Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Welded and surface treated steel products

from

EXMET SERVICES

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
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804:2012+A2:2019 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction products, v1.2.5 NPCR 013:2019 Part B for Steel and Aluminium Construction Products, version 4.0, issued 06/10/2021 as Environdec c-PCR “Steel and Aluminium structural products, and other metal products, for use in construction works” is under development
PCR review was conducted by: PCR - The Technical Committee of the International EPD® System NPCR - Version 4.0 (ed.) EPD-Norway Secretariat
Life Cycle Assessment (LCA)
LCA accountability: The life cycle assessment (LCA) has been worked out by Bureau Veritas Latvia Phone: +371 67323246, E-mail: riga@bureauveritas.com
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: Elisabet Amat Guasch GREENIZE PROJECTS eamat@greenize.es Approved by: The International EPD® System
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 registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of

PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Exmet Services OÜ
Contact: Herman Vesiaid, Chief Financial Officer, herman.vesiaid@exmet.ee, +372 5340 4908
Description of the organisation: Exmet Services OÜ are experts in the field of metal processing with clients in construction and machinery who also are leaders in their field, therefore, with high expectations for quality. The certified manufacturing processes of Exmet Services meet the strictest requirements of the metal industry and our quality monitoring ensures the best service. Exmet Services specializes in all sorts of metal processing, including plasma and laser cutting, sheet metal bending, CNC profile processing, shot blasting and welding. Exmet Group, which Exmet Services also is a part of, manufactures, sells, and upcycles steel for manufacturing and construction. Exmet RSE, Exmet Services, Exmet PA and Exmet OÜ cooperate to fulfil even the most complex needs that you may have while being fast and flexible.
Product-related or management system-related certifications: ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, EN ISO 3834-2-2005, TR 392:2018, EN 1090-2 EXC3, SFS 1267:2008
Name and location of production site(s): Exmet Services OÜ Koorma 5, Muuga, 74004 Harjumaa Estonia

Product information

Product name: Welded and surface treated steel products
Product identification: TRUSSES, WQ-beams, COLUMNS, BEAMS, BRACINGS, STAIRS, HANDRAILS, PLATFORMS/FRAMES
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, bolt connections etc. The steel structures are welded and prepared at Exmet Services OÜ factory. The technical parameters of the product are:

- Density: 7800-8000 kg/m^3;
- Thermal conductivity: 40-50 W/mK;
- Tensile strength: 470-680 N/mm^2;
- Thickness 2 – 80 mm, 8mm on average.

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).
UN CPC code: 421 Structural metal products and parts thereof
Geographical scope: module A3 represents country of manufacturing plant, i.e. Estonia, while End-of-life and Construction stages has been modelled for destination countries (European Union) and Product stage's raw materials (module A1) has been modelled for countries of origin (EU, Turkey). Representation of all stages and modules of LCA is presented in geographical scope.

LCA information

Functional unit / declared unit: 1 kg of Welded and surface treated steel products
Reference service life: is has been assumed that reference service life is equal to Estimated Service Life of building or the structure of intended use
Time representativeness: All inventory data was collected using year 2021 as a reference year. Secondary data based on Ecoinvent database, processes correspond to the latest available in the Ecoinvent version 3.8 with time representativeness for 2011 – 2021.

Database(s) and LCA software used: Database used is mainly Ecoinvent 3.8. The LCA software used is SimaPro 9.4.0.2.

Description of system boundaries:

The system boundaries for EPD Type B is “Cradle to gate with options, modules C1–C4, module D and with optional modules as A4 and A5”

All major materials, production energy use and waste are included for product stages A1, A2, A3, A4, A5, C1, C2, C3, C4, and D.

All mentioned 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.

