Environmental Product Declaration

Steel wire rod manufactured from steel scrap by TA 2000

In conformity with ISO 14025:2006 and EN15804:2012+A2:2019

TYASA®

Programme:

The International EPD® System

EPD registered through the fully aligned regional programme/hub:

Latin America Hub of the International EPD System

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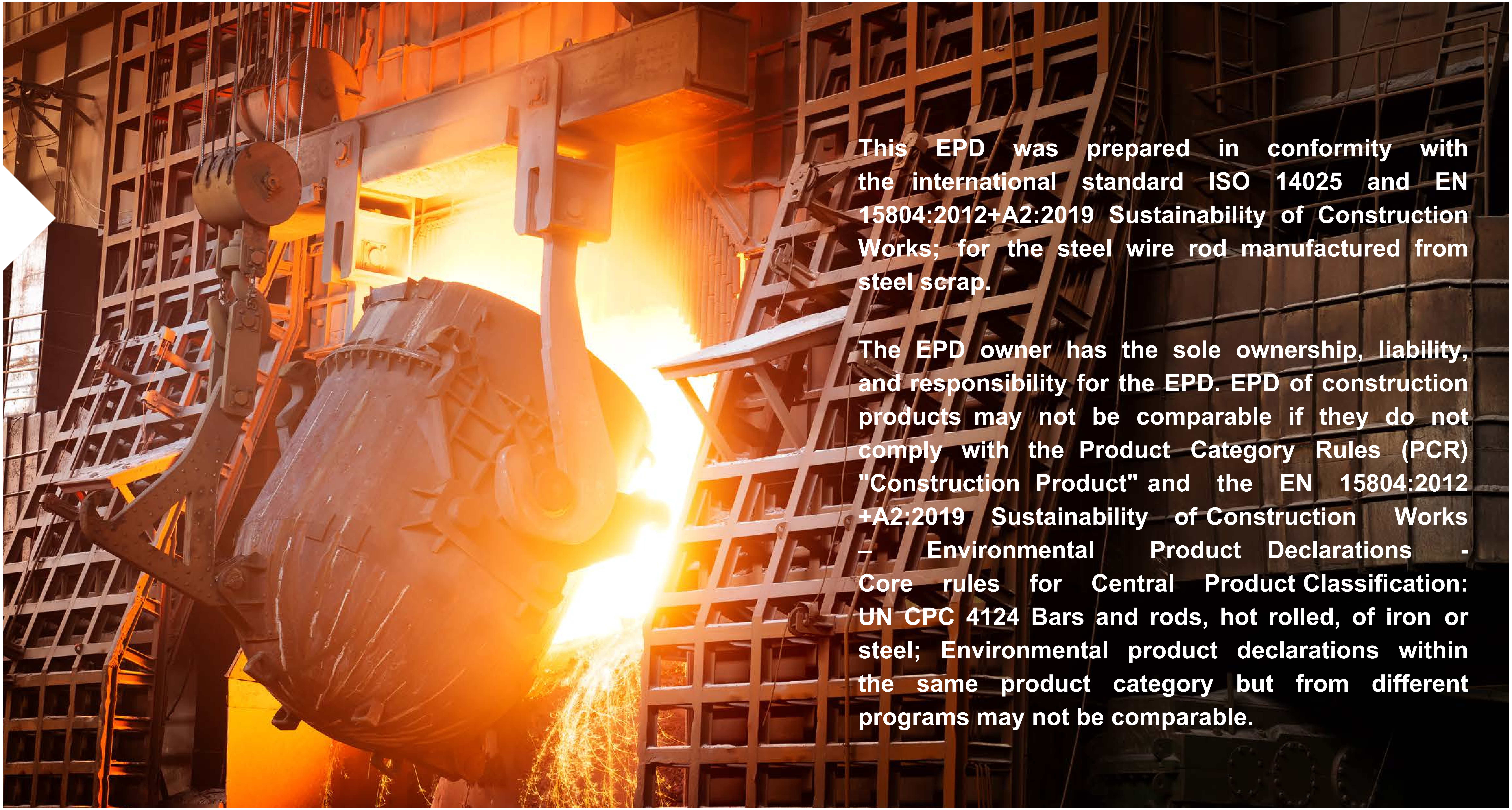
*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at **www.environdec.com***

ENVIRONMENTAL PRODUCT DECLARATION

Content



This EPD was prepared in conformity with the international standard ISO 14025 and EN 15804:2012+A2:2019 Sustainability of Construction Works; for the steel wire rod manufactured from steel scrap.

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPD of construction products may not be comparable if they do not comply with the Product Category Rules (PCR) "Construction Product" and the EN 15804:2012 +A2:2019 Sustainability of Construction Works – Environmental Product Declarations - Core rules for Central Product Classification: UN CPC 4124 Bars and rods, hot rolled, of iron or steel; Environmental product declarations within the same product category but from different programs may not be comparable.

