Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Welded and surface treated steel products

from

Metest Steel OÜ

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
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ISO Standard ISO 21930 and CEN standard EN 15804:2012+A2:2019 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): NPCR 013:2019 part B for steel and aluminium construction products
PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción (Chile). The review panel may be contacted via the Secretariat info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: Marcel Gómez Ferrer, Marcel Gómez Consultoría Ambiental (www.marcelgomez.com). Phone: +34 630 64 35 93. Email: info@marcelgomez.com Approved by: The International EPD® System
The life cycle assessment (LCA) has been worked out by Bureau Veritas Estonia. (www.bureauveritas.ee). Phone: +372 6676 610. Email: tallinn@bureauveritas.com
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804:2012+A2:2019. For further information about comparability, see EN 15804:2012+A2:2019 and ISO 14025.

Company information

Owner of the EPD: Metest Steel OÜ
Contact: Annes Märtsimaa, annes@metest.eu, +372 53267853.
Description of the organisation: Company specialized in production of welded steel beams. The in-line production process is able to produce all types of welded beams that are used in construction or steel industry.
Product-related or management system-related certifications: EN ISO 9001 and 14001, EN ISO 3834-2 and EN 1090-2.
Name and location of production site(s): Metest Steel OÜ, Kõvaküla, Estonia.

Product information

Product name: Welded and surface treated steel products
Product identification: The CEN standard EN 15804:2012+A2:2019 serves as the core PCR. In addition, NPCR 013:2019 part B for steel and aluminium construction products and the EN 1090.
Information on fire protection according to EN 13501 – 1 or any national standard.
Class of construction material - A1 by default. It can be modified on demand.
Product description: Products are part of structural steel frame for buildings, bridges or other load bearing frames. Products are assembled on the construction site with help of heavy lifting equipment and are joined together by locking mechanism, welding on site or bolt connection. The steel structures are welded and prepared at Metest Steel OÜ factory in Kõvaküla, Estonia. The technical parameters of the product are:

- Density: 7850 kg/m^3;
- Thermal conductivity ambient temperature: 40-50 W/(m^2 K);
- Tensile strength up to 3 mm: 510-680 MPa;
- Tensile strength 3 mm – 100 mm: 470-630 MPa;

The products is manufactured following the EN ISO 3834-2 and EN 1090-2 standards.
The target group of the product is Business to business (B2B).

LCA information

Functional unit / declared unit: 1 kg of the welded and surface treated steel products.
Reference service life: 50 years.
Time representativeness: The production data are from 2020, the database data are from 2013 – 2021 i.e. no data is older than 10 years.
Database(s) and LCA software used: Database used is mainly Ecoinvent 3.7.1. The LCA software used is SimaPro 9.2.
Data quality:
The foreground data was collected internally considering the latest available average production amounts and measures during the last year (2020). Data regarding the end-of-life modules are based on the experts' judgement and database data (i.e. Ecoinvent 3.7.1.).
According to the criteria of the UN Environment Global Guidance on LCA database development, the quality level can be defined as very good. Data is geographically representative as it comes from the area of study, it is technical representative as it comes from processes and products under study using the same state of technology defined in goal and scope, and it is also time representative as data used was collected less than 3 years difference between the reference year according to the documentation.
The data quality is summarized in the table below.

Geographical rating (GER)	Temporal rating (TIR)	Technologycal rating (TER)	Total average score (GER+TIR+TER)
2,43	1,81	1,90	2,05

Where the 1 is the highest rank and 5 is the lowest rank.

Description of system boundaries:

LCA is made in "Cradle-to-gate with options, modules C1 – C4 and module D" form. All major materials, production energy use and waste are included for product stages A1, A2, A3, A4, C1, C2, C3, C4, and D. All life cycle impacts are included, see flowchart below. The following information describes the scenarios in the different modules of the EPD. It must be noted that, all major raw materials and all the essential energy are included. Marginal production process for raw materials and energy flows with a cut-off of 1% are not included. This cut-off rule does not apply for hazardous materials and substances.

- **Raw material supply (A1)**

The materials needed for the production of welded and surface treated steel products are: steel, paint and thinner agent. The hardener agent used in the process has not been considered because of a quantity less than 1% in mass. In addition to electricity from public network a solar plant that the company Metest Metall OÜ owns is considered for electricity supply for the raw material manufacturing (A1).

