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ΕΛΛΑΔΟΣ

ENVIRONMENTAL PRODUCT DECLARATION

Hellenic Halyvourgia S.A. – Concrete Reinforcing Steel and Mesh Products
In accordance with ISO 14025 and EN 15804 + A2

EPD REGISTRATION NUMBER
S-P-06079

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PROGRAM
The International EPD® System
www.environdec.com

PROGRAM OPERATOR
EPD International AB

UN CPC
412 – Products of Iron or Steel

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Program Information

PROGRAM

EPD® ENVIRONMENTAL PRODUCT DECLARATION

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EPD OWNER

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VOLOS ROLLING – MILL AND WIRE MESH PLANT: 4th km Nat. Rd Volos – Larissa, Volos
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Product category rules (PCR):	PCR 2019:14 Construction products (EN 15804:A2 v1.11)
PCR review was conducted by:	The Technical Committee of the International EPD System Contact via info@envrirondec.com
Independent third-party verification of the declaration and data, according to ISO 14025:	☐ EPD process certification ☒ EPD verification (external)
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Technical support:	SustChem Technical Consulting S.A. www.sustchem.gr

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

COMPANY'S PROFILE

Hellenic Halyvourgia S.A. is a producer of a wide range of top-quality long steel products which meet the requirements of the market and exceed the specifications of European and International standards.

The company was established in 2006, merging the forces of two historic companies "Helliniki Halyvourgia" and "Halyvourgia Thessalias". Bringing together a tradition of innovation encompassing all eras, a new leading force is emerging with the necessary know-how and experience to rise up to the future challenges.

The company owns 3 state-of-the-art industrial steel production units in Aspropyrgos, Velestino and Volos.

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Environmental Sustainability & Health and Safety

Hellenic Halyvourgia's mission is to manufacture high quality, certified products and promote them all over the world, always respecting human health and the environment. Having adopted an integrated Environmental and Occupational Health & Safety management system, the company is committed to a continuously improving work environment that offers a heightened sense of job-related safety and security. Furthermore, committed to environmental protection and sustainable development, Hellenic Halyvourgia allocates a significant portion of its annual investments to meet regulatory requirements and keep improving its environmental performance.

Hellenic Halyvourgia is certified with **EN ISO14001:2015, EN ISO9001:2015, EN ISO45001:2018 & EN ISO50001:2018**

Further information on www.hlv.gr

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Milestones

1938: Establishment of **Helliniki Halyvourgia,** the first steel plant in Greece and one of the largest industrial companies in the country. The historic Roupel fortress is built in Macedonia using Helliniki Halyvourgia's reinforcing bars. In 1951, the company's production unit is relocated from its first plant in Athens (Piraeus str.), to new private industrial premises in Aspropyrgos, Attica.

1963: Establishment of Halyvourgia Volos. In 1974, the name is changed into **Halyvourgia Thessalias** and the meltshop in Velestino sets off. On a steadily rising trend and constantly achieving new standards of excellence, the company's products are selected for large infrastructure projects. The largest part of the Rio-Antirio Bridge was constructed with Halyvourgia Thessalias' reinforcing bars.

2006: The two historic companies join their forces and "sign" with a new corporate name: **Hellenic Halyvourgia.**

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Quality & Certification

Technology, know-how and experience are the key factors that enable Hellenic Halyvourgia to manufacture products of superior quality. Staffed with experienced and highly specialized scientific and technical personnel, our quality control laboratories are equipped with the latest test and measurement equipment. Rigorous quality control procedures are applied throughout production, from raw materials to finished products. Every steel product bears a quality assurance tag and is accompanied by a quality certificate stating its chemical and mechanical properties. Top product quality is ensured by strictly adhering to our ISO 9001:2015 Quality Assurance System, certified by EVETAM, and our Product Conformity Certifications by recognized international bodies as follows:

- **ELOT EN 10080, ELOT 1421-2, 1421-3** (MIRTEC, Greece)
- **DIN 488** (University of Munich, Germany)
- **D.M. 17.01.2018 B450C** (University of Brescia, Italy)
- **NISI** (NISI Insititute, Bulgaria)
- **ICECON SA & ICECON CERT Institutions** (Romania)
- **ISRAEL Standard No. 4466 Part 3** (Standards Institution of Israel, Israel)

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Concrete Reinforcing Steel Bars

Hellenic Halyvourgia's concrete reinforcing steel, quality B500C, of high strength and ductility, certified according to ELOT 1421-3. The product is available in bars with diameters ranging from Φ8 up to Φ50mm, 12 and 14m long, and is also available in special lengths upon order.

