiums, and also for bridges and machines. The main market areas are Scandinavia and Europe.

## TECHNICAL SPECIFICATIONS

Steel structures are fabricated according to product standardsin compliance with project requirements. Main steel material classes used are S235 - S420 and steel density is 7850 kg/m3. Detailed technical data is delivered with every delivery on CE-mark (declaration of compliance).

## PRODUCT STANDARDS

The quality management system at Maru Metall is based on the requirements of EVS-EN ISO 9001:2008 standard. The steel structures are fabricated according to EN 1090-2 and CE-marked according to EN 1090-1 up to EXC3. Welding processes are certified according to EN ISO 3834-2.

## PHYSICAL PROPERTIES OF THE PRODUCT

Dimensions of the products vary based on specific project requirements. Due to fabrication process, the recommended weight of single element fabricated is 20 t and with dimensions 4.7 x 5 x 33 m.

## ADDITIONAL TECHNICAL INFORMATION

Further information can be found at www.maru.ee.

## PRODUCT RAW MATERIAL COMPOSITION

| Product and Packaging Material | Weight, kg | Post-consumer % | Renewable % | Country Region of origin |
|---|---|---|---|---|
| Steel | 980.0 | 56 | 0 | EU & non-EU |
| Coating materials | 20.0 | 0 | 0 | EU & non-EU |
| Welding wire | <0.1 | 0 | 0 | EU |
| Packaging | 9.0 | 0 | 100 | EU |
| Total (product + packaging) | 1000+9 | - | - | - |

## PRODUCT RAW MATERIAL MAIN COMPOSITION

| Raw material category | Amount, mass-% | Material origin |
|---|---|---|
| Metals | 98 | EU & non-EU |
| Minerals | 0 | - |
| Fossil materials | 2 | EU & non-EU |
| Bio-based materials | 0 | - |

## SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

# PRODUCT LIFE-CYCLE

## MANUFACTURING AND PACKAGING (A1-A3)

When materials arrive to the Maru Metall factory, materials are sorted and sent to the preparation department. According to the project documentation and design requirements, material cutting, shaping and openings are carried out with machines in the factory. Prepared part details are blast cleaned and after that assembling and welding will take place. Welding works are carried out either manually or with a welding portal, depending on the type of structure. The main method of surface coating in the factory is wet painting. The galvanization process is external. When products are surface coated and finished, the products are packaged, marked and transported to the end user.

## TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

Scenario A5 is modelled as installation of typical steel structures in a building. Fossil fuel for building machinery and hot dip galvanised fasteners made of carbon steel (bolts, nuts, washers) fasteners, and transportation packaging waste are included.

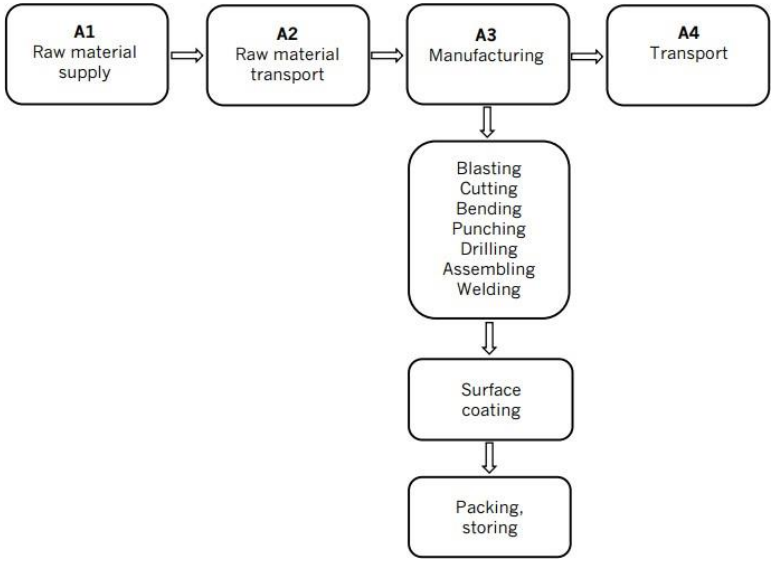
## PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase. Air, soil, and water impacts during the use phase have not been studied.