- **Transport (A2)**

The steel is transported as followed: 40,5% for a distance of 500 km from Russia, 29,7% for a distance of 1900 km from Ukraine, 11% for a distance of 900 km from Finland/Sweden,15% for a distance of 2500 km from Russia, and 3,9% for a distance of 200 km from local suppliers. Paint and thinner agent are transported for 195 km from Estonia.

- **Manufacturing (A3)**

The processes present in the manufacturing phase are the welding and the protective painting, of which energy consumption and gaseous emissions have been modeled. All the materials coming from the packaging of the paint and the hardening agent are 100% recycled as scrap metal, so there is no waste disposed.

- **Transport from production place to user (A4)**

Transportation from Metest Steel OÜ production sites in Estonia to customers in Sweden and Finland have been considered. First the product has 190 km of transport by truck to the harbour, then it is shipped with ferry for 87 km to Finland and 336 km to Sweden and then it followes different distance of 200 km, 400 km and 600 km. Road transport is carried out for 50% (percentage assumed in the Ecoinvent 3.7.1 database) with lorry 16 – 32 metric ton, EURO5 and for 50% (percentage assumed in the Ecoinvent 3.7.1 database) through lorry 16 – 32 metric ton, EURO6. The transportation impacts cover fuel direct exhaust emissions, environmental impacts of fuel production and also related to infrastructure emissions. The information of these transports are shown in the table below.

Type	Vehicle	Distance km	Fuel/energy consumption	Value (l/t)
Sweden destination				
Truck	Lorry, 16-32t, EURO6	195	0,0438 l/tkm	8,54
Truck	Lorry, 16-32t, EURO5	195	0,0449 l/tkm	8,76
Boat	Ferry	336	0,0299 l/tkm	10,05
Finland destination 1				
Truck	Lorry, 16-32t, EURO6	195	0,0438 l/tkm	8,54
Truck	Lorry, 16-32t, EURO5	195	0,0449 l/tkm	8,76
Boat	Ferry	87	0,0299 l/tkm	2,60
Finland destination 2				
Truck	Lorry, 16-32t, EURO6	295	0,0438 l/tkm	12,92

Truck	Lorry, 16-32t, EURO5	295	0,0449 l/tkm	13,25
Boat	Ferry	87	0,0299 l/tkm	2,60
Finland destination 3				
Truck	Lorry, 16-32t, EURO6	395	0,0438 l/tkm	17,30
Truck	Lorry, 16-32t, EURO5	395	0,0449 l/tkm	17,74
Boat	Ferry	87	0,0299 l/tkm	2,60

- **Demolition (C1)**

It has been assumed that for the demolition phase for a steel structure the use of the following machines is necessary: lattice boom crane, forklift, hydraulic crane, and crawler loader. The average using time is 20 minutes.

- **Transport (C2)**

It is assumed an average transport for a distance of 100 km by truck.

- **Waste processing (C3)**

This includes procedures that allow the sorting of steel from other possible building materials present.