Data quality:

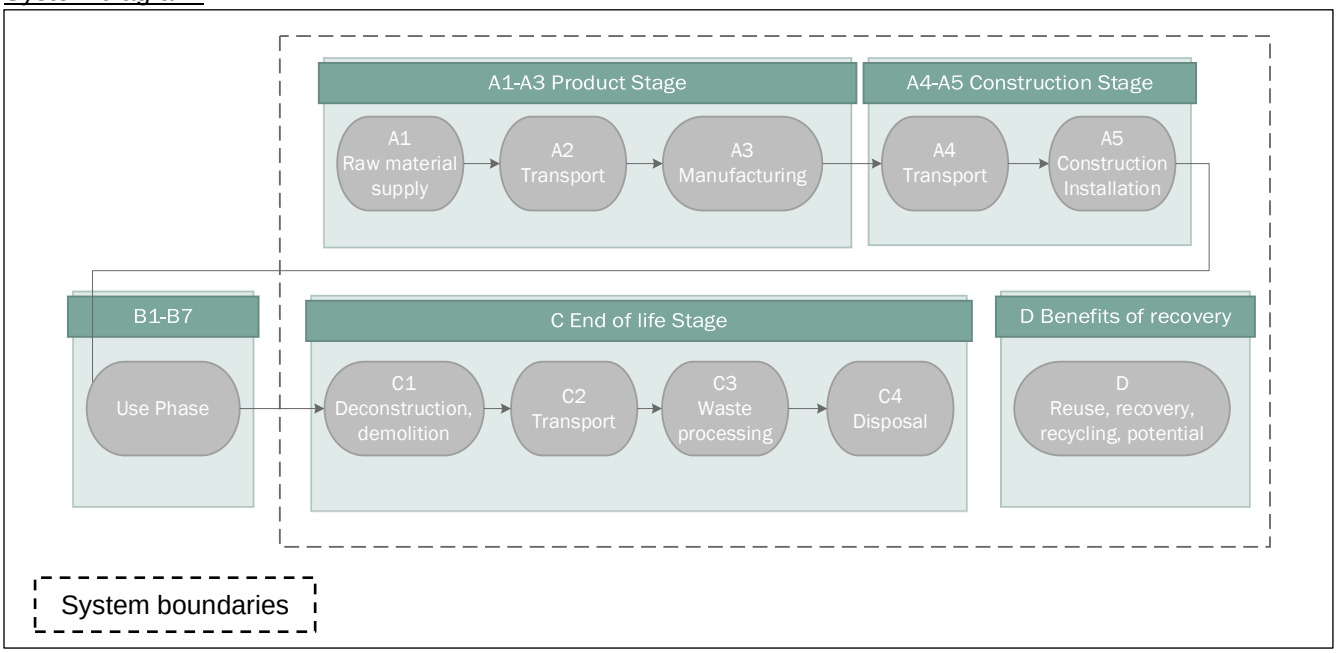
The foreground data was collected internally considering the latest available average production amounts and measures during the last year (2021). Data regarding the end-of-life modules are based on the experts’ judgement and waste treatment scenarios described in the Ecoinvent 3.8 database.

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. The data quality is summarized in the table below.

Technological rating (TER)	Geographical rating (GER)	Temporal rating (TIR)	Total average score (TER+GER+TIR)
2,56	**2,50**	**2,02**	**2,36**

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

System diagram:



More information:

Heat, electricity and other energy use, and waste in production are calculated as an average weight per produced weight of all products using yearly production data and rate for 2021. For manufacturing processes and raw materials, the specific country mix of electricity was considered. For secondary data

on materials' flow information has been gathered from the Ecoinvent 3.8 database. In addition, the allocation is made following the provisions of PCR 2019:14 Construction products, v1.2.5. Incoming energy and resources 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.

- **Raw material supply (A1)**

The materials needed for the production of welded and surface treated steel products are: steel and welding wire (steel). As per manufacturer – 8% of incoming raw steel is considered as a share of recycled steel. Coating process is represented in module A3.

- **Transport (A2)**

The steel is transported as followed: 52% for a distance of 970 km from Poland, 20% for a distance of 2485 km from Italy, 15% for a distance of 1270 km from Denmark, 11% for a distance of 1560 km from Czech Republic and 2,0% for a distance of 3500 km from Turkey. Other auxiliary materials are transported locally for 50 km from Estonia.

- **Manufacturing (A3)**

The processes present in the manufacturing phase are the welding and coating, of which energy consumption and use of auxiliary components have been modeled. Residuals (cut-offs) of raw material are considered for recycling as waste processing, iron waste from shot blasting is considered for final waste flow for mass balance purposes.

