

ENVIRONMENTAL PRODUCT DECLARATION
in accordance with ISO 14025 and EN 15804:2012+A2:2019

Steel products by SIDENOR STOMANA INDUSTRY plant

Programme

The International EPD® System,
www.environdec.com

Programme operator

EPD International AB

EPD registration No

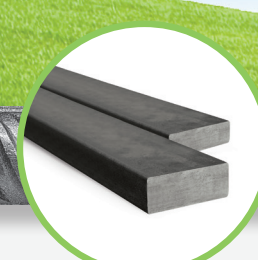
S-P-06442

Publication date

2022-09-20

Valid until

2027-09-19



The companies of SIDENOR Steel Group are leading producers of steel products in Southeastern Europe.

They have more than 55 years of manufacturing experience and expertise in steel production and distribution, and an extensive product portfolio which includes long, flat and downstream steel products.

The SIDENOR Steel Group offers a broad range of value-added products and solutions for applications in building and construction (including buildings, roadworks, metro stations, bridges, shopping malls and hydroelectric dam projects), in mechanical engineering, shipbuilding, road and rail, automotive, and in mining & tunneling and delivers products in more than 50 countries worldwide.



SIDENOR



SOVEL INDUSTRY



DOJRAN STEEL



Major supplier to the shipbuilding, automotive, industrial sectors

Capacities



Meltshop
1.400.000
tn/year

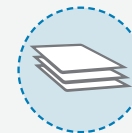


Plate mill
400.000
tn/year



Long products mill
1.000.000
tn/year

Stomana Industry is a leading manufacturing company of flat and long steel products located in Bulgaria.

Stomana plant in Pernik produces steel from recycled scrap and is among the few steel mills producing 100% of the hot rolled plates exclusively by recycled ferrous scrap, providing solutions that reduce the environmental footprint and promote the circular economy.

The plant operates a digital steel scrap reception and monitoring system.

The steel is manufactured via two electric arc furnaces, a vacuum degasser for the quality steel products, while billet grinding technology is among many state-of-the-art technologies installed.

The company has been present in the Balkan and international markets for 70 years and produces a wide range of products including quarto

plates, special bar quality steels (SBQs), reinforcing steel, grinding balls and special profiles.

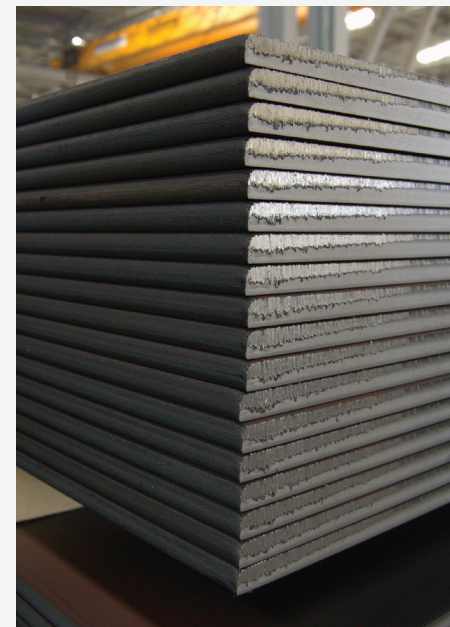
As downstream operations Stomana Industry manufactures bright steel bars and quenched and tempered bars for engineering applications, as well as thin wall tubes and hollow sections.

Stomana Industry continuously invests in the most up-to-date technology, operates a state-of-the-art laboratory, that together with several inspection lines ensures high quality products complying with the strictest standards.

Stomana Industry exports its products to all over the world, by trucks, rail and vessels.

The company is certified acc. to ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 and SustSteel mark. The products meet requirements of EN, DIN, ASTM, SIS, BS, Lloyd's register and Germanischer Lloyd standards.

GENERAL INFORMATION



Plant	Production focus	Annual production capacity	System certifications
Stomana Industry (Pernik, Bulgaria)	<ul style="list-style-type: none"> Continuously cast semi-products (billets, blooms and slabs) SD concrete reinforcing steel Steel quarto plates Special Bar Quality steels (SBQ) Steel balls Welded Hollow sections 	<ul style="list-style-type: none"> Meltshop: 1.400.000 tn/year Long products rolling mill: 1.000.000 tn/year Plate products rolling mill: 400.000 tn/year Welded Hollow sections mill: 45.000 tn/year 	<ul style="list-style-type: none"> ISO 9001:2015 ISO 14001:2015 ISO 45001:2018 SustSteel

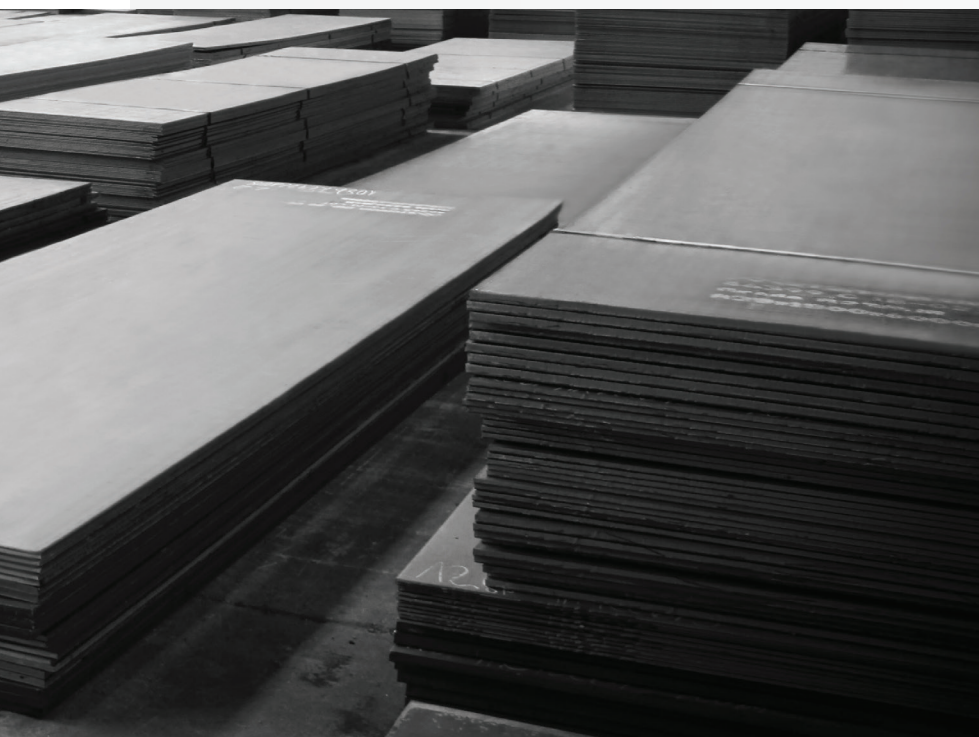
Stomana Industry, produces high quality steel plates, rolled in a modern reversing plate mill, ensuring consistent quality during the whole process. Stomana offers a wide range of plate products for a large number of markets and applications. These include construction, machinery, energy and power, shipbuilding, transportation, mining. Hot rolled plates are produced in a variety of sizes and specifications according to the European and international standards. Customized dimensions are possible based on customer needs.

Steel	Steel grades	Standard
Structural	S235; S275; S355 – JR, J0, J2, K2 +AR, +N A283 Gr. C; A36 A572 Gr.50; A573 Gr.70; A709 Gr.50	EN 10025-2, non-alloyed ASTM - non alloyed ASTM low-alloyed
Weldable	S355N	EN 10025-3
Corrosion resistant	S235J0W; S235J2W; S355J0W; S355J2W	EN 10025-5
For pressure vessels	P235GH; P265GH; P295GH; P355GH A516 Gr.55; A516 Gr.60; A516 Gr.65; A516 Gr.70	EN 10028-2 ASTM
Shipbuilding	AB-A; AB-B; LR-A; LR-B; BV-A; VL-A; VL-B; ASTM A131-A, A131-B (up to 40mm); AH-32; DH-32; AH-36; DH-36	Normal strength High strength
Quenching & Tempering	C45	EN ISO 683-1

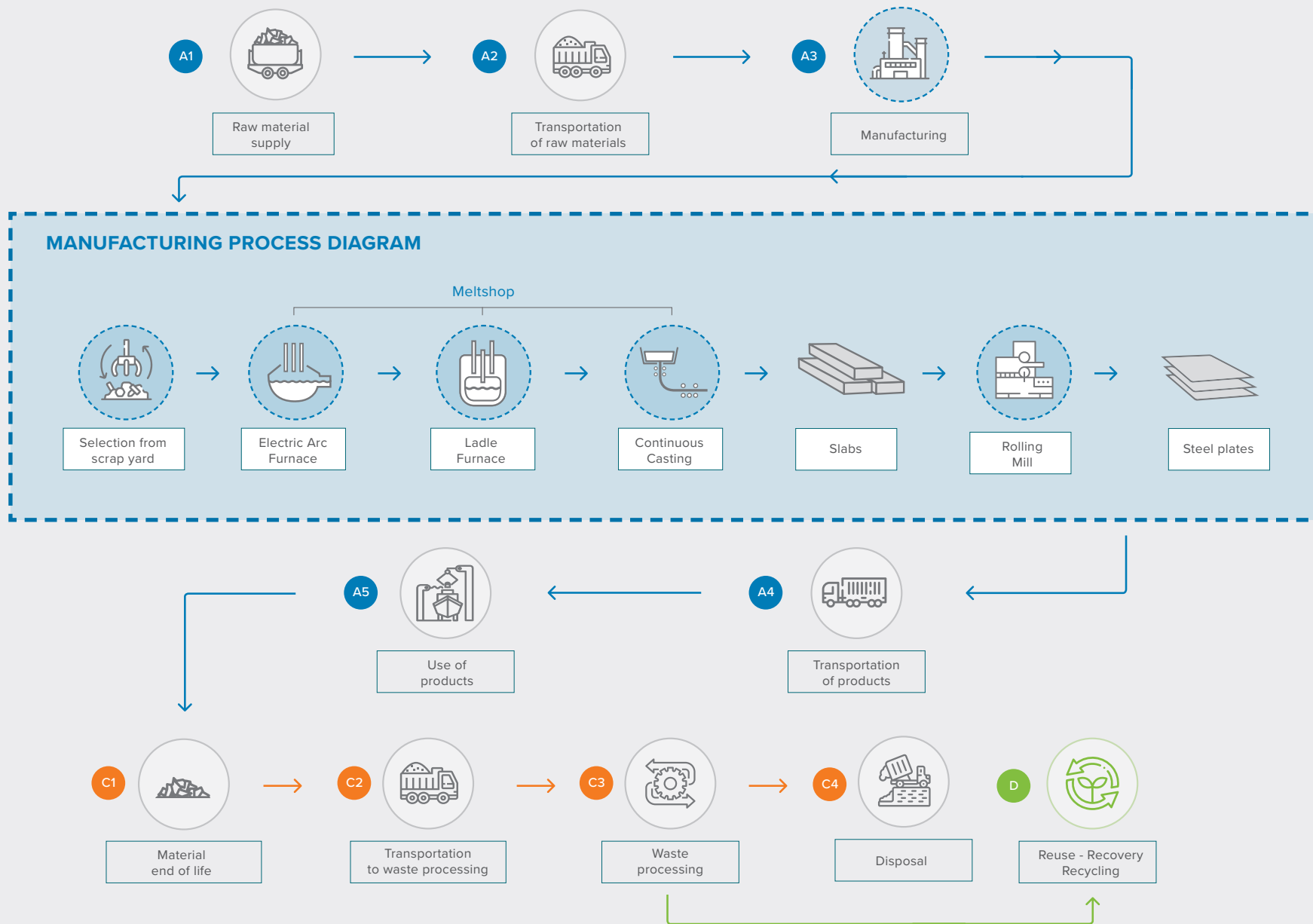
Plates certification

Certificate of Quality: According to EN 10204/3.1 and 3.2

TÜV Rhineland EN 10025-2:2019	S235JR, S235JO, S235J2, S275JR, S275JO, S275J2 S355JR, S355JO, S355J2, S355K2 S235JRC, S235JOC, S235J2C, S275JRC, S275JOC, S275J2C; S355JRC, S355JOC, S355J2C, S355K2C
TÜV Rhineland Regulation No. 305/2011/EU	S235JR, S235JO, S235J2, S275JR, S275JO, S275J2 S355JR, S355JO, S355J2, S355K2, S235JOW, S235J2W, S355JOW, S355J2W, S355K2W, S355N
Lloyd's Register	Normal strength LR-A, LR-B
	Higher strength AH27S, AH32, AH36, DH27S, DH32, DH36
	Boiler & Pressure vessel 360AR, 410AR, 360FG, 410FG, 460FG, 490FG, 510FG
ABS-American Bureau of Shipping	Normal strength AB/A
Bureau Veritas	Normal strength BV/A
DNV	Normal strength VL A and VL B
TÜV Rhineland Pressure Equipment Directive 2014/68/EU, EN 10028-2/ EN 10028-3	P235GH, P265GH, P295GH, P355GH, P275NH, P355NH, P275NL1; P275NL2; P355N; P355NL1; P355NL2