Concrete Reinforcing Steel Bars in Coils

Hellenic Halyvourgia's concrete reinforcing steel, quality B500C, of high strength and ductility, certified according to ELOT 1421-3. The product is available in coils. The rod diameters range from 8 up to 16 mm and in spooled coils at diameters from 8 to 12 mm.

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PRODUCT DESCRIPTION & TECHNICAL CHARACTERISTICS

Concrete Reinforcing Steel Features

Product Features	Bars	Coils
Nominal Diameter (mm)	From 8 to 50 mm	From 8 to 16 mm
Nominal Cross Section (mm2)	From 50.3 to 1964 mm2	From 50.3 to 201 mm2
Tolerances (%)	3 6 for a diameter of 8 mm, 3 4.5 all other diameters	36 for a diameter of 8 mm, 34.5 all other diameters
Nominal Weight (kg/m)	From 0.395 to 15.4 kg/m	From 0.395 to 1.58 kg/m

Concrete Reinforcing Steel (Bars & Coils) Characteristics

Standards	Yield Strength Re (N/mm2)	Elongation %	Ratio Rm/Re	Ratio Re, act/Re, nom	Elongation at Max load Agt (%)	Weldability
ELOT 1421-3 B500C	≥500		≥1.15, ≤1.35	≤1.25	≥7.5	Ceq 0.52% max
	≥500	5 ≥15, 10 ≥12	≥1.15, ≤1.35	≤1.25	≥8.0	

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Concrete Reinforcing Mesh

Prefabricated concrete reinforcing mesh for columns, beams and walls, using rebars of B500C quality.

Wire Mesh

Wire mesh using steel quality B500A or B500C.

Fitsteel Mesh

The FitSteel wire mesh sheets are special mesh reinforcements that can be arranged with the main reinforcement being in one or two directions. The FitSteel special mesh reinforcements can meet all construction work requirements, including the reinforcement of slabs, walls, foundation slabs and beams, while offering time and labor cost saving and ensuring strict compliance with design specifications. It can be used as single flat sheets to reinforce surface structures.

Content Declaration

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH Regulations that exceed 0.1% of the total weight are present in the examined products.

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PRODUCT DESCRIPTION & TECHNICAL CHARACTERISTICS

Concrete Reinforcing Mesh

Product type	Product Features		
	Nominal Sheet Weight (kg)	Sheet/Bundle	Nom. Bundle Weight (kg)
8/100	From 11.5 to 44.5 kg	30 or 50	From 574 to 1470 kg
10/100	From 16.6 to 67.6 kg	25, 30 or 50	From 830 to 2205 kg
8/125	From 9.6. to 28.6 kg	30 or 50	From 479 to 1209 kg
10/125	From 19.8 to 40.5 kg	30 or 50	From 990 to 1795 kg

Wire Mesh

Product Features and Characteristics

Length (m)		3.6 or 5 m
Width (m)		1.25, 1.55, or 2.15 m
Longitudinal Wires	Quantity	9, 10, 11, 13, or 16
	Diameter (mm)	4.2, 5, 6, 8, or 10 mm
	Distances (mm)	100, 150 or 200 mm
Transverse Wires	Quantity	17, 18 20, 32, 34, or 50
	Diameter (mm)	4.2, 5, 6, 8, or 10 mm
	Distances (mm)	100, 150, 156, 200 or 250 mm
Sheet Weight (kg)		From 8.40 to 45.29 kg
Sheets per Bundle		30, 50, 60, or 100
Nominal Bundle Weight (kg)		From 504 to 2150 kg

Fitsteel Mesh

Product Features and Characteristics

Length (m)	Width (m)	Diameter of line rebars (mm)	Diameter of cross rebars (mm)	Line rebar spacing (mm)	Cross rebar spacing (mm)	Distance between opposite line rebars (mm)
0.80 – 15.00	1.2 – 3.45 m	6 – 25 mm	6 – 16 mm	75 mm and over	50 mm and over	3200 mm