- **Disposal (C4)**

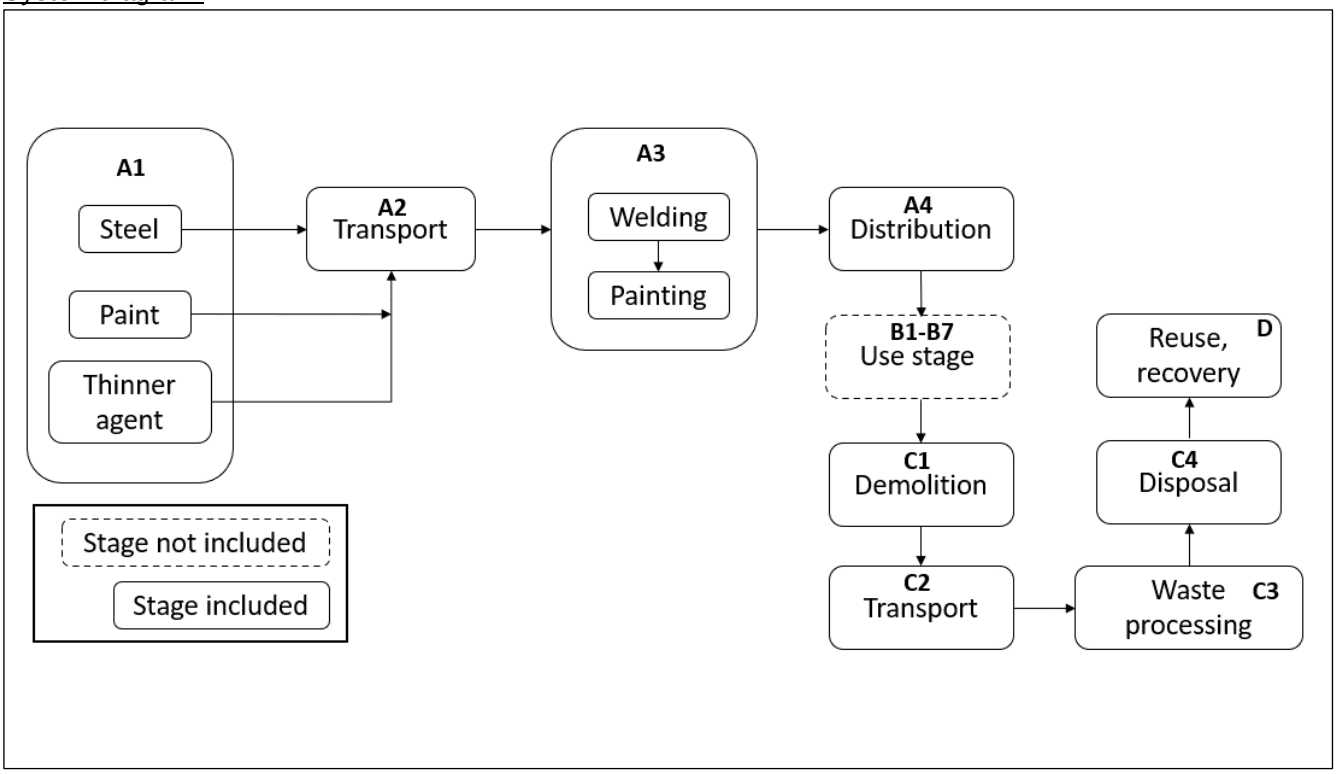
All the steel is recycled so there is not a disposal. The information about the end-of-life scenario are summarized in the following table.

Parameter	Value/Description
Collection process specified by type	The product is collected with other possible construction waste and sent to the sorting procedures.
Recovery system specified by type	100% recycling
Disposal specified by type	0%
Assumptions for scenario development (e.g. transportation)	Lorry, 16-32t, EURO5. Distance: 50km. Consumption: 0,0449 l/tkm.

- **Reuse, recovery, recycling, potential (D)**

It is assumed that all the quantity of steel is recycled.

System diagram:



More information: Heat, electricity and other energy use, and waste in production are calculated as an average weight per produced tonne of all products using yearly production data and rate for 2020. For manufacturing processes and raw materials, the specific country mix of heat and electricity were considered. For secondary data on materials' flow information has been gathered from the Ecoinvent 3.7.1 database. In addition, the allocation is made following the provisions of NPCR 013:2019 Part B for steel and aluminium construction products. Incoming energy and water together with waste production in-house are allocated equally among all products through mass allocation. The recycling process and transportation of the material are allocated to this analysis. The polluter payer and modularity principles have been followed. Moreover, the processes excluded are environmental impacts from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process and personnel-related impacts, such as transportation to and from work.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	EU, RU	EU	EE	SE, FI	ND	ND	ND	ND	ND	ND	ND	ND	EU	EU	EU	EU	EU
Specific data used						-	-	-	-	-	-	-	-	-	-	-	-
Variation – products						-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites						-	-	-	-	-	-	-	-	-	-	-	-

More information: Note that ND stands for "Not Declared" as reported by EN 15804:2012+A2:2019.

Content information

Data refer to the declared unit of product.

Product components	Weight, %	Post-consumer material, weight-%	Renewable material, weight-%
Steel	>99%	51%	0%
Paint	<1%	0%	0%
TOTAL	100%	>50%	0%

Since the paint is present in a quantity of less than 1%, it can be assumed that the entire declared unit consists of 1 kg of steel.

The product does not contain any REACH SVHC substances in amounts greater than 1%.