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

Transportation from Exmet Services OÜ production site in Estonia to customers in Sweden (Stockholm and 200km radius), Finland (Helsinki and 200km radius) and Estonia via road transport have been considered. First two destinations involve the use of sea transport as well. Road transport is carried with freight lorry of 16 – 32 metric ton and EURO6 emissions class. 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				
Road	Lorry, 16-32t, EURO6	208	0,0441 l/tkm	9,17
Water	Sea ferry	400	0,0298 l/tkm	11,91
Finland destination				
Road	Lorry, 16-32t, EURO6	119	0,0441 l/tkm	5,25
Water	Sea ferry	81	0,0298 l/tkm	2,41
Estonian destination				
Road	Lorry, 16-32t, EURO6	70	0,0441 l/tkm	3,09

- **Construction installation (A5)**

It has been assumed that for installation phase of a steel structure the use of roughly the same machinery as in module C1 is necessary (lattice boom crane, forklift, hydraulic crane and crawler

loader). Same specific use of machinery operation that varies from 17 to 21 minutes per ton, has been applied to this calculation.
Module A5 also includes the environmental impact of waste resulting from all packaging materials of the product:

- collection of waste wood (Wooden planks) for Recycling purposes as a total value;
- collection of metal (Metal strips) that according to each destination strategy is further distributed between Recycling, Landfilling and Incineration.

Benefits and loads of this treatment are included in module D as avoided impact.

- **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 with construction machinery operation specific use that varies from 17 to 21 minutes per ton. Data from module C1 has been extrapolated to module A5 Construction installation. Approach adapted from scientific paper Yeung J., Walbridge S., Haas C., et al., (2017). “Understanding the total life cycle cost implications of reusing structural steel”.

- **Transport (C2)**

It has been assumed that the average distance for transportation of Demolished steel structure elements, using the “Freight lorry, EURO5, 16-32t” is 50 km.

- **Waste processing (C3)**

This includes procedures that allow the sorting of steel from other possible building materials present, and the processing for any given further use. Waste treatment scenario for each destination country at End-of-Life stage is displayed in the following table:

Waste Treatment	Estonia	Finland	Sweden
Recycling	100%	85,1%	85,8%
Incineration	-	14,6%*	14,0%*
Landfilled	-	0,3%	0,2%

*Recovery of metal scrap for recycling after incineration is 472.89g per 1 kg, therefore this amount also is considered as recycled.

- **Disposal (C4)**

According to average waste treatment scenarios found in Ecoinvent 3.8 database 14.2% (Sweden) and 14.9% (Finland) of total steel weight is assumed to be disposed of via landfill (1.4-1.7% of disposable amount) and municipal incineration (98.3-98.6% of disposable amount) in Sweden’s and Finland’s destinations. Due to 100% recycling in third destination country (Estonia), no disposal process has been modelled. Incineration treatment is assumed to be carried out without energy recovery because of the base material (steel) that is not combustible and the purpose of Incineration treatment is purely an alternative way of disposing waste (per chosen dataset).

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

In this module, the potential benefit from reusing the recycled steel from module C3 is considered. It is assumed that the recycled steel replaces iron scrap, sorted and pressed in the market. Transportation

activities required to put the recycled steel in the market are accounted for in this module. Wood recycling benefits from module A5 are also included in this stage. No energy recovery via Incineration has been considered.

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

	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	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	GLO		EE	EU		ND	ND	ND	ND	ND	ND	ND	EU	EU	EU	EU	EU
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products						-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites						-	-	-	-	-	-	-	-	-	-	-	-

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

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Steel	0,9901	29,35%	0,00
Welding wire (steel)	0,0099	23,21%	0,00
TOTAL	**1,0000**	**29,29%**	**0,00**

Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Wooden planks	0,00559	0,56%	0,00
Metal strips	0,00101	0,10%	0,00
TOTAL	**0,00660**	**0,66%**	**0,00**

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

The biogenic carbon content of the product and of the packaging is less than 5%, therefore the declaration of biogenic carbon content is omitted.