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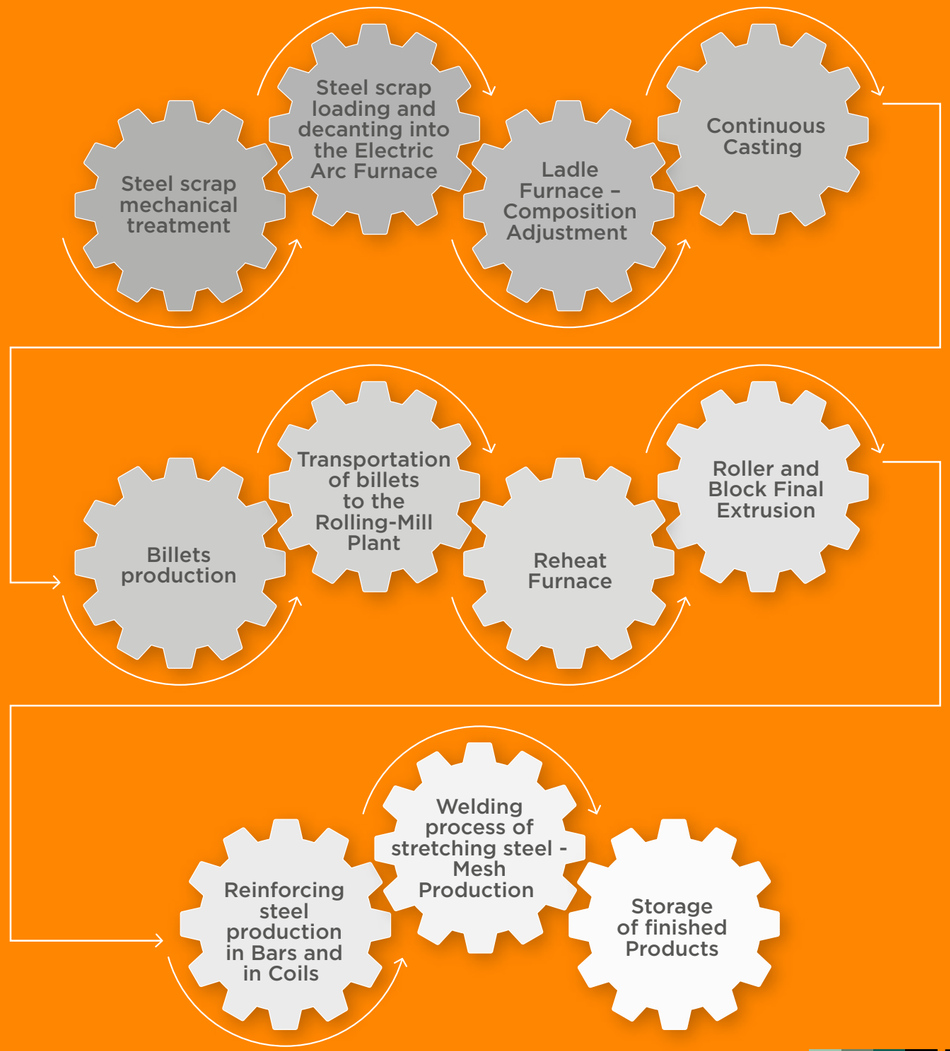
Manufacturing Process

Bars, Coils and Mesh production is a continuous process divided into two main distinct phases which take place in Hellenic Halyvourgia's Plants. The first step is the production of billets occurring at the company's steel plant in Velestino. After their production, billets are transported to the Rolling-Mill plant at Volos, where the production of Bars and Coils takes place. An additional welding process is required after the production of bars for the manufacturing of mesh products.

It should be mentioned that the manufacturing procedure of all products of the same product group category examined is the same in terms of steps followed and the respective raw materials and utilities used. Hence, the potential environmental impacts computed are representative for all products of each product group category (Concrete reinforcing steel in bars & coils and Mesh Products).



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Declared Unit

The declared unit is 1 tn of Bars & Coils and 1 tn of Mesh Products.

System boundaries

This EPD covers the cradle-to-gate with options approach. Therefore, the defined system boundaries include modules A1-A3, A4, C and D.

Reference Period Considered

January 2020 – December 2020

DESCRIPTION OF EXAMINED MODULES

Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Resource Recovery Stage
Raw material	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction, demolition	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling potentials
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

EPD TYPE

Specific

SOFTWARE

GaBi ts version 10.6.0.110

DATABASE

Ecoinvent 3.8.1 & Professional 2021

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DESCRIPTION OF EXAMINED MODULES

A1: Raw Material Extraction/Production

Module A1 includes the production of all raw materials and utilities (i.e. electricity, natural gas) required in each of the two distinct processing phases (Billet production at Steel Plant and Bars, Coils and Mesh Manufacturing at Rolling-Mill Plant).