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804:2012+A2:2019

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	1,01 E+00	2,09 E-01	1,15 E-01	7,43 E-01	7,06 E-02	8,32 E-03	1,68 E-03	0,00 E+00	-1,61 E+00
GWP-fossil	kg CO_2 eq.	9,96 E-01	2,08 E-01	1,09 E-01	7,41 E-01	7,06 E-02	8,30 E-03	1,58 E-03	0,00 E+00	-1,59 E+00
GWP-biogenic	kg CO_2 eq.	1,39 E-02	5,01 E-04	5,31 E-03	1,68 E-03	5,52 E-05	3,97 E-05	8,86 E-05	0,00 E+00	-9,77 E-03
GWP-luluc	kg CO_2 eq.	4,36 E-03	7,04 E-05	8,74 E-05	2,65 E-04	5,57 E-06	5,58 E-06	3,24 E-06	0,00 E+00	-1,44 E-03
ODP	kg CFC 11 eq.	8,51 E-08	4,72 E-08	1,55 E-08	1,67 E-07	1,51 E-08	1,88 E-09	8,06 E-11	0,00 E+00	-9,55 E-08
AP	mol H^+ eq.	5,64 E-03	8,15 E-04	8,52 E-04	3,88 E-03	3,76 E-04	3,32 E-05	8,63 E-06	0,00 E+00	-7,42 E-03
EP-freshwater	kg PO_4^{3-} eq.	1,40 E-04	4,65 E-06	1,07 E-05	1,60 E-05	6,98 E-07	1,84 E-07	5,17 E-07	0,00 E+00	-2,68 E-04
EP-freshwater	kg P eq.	4,25 E-04	1,41 E-05	3,24 E-05	4,85 E-05	2,12 E-06	5,57 E-07	1,57 E-06	0,00 E+00	-8,13 E-04
EP-marine	kg N eq.	1,27 E-03	2,45 E-04	1,36 E-04	1,01 E-03	1,49 E-04	1,02 E-05	1,51 E-06	0,00 E+00	-1,99 E-03
EP-terrestrial	mol N eq.	1,12 E-02	2,68 E-03	1,39 E-03	1,11 E-02	1,64 E-03	1,11 E-04	1,33 E-05	0,00 E+00	-1,66 E-02
POCP	kg NMVOC eq.	4,33 E-03	8,26 E-04	4,53 E-04	3,35 E-03	4,51 E-04	3,39 E-05	3,69 E-06	0,00 E+00	-6,79 E-03
ADP-minerals&metals*	kg Sb eq.	6,98 E-06	7,66 E-07	2,84 E-07	2,58 E-06	2,83 E-08	2,99 E-08	1,51 E-08	0,00 E+00	-1,26 E-05
ADP-fossil*	MJ	1,21 E+01	3,15 E+00	1,58 E+00	1,11 E+01	9,62 E-01	1,26 E-01	3,25 E-02	0,00 E+00	-1,86 E+01
WDP	m^3	4,19 E-01	9,00 E-03	4,23 E-02	3,10 E-02	1,39 E-03	3,57 E-04	3,41 E-04	0,00 E+00	-7,87 E-01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption									

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Global warming potential - GHG

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
GWP-GHG	kg CO_2 eq.	1,01 E+00	2,09 E-01	1,15 E-01	7,43 E-01	7,06 E-02	8,32 E-03	1,68 E-03	0,00 E+00	-1,61 E+00
Acronyms	GWP-GHG = Global Warming Potential, Green House Gases emissions.									

Potential environmental impact – additional mandatory and voluntary indicators

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
PM	Disease inc.	8,05 E-08	1,43 E-08	3,02 E-08	4,74 E-08	4,70 E-09	5,75 E-10	2,70 E-11	0,00 E+00	-1,31 E-07
IRP	kBq U-235 eq	8,29 E-02	1,65 E-02	1,89 E-02	5,77 E-02	4,39 E-03	6,55 E-04	8,54 E-04	0,00 E+00	-1,23 E-01
ETP-fw	CTUe	2,62 E+01	2,41 E+00	1,54 E+00	8,42 E+00	5,49 E-01	9,59 E-02	2,15 E-02	0,00 E+00	-4,76 E+01
HTP-c	CTUh	1,28 E-08	8,74 E-11	3,97 E-10	3,15 E-10	6,51 E-11	3,42 E-12	1,05 E-12	0,00 E+00	-2,53 E-08
HTP-nc	CTUh	2,48 E-08	2,44 E-09	1,07 E-09	8,24 E-09	3,28 E-10	9,74 E-11	1,69 E-11	0,00 E+00	-4,73 E-08
SQP	Pt	5,91 E+00	2,17 E+00	5,06 E-01	7,38 E+00	1,25 E-01	8,64 E-02	2,06 E-02	0,00 E+00	-6,79 E+00
Acronyms	PM = Potential incidence of disease due to PM emissions; IRP = Potential Human exposure efficiency relative to U235; ETP-fw= Potential Comparative Toxic Unit for ecosystems; HTP-c = Potential Comparative Toxic Unit for humans; HTP-nc = Potential Comparative Toxic Unit for humans; SQP = Potential Soil quality index									