## PRODUCT END OF LIFE (C1-C4, D)

At the end-of-life, in the demolition phase end-of-life product is collected (C1) and 98% of the product is assumed to be sent (C2) to recycling (C3). Around 2% is sent to landfill (C4). Due to the recycling potential of steel, some of the end-of-life product is converted into recycled raw materials (D).

# MANUFACTURING PROCESS



# LIFE-CYCLE ASSESSMENT

## LIFE-CYCLE ASSESSMENT INFORMATION

| | |
|---|---|
| **Period for data** | 2020 |

## DECLARED AND FUNCTIONAL UNIT

| | |
|---|---|
| **Declared unit** | 1 tonne |
| **Mass per declared unit** | 1000 kg |

## BIOGENIC CARBON CONTENT

**Product's biogenic carbon content at the factory gate**

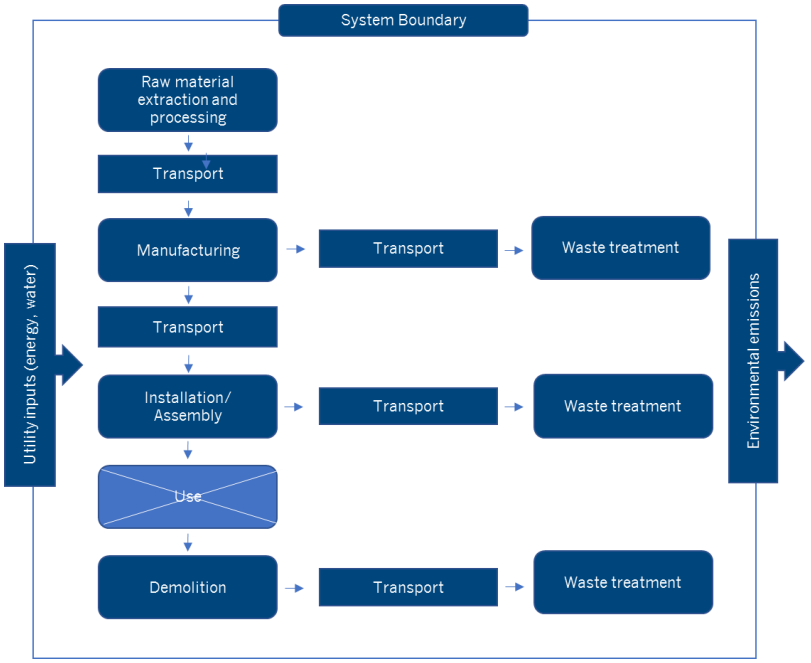
| | |
|---|---|
| **Biogenic carbon content in product, kg C** | 0.0 |
| **Biogenic carbon content in packaging, kg C** | 5.93 |

## SYSTEM BOUNDARY

This EPD covers the cradle to gate with options scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A4 (Transport), A5 (Assembly) as well as C1 (Deconstruction), C2 (Transport at end-of-life), C3 (Waste processing) and C4 (Disposal). In addition, module D - benefits and loads beyond the system boundary is included.

| Product stage | | | Assembly stage | | Use stage | | | | | | | End of life stage | | | | Beyond the system boundaries | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D | D | D |
| x | x | x | x | x | MND | MND | MND | MND | MND | MND | MND | x | x | x | x | x | x | x |
| **Geography**, by two-letter ISO country code or regions. The International EPD System only. | | | | | | | | | | | | | | | | | | |
| EU | EU | EU | EU | EU | - | - | - | - | - | - | - | EU | EU | EU | EU | EU | | |
| Raw materials | Transport | Manufacturing | Transport | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstr./demol. | Transport | Waste processing | Disposal | Reuse | Recovery | Recycling |

*Modules not declared = MND. Modules not relevant = MNR.*



## CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

## ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order:

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

Allocation used in Ecoinvent 3.6 environmental data sources follows the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the EN 15804 -standard.

This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs. All estimations and assumptions are given below:

- **Module A2, A4 & C2**

Vehicle capacity utilization volume factor is assumed to be 1 which means full load. In reality, it may vary but as role of transportation emission in total results is small and so the variety in load assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by transportation company to serve needs of other clients.