A2: Transport to Halyvourgia's Facilities

Module A2 includes the transport of all raw materials and utilities to the company's plants. The internal transport of billets from the steel plant to the Rolling-Mill plant is also included.

A3: Manufacturing

Module A3 depicts the environmental impact potentials attributed to all processes taking place at Steel and Rolling-Mill plant.

A4: Finished Products Transport

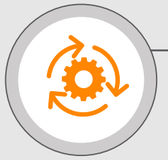
Module A4 includes the transport of finished products (Bars, Coils and Mesh) to clients/Building sites. Actual data of distances of sites locations had been taken into account.

C1: Deconstruction/Demoltion

Regarding deconstruction/demolition, a scenario has been developed since no actual data are available. More specifically, it has been considered that an excavator (diesel, 100kW) is used.

C2: Steel Waste Transport

A nominal distance of 100 km is assumed for the transport of steel scrap to sorting/recovery plants and disposal facilities (Truck 12-14 tons).

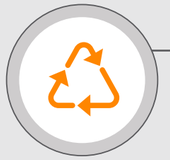


C3: Steel Waste Processing

Based on World Steel Association, the overall steel recycling rate equals to 85%.

C4: Disposal

The remaining quantity of 15% is being disposed.



D: Reuse, Recovery, Recycling Potential

Module D covers the net benefits and load arising from the recycling of steel from end-of-waste state materials. As per EN 15804 + A2, the following equation is used to calculate the net benefits and loads:

$$e_D = (M_{MRout} - M_{MRin})(E_{MR\,after\,EoW\,out} - E_{VMSub\,out.} * \frac{Q_{Rout}}{Q_{Sub}})$$

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LIFE CYCLE ASSESSMENT INFORMATION

Cut-off criteria

All major raw materials, elements and all the essential energy required are included within the system boundaries. Data for elementary flows to and from the product system contributing to minimum of 99% of the declared environmental impacts are included in the study. Thus, it is assumed that the total neglected input flows are less than 1% of total energy and mass. The only flows that have been excluded from the examined system are:

- Production of ferro-vanadium, aluminum and LPG since they account for less than 0,004%, 0,0016% and 0,004% of the total raw materials that were used for the manufacturing of billets, respectively, while their contribution to the overall environmental impact is negligible.
- Certain waste streams such as wooden, plastic and paper packaging waste and vehicles tires since they are traced in minor quantities in comparison to the total waste produced.

Assumptions, Allocation and Limitations

- Regarding the exclusion of product life cycle stages and processes, use phase has not been accounted for. Also, construction installation (A5) phase is not included in this LCA study.
- Hellenic Halyvourgia's production processes yield no commercial by-products in its plants. Thus, there is no need for by-product allocation in the manufacturing process.
- Regarding mixed waste produced from the shredding facilities of End-of-Life Vehicles, the nature and the condition of the specific stream does not allow sorting into separate fractions and as a result they are supposed to be transported to disposal facilities.
- A default mean of road transportation "Truck Euro 6 – 9.3t payload – 12-14t gross weight" was assumed. Weighted average of the distance covered, and time needed were taken into account. Regarding ship transportation, "Average ship, 3,500t payload capacity" was assumed due to lack of actual data.
  recycling rate of 85% is assumed for construction applications based on world steel association. The remaining 15% is assumed to be disposed.

Background data and data quality

For all processes, primary data were collected and provided by HELLENIC HALYVOURGIA S.A. Data related to material and energy flows of the defined system, were acquired from the company developing the EPD and data related to life cycle impacts resulted from calculations based on widely used and trust-worthy databases.
Primary data refer to January – December 2020 reference period.
Regarding modules C1-C4 and D no actual data were available and hence specific scenarios were developed based on bibliography and the most common industry practices. However, these scenarios were modeled based on accurate and area representative datasets available either into Professional 2021 or Ecoinvent 3.8.1. Thus, these data are expected to be of high quality too.
The LCA software GaBi ts version 10.6.0.110 was used for inventory and impact assessment calculations based on data entry of the developed mode. A compilation of Ecoinvent v.3.8.1 and Professional 2021 databases was used.

Comparability

- 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.
- This EPD and PCR 2019:14 "Construction products" are available on the website of The International EPD® System (www.environdec.com).