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	2,2E+00	2,5E-02	1,1E-01	1,1E-01	6,9E-03	2,3E-03	2,2E-04	-3,0E-02
GWP-biogenic	kg CO_2 eq.	-2,7E-03	7,1E-06	3,2E-05	3,2E-05	2,2E-06	1,6E-05	1,2E-06	-2,8E-02
GWP-luluc	kg CO_2 eq.	1,1E-03	2,8E-07	2,8E-06	2,8E-06	5,6E-08	4,7E-06	3,4E-09	-1,7E-05
GWP-total	kg CO_2 eq.	2,2E+00	2,5E-02	1,1E-01	1,1E-01	6,9E-03	2,3E-03	2,2E-04	-6,0E-02
ODP	kg CFC 11 eq.	1,5E-07	5,5E-09	2,6E-08	2,5E-08	1,6E-09	4,0E-10	4,9E-11	-3,5E-09
AP	mol H^+ eq.	7,9E-03	3,7E-04	6,2E-04	6,2E-04	2,4E-05	2,0E-05	1,6E-06	-1,2E-04
EP-freshwater	kg P eq.	8,5E-04	1,0E-07	6,8E-07	6,8E-07	2,8E-08	2,2E-07	6,2E-07	-5,6E-06
EP-marine	kg N eq.	1,8E-03	9,1E-05	2,5E-04	2,5E-04	7,7E-06	3,1E-06	6,5E-07	-7,1E-05
EP-terrestrial	mol N eq.	1,9E-02	1,0E-03	2,8E-03	2,8E-03	8,5E-05	3,4E-05	7,1E-06	-4,5E-04
POCP	kg NMVOC eq.	9,1E-03	2,6E-04	7,5E-04	7,5E-04	2,3E-05	1,0E-05	2,1E-06	-1,3E-04
ADP-minerals&metals*	kg Sb eq.	4,8E-07	7,4E-10	5,9E-09	5,9E-09	3,0E-10	4,8E-11	9,8E-12	-1,1E-09
ADP-fossil*	MJ	2,3E+01	3,4E-01	1,6E+00	1,6E+00	9,8E-02	3,8E-02	3,0E-03	-2,9E-01
WDP*	m^3	4,2E-01	-5,8E-05	4,1E-04	4,1E-04	-1,6E-05	2,1E-04	-1,1E-03	-1,5E-03
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.*

Potential environmental impact – additional mandatory and voluntary indicators

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	2,2E+00	2,5E-02	1,1E-01	1,1E-01	6,9E-03	2,3E-03	2,2E-04	-3,1E-02

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Use of resources

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	5,2E-01	3,7E-04	1,9E-03	1,9E-03	1,1E-04	3,5E-03	4,1E-06	-1,3E-02
PERM	MJ	2,8E-01	1,2E-04	6,5E-04	6,5E-04	3,7E-05	2,7E-03	1,5E-06	-1,4E-01
PERT	MJ	8,0E-01	4,9E-04	2,6E-03	2,5E-03	1,5E-04	6,2E-03	5,6E-06	-1,5E-01
PENRE	MJ	2,3E+01	3,4E-01	1,6E+00	1,6E+00	9,8E-02	3,8E-02	3,0E-03	-2,9E-01
PENRM	MJ	3,3E-03	5,6E-07	9,0E-06	9,0E-06	4,1E-08	1,9E-07	6,9E-09	-9,0E-06
PENRT	MJ	2,3E+01	3,4E-01	1,6E+00	1,6E+00	9,8E-02	3,8E-02	3,0E-03	-2,9E-01
SM	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
RSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
NRSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
FW	m^3	1,1E-02	9,5E-07	2,5E-05	2,5E-05	2,5E-07	1,5E-05	-2,5E-05	-9,5E-05
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

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1,6E-04	6,2E-07	4,1E-06	4,1E-06	2,6E-07	1,8E-08	7,8E-09	-5,7E-07
Non-hazardous waste disposed	kg	2,9E-01	1,5E-05	9,7E-05	9,7E-05	4,0E-06	9,4E-06	9,0E-04	-1,3E-02
Radioactive waste disposed	kg	6,1E-05	2,4E-06	1,1E-05	1,1E-05	7,0E-07	3,1E-07	2,1E-08	-2,1E-06