- **Module A4**

The transportation distance is defined according to RTS PCR. The typical installation place was assumed as a weighted average of all options – 175 km by lorry and 70 km by ferry. According to the manufacturer, transportation doesn't cause

losses as product are packaged properly. Also, volume capacity utilisation factor is assumed to be 1 for the nested packaged products. Density of the product is on average 7850 kg/m3, however bulk density varies depending on product type and thickness.

- **Module A5**

A5 covers the assembly of the Products. It is assumed that the fuel consumption of assembling 1 tonne of Product is 1.5 l. The Products are fastened with hot dip galvanised fasteners made from carbon steel. Waste treatment impacts occur from the wood used in transport packaging. It is assumed that the packaging is collected and prepared for incineration (chipped). The efficiency of incineration is assumed to be over 60%.

- **Module C1**

Demolition is assumed to take 0.01 kWh/kg (Bozdağ, Ö & Seçer, M (2007)). It is assumed that 100% of the waste is collected. Fasteners are not included as cut-off is applied.

- **Module C2**

It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed that it has the same weight with the declared product. All of the end-of-life product is assumed to be sent to the closest facilities such as recycling and landfill. Transportation distance to the closest disposal area is estimated as 25 km and the transportation method is assumed as lorry which is the most common.

- **Module C3**

98% of steel (World Steel Association. 2020) is recycled. Losses in the sorting process are assumed to be very small and not considered in the assessment.

- **Module C4**

The remaining 2% of steel is assumed to be sent to landfill.

- **Module D**

Benefits of recyclable waste generated in the Module C3 are considered.

# ENVIRONMENTAL IMPACT DATA

Note: additional environmental impact data is presented in annexes.

## CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP – total | kg CO2e | 1,89E3 | 1,25E2 | 2,35E2 | 2,25E3 | 2,35E1 | 3,99E1 | 3,3E0 | 2,18E0 | 2,28E1 | 1,06E-1 | -5,80E2 |
| GWP – fossil | kg CO2e | 1,88E3 | 1,25E2 | 2,56E2 | 2,26E3 | 2,37E1 | 1,81E1 | 3,3E0 | 2,18E0 | 2,42E1 | 1,05E-1 | -5.96E02 |
| GWP – biogenic | kg CO2e | 3,69E0 | 9,47E-2 | -2,08E1 | -1,7E1 | 9,79E-3 | 2,18E1 | 9,17E-4 | 1,65E-3 | -1,39E0 | 2,09E-4 | 1.77E01 |
| GWP – LULUC | kg CO2e | 4,31E0 | 3,93E-2 | 2,26E-1 | 4,58E0 | 9,95E-3 | 9,1E-3 | 2,79E-4 | 6,84E-4 | 2,75E-2 | 3,13E-5 | -7.33E-06 |
| Ozone depletion pot. | kg CFC11e | 1,35E-4 | 3,07E-5 | 4,85E-5 | 2,14E-4 | 5,45E-6 | 1,93E-6 | 7,12E-7 | 5,35E-7 | 3,47E-6 | 4,34E-8 | -1.62E-05 |
| Acidification potential | mol H+e | 9,43E0 | 4,02E-1 | 2,36E0 | 1,22E1 | 3,22E-1 | 1,16E-1 | 3,45E-2 | 7E-3 | 2,93E-1 | 1E-3 | -2.28E00 |
| EP-freshwater[2)] | kg Pe | 1,18E-1 | 1,06E-3 | 3,46E-3 | 1,22E-1 | 1,66E-4 | 6,88E-4 | 1,33E-5 | 1,85E-5 | 1,67E-3 | 1,27E-6 | -2.40E-02 |
| EP-marine | kg Ne | 1,82E0 | 8,83E-2 | 3,69E-1 | 2,28E0 | 7,88E-2 | 3,54E-2 | 1,52E-2 | 1,54E-3 | 6,47E-2 | 3,44E-4 | -4.56E-01 |
| EP-terrestrial | mol Ne | 2,06E1 | 9,82E-1 | 3,89E0 | 2,55E1 | 8,76E-1 | 3,92E-1 | 1,67E-1 | 1,71E-2 | 7,5E-1 | 3,79E-3 | -4.92E00 |
| POCP ("smog") | kg NMVOCe | 8,64E0 | 3,86E-1 | 1,19E0 | 1,02E1 | 2,42E-1 | 1,32E-1 | 4,59E-2 | 6,72E-3 | 2,05E-1 | 1,1E-3 | -3.14E00 |
| ADP-minerals & metals | kg Sbe | 2,89E-1 | 2,24E-3 | 4,01E-4 | 2,92E-1 | 3,3E-4 | 2,28E-2 | 5,03E-6 | 3,88E-5 | 1,34E-3 | 9,62E-7 | -5.42E-04 |
| ADP-fossil resources | MJ | 2,35E4 | 2,03E3 | 3,59E3 | 2,91E4 | 3,56E2 | 2,18E2 | 4,54E1 | 3,54E1 | 3,35E2 | 2,94E0 | -4.40E03 |
| Water use[1)] | m3e depr. | 1,24E3 | 7,55E0 | 1,56E1 | 1,27E3 | 1,13E0 | 6,07E0 | 8,46E-2 | 1,31E-1 | 4,76E0 | 1,36E-1 | -8.74E01 |

1) GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation. human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. 3) Required characterisation method and data are in kg P-eq. Multiply by 3.07 to get PO4e.

## USE OF NATURAL RESOURCES

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Renew. PER as energy | MJ | 2.31E3 | 2.56E1 | 5.53E2 | 2.89E3 | 3.81E0 | 9,85E0 | 2.45E-1 | 4.45E-1 | 5.26E1 | 2.38E-2 | -1.44E02 |
| Renew. PER as material | MJ | 0E0 | 0E0 | 1.98E2 | 1.98E2 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Total use of renew. PER | MJ | 2.31E3 | 2.56E1 | 7.51E2 | 3.09E3 | 3.81E0 | 9,85E0 | 2.45E-1 | 4.45E-1 | 5.26E1 | 2.38E-2 | -1.44E02 |
| Non-re. PER as energy | MJ | 2.32E4 | 2.03E3 | 3.59E3 | 2.88E4 | 3.56E2 | 2,18E2 | 4.54E1 | 3.54E1 | 3.35E2 | 2.94E0 | -4.40E03 |
| Non-re. PER as material | MJ | 3E2 | 0E0 | 0E0 | 3E2 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Total use of non-re. PER | MJ | 2.35E4 | 2.03E3 | 3.59E3 | 2.91E4 | 3.56E2 | 2,18E2 | 4.54E1 | 3.54E1 | 3.35E2 | 2.94E0 | -4.40E03 |
| Secondary materials | kg | 6.19E2 | 0E0 | 0E0 | 6.19E2 | 0E0 | 1,15E0 | 0E0 | 0E0 | 0E0 | 0E0 | 2.76E02 |
| Renew. secondary fuels | MJ | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Non-ren. secondary fuels | MJ | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Use of net fresh water | m3 | 1.6E1 | 4.22E-1 | 5.94E-1 | 1.71E1 | 6.16E-2 | 1,98E-1 | 4.01E-3 | 7.36E-3 | 1.37E-1 | 3.22E-3 | -3.94E00 |

4) PER = Primary energy resources

## END OF LIFE – WASTE

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous waste | Kg | 6.06E2 | 1.97E0 | 4.85E0 | 6.12E2 | 3.58E-1 | 2,32E0 | 4.88E-2 | 3.44E-2 | 0E0 | 2.75E-3 | -7.13E01 |
| Non-hazardous waste | Kg | 5.51E3 | 2.18E2 | 1.11E2 | 5.84E3 | 2.83E1 | 3,32E1 | 5.22E-1 | 3.8E0 | 0E0 | 2E1 | -7.98E02 |
| Radioactive waste | Kg | 6.9E-2 | 1.39E-2 | 2.56E-2 | 1.09E-1 | 2.46E-3 | 8,53E-4 | 3.18E-4 | 2.43E-4 | 0E0 | 1.95E-5 | 3.19E-03 |

## END OF LIFE – OUTPUT FLOWS

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Components for re-use | Kg | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Materials for recycling | Kg | 0E0 | 0E0 | 8.69E1 | 8.69E1 | 0E0 | 0E0 | 0E0 | 0E0 | 9.8E2 | 0E0 | 0E0 |
| Materials for energy rec | Kg | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 1,34E1 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |
| Exported energy | MJ | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 | 0E0 |

## KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP – total | kg CO2e | 1.89E0 | 1.25E-1 | 2.35E-1 | 2.25E0 | 2.37E-2 | 3,99E-2 | 3.3E-3 | 2.18E-3 | 2.28E-2 | 1.06E-4 | -5,80E-1 |
| ADP-minerals & metals | kg Sbe | 2.89E-4 | 2.24E-6 | 4.01E-7 | 2.92E-4 | 3.3E-7 | 2,28E-5 | 5.03E-9 | 3.88E-8 | 1.34E-6 | 9.62E-10 | -5,42E-7 |
| ADP-fossil | MJ | 2.35E1 | 2.03E0 | 3.59E0 | 2.91E1 | 3.56E-1 | 2,18E-1 | 4.54E-2 | 3.54E-2 | 3.35E-1 | 2.94E-3 | -4,40E0 |
| Water use | m3e depr. | 1.24E0 | 7.55E-3 | 1.56E-2 | 1.27E0 | 1.13E-3 | 6,07E-3 | 8.46E-5 | 1.31E-4 | 4.76E-3 | 1.36E-4 | -8,74E-2 |
| Secondary materials | kg | 6.19E-1 | 0E0 | 0E0 | 6.19E-1 | 0E0 | 1,15E-3 | 0E0 | 0E0 | 0E0 | 0E0 | 2,76E-1 |
| Biog. C in product | kg C | N/A | N/A | 0E0 | 0E0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Biog. C in packaging | kg C | N/A | N/A | 5.93E-3 | 5.93E-3 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

5) Biog. C in product = Biogenic carbon content in product

# SCENARIO DOCUMENTATION

**Manufacturing energy scenario documentation**

| Scenario parameter | Value |
|---|---|
| Electricity data source and quality | Market for electricity, high voltage (Reference product: electricity, high voltage). Estonia. Ecoinvent 3.6. year: 2019 |
| Electricity CO2e / kWh | 0.84 kg CO2e / kWh |
| Heating data source and quality | Heat production, wood pellet, at furnace 300kw, state-of-the-art 2014 (Reference product: heat, central or small-scale, other than natural gas). Rest of World. Ecoinvent 3.6. year: 2019 |
| District heating CO2e / kWh | 0.004 kg CO2e / kWh |
| Fuel data source and quality | Diesel, burned in building machine (Reference product: diesel, burned in building machine). Ecoinvent 3.6. Global. year: 2019 |
| Fuel CO2e / kWh | 0.33 kg CO2e / kWh |

**Transport scenario documentation (A4)**

| Scenario parameter | Value |
|---|---|
| Destination | Weighted average |
| Specific transport CO2e emissions. lorry | 0.09 kg CO2e / tkm |
| Average transport distance. lorry | 175 km |
| Specific transport CO2e emissions. ferry | 0.011 CO2e / km |
| Average transport distance. ferry | 70 km |
| Capacity utilization (including empty return) | 75% |
| Bulk density of transported products | 7850 kg/m$^3$ |
| Volume capacity utilization factor | 1 |

**End of life scenario documentation**

| Scenario parameter | Value |
|---|---|
| Collection process – kg collected separately | 1000 |
| Collection process – kg collected with mixed waste | 0 |
| Recovery process – kg for re-use | 0 |
| Recovery process – kg for recycling | 980 |
| Recovery process – kg for energy recovery | 0 |
| Disposal (total) – kg for final deposition | 20 |
| Scenario assumptions e.g. transportation | End-of-life product is transported 25 km with an average lorry. |

## BIBLIOGRAPHY


ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

ISO 21930:2017 Sustainability in buildings and civil engineering works. Core rules for environmental product declarations of construction products and services.

Ecoinvent database v3.6 (2019) and One Click LCA database.

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

Maru Metall LCA background report X.10.2021

Bozdağ, Ö & Seçer, M. 2007. *Energy consumption of RC buildings during their life cycle*.