Use of resources

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
PERE	MJ	1,07 E+00	3,11 E-02	9,98 E-02	1,06 E-01	3,76 E-03	1,23 E-03	5,00 E-03	0,00 E+00	-1,17 E+00
PERM	MJ	3,54 E-01	1,16 E-02	7,48 E-02	4,01 E-02	1,22 E-03	4,60 E-04	7,94 E-04	0,00 E+00	-3,02 E-01
PERT	MJ	1,43 E+00	4,27 E-02	1,75 E-01	1,46 E-01	4,99 E-03	1,69 E-03	5,79 E-03	0,00 E+00	-1,48 E+00
PENRE	MJ	1,21 E+01	3,15 E+00	1,57 E+00	1,11 E+01	9,62 E-01	1,26 E-01	3,25 E-02	0,00 E+00	-1,86 E+01
PENRM	MJ	5,58 E-03	6,51 E-05	1,26 E-05	2,59 E-04	2,52 E-06	2,58 E-06	1,24 E-07	0,00 E+00	-3,90 E-04
PENRT	MJ	1,21 E+01	3,15 E+00	1,57 E+00	1,11 E+01	9,62 E-01	1,26 E-01	3,25 E-02	0,00 E+00	-1,86 E+01
SM	kg	5,09 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00

NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
FW	m^3	1,20 E-02	3,18 E-04	1,38 E-03	1,09 E-03	4,65 E-05	1,26 E-05	2,64 E-05	0,00 E+00	-2,19 E-02
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources 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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water									

Waste production and output flows

Waste production

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	3,53 E-05	8,50 E-06	1,37 E-06	2,79 E-05	2,60 E-06	3,27 E-07	2,46 E-08	0,00 E+00	-5,71 E-05
Non-hazardous waste disposed	kg	8,98 E-01	1,51 E-01	1,12 E-02	5,09 E-01	1,16 E-03	6,01 E-03	1,19 E-04	0,00 E+00	-7,70 E-01
Radioactive waste disposed	kg	4,42 E-05	2,16 E-05	9,85 E-06	7,62 E-05	6,70 E-06	8,59 E-07	2,30 E-07	0,00 E+00	-5,24 E-05

Output flows

Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
Material for recycling	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,00 E+00
Material for energy recovery	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
Exported energy	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00

Information on biogenic carbon content

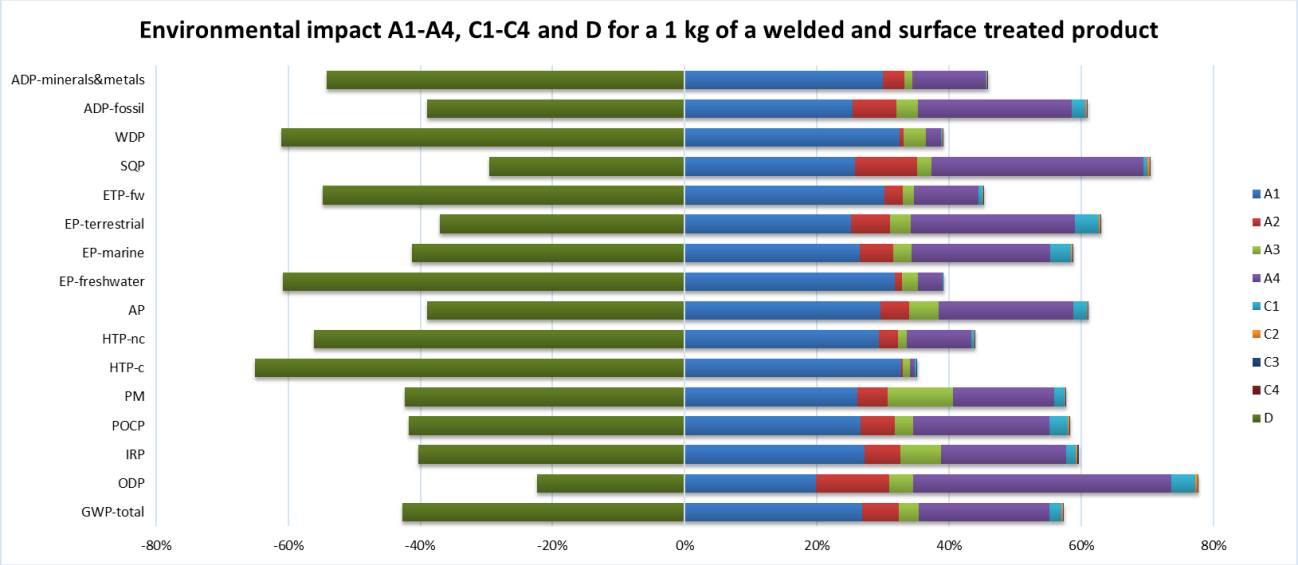
Results per functional or declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0,00 E+00
Biogenic carbon content in packaging	kg C	0,00 E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