HOT ROLLED PLATES | FLOW CHART

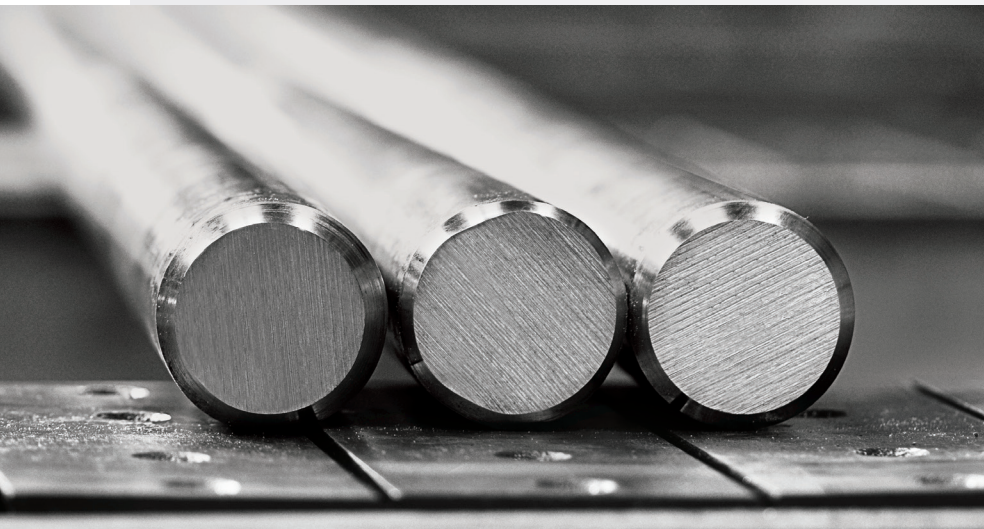


Stomana Industry S.A. specializes in the production of engineering steels (Special Bar Quality SBQs) and has been actively producing SBQs for more than two decades.

SBQs are produced and delivered as "hot rolled round bars" in diameters from 22mm to 120mm and "Bright round bars" (peeled and polished round bars) in diameters from 32mm to 115mm.

The production range includes a wide range of steel grades according to the European standards: structural, for quenching and tempering (Q&T), for flame and structural induction hardening steels, case hardening, micro-alloyed and free-cutting. Additionally, Stomana offers optional to its customers tailored made steel grade production to meet their special needs and/or specifications.

The expanding customers' list of Stomana includes major steel distributors, service centers and manufacturing companies in the hydraulic components, forging, automotive, heavy vehicles and earth moving machines, cranes and other engineering steel sectors. Stomana's SBQ steels are supplied to most European countries like Germany, Italy, France, Romania, Austria, Poland, and others as well as Turkey, North Africa and South America



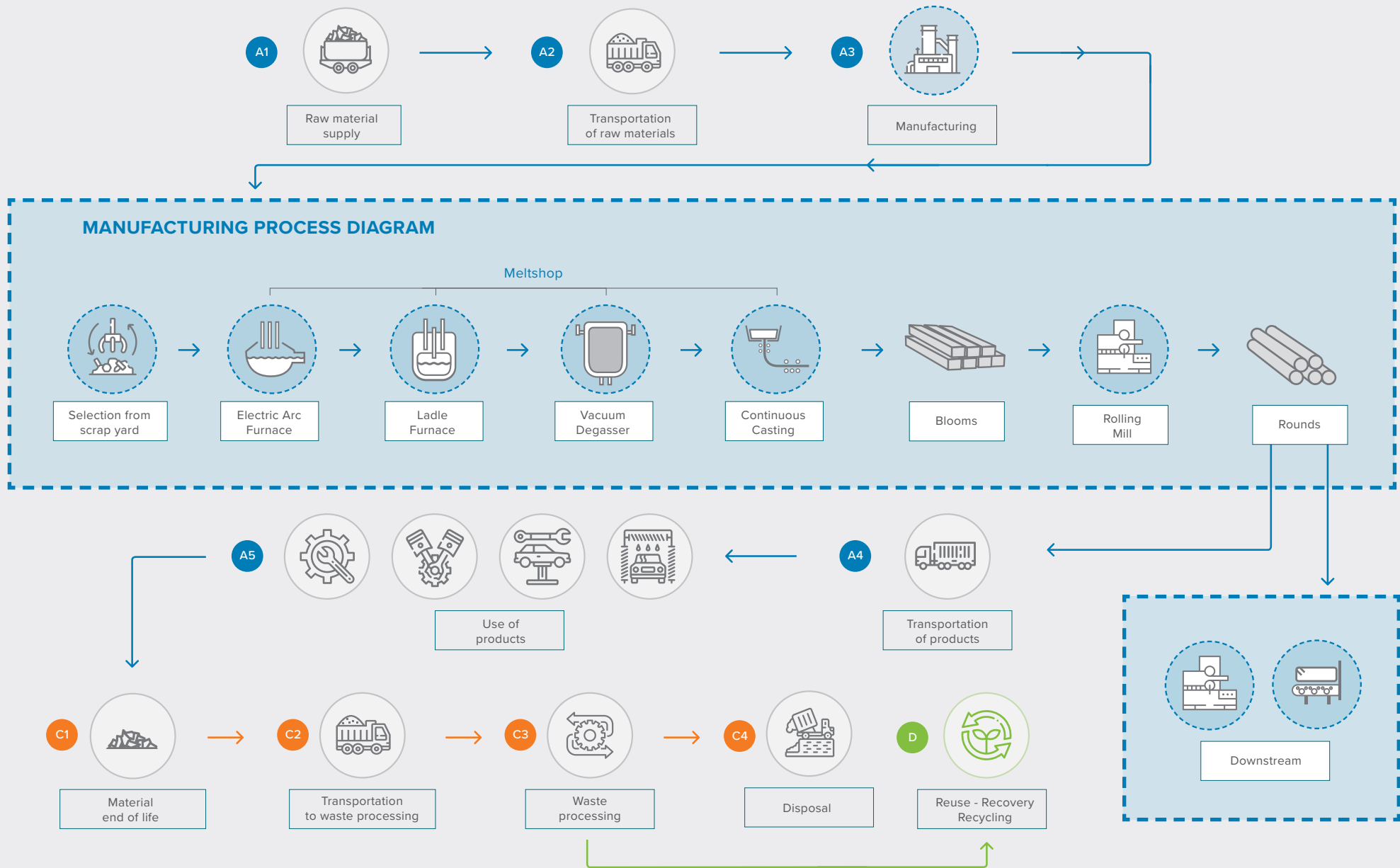
Steel grades

Steel	Steel grades	Standard
Structural steels	S355J2, S235JR	EN 10025-2
Quenching & Tempering steels	C35E, C40E, C45E, C45R, C50E, C60E	EN ISO 683-1
Quenching & Tempering steels	42CrMo4, 34CrNiMo6, 27MnCrB5-2, 33MnCrB5-2, 41Cr4	EN ISO 683-2
Steels for induction hardening	CF53	DIN 17212
Case hardening steels	16(20)MnCr5, 16(20)MnCrS5, 20MnCrS5+HH	EN 10084
Free cutting steels	11SMn30	EN 10087
Ferrite -pearlite steels for pre-precipitation hardening	38MnVS6	EN 10267
Stomana specification	38MnVS6X, CF53BR, 20MnV6, 20MnV6M	Micro alloyed

Technical Information

Product		
Hot Rolled Round bars	Manufacturing Method	EAF-LF / VD depending on the steel grade -CCM with EMS and Air-Mist – RM
	Diameters	D22 - D130
	Straightness	According to EN 10060
	Length	Standard Length – 6m / tolerance -0/+100
	Surface quality	Class A and Class B, according to EN 10221
	Ultrasonic test	Class 3, according to EN 10308
	Packing	2,0 – 2,5 t/bundle
	Certificate of Quality	According to EN 10204/3.1

SPECIAL BAR QUALITY (SBQ) | FLOW CHART



STOMANA's HOT-ROLLED WELDABLE REINFORCING BARS are marketed under the name SD Concrete Reinforcing Steel and are used in the reinforcing of concrete, for both in-situ and precast applications. They are finished products that are used as tension devices in reinforced concrete structures, strengthening and holding the concrete in tension. The reinforcing steel surface incorporates deformed patterns (ribs) in order to enhance the mechanical bond with the concrete. Chemical composition, mechanical properties, sizes and ribs dimensions of Stomana reinforcing steel in bars are manufactured to comply with national standards of destination countries.