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ENVIRONMENTAL PERFORMANCE INDICATORS

Concrete Reinforcing Steel Bars and Coils

POTENTIAL ENVIRONMENTAL IMPACTS / 1 TN OF BARS & COILS

Core Environmental Impact Indicators	Unit	A1	A2	A3	A4	C1	C2	C3	C4	Total	D
Global Warming Potential -total	kg CO2 eq.	213.289	3.558	222.85	0.964	0.618	12.162	51.410	7.258	**512.109**	439.8
Global Warming Potential – fossil fuels	kg CO2 eq.	213.107	3.533	174.00	0.957	0.641	12.083	51.310	7.325	**462.957**	449.3
Global Warming Potential – biogenic	kg CO2 eq.	1.116E-01	-4.534E-03	48.817	-1.212E-03	-0.028	-0.0154	0.0902	-0.07503	**48.895**	-9.355
Global Warming Potential – land use and land use change	kg CO2 eq.	7.295E-02	2.898E-02	1.862E-02	7.852E-03	5.057E-03	9.908E-02	1.059E-02	0.00733	**2.505E-01**	-0.0556
Global Warming Potential (GWP-GHG)	kg CO2 eq.	213.177	3.563	174.033	0.965	0.646	12.177	51.320	7.333	**463.215**	449.155
Ozone Depletion Potential	kg CFC-11 eq.	5.909E-13	4.521E-16	8.227E-12	1.225E-16	7.889E-17	1.546E-15	1.055E-05	1.730E-14	**1.055E-05**	1.521E-05
Acidification Potential	Mole of H+ eq.	8.080E-01	3.759E-03	2.968E-01	1.180E-03	3.044E-03	1.182E-02	5.207E-01	0.02333	**1.669**	1.346
Eutrophication Potential Freshwater	kg P eq.	12.702E-05	1.051E-05	7.525E-04	2.847E-06	1.833E-06	3.592E-05	2.622E-03	5.575E-06	**3.558E-03**	0.1965
Eutrophication Potential Marine	kg N eq.	12.347E-02	1.148E-03	8.145E-02	4.197E-04	1.431E-03	3.691E-03	2.278E-01	0.00579	**4.452E-01**	0.3504
Eutrophication Potential Terrestrial	mol N eq.	1.347	0.014	0.833	0.005	0.0159	0.045	2.493	0.06354	**4.8157**	3.810
Formation Potential of Tropospheric Ozone	kg NMVOC eq.	3.729E-01	3.166E-03	2.747E-01	1.176E-03	0.00403	1.014E-02	6.854E-01	0.01825	**1.3697**	2.478
Abiotic Depletion Potential, minerals and metals*	kg Sb eq.	6.598E-05	2.694E-07	4.599E-03	7.30E-08	4.701E-08	9.211E-07	3.680E-05	5.055E-07	**4.703E-03**	-9.58E-04
Abiotic Depletion Potential, fossil resources*	MJ net calorific value	4306.30	47.110	2524.936	12.765	8.220	161.10	706.20	106.70	**7873.331**	5319.0
Water Deprivation Potential*	m3 world eq. deprived	69.153	0.031	151.817	0.008	0.005	0.105	2.407	-0.0868	**223.440**	3.7

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

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Concrete Reinforcing Steel Bars and Coils

POTENTIAL ENVIRONMENTAL IMPACTS / 1 TN OF BARS & COILS

Use of Resources	Unit	A1	A2	A3	A4	C1	C2	C3	C4	Total	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ. net calorific value	196.930	2.624	108.188	0.712	0.459	8.988	7.672	7.704	**333.277**	-182.90
Use of renewable primary energy resources used as raw materials	MJ. net calorific value	-	-	-	-	-	-	-	-	**-**	-
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ. net calorific value	196.930	2.624	108.188	0.712	0.459	8.988	7.672	7.704	**333.277**	-182.90
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ. net calorific value	4306.106	47.165	2524.841	12.785	8.231	161.30	706.20	106.70	**7873.328**	5319.0
Use of non-renewable primary energy resources used as raw materials	MJ. net calorific value	-	-	-	-	-	-	-	-	**-**	-
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ. net calorific value	4306.106	47.165	2524.841	12.785	8.231	161.30	706.20	106.70	**7873.328**	5319.0
Use of secondary material	kg	1273.75	-	-	-	-	-	-	-	**-**	-
Use of renewable secondary fuels	MJ. net calorific value	-	-	-	-	-	-	-	-	**-**	-
Use of non-renewable secondary fuels	MJ. net calorific value	-	-	-	-	-	-	-	-	**-**	-
Use of net fresh water	m3	1.71315	3.010E-03	3.538	8.154E-04	5.251E-04	1.029E-02	5.603E-02	1.102E-03	**5.323**	8.60E-02