Output flows

Results per functional or declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Material for recycling	kg	8,6E-02	0,0E+00	6,6E-03	0,0E+00	0,0E+00	9,4E-01	2,7E-02	0,0E+00
Materials for energy recovery	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Exported energy, electricity	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Exported energy, thermal	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+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
Biogenic carbon content in packaging	kg C	0,00

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

Additional environmental information

With some exclusions, i.e. Ozone Depletion Potential (ODP) and Biogenic Global Warming Potential, vast majority of environmental impact indicators have raw material supply (Module A1) as leading source of impact with at least 60% share. For Ozone Depletion Potential (ODP) raw materials result in almost 40% share of total impact with module A2 contributing another 20%, while Module D stands out in Biogenic Global Warming Potential. Core environmental impact indicators are displayed in Figure 1.

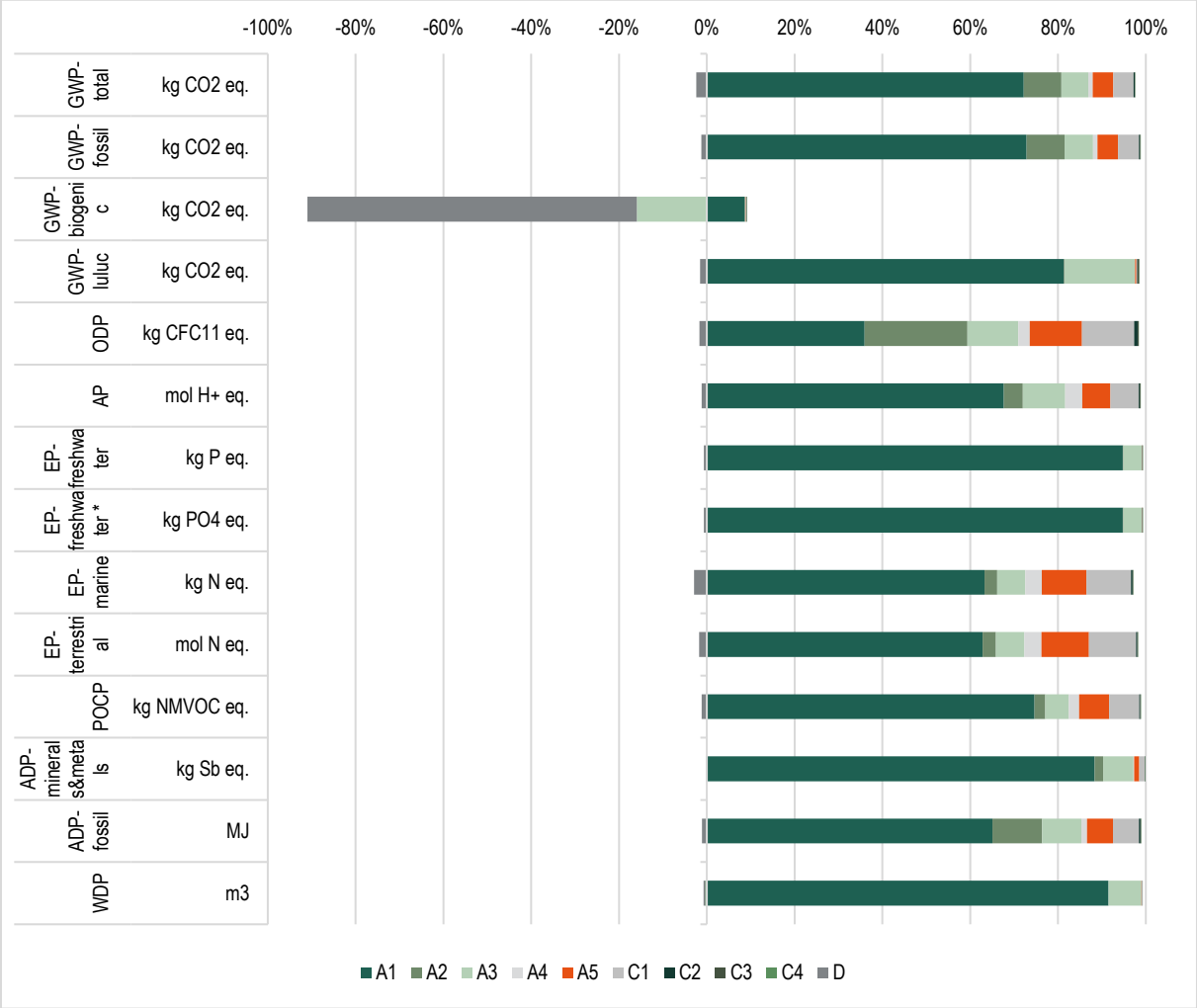


Figure 1. Core environmental impact indicators