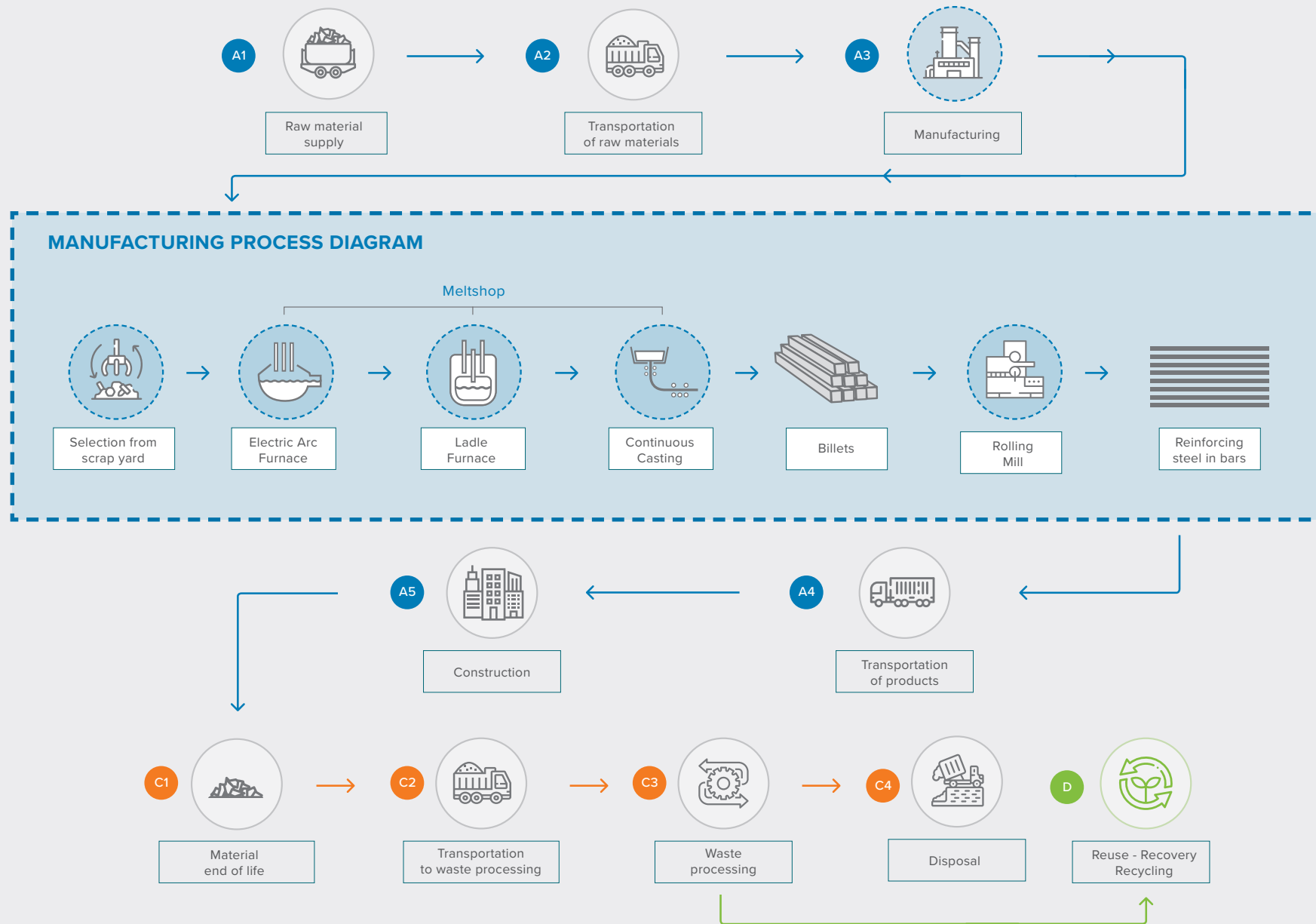
Certification Body	Steel grades	Standard
NISI - Bulgaria	B500B	BDS 9252:2007 BDS EN 10080:2005
Prufstelle Prof. Rehn Germany	B500B	DIN 488:2009
ICECON Romania	B500C	Technical Approval
ICECON Romania	PC 52, class II	SR 438-1:2012
ZAG Slovenia	B500B	Technical Approval STS-09/0051
TSUS Slovakia	B500B	Technical Approval SK TP-15/0011-26.02.2015
IGH Croatia	B500B	HRN EN 10080:2005 HRN 1130-2:2008
EMI Hungary	B500B	Technical Approval A-73/2014
TZUS Czech Republic	B500B	CSN 420139 EN 10080:2005
TMS Serbia	B500B	SRPS EN 10080:2008 Uredba Serbia

Technical Characteristics

INFORMATION	DESCRIPTION		
Product Identification	Hot-rolled weldable ribbed reinforcing steel for concrete in bars		
Product features (Indicative values)	Bars	Diameters from 8 mm to 40 mm Standard length of 12 m Bundle weight: 2.000 kg	
Product properties (acc. EN 10080:2005)	Weldability	$Ceq \leq 0,52\%$	
	Typical nominal yield stress (Re)	$400 \text{ MPa} \leq C_v \leq 600 \text{ MPa}$	
	Bendability	Successful in bend and rebend test	
	Elongation	Agt > 5% (ductility class B)	
		Agt > 7,5 % (ductility class C)	
	Adherence (surface geometry fR)	- for $8 \leq \emptyset$	fR > 0,045
- for $8 < \emptyset \leq 10 \text{ mm}$		fR > 0,052	
- for $\emptyset > 10 \text{ mm}$		fR > 0,056	
Fatigue strength	Successful in fatigue test		



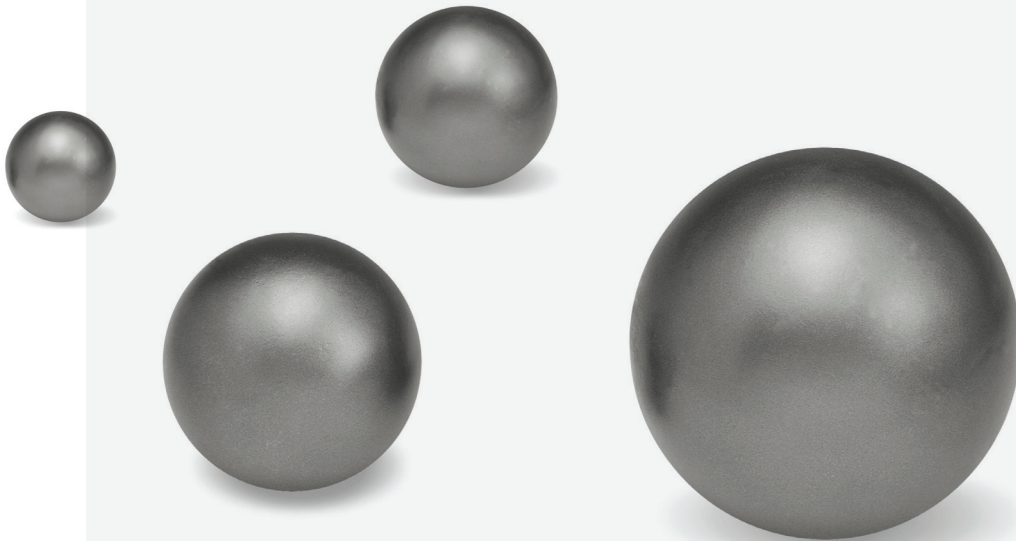
HOT-ROLLED REINFORCING BARS | FLOW CHART



Steel balls for grinding are produced in a range of 60-125mm diameter. They are used in ore grinding mills, such as SAG (Semi Autogenous Grinding) mills when it is for initial grinding or ball mills for regrinding.

The most common applications of these steel balls are in gold, copper, iron, zinc, nickel and silver mining. Different hardness level of the product can be used depending on metal ore in order for grinding to be optimized.

GENERAL FEATURES	
TYPE	Hot-Rolled Steel Balls for Grinding
FORM-DIMENSIONS	Diameters from 60 to 125 mm
SURFACE HARDNESS	As per Brinel & Rockwell
PACKING	Steel Drums, Big Bags, Bulk
DIMENSIONS, WEIGHT & TOLERANCES	According to FN-SPP-03-18



Technical characteristics

Diameter of steel balls (mm)	Hardness HRC (HBW) not less than			
	CATEGORY			
	Normal (NH)	Enhanced (EH)	High (HH)	Very High (VHH)
60	(48) 461	(53) 534	(57) 601	(60) 653
70	(48) 461	(52) 514	(56) 578	(60) 653
80	(48) 461	(51) 495	(55) 555	(60) 653
90	(40) 375	(48) 461	(51) 495	(60) 653
100	(40) 375	(44) 415	(44) 415	(59) 634
110	(40) 375	(44) 415	(44) 415	(54) 543
115	(40) 375	(44) 415	(44) 415	(54) 543
120	(40) 375	(44) 415	(44) 415	(53) 525
125	(40) 375	(44) 415	(44) 415	(53) 525

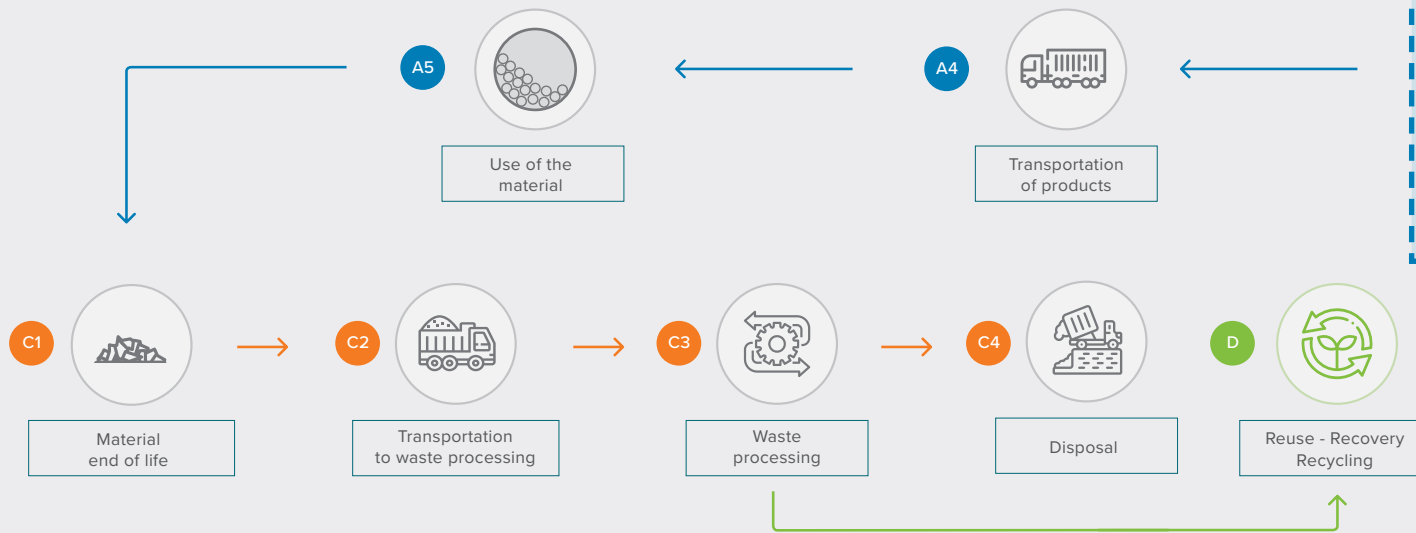
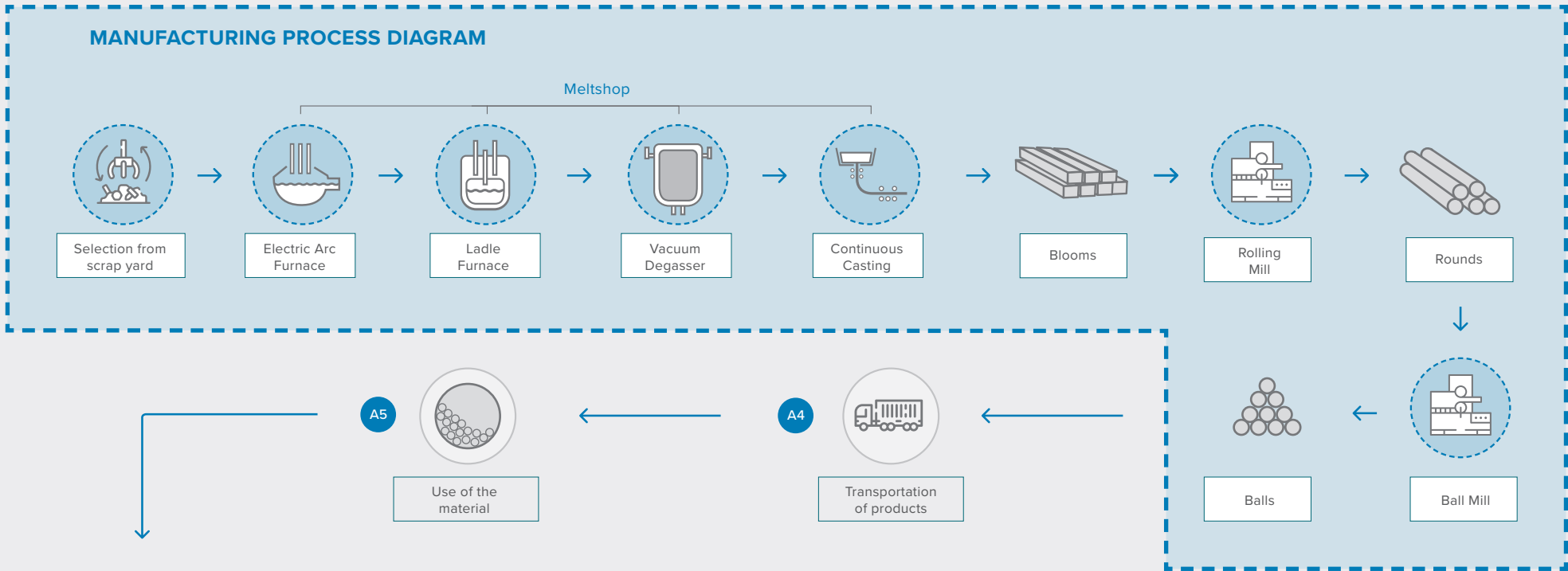
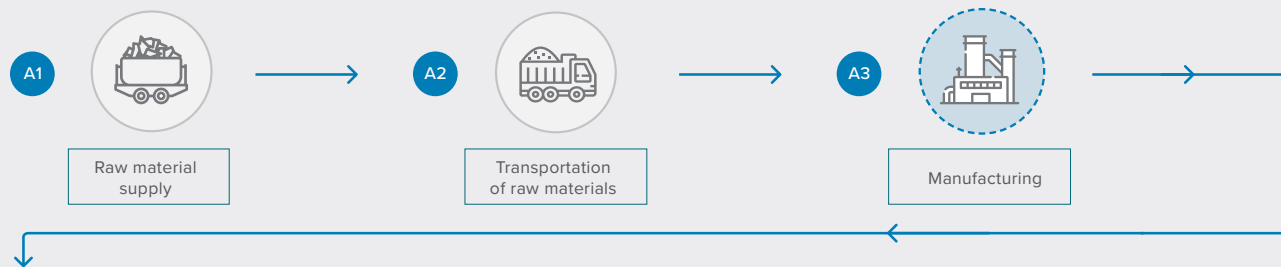
Depending on their surface hardness, the steel balls shall be normally divided into the following four categories:

Normal (typical) hardness with a code designation (NH)
Enhanced hardness - (EH)

High hardness - (HH)
Very high hardness - (VHH)

Nominal Diameter of a Steel Ball (mm)	Limit Deviations (mm)	Nominal Volume (cm ³)	Nominal Mass (kg)
60	+3,0 / -2,0	113,12	0,888
70	+3,0 / -2,0	179,62	1,410
80	+4,0 / -2,0	268,02	2,104
90	+4,0 / -3,0	381,66	2,996
100	+5,0 / -3,0	523,57	4,110
110	+5,0 / -5,0	696,55	5,468
115	+5,0 / -5,0	795,92	6,248
120	+5,0 / -5,0	904,78	7,099
125	+5,0 / -5,0	1022,65	8,024

STEEL BALLS FOR GRINDING | FLOW CHART



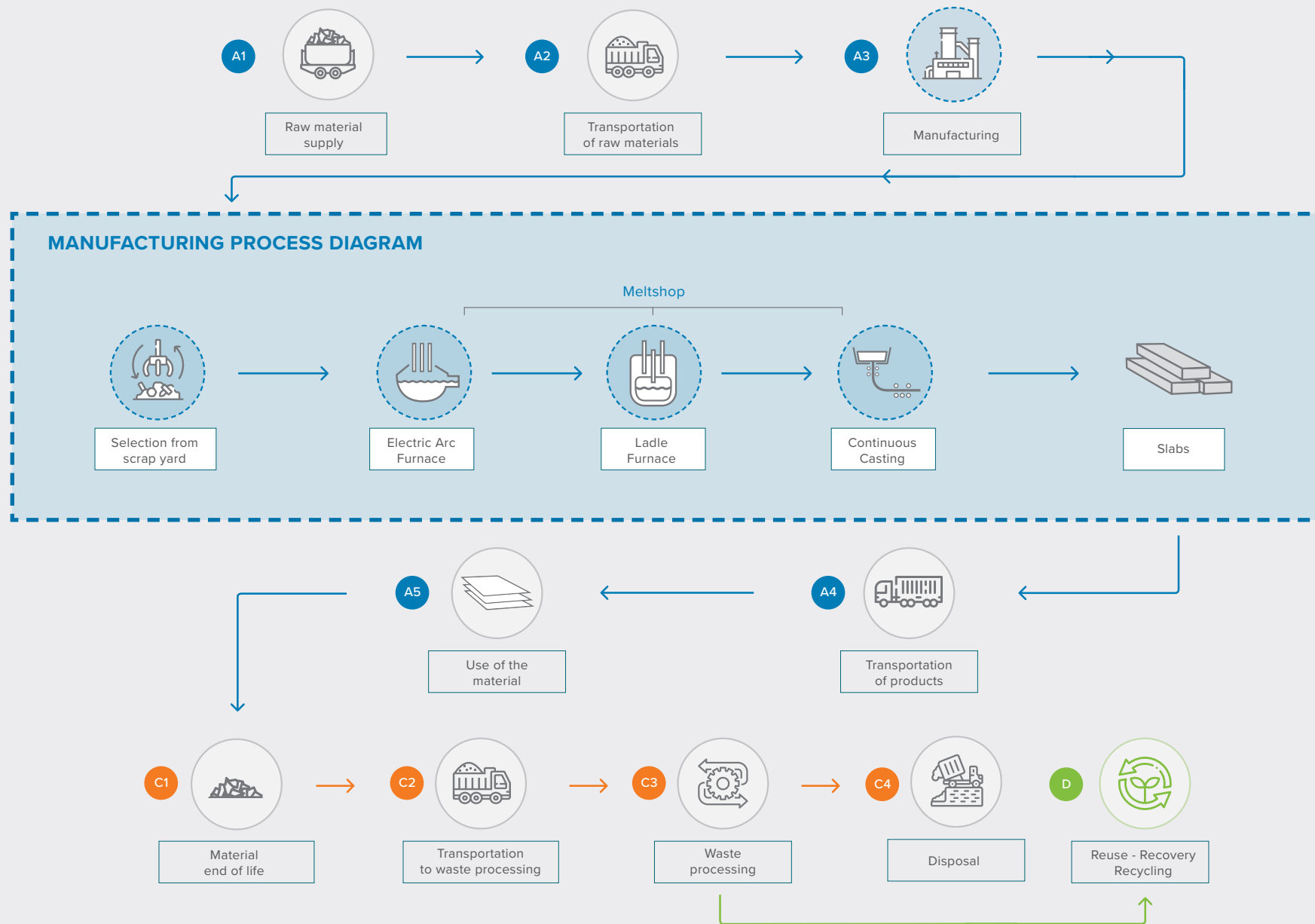
Stomana Industry produces high quality steel slabs, produced in Melt Shop equipped with two high-power Electric Arc Furnaces (EAFs), two Ladle Furnaces and a Slab Caster.

In the electric arc furnace we melt exclusively scrap which increases the recycled content with a significant contribution to circular economy. The scrap recycling production route reduces drastically the CO₂ emissions and environmental impacts of the steel enabling customers to achieve their products' continuous environmental improvement.

Stomana produces slabs suitable for heavy plates as well as for hot-rolled-coils (HRC) with a large number of markets and applications. These include construction, machinery, energy and power, shipbuilding, transportation, mining.

Steel	Steel grades	Standard
Structural	S235; S275; S355; A283 Gr. C; A36 A572 Gr.50; A573 Gr.70; A709 Gr.50	EN 10025-2, non-alloyed ASTM - non alloyed ASTM low-alloyed
Weldable	S355N	EN 10025-3
Corrosion resistant	S235J0W; S235J2W; S355J0W; S355J2W	EN 10025-5
For pressure vessels	P235GH; P265GH; P295GH; P355GH A516 Gr.55; A516 Gr.60; A516 Gr.65; A516 Gr.70	EN 10028-2 ASTM
Shipbuilding	AB-A; AB-B; LR-A; LR-B; BV-A; VL-A; VL-B; ASTM A131-A, A131-B; AH-32; DH-32; AH-36; DH-36	
Quenching & Tempering	C45	EN ISO 683-1







DECLARED UNIT

The declared unit is 1 tonne of steel product.



GOAL AND SCOPE

This EPD evaluates the environmental impacts of the production of 1 tonne of five different steel products from Cradle-to-gate with optional modules A4 + C + D.



CUT-OFF RULES

Where there is insufficient data or data gaps for a unit process, the cut-off criteria are 1% of the total mass of input of that process. The cut-off rule was used in cases of some raw materials fed into meltshop and some packaging materials. The total of neglected input flows per module is a maximum of 5% of energy usage and mass.



BACKGROUND DATA

The most recent version of Ecoinvent database (V3.8) was used as a source of background data.



SOFTWARE

The software used for this study is OpenLCA 1.10.3.



DATA QUALITY

Data on raw materials, transportation of raw materials and products, emissions, waste along with energy and water consumption in manufacturing stage was collected by Sidenor.



TIME REPRESENTIVENESS

All primary data used in this study is for the entire year 2021.



GEOGRAPHICAL SCOPE

Worldwide



ALLOCATIONS

Allocation based on the mass of the final products of each line is applied in meltshop and bar rolling mill. Also, allocation based on the mass of final products is applied in packaging materials used and some general fuel and energy consumptions.



CPC CODE

412 Products of Iron and Steel



SUBSTANCES OF VERY HIGH CONCERN

The product does not contain any substances listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorization” exceeding 0.1 % of the weight of the product.

0,1

NUMBERS

Numbers are expressed using the French style (comma as the decimal separator).

DESCRIPTION OF STAGES INCLUDED

X= Included, MND= Module Not Declared																	
	Product stage			Construction stage		Use stage							End of life stage				Resource recovery stage
	Raw Materials Supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction and demolition	Transport	Waste processing for reuse, recovery and/or recycling	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	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography	GLO	GLO	BG	GLO													
Specific data used	>90%																
Variation-products	Not relevant																
Variation-sites	Not relevant																



A1: Raw Material Supply

Production starts with raw materials supply including procured electricity. This stage includes the mining and processing of raw materials, the generation of fuels required for the manufacturing and the recycling process of secondary materials. In the manufacturing of the products more than 97% of the raw materials are recycled.



A2: Transportation of raw materials to manufacturer

Transport is relevant to the delivery of raw materials from the supplier to the gate of manufacturing plant. The raw materials are transported by truck, vessels and trains from different countries all over the world.



A3: Manufacturing

Manufacturing of the products includes all the processes presented in the flow charts.



A4: Transportation of product

The products are transported to customers and/or construction sites by trucks, vessels, trains and barges in Bulgaria and worldwide.



C1: De-construction and demolition

Construction and demolition wastes are generated during construction and the demolition of the structures after the end of their useful life. Due to the lack of information concerning how the environmental impacts of the demolition of the whole building are allocated to the steel parts, they are assumed to be zero.



C2: Transport to waste processing

As a conservative assumption, a distance of 100 km by lorry 16-32 tonnes from construction/demolition sites to scrap dealers and disposal sites has been chosen.



C3: Waste processing for reuse, recovery and/or recycling

According to Worldsteel Association, global steel recycle rates are estimated at 85% for construction applications.



C4: Disposal

According to Worldsteel Association, 15% of the product will be landfilled.



D: Reuse-Recovery-Recycling-potential

Module D consists of avoided burdens related to the potential reuse and/or recycling of the product after its end-of-life stage.