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ENVIRONMENTAL PERFORMANCE INDICATORS

Concrete Reinforcing Steel Bars and Coils

POTENTIAL ENVIRONMENTAL IMPACTS / 1 TN OF BARS & COILS

Waste Categories	Unit	A1	A2	A3	A4	C1	C2	C3	C4	Total	D
Hazardous waste disposed	kg	1.309E-07	2.377E-09	7.246E-07	6.440E-10	4.148E-10	8.126E-09	-	1.890E-08	**8.860E-07**	-
Non-hazardous waste disposed	kg	5.814E-01	7.007E-03	3.734E+01	1.898E-03	1.223E-03	2.396E-02	-	1.502E+02	**188.154**	-
Radioactive waste disposed	kg	3.965E-02	5.706E-05	1.796E-02	1.546E-05	9.956E-06	1.951E-04	-	1.216E-03	**5.911E-02**	-

POTENTIAL ENVIRONMENTAL IMPACTS / 1 TN OF BARS & COILS

Output Flows	Unit	A1	A2	A3	A4	C1	C2	C3	C4	Total	D
Components for re-use	kg	-	-	-	-	-	-	-	-	**-**	-
Material for recycling	kg	-	-	6.310E-02	-	-	-		-	**886.763**	-
Materials for energy recovery	kg	-	-	6.577E+01	-	-	-	8.867E+02	-	**6.577E+01**	-
Exported energy. electricity	MJ	-	-	-	-	-	-	-	-	**-**	-
Exported energy. thermal	MJ	-	-	-	-	-	-	-	-	**-**	-

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ENVIRONMENTAL PERFORMANCE INDICATORS

Mesh Products

POTENTIAL ENVIRONMENTAL IMPACTS / 1 TN OF MESH PRODUCTS

Core Environmental Impact Indicators	Unit	A1	A2	A3	A4	C1	C2	C3	C4	Total	D
Global Warming Potential -total	kg CO2 eq.	213.301	3.558	222.854	5.205	0.618	12.162	51.410	7.258	**516.367**	439.8
Global Warming Potential – fossil fuels	kg CO2 eq.	213.123	3.533	174.004	5.170	0.641	12.083	51.310	7.325	**467.189**	449.3
Global Warming Potential – biogenic	kg CO2 eq.	1.1163E-02	-4.534E-03	48.817	-0.660E-02	-0.028	-0.0154	0.090	-7.503E-02	**48.8895**	-9.355
Global Warming Potential – land use and land use change	kg CO2 eq.	7.296E-02	2.898E-02	1.866E-02	0.424E-01	5.057E-03	9.908E-02	1.059E-02	7.331E-03	**2.851E-01**	-0.0556
Global Warming Potential (GWP-GHG)	kg CO2 eq.	213.189	3.563	174.037	5.212	0.646	12.177	51.320	7.333	**467.477**	449.155
Ozone Depletion Potential	kg CFC-11 eq.	5.912E-13	4.521E-16	8.227E-12	6.615E-16	7.889E-17	1.546E-15	1.055E-05	1.730E-14	**1.055E-05**	1.521E-05
Acidification Potential	Mole of H+ eq.	8.081E-01	3.759E-03	2.968E-01	5.068E-03	3.044E-03	1.182E-02	5.207E-01	2.333E-02	**1.673**	1.346
Eutrophication Potential Freshwater	kg P eq.	12.704E-05	1.051E-05	7.525E-04	1.537E-05	1.833E-06	3.592E-05	2.622E-03	5.575E-06	**3.571E-03**	0.1965
Eutrophication Potential Marine	kg N eq.	12.348E-02	1.148E-03	8.145E-02	1.584E-04	1.431E-03	3.691E-03	2.278E-01	5.791E-03	**4.464E-01**	0.3504
Eutrophication Potential Terrestrial	mol N eq.	1.347	0.014	0.833	0.019	0.0159	0.045	2.493	0.064	**4.8299**	3.810
Formation Potential of Tropospheric Ozone	kg NMVOC eq.	3.729E-01	3.166E-03	2.747E-01	0.004	0.00403	1.014E-02	6.854E-01	0.018	**1.3729**	2.478
Abiotic Depletion Potential, minerals and metals*	kg Sb eq.	6.599E-05	2.694E-07	4.599E-03	4.672E-07	4.701E-08	9.211E-07	3.680E-05	5.055E-07	**4.704E-03**	-9.58E-04
Abiotic Depletion Potential, fossil resources*	MJ net calorific value	4306.622	47.110	2524.995	68.923	8.220	161.10	706.20	106.700	**7929.870**	5319.0
Water Deprivation Potential*	m3 world eq. deprived	69.157	0.031	151.817	0.045	0.005	0.105	2.407	-0.087	**223.480**	3.7