World Steel Association. 2020. *Steel industry key facts - Steel is at the core of a green economy*. [website]

## ABOUT THE MANUFACTURER

Maru Metall AS is a leading steel structures manufacturer in Estonia with over 20 years of experience. The production capacity is up to 8000 t per year and 80% of the production is exported to several countries, mainly to the Scandinavia.

The company has experience with different structures and volumes, from sport facilities, industrial buildings, residential buildings to mechanical structures. Maru Metall AS is committed to responsible production of high-quality steel structures with execution class up to EXC3, providing with full service from design works to delivery.

The entire production cycle is carried out in the production plant in Ardu, Estonia which enables to control the production in all its stages. The company quality management system is certified according to requirements of the ISO 9001, production processes according to EN 1090, and welding processes according to EN ISO 3834-2 requirements.

For more information: www.maru.ee

## EPD AUTHOR AND CONTRIBUTORS

| | |
|---|---|
| **Manufacturer** | Maru Metall AS |
| **EPD author** | Mari Kirss and Anni Oviir |
| **EPD verifier** | Ipek Goktas |
| **EPD program operator** | The Building Information Foundation RTS sr |
| **Background data** | This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases |
| **LCA software** | The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for metal-based products |

# VERIFICATION STATEMENT

## VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with EN 15804, ISO 14025, and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The background report (project report) for this EPD

Why does verification transparency matter? Read more online.

## VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

| EPD verification information | Answer |
|---|---|
| Independent EPD verifier<br>3rd-party verifier for EPD | Ipek Goktas, One Click LCA, www.oneclicklca.com |
| EPD verification started on | 19 October 2021 |
| EPD verification completed on | 27 October 2021 |
| Approver of the EPD verifier | The Building Information Foundation RTS sr |
| **Author & tool verification** | **Answer** |
| EPD author | Mari Kirss, Anni Oviir |
| EPD Generator module | EPD Generator for metal-based products |
| Software verification date | 17 January 2021 |

## THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of

- the data collected and used in the LCA calculations,
- the way the LCA-based calculations have been carried out,
- the presentation of environmental data in the EPD, and
- other additional environmental information, as present

with respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Ipek Goktas, One Click LCA, www.oneclicklca.com

# ANNEX 1 : ENVIRONMENTAL IMPACTS – EN 15804+A1. CML / ISO 21930

| Impact category | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Global Warming Pot. | kg CO2e | 1.82E3 | 1.24E2 | 2.53E2 | 2.19E3 | 2.35E1 | 1,76E1 | 3.27E0 | 2.16E0 | 2.38E1 | 1.03E-1 | -5.64E2 |
| Ozone depletion Pot. | kg CFC11e | 1.27E-4 | 2.44E-5 | 3.99E-5 | 1.92E-4 | 4.33E-6 | 1,64E-6 | 5.63E-7 | 4.25E-7 | 2.95E-6 | 3.44E-8 | -1.39E-5 |
| Acidification | kg SO2e | 7.47E0 | 2.66E-1 | 1.96E0 | 9.69E0 | 2.5E-1 | 6,26E-2 | 4.87E-3 | 4.63E-3 | 1.82E-1 | 4.17E-4 | -1.81E0 |
| Eutrophication | kg PO4 3e | 4.66E0 | 5.37E-2 | 2.05E-1 | 4.92E0 | 3.11E-2 | 2,81E-2 | 8.57E-4 | 9.34E-4 | 7.44E-2 | 8.06E-5 | -9.97E0 |
| POCP (“smog”) | kg C2H4e | 9.52E-1 | 1.53E-2 | 7.68E-2 | 1.04E0 | 7.47E-3 | 8,11E-3 | 5.01E-4 | 2.66E-4 | 8.54E-3 | 3.06E-5 | -4.63E-1 |
| ADP-elements | kg Sbe | 2.89E-1 | 2.24E-3 | 4.01E-4 | 2.92E-1 | 3.3E-4 | 2,28E-2 | 5.03E-6 | 3.88E-5 | 1.34E-3 | 9.62E-7 | -5.42E-3 |
| ADP-fossil | MJ | 2.35E4 | 2.03E3 | 3.59E3 | 2.91E4 | 3.56E2 | 2,18E2 | 4.54E1 | 3.54E1 | 3.35E2 | 2.94E0 | -4.40E3 |