HOT ROLLED PLATES



ENVIRONMENTAL IMPACTS	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential - total	kg CO ₂ eq	5,10E+02	6,17E+01	2,01E+02	7,73E+02	1,07E+02	0,00E+00	1,65E+01	4,89E+01	7,91E-01	8,64E+00
Global warming potential - fossil	kg CO ₂ eq	5,05E+02	6,16E+01	2,01E+02	7,68E+02	1,07E+02	0,00E+00	1,65E+01	4,89E+01	7,90E-01	8,63E+00
Global warming potential - biogenic	kg CO ₂ eq	3,49E+00	2,60E-02	7,55E-03	3,52E+00	3,91E-02	0,00E+00	5,55E-03	7,93E-03	4,41E-04	1,40E-03
Global warming potential -luluc	kg CO ₂ eq	1,05E+00	3,66E-02	3,48E-03	1,09E+00	6,25E-02	0,00E+00	5,58E-03	4,88E-03	7,46E-04	8,62E-04
Global warming potential - GHG *	kg CO ₂ eq	4,96E+02	6,09E+01	2,01E+02	7,58E+02	1,06E+02	0,00E+00	1,63E+01	4,84E+01	7,74E-01	8,54E+00
Ozone Depletion Potential	kg CFC-11 eq	5,25E-05	1,28E-05	3,87E-07	6,57E-05	2,33E-05	0,00E+00	3,77E-06	1,05E-05	3,20E-07	1,85E-06
Acidification Potential	mol H+ eq	2,76E+00	5,16E-01	2,02E-02	3,29E+00	1,14E+00	0,00E+00	8,25E-02	5,08E-01	7,43E-03	8,97E-02
Eutrophication potential -freshwater	kg PO ₄ ⁻³ eq	1,27E+00	1,70E-02	8,35E-03	1,29E+00	2,27E-02	0,00E+00	3,42E-03	4,65E-03	2,22E-04	8,20E-04
Eutrophication potential -freshwater **	kg P eq	4,13E-01	5,54E-03	2,72E-03	4,21E-01	7,41E-03	0,00E+00	1,11E-03	1,52E-03	7,23E-05	2,67E-04
Eutrophication potential -marine	kg N eq	5,08E-01	1,96E-01	5,90E-03	7,10E-01	3,36E-01	0,00E+00	2,88E-02	2,25E-01	2,58E-03	3,97E-02
Eutrophication potential -terrestrial	mol N eq	4,75E+00	2,15E+00	6,60E-02	6,96E+00	3,70E+00	0,00E+00	3,14E-01	2,47E+00	2,83E-02	4,35E-01
Photochemical oxidant formation Potential	kg NMVOC eq	1,39E+00	5,86E-01	1,73E-02	1,99E+00	1,01E+00	0,00E+00	8,95E-02	6,78E-01	8,23E-03	1,20E-01
Abiotic depletion potential – Elements ***	kg Sb eq	1,37E-03	2,22E-04	1,80E-05	1,61E-03	3,41E-04	0,00E+00	5,98E-05	2,52E-05	1,80E-06	4,44E-06
Abiotic depletion potential – Fossil resources ***	MJ	1,25E+04	8,74E+02	3,91E+01	1,34E+04	1,54E+03	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Water scarcity potential ***	m ³ eq	4,48E+02	5,45E+00	9,26E-01	4,54E+02	7,75E+00	0,00E+00	1,17E+00	1,64E+00	1,02E+00	2,90E-01

(*) GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide emissions and uptake and biogenic carbon stored in the product, with characterization factors (CFs) based on IPCC (2013).

(**) Eutrophication aquatic freshwater shall be given in both kg PO₄ eq and kg P eq.

(***) 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 experienced with the indicator.

HOT ROLLED PLATES

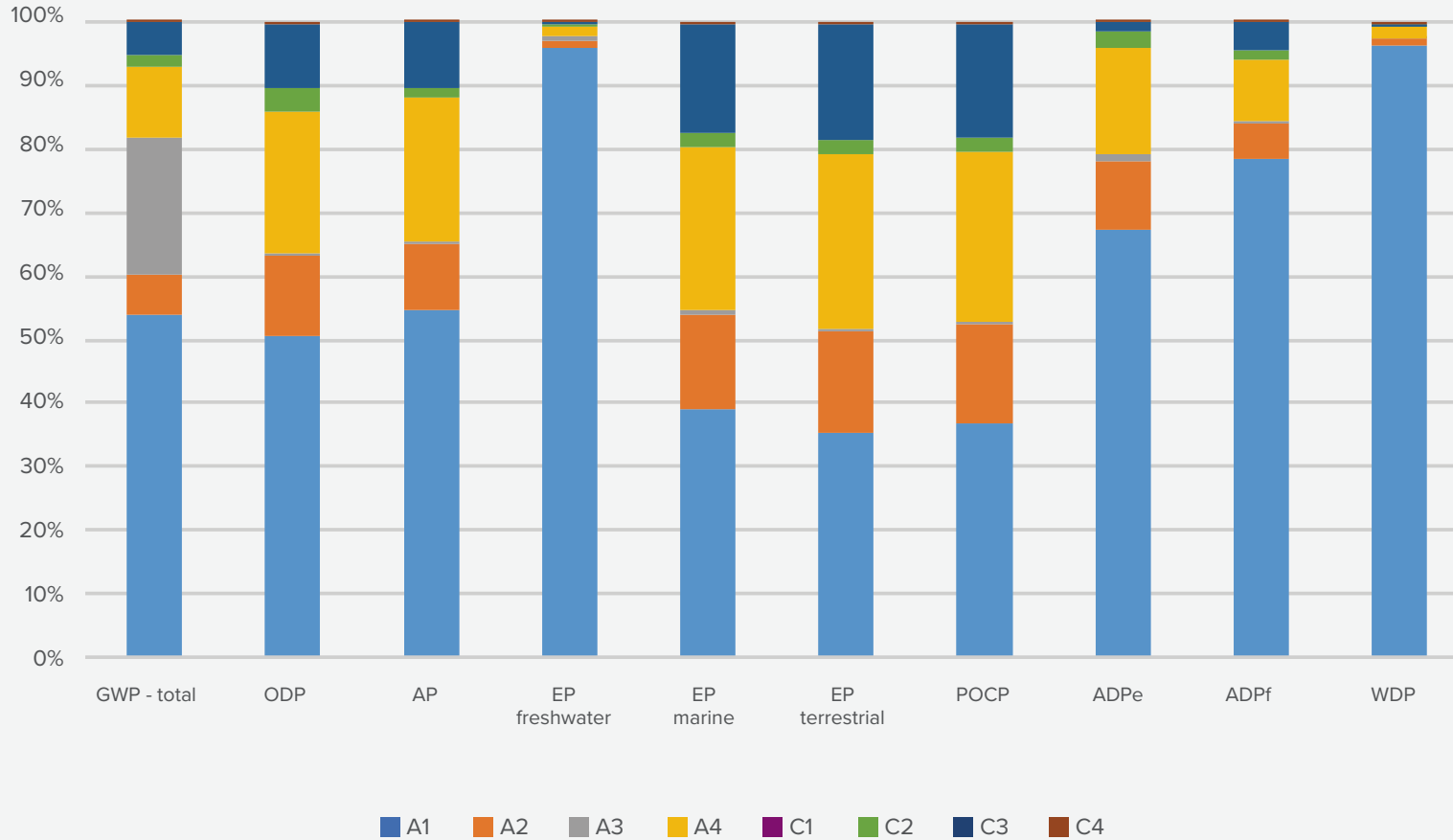


RESOURCE USE	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	1,70E+03	1,69E+01	1,70E+00	1,72E+03	2,31E+01	0,00E+00	3,38E+00	3,77E+00	1,88E-01	6,66E-01
Use of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	1,00E+00	2,00E+00	3,00E+00	4,00E+00	5,00E+00	6,00E+00	7,00E+00
Total use of renewable primary energy resources	MJ	1,70E+03	1,69E+01	1,70E+00	1,72E+03	2,51E+01	3,00E+00	7,38E+00	8,77E+00	6,19E+00	7,67E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	1,25E+04	8,74E+02	3,91E+01	1,34E+04	1,54E+03	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	MJ	1,25E+04	8,74E+02	3,91E+01	1,34E+04	1,54E+03	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of secondary material	kg	1,27E+03	0,00E+00	0,00E+00	1,27E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	1,04E+01	1,27E-01	2,15E-02	1,06E+01	1,80E-01	0,00E+00	2,71E-02	3,83E-02	2,36E-02	6,76E-03

OUTPUT FLOWS AND WASTE CATEGORIES	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	7,88E-03	2,30E-03	4,38E-05	1,02E-02	3,64E-03	0,00E+00	6,54E-04	1,84E-03	3,34E-05	3,24E-04
Non-hazardous waste disposed	kg	8,62E+01	2,98E+01	3,73E+01	1,53E+02	5,75E+01	0,00E+00	1,20E+01	9,13E-01	1,50E+02	1,61E-01
Radioactive waste disposed	kg	6,24E-02	5,69E-03	1,87E-04	6,83E-02	1,03E-02	0,00E+00	1,72E-03	4,63E-03	1,45E-04	8,18E-04
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

HOT ROLLED PLATES

RELATIVE CONTRIBUTION OF EACH ASSESSED STAGE TO THE MAIN ENVIRONMENTAL IMPACTS



SPECIAL BAR QUALITY (SBQ)



ENVIRONMENTAL IMPACTS	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential - total	kg CO ₂ eq	4,97E+02	5,84E+01	1,79E+02	7,35E+02	1,14E+02	0,00E+00	1,65E+01	4,89E+01	7,91E-01	8,64E+00
Global warming potential - fossil	kg CO ₂ eq	4,93E+02	5,83E+01	1,79E+02	7,30E+02	1,14E+02	0,00E+00	1,65E+01	4,89E+01	7,90E-01	8,63E+00
Global warming potential - biogenic	kg CO ₂ eq	3,30E+00	2,45E-02	8,78E-03	3,34E+00	4,15E-02	0,00E+00	5,55E-03	7,93E-03	4,41E-04	1,40E-03
Global warming potential -luluc	kg CO ₂ eq	1,01E+00	3,44E-02	4,05E-03	1,05E+00	4,80E-02	0,00E+00	5,58E-03	4,88E-03	7,46E-04	8,62E-04
Global warming potential - GHG *	kg CO ₂ eq	4,84E+02	5,76E+01	1,79E+02	7,21E+02	1,13E+02	0,00E+00	1,63E+01	4,84E+01	7,74E-01	8,54E+00
Ozone Depletion Potential	kg CFC-11 eq	4,60E-05	1,22E-05	4,42E-07	5,86E-05	2,63E-05	0,00E+00	3,77E-06	1,05E-05	3,20E-07	1,85E-06
Acidification Potential	mol H+ eq	2,66E+00	4,88E-01	2,33E-02	3,17E+00	6,23E-01	0,00E+00	8,25E-02	5,08E-01	7,43E-03	8,97E-02
Eutrophication potential -freshwater	kg PO ₄ ⁻³ eq	1,23E+00	1,60E-02	8,93E-03	1,25E+00	2,38E-02	0,00E+00	3,42E-03	4,65E-03	2,22E-04	8,20E-04
Eutrophication potential -freshwater **	kg P eq	4,00E-01	5,21E-03	2,91E-03	4,08E-01	7,77E-03	0,00E+00	1,11E-03	1,52E-03	7,23E-05	2,67E-04
Eutrophication potential -marine	kg N eq	4,92E-01	1,85E-01	6,79E-03	6,83E-01	2,18E-01	0,00E+00	2,88E-02	2,25E-01	2,58E-03	3,97E-02
Eutrophication potential -terrestrial	mol N eq	4,59E+00	2,02E+00	7,61E-02	6,68E+00	2,39E+00	0,00E+00	3,14E-01	2,47E+00	2,83E-02	4,35E-01
Photochemical oxidant formation Potential	kg NMVOC eq	1,36E+00	5,52E-01	1,99E-02	1,93E+00	6,76E-01	0,00E+00	8,95E-02	6,78E-01	8,23E-03	1,20E-01
Abiotic depletion potential – Elements ***	kg Sb eq	1,99E-03	2,09E-04	2,09E-05	2,22E-03	4,02E-04	0,00E+00	5,98E-05	2,52E-05	1,80E-06	4,44E-06
Abiotic depletion potential – Fossil resources ***	MJ	1,17E+04	8,28E+02	4,49E+01	1,25E+04	1,73E+03	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Water scarcity potential ***	m ³ eq	3,85E+02	5,13E+00	1,07E+00	3,91E+02	8,56E+00	0,00E+00	1,17E+00	1,64E+00	1,02E+00	2,90E-01

(*) GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide emissions and uptake and biogenic carbon stored in the product, with characterization factors (CFs) based on IPCC (2013).