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

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ENVIRONMENTAL PERFORMANCE INDICATORS

Mesh Products

POTENTIAL ENVIRONMENTAL IMPACTS / 1 TN OF MESH PRODUCTS

Use of Resources	Unit	A1	A2	A3	A4	C1	C2	C3	C4	Total	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ. net calorific value	197.005	2.624	108.191	3.847	0.459	8.988	7.672	7.704	**336.490**	-182.90
Use of renewable primary energy resources used as raw materials	MJ. net calorific value	-	-	-	-	-	-	-	-	**-**	-
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ. net calorific value	197.005	2.624	108.191	3.847	0.459	8.988	7.672	7.704	**336.490**	-182.90
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ. net calorific value	4306.428	47.165	2524.899	69.013	8.231	161.30	706.20	106.70	**7929.936**	5319.0
Use of non-renewable primary energy resources used as raw materials	MJ. net calorific value	-	-	-	-	-	-	-	-	**-**	-
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ. net calorific value	4306.428	47.165	2524.899	69.013	8.231	161.30	706.20	106.70	**7929.936**	5319.0
Use of secondary material	kg	1273.75	-	-	-	-	-	-	-	**-**	-
Use of renewable secondary fuels	MJ. net calorific value	-	-	-	-	-	-	-	-	**-**	-
Use of non-renewable secondary fuels	MJ. net calorific value	-	-	-	-	-	-	-	-	**-**	-
Use of net fresh water	m3	1.713	3.010E-03	4.403E-03	4.403E-03	5.251E-04	1.029E-02	5.603E-02	1.102E-03	**5.327**	8.60E-02

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POTENTIAL ENVIRONMENTAL IMPACTS / 1 TN OF MESH PRODUCTS

Waste Categories	Unit	A1	A2	A3	A4	C1	C2	C3	C4	Total	D
Hazardous waste disposed	kg	1.310E-07	2.377E-09	7.246E-07	3.478E-09	4.148E-10	8.126E-09	-	1.890E-08	**8.889E-07**	-
Non-hazardous waste disposed	kg	5.814E-01	7.007E-03	3.734E+01	1.025E-02	1.223E-03	2.396E-02	-	1.502E+02	**188.163**	-
Radioactive waste disposed	kg	3.966E-02	5.706E-05	1.796E-02	8.349E-05	9.956E-06	1.951E-04	-	1.216E-03	**5.918-02**	-

POTENTIAL ENVIRONMENTAL IMPACTS / 1 TN OF MESH PRODUCTS

Output Flows	Unit	A1	A2	A3	A4	C1	C2	C3	C4	Total	D
Components for re-use	kg	-	-	-	-	-	-	-	-	**-**	-
Material for recycling	kg	-	-	6.310E-02	-	-	-	8.867E+02	-	**886.763**	-
Materials for energy recovery	kg	-	-	9.007E+01	-	-	-	-	-	**9.007E+01**	-
Exported energy. electricity	MJ	-	-	-	-	-	-	-	-		-
Exported energy. thermal	MJ	-	-	-	-	-	-		-	**-**	-

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Concrete Reinforcing Steel and Mesh Products

The following figure represents the contribution of each examined module (A1-A4, C1-C4) on the core environmental impact indicators formation. It can be clearly depicted that the majority of the analyzed impact categories are mainly influenced by modules A1, A3 and C3. Similar patterns are observed for both product categories examined.

- The Global Warming Potential – total in relation to the production of 1 ton of concrete reinforcing steel bars and coils is shared among the extraction/production of raw materials and the manufacturing process accounting for 41.6% and 43.5% respectively. The treatment of waste steel (C3) occurred from the demolition process accounts for 9.96% of the total environmental impact of modules A1-A4 and C1-C4. The respective percentages for Mesh products equal to 41.3%, 43.16% and 9.96%, respectively.
- ODP is almost exclusively influenced by the module C3, treatment of steel waste (sorting).
- Depletion of abiotic resources (minerals & metals) is almost exclusively influenced by Module A3 (approximately 97.8%) whereas for the Depletion of fossil abiotic resources production/extraction of raw materials is the main contributor to the overall impact indicator (54.7%), followed by Module A3 (32.1%) and Module C3 (8.97%).
- Acidification Potential is mainly influenced by module A1 with the respective percentage being equal to 48.4%. Steel sorting process (Module C3) follows with a percentage of 31.1% while the manufacturing process accounts for 17.8% of the total emissions.