The electricity mix used in LCA calculations represents Estonian mix and is based on the data present on Ecoinvent 3.8. Main electricity sources are shale oil (62%), import from Finland (18%), wood chips CHP (8%), wind (5%), coal gas (5%), and others (2%) as shown in Figure 2.

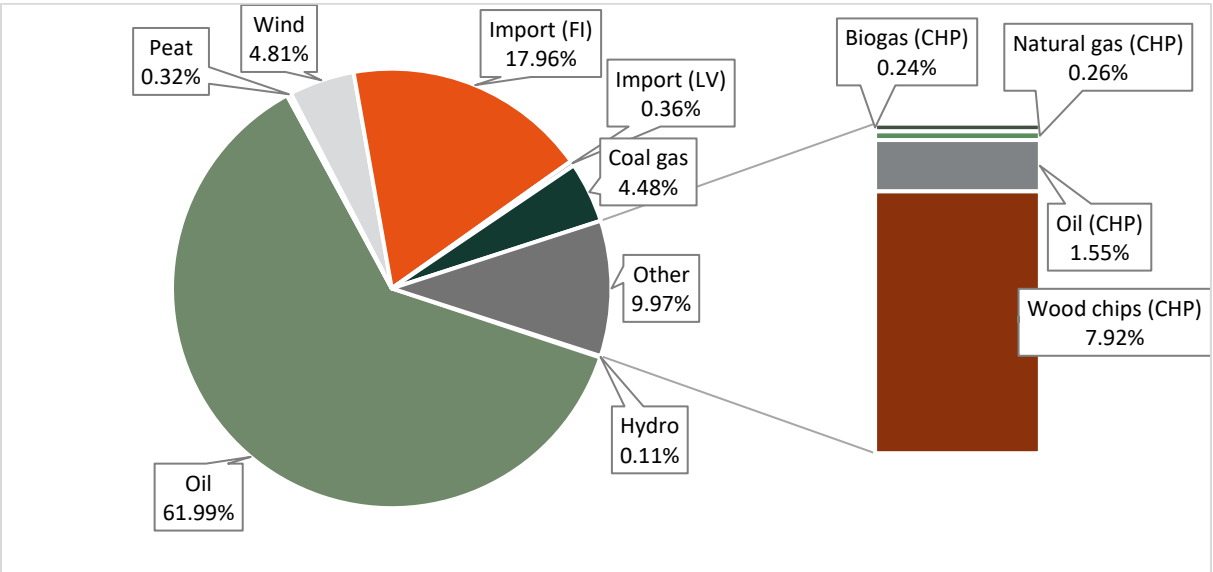


Figure 2. Estonian electricity mix, as per Ecoinvent 3.8.

Additional social and economic information

Not applicable

Information related to Sector EPD

Not applicable

Differences versus previous versions

Not applicable

References

General Programme Instructions of the International EPD® System. Version 4.0.

PCR 2019:14. Construction products. Version 1.2.5

NPCR 013 Part B for Steel and Aluminium Construction Products (version 4.0, issued on October 6th 2021) as Environdec c-PCR Steel and Aluminium structural products, and other metal products, for use in construction works is under development

NPCR PART A: Construction products and services (version 2.0, issued on March 24th 2021)

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

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

Yahong D. et al., (2021). Developing Conversion Factors of LCIA Methods for Comparison of LCA Results in the Construction Sector.

LCA software SimaPro 9.4.0.2

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