(**) Eutrophication aquatic freshwater shall be given in both kg PO₄ eq and kg P eq.

(***) 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 experienced with the indicator.

SPECIAL BAR QUALITY (SBQ)

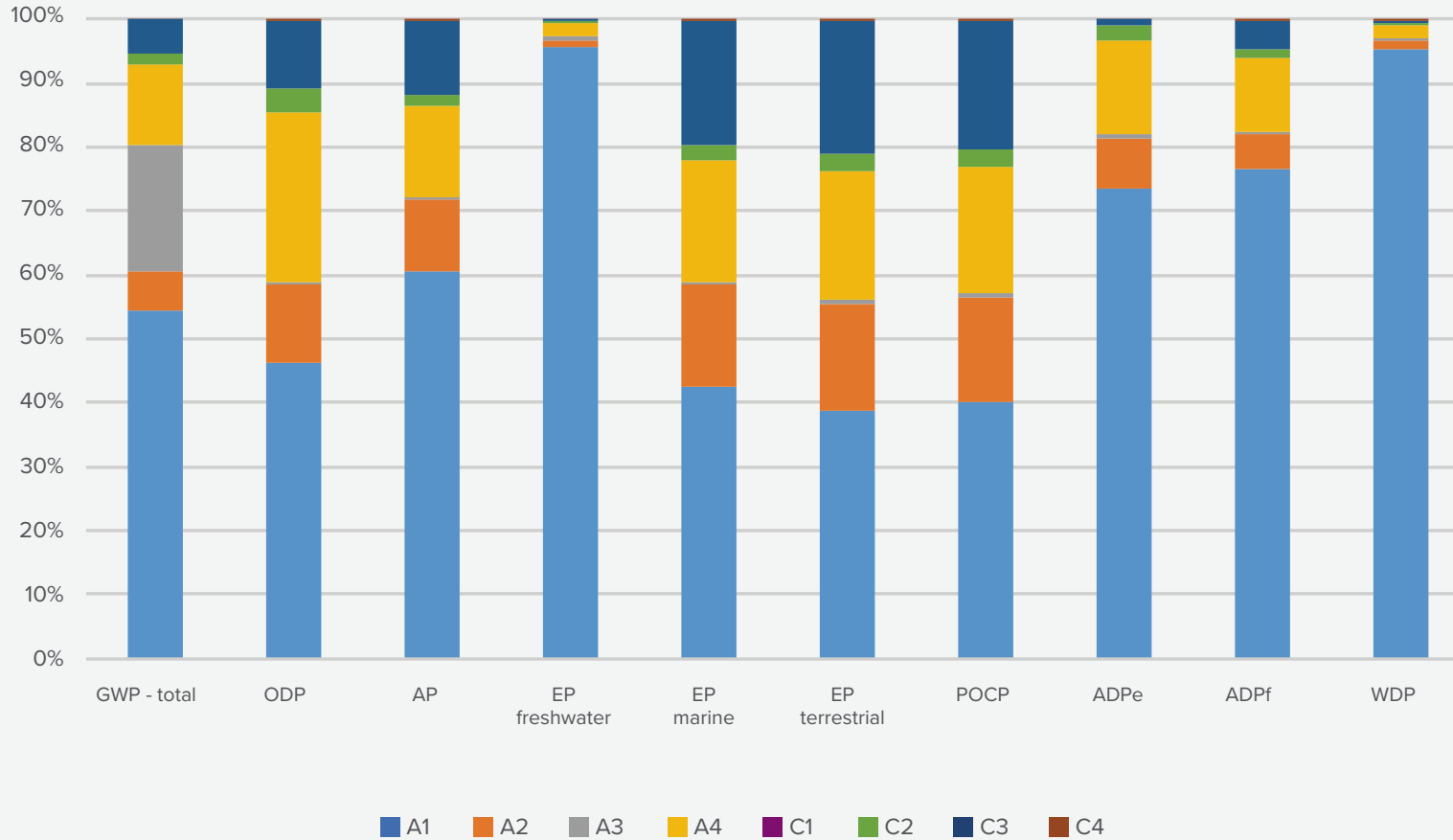


RESOURCE USE	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	1,55E+03	1,59E+01	1,96E+00	1,57E+03	2,54E+01	0,00E+00	3,38E+00	3,77E+00	1,88E-01	6,66E-01
Use of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	1,00E+00	2,00E+00	3,00E+00	4,00E+00	5,00E+00	6,00E+00	7,00E+00
Total use of renewable primary energy resources	MJ	1,55E+03	1,59E+01	1,96E+00	1,57E+03	2,74E+01	3,00E+00	7,38E+00	8,77E+00	6,19E+00	7,67E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	1,17E+04	8,28E+02	4,49E+01	1,25E+04	1,73E+03	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	MJ	1,17E+04	8,28E+02	4,49E+01	1,25E+04	1,73E+03	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of secondary material	kg	1,18E+03	0,00E+00	0,00E+00	1,18E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	8,95E+00	1,20E-01	2,49E-02	9,10E+00	1,99E-01	0,00E+00	2,71E-02	3,83E-02	2,36E-02	6,76E-03

OUTPUT FLOWS AND WASTE CATEGORIES	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	7,33E-03	2,17E-03	4,96E-05	9,55E-03	4,52E-03	0,00E+00	6,54E-04	1,84E-03	3,34E-05	3,24E-04
Non-hazardous waste disposed	kg	8,45E+01	2,85E+01	4,33E+01	1,56E+02	8,57E+01	0,00E+00	1,20E+01	9,13E-01	1,50E+02	1,61E-01
Radioactive waste disposed	kg	5,98E-02	5,40E-03	2,14E-04	6,54E-02	1,16E-02	0,00E+00	1,72E-03	4,63E-03	1,45E-04	8,18E-04
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

SPECIAL BAR QUALITY (SBQ)

RELATIVE CONTRIBUTION OF EACH ASSESSED STAGE TO THE MAIN ENVIRONMENTAL IMPACTS



HOT-ROLLED REINFORCING BARS



ENVIRONMENTAL IMPACTS	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential - total	kg CO ₂ eq	4,61E+02	5,63E+01	1,70E+02	6,88E+02	2,80E+01	0,00E+00	1,65E+01	4,89E+01	7,91E-01	8,64E+00
Global warming potential - fossil	kg CO ₂ eq	4,57E+02	5,62E+01	1,70E+02	6,84E+02	2,80E+01	0,00E+00	1,65E+01	4,89E+01	7,90E-01	8,63E+00
Global warming potential - biogenic	kg CO ₂ eq	3,12E+00	2,37E-02	8,72E-03	3,16E+00	1,01E-02	0,00E+00	5,55E-03	7,93E-03	4,41E-04	1,40E-03
Global warming potential -luluc	kg CO ₂ eq	9,43E-01	3,34E-02	4,02E-03	9,81E-01	1,14E-02	0,00E+00	5,58E-03	4,88E-03	7,46E-04	8,62E-04
Global warming potential - GHG *	kg CO ₂ eq	4,49E+02	5,55E+01	1,70E+02	6,75E+02	2,77E+01	0,00E+00	1,63E+01	4,84E+01	7,74E-01	8,54E+00
Ozone Depletion Potential	kg CFC-11 eq	4,39E-05	1,17E-05	4,39E-07	5,61E-05	6,49E-06	0,00E+00	3,77E-06	1,05E-05	3,20E-07	1,85E-06
Acidification Potential	mol H+ eq	2,46E+00	4,71E-01	2,31E-02	2,95E+00	1,46E-01	0,00E+00	8,25E-02	5,08E-01	7,43E-03	8,97E-02
Eutrophication potential -freshwater	kg PO ₄ ⁻³ eq	1,13E+00	1,55E-02	8,85E-03	1,16E+00	5,72E-03	0,00E+00	3,42E-03	4,65E-03	2,22E-04	8,20E-04
Eutrophication potential -freshwater **	kg P eq	3,70E-01	5,05E-03	2,89E-03	3,78E-01	1,86E-03	0,00E+00	1,11E-03	1,52E-03	7,23E-05	2,67E-04
Eutrophication potential -marine	kg N eq	4,54E-01	1,79E-01	6,74E-03	6,39E-01	5,11E-02	0,00E+00	2,88E-02	2,25E-01	2,58E-03	3,97E-02
Eutrophication potential -terrestrial	mol N eq	4,23E+00	1,96E+00	7,55E-02	6,26E+00	5,58E-01	0,00E+00	3,14E-01	2,47E+00	2,83E-02	4,35E-01
Photochemical oxidant formation Potential	kg NMVOC eq	1,25E+00	5,34E-01	1,98E-02	1,81E+00	1,59E-01	0,00E+00	8,95E-02	6,78E-01	8,23E-03	1,20E-01
Abiotic depletion potential – Elements ***	kg Sb eq	1,69E-03	2,02E-04	2,07E-05	1,91E-03	9,85E-05	0,00E+00	5,98E-05	2,52E-05	1,80E-06	4,44E-06
Abiotic depletion potential – Fossil resources ***	MJ	1,09E+04	7,97E+02	4,46E+01	1,18E+04	4,25E+02	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Water scarcity potential ***	m ³ eq	4,11E+02	4,97E+00	1,06E+00	4,17E+02	2,07E+00	0,00E+00	1,17E+00	1,64E+00	1,02E+00	2,90E-01

(*) GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide emissions and uptake and biogenic carbon stored in the product, with characterization factors (CFs) based on IPCC (2013).

(**) Eutrophication aquatic freshwater shall be given in both kg PO₄ eq and kg P eq.

(***) 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 experienced with the indicator.