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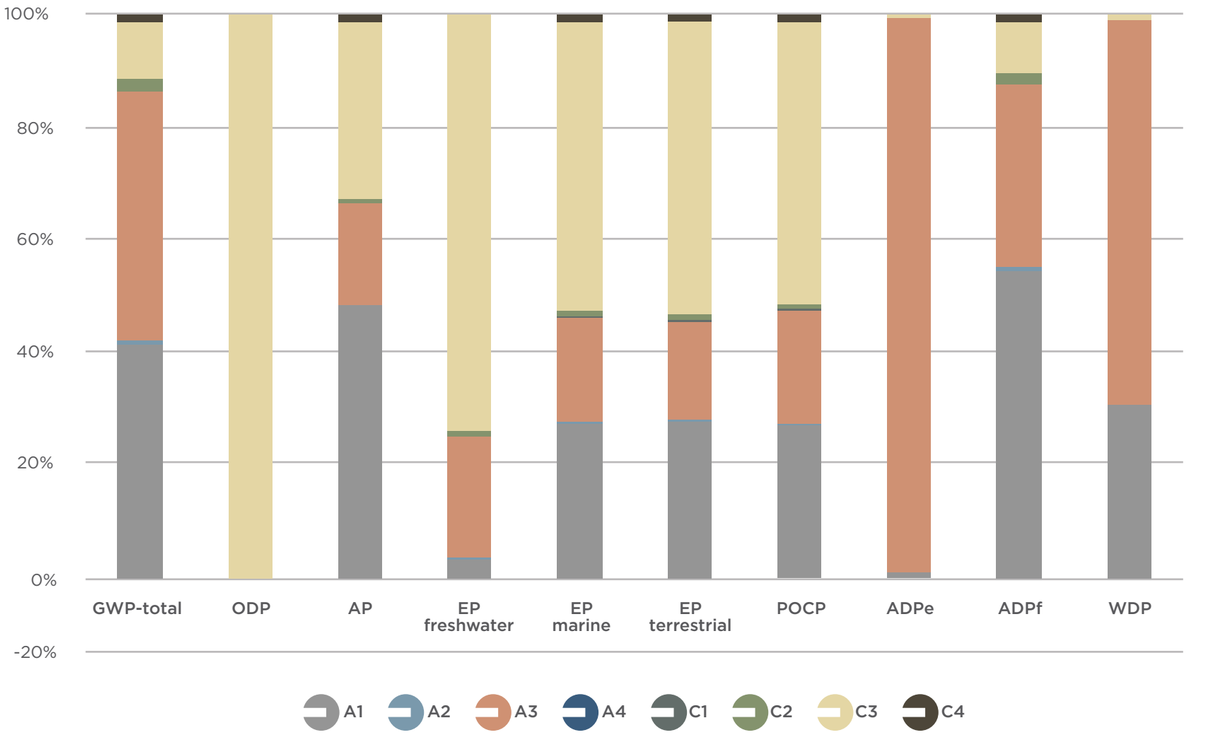
RESULTS INTERPRETATION

Relative Contribution of the examined modules



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- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- International Organization for Standardization (ISO), Environmental management – Life Cycle assessment – Principles and framework. ISO 14040:2006
- International Organization for Standardization (ISO), Environmental management – Life Cycle assessment – Requirements and guidelines. ISO 14044:2006
- The International EPD® System – The International EPD System is a programme for type III environmental declarations, maintaining a system to verify and register EPDs as well as keeping a library of EPDs and PCRs in accordance with ISO 14025. www.environdec.com
- EN ISO 14001 – Environmental Management Systems – Requirements
- ISO 14020 – Environmental Labels and Declarations – General Principles
- Sphera – GaBi Product Sustainability software – www.sphera.com
- World Steel Association, Steel Recycling Rate – https://worldsteel.org/steel-by-topic/raw-materials/

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In accordance with ISO 14025 and EN 15804 + A2

Differences versus previous version

07/06/2022 Version 1

07/07/2022 Version 2

Editorial Change: Aesthetic Improvements – New EPD Template