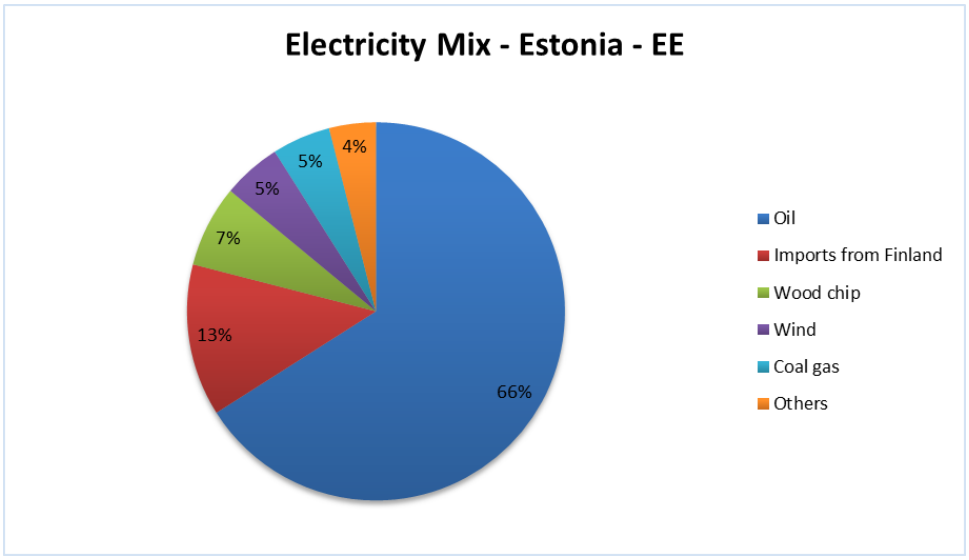
To obtain the results in accordance with the provisions of EN 15804:2012+A2:2019, the “EF method”, “EDIP”, “CED” and “IPCC” methodologies have been used for environmental impacts, waste generation, energy consumption and biogenic carbon content respectively.

Additional Environmental Information

Most of the impacts occur in the raw material supply (A1) for most of the indicators. The distribution (A4) is dominant for Ozone Depletion Potential (ODP) and Land Use (SQP). While it is evident the benefit of the recycling of steel in the D phase.



The Estonian electricity mix is used for production site, based on the data present on Ecoinvent 3.7.1. The main electricity sources are production from oil (66%), imports for Finland (13%), production from wood chips (7%), production from wind (5%), production from coal gas (5%), and others (4%).



Information related to the EPD sector

This EPD® is individual.

References

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

- General Programme Instructions of the International EPD® System. Version 3.01

- ISO 14040:2006. Environmental management – Life cycle assessment – Principles and framework

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

- Yeung J., Walbridge S., Haas C., et al., (2017). Understanding the total life cycle cost implications of reusing structural steel. Environ Syst Decis. 37:101-120

- LCA software SimaPro 9.2

- NPCR 013:2019 Part B for steel and aluminium construction products

- EN ISO 3834-2: Quality requirements for fusion welding of metallic materials - Part 2: Comprehensive quality requirements

- EN 1090-2: Execution of steel structures and aluminium structures - Part 2: Technical requirements for steel structures

- EN ISO 9001: Quality management systems — Requirements

- EN ISO 14001:2015: Environmental management systems — Requirements with guidance for use

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