HOT-ROLLED REINFORCING BARS

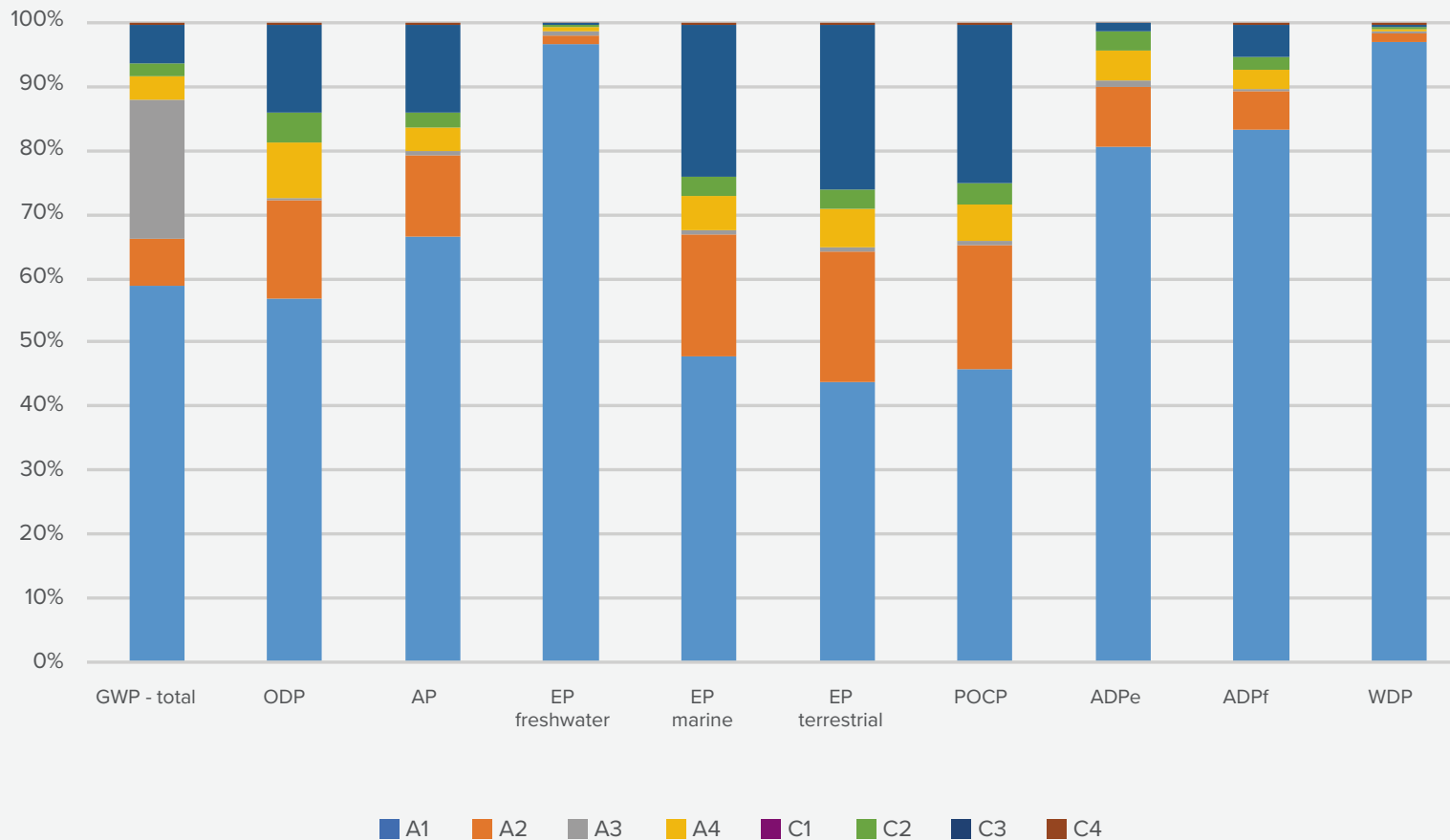


RESOURCE USE	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	1,43E+03	1,54E+01	1,94E+00	1,45E+03	6,13E+00	0,00E+00	3,38E+00	3,77E+00	1,88E-01	6,66E-01
Use of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	1,00E+00	2,00E+00	3,00E+00	4,00E+00	5,00E+00	6,00E+00	7,00E+00
Total use of renewable primary energy resources	MJ	1,43E+03	1,54E+01	1,94E+00	1,45E+03	8,13E+00	3,00E+00	7,38E+00	8,77E+00	6,19E+00	7,67E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	1,09E+04	7,97E+02	4,46E+01	1,18E+04	4,25E+02	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	MJ	1,09E+04	7,97E+02	4,46E+01	1,18E+04	4,25E+02	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of secondary material	kg	1,15E+03	0,00E+00	0,00E+00	1,15E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	9,56E+00	1,16E-01	2,48E-02	9,70E+00	4,83E-02	0,00E+00	2,71E-02	3,83E-02	2,36E-02	6,76E-03

OUTPUT FLOWS AND WASTE CATEGORIES	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	7,04E-03	2,10E-03	4,92E-05	9,18E-03	1,11E-03	0,00E+00	6,54E-04	1,84E-03	3,34E-05	3,24E-04
Non-hazardous waste disposed	kg	7,48E+01	2,72E+01	4,29E+01	1,45E+02	2,15E+01	0,00E+00	1,20E+01	9,13E-01	1,50E+02	1,61E-01
Radioactive waste disposed	kg	5,54E-02	5,19E-03	2,12E-04	6,08E-02	2,87E-03	0,00E+00	1,72E-03	4,63E-03	1,45E-04	8,18E-04
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

HOT-ROLLED REINFORCING BARS

RELATIVE CONTRIBUTION OF EACH ASSESSED STAGE TO THE MAIN ENVIRONMENTAL IMPACTS



STEEL BALLS FOR GRINDING



ENVIRONMENTAL IMPACTS	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential - total	kg CO ₂ eq	6,55E+02	6,09E+01	4,60E+02	1,18E+03	3,17E+01	0,00E+00	1,65E+01	4,89E+01	7,91E-01	8,64E+00
Global warming potential - fossil	kg CO ₂ eq	6,50E+02	6,09E+01	4,60E+02	1,17E+03	3,17E+01	0,00E+00	1,65E+01	4,89E+01	7,90E-01	8,63E+00
Global warming potential - biogenic	kg CO ₂ eq	3,88E+00	2,54E-02	9,05E-03	3,91E+00	1,11E-02	0,00E+00	5,55E-03	7,93E-03	4,41E-04	1,40E-03
Global warming potential -luluc	kg CO ₂ eq	1,59E+00	3,58E-02	4,17E-03	1,63E+00	1,73E-02	0,00E+00	5,58E-03	4,88E-03	7,46E-04	8,62E-04
Global warming potential - GHG *	kg CO ₂ eq	6,33E+02	6,02E+01	4,60E+02	1,15E+03	3,14E+01	0,00E+00	1,63E+01	4,84E+01	7,74E-01	8,54E+00
Ozone Depletion Potential	kg CFC-11 eq	1,04E-04	1,27E-05	4,56E-07	1,17E-04	6,97E-06	0,00E+00	3,77E-06	1,05E-05	3,20E-07	1,85E-06
Acidification Potential	mol H+ eq	3,45E+00	5,12E-01	2,40E-02	3,98E+00	3,45E-01	0,00E+00	8,25E-02	5,08E-01	7,43E-03	8,97E-02
Eutrophication potential -freshwater	kg PO4 ⁻³ eq	1,47E+00	1,65E-02	9,18E-03	1,49E+00	6,25E-03	0,00E+00	3,42E-03	4,65E-03	2,22E-04	8,20E-04
Eutrophication potential -freshwater **	kg P eq	4,78E-01	5,40E-03	2,99E-03	4,86E-01	2,04E-03	0,00E+00	1,11E-03	1,52E-03	7,23E-05	2,67E-04
Eutrophication potential -marine	kg N eq	6,75E-01	1,92E-01	7,00E-03	8,74E-01	9,72E-02	0,00E+00	2,88E-02	2,25E-01	2,58E-03	3,97E-02
Eutrophication potential -terrestrial	mol N eq	6,45E+00	2,11E+00	7,83E-02	8,64E+00	1,07E+00	0,00E+00	3,14E-01	2,47E+00	2,83E-02	4,35E-01
Photochemical oxidant formation Potential	kg NMVOC eq	2,07E+00	5,75E-01	2,05E-02	2,67E+00	2,92E-01	0,00E+00	8,95E-02	6,78E-01	8,23E-03	1,20E-01
Abiotic depletion potential – Elements ***	kg Sb eq	3,61E-03	2,18E-04	2,15E-05	3,85E-03	9,92E-05	0,00E+00	5,98E-05	2,52E-05	1,80E-06	4,44E-06
Abiotic depletion potential – Fossil resources ***	MJ	1,94E+04	8,65E+02	4,63E+01	2,03E+04	4,59E+02	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Water scarcity potential ***	m ³ eq	6,13E+02	5,33E+00	1,10E+00	6,20E+02	2,17E+00	0,00E+00	1,17E+00	1,64E+00	1,02E+00	2,90E-01

(*) GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide emissions and uptake and biogenic carbon stored in the product, with characterization factors (CFs) based on IPCC (2013).

(**) Eutrophication aquatic freshwater shall be given in both kg PO4 eq and kg P eq.

(***) 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 experienced with the indicator.

STEEL BALLS FOR GRINDING



RESOURCE USE	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	7,64E+03	1,65E+01	2,01E+00	7,65E+03	6,40E+00	0,00E+00	3,38E+00	3,77E+00	1,88E-01	6,66E-01
Use of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	1,00E+00	2,00E+00	3,00E+00	4,00E+00	5,00E+00	6,00E+00	7,00E+00
Total use of renewable primary energy resources	MJ	7,64E+03	1,65E+01	2,01E+00	7,66E+03	8,40E+00	3,00E+00	7,38E+00	8,77E+00	6,19E+00	7,67E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	1,94E+04	8,65E+02	4,63E+01	2,03E+04	4,59E+02	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	MJ	1,94E+04	8,65E+02	4,63E+01	2,03E+04	4,59E+02	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of secondary material	kg	1,20E+03	0,00E+00	0,00E+00	1,20E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	1,43E+01	1,24E-01	2,57E-02	1,44E+01	5,06E-02	0,00E+00	2,71E-02	3,83E-02	2,36E-02	6,76E-03

OUTPUT FLOWS AND WASTE CATEGORIES	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1,60E-02	2,27E-03	5,11E-05	1,83E-02	1,06E-03	0,00E+00	6,54E-04	1,84E-03	3,34E-05	3,24E-04
Non-hazardous waste disposed	kg	1,13E+02	2,99E+01	4,46E+01	1,87E+02	1,78E+01	0,00E+00	1,20E+01	9,13E-01	1,50E+02	1,61E-01
Radioactive waste disposed	kg	7,42E-02	5,64E-03	2,20E-04	8,01E-02	3,09E-03	0,00E+00	1,72E-03	4,63E-03	1,45E-04	8,18E-04
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

STEEL BALLS FOR GRINDING

RELATIVE CONTRIBUTION OF EACH ASSESSED STAGE TO THE MAIN ENVIRONMENTAL IMPACTS



STEEL SLABS



ENVIRONMENTAL IMPACTS	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential - total	kg CO ₂ eq	3,78E+02	5,43E+01	7,35E+01	5,06E+02	1,59E+02	0,00E+00	1,65E+01	4,89E+01	7,91E-01	8,64E+00
Global warming potential - fossil	kg CO ₂ eq	3,74E+02	5,42E+01	7,35E+01	5,02E+02	1,59E+02	0,00E+00	1,65E+01	4,89E+01	7,90E-01	8,63E+00
Global warming potential - biogenic	kg CO ₂ eq	2,78E+00	2,28E-02	4,60E-03	2,80E+00	5,74E-02	0,00E+00	5,55E-03	7,93E-03	4,41E-04	1,40E-03
Global warming potential -luluc	kg CO ₂ eq	8,01E-01	3,22E-02	2,13E-03	8,35E-01	6,52E-02	0,00E+00	5,58E-03	4,88E-03	7,46E-04	8,62E-04
Global warming potential - GHG *	kg CO ₂ eq	3,69E+02	5,36E+01	7,35E+01	4,96E+02	1,58E+02	0,00E+00	1,63E+01	4,84E+01	7,74E-01	8,54E+00
Ozone Depletion Potential	kg CFC-11 eq	2,38E-05	1,13E-05	2,43E-07	3,54E-05	3,68E-05	0,00E+00	3,77E-06	1,05E-05	3,20E-07	1,85E-06
Acidification Potential	mol H+ eq	2,08E+00	4,54E-01	1,25E-02	2,55E+00	8,35E-01	0,00E+00	8,25E-02	5,08E-01	7,43E-03	8,97E-02
Eutrophication potential -freshwater	kg PO ₄ ⁻³ eq	9,63E-01	1,49E-02	5,97E-03	9,83E-01	3,26E-02	0,00E+00	3,42E-03	4,65E-03	2,22E-04	8,20E-04
Eutrophication potential -freshwater **	kg P eq	3,14E-01	4,87E-03	1,95E-03	3,21E-01	1,06E-02	0,00E+00	1,11E-03	1,52E-03	7,23E-05	2,67E-04
Eutrophication potential -marine	kg N eq	3,84E-01	1,73E-01	3,65E-03	5,60E-01	2,92E-01	0,00E+00	2,88E-02	2,25E-01	2,58E-03	3,97E-02
Eutrophication potential -terrestrial	mol N eq	3,59E+00	1,89E+00	4,09E-02	5,52E+00	3,19E+00	0,00E+00	3,14E-01	2,47E+00	2,83E-02	4,35E-01
Photochemical oxidant formation Potential	kg NMVOC eq	1,03E+00	5,15E-01	1,07E-02	1,55E+00	9,07E-01	0,00E+00	8,95E-02	6,78E-01	8,23E-03	1,20E-01
Abiotic depletion potential – Elements ***	kg Sb eq	1,07E-03	1,95E-04	1,10E-05	1,28E-03	5,60E-04	0,00E+00	5,98E-05	2,52E-05	1,80E-06	4,44E-06
Abiotic depletion potential – Fossil resources ***	MJ	7,70E+03	7,69E+02	2,43E+01	8,49E+03	2,41E+03	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Water scarcity potential ***	m ³ eq	3,27E+02	4,80E+00	5,65E-01	3,32E+02	1,18E+01	0,00E+00	1,17E+00	1,64E+00	1,02E+00	2,90E-01

(*) GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide emissions and uptake and biogenic carbon stored in the product, with characterization factors (CFs) based on IPCC (2013).

(**) Eutrophication aquatic freshwater shall be given in both kg PO₄ eq and kg P eq.

(***) 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 experienced with the indicator.

STEEL SLABS

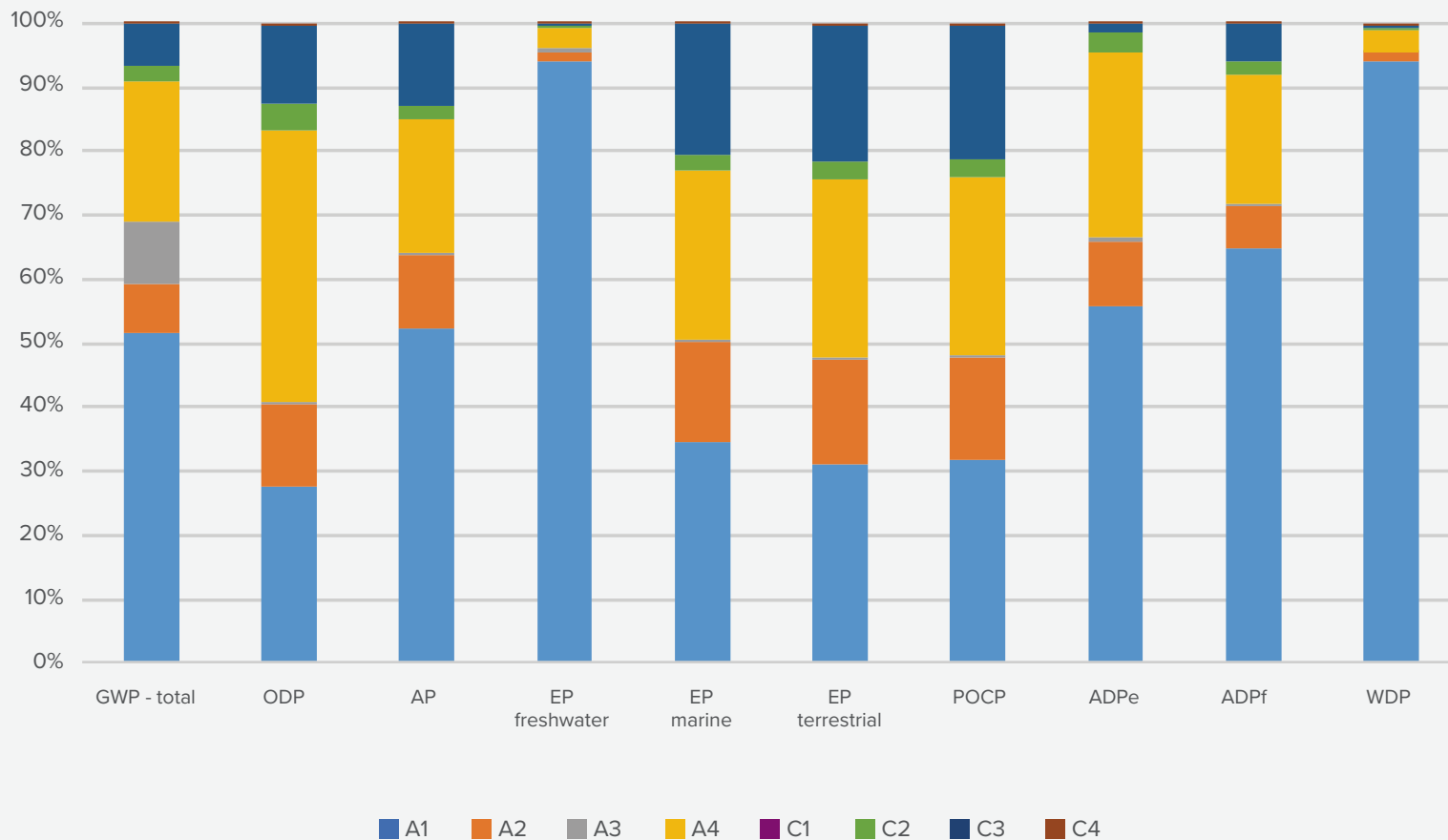


RESOURCE USE	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	1,18E+03	1,48E+01	1,04E+00	1,20E+03	3,49E+01	0,00E+00	3,38E+00	3,77E+00	1,88E-01	6,66E-01
Use of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	1,00E+00	2,00E+00	3,00E+00	4,00E+00	5,00E+00	6,00E+00	7,00E+00
Total use of renewable primary energy resources	MJ	1,18E+03	1,48E+01	1,04E+00	1,20E+03	3,69E+01	3,00E+00	7,38E+00	8,77E+00	6,19E+00	7,67E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	7,70E+03	7,69E+02	2,43E+01	8,49E+03	2,41E+03	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources	MJ	7,70E+03	7,69E+02	2,43E+01	8,49E+03	2,41E+03	0,00E+00	2,51E+02	6,71E+02	2,21E+01	1,18E+02
Use of secondary material	kg	1,12E+03	0,00E+00	0,00E+00	1,12E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	7,61E+00	1,12E-01	1,32E-02	7,73E+00	2,75E-01	0,00E+00	2,71E-02	3,83E-02	2,36E-02	6,76E-03

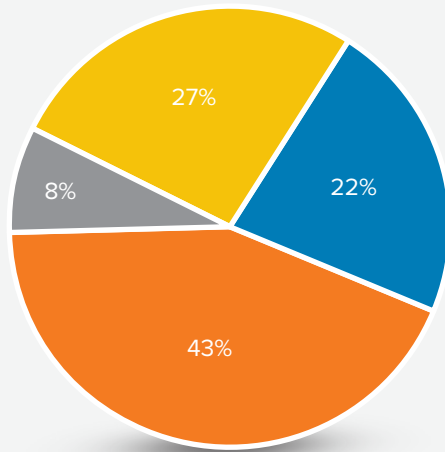
OUTPUT FLOWS AND WASTE CATEGORIES	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	3,67E-03	2,02E-03	2,81E-05	5,72E-03	6,32E-03	0,00E+00	6,54E-04	1,84E-03	3,34E-05	3,24E-04
Non-hazardous waste disposed	kg	7,12E+01	2,62E+01	2,28E+01	1,20E+02	1,22E+02	0,00E+00	1,20E+01	9,13E-01	1,50E+02	1,61E-01
Radioactive waste disposed	kg	4,60E-02	5,01E-03	1,17E-04	5,11E-02	1,63E-02	0,00E+00	1,72E-03	4,63E-03	1,45E-04	8,18E-04
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

STEEL SLABS

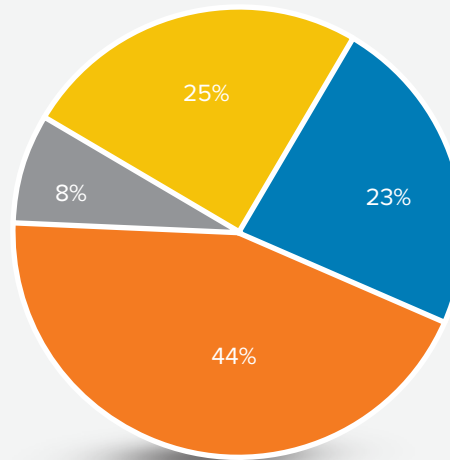
RELATIVE CONTRIBUTION OF EACH ASSESSED STAGE TO THE MAIN ENVIRONMENTAL IMPACTS



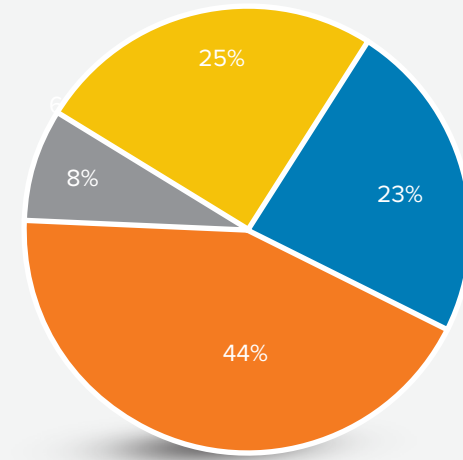
HOT-ROLLED PLATES



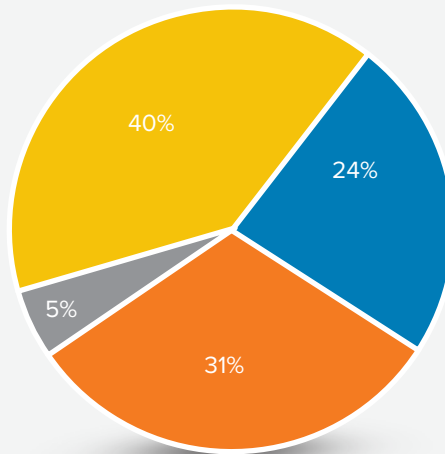
SPECIAL BAR QUALITY (SBQ)



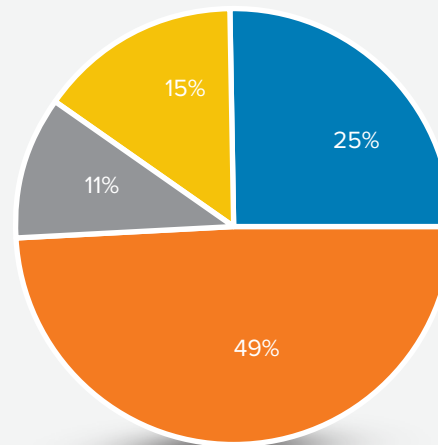
HOT-ROLLED REINFORCING BARS



STEEL BALLS FOR GRINDING



STEEL SLABS



- Materials production
- Electricity generation
- Transportation of materials
- Manufacturing stage



General Programme Instructions of the International EPD® System. Version 3.01, 2019-09-18

PCR 2019:14 v.1.11. Construction products. EPD System. Date 2021-2-5. Valid until 2022-12-31

EN 15804:2012+A2:2019, Sustainability of construction works - Environmental Product Declarations
- Core rules for the product category of construction products

ISO 14020:2000 Environmental labels and declarations — General principles

ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations
- Principles and procedures

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

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

Ecoinvent / Ecoinvent Centre, www.Eco-invent.com

European Residual Mixes 2021 Association of Issuing Bodies, European Residual Mixes Results of the
calculation of Residual Mixes for the calendar year 2021

PROGRAMME INFORMATION



Programme

The International
EPD® System



Address

EPD International AB
Box 210 60 , SE-100 31
Stockholm Sweden



Website

www.environdec.com



E-mail

info@environdec.com

The CEN standard EN 15804 serves as the core Product Category Rules
PCR 2019:14 Construction products (EN 15804:A2); Version 1.11; 2021-02-5
PCR review was conducted by The Technical Committee of the International EPD® System.

Independent third-party verification of the declaration and data, according to ISO 14025:2006

EPD process certification EPD verification

EPD owner:



www.sidenor.gr/en

EPD Prepared by:



www.envirometrics.gr

Verification by:



Approved by:

The International EPD®
System Technical Committee,
supported by the Secretariat

Procedure for follow-up during EPD validity involves third party verifier

Yes No

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