1. T A 2000

T A 2000 S.A. de C.V. is a 100% Mexican steel company, specializing in the manufacture of steel products for construction, special bar quality (SBQ), coated flat steels and commercial profiles.

T A 2000 has more than 30 years of experience in the manufacture of steel. Innovation and optimization in production processes, have driven the company to renew and diversify its product catalog. In 2016 a cutting-edge technology has been implemented in T A 2000's steelmaking plant: an electric arc furnace (EAF) QUANTUM. The EAF QUANTUM, based on an optimized preheating and melting concept, delivers minimum conversion costs, maximized output, and environmental compliance.

T A 2000's value proposal is to offer its customers quality steel. T A 2000 has been granted with ISO 9001:2015 certification and above all the company focus on offering an unparalleled service, characterized by competitive delivery times and optimal business conditions for the growth of its clients.

T A 2000 is permanently committed to offer the market a dynamic, competitive and quality option. So that, the company have distribution centers in: Orizaba, Mérida; Arriaga, Silao and a commercial office in Mexico City.

2. GENERAL INFORMATION

PRODUCT:	STEEL WIRE ROD MANUFACTURED FROM STEEL SCRAP
Name of the manufacturer:	T A 2000 S.A. de C.V.
Declared unit:	1000 kg of Steel wire rod manufactured from steel scrap.
Construction product identification:	Central Product Classification: CPC 4124 Bars and rods, hot rolled, of iron or steel
Description of the main product components and or materials:	99% Steel manufactured using scrap steel as source of iron.
Life cycle stages not considered:	The modules: A4, A5, B1, B2, B3, B4, B5, B6, B7.
Statement content:	This environmental product declaration is based on information modules that do not cover aspects of construction stage and use. It contains detailed information on the stage of input materials used for the generation of raw material and central process, modules A1, A2, A3, approximations of scenarios C1, C2, C3, C4 and D based on national statistics. ▪ Definition of the product. ▪ Content declaration. ▪ Declared unit. ▪ System boundary. ▪ Environmental performance. ▪ Evidence and verifications.
Comparability of EPD of construction products	a. EPD of construction products may not be comparable if they do not comply with EN 15804:2012+A2:2019. b. Environmental product declarations within the same product category from different programs may not be comparable
For more information consult	https://tyasa.com/
Sites for which this EPD is representative	Manufacturing Plant ORIZABA: Carretera Federal México-Veracruz Km. 321, s/n, interior 2, Ixtaczoquitlán, Veracruz, C.P. 94450 Tel. 01 (272) 72 4 47 00 Ventas: Ext. 306 Steel Scrap Collection and pre-processing Plant MÉRIDA: Carretera Federal Mérida- Umán Km. 8.3, s/n, Colonia Ampliación Ciudad Industrial, Umán, Yucatán, C.P. 97390. Tel. 01 (999) 91 9 25 01 Ventas: Ext. 101 ARRIAGA: Carretera Arriaga-Tapanatepec Km. 28.5, No. 250, Colonia Emiliano Zapata, Arriaga, Chiapas, C.P. 30462. Tel. (045) 96 61 13 56 88 Ventas: (045) 96 66 64 02 82 SILAO: Carretera Silao-León Km. 157, s/n, Colonia Bustamante, Silao, Guanajuato, C.P. 36100. Tel. 01 (472) 72 3 94 32 / 01 (472) 72 3 94 35 Ventas: Ext. 107
Intended Public:	B2B (Business to Business)

3. THE PRODUCT

Wire rod is a steel product is a hot rolled steel product of circular cross section with diameters between 5 mm and 18 mm and smooth shiny surface. Steel wire rod can be used by the construction industry to build stirrups and rings to reinforce concrete.

Wire rod manufactured by T A 2000 S.A. de C.V. complies with the Mexican Sandard NMX-B-365-CANACERO-2008 and International Standard ASTM-A-510 required by the construction regulations in Mexico.

T A 2000 produces wire rod with state-of-the-art technology (EAF QUANTUM) in the city of Ixtaczoquitlán, Veracruz. The wire rod T A 2000 is ideal to be used in conjunction with steel reinforcing bar produced by T A 2000 as concrete reinforcement in construction industry.

The characteristics of steel wire rod produced by T A 2000 are provided hereafter:

Technical specifications:

STEEL GRADE	
Low carbon	1 005 – 1 025
Medium Carbon	1 026 – 1 045
Higho Carbon	1 046 – 1 095

Mechanical properties:

Characteristic	Value
Diameter (mm)	5.0, 6.35, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0, 10.5, 11.0, 11.5, 12.0, 12.5, 13.0, 13.5, 14.0, 14.5, 15.0, 15.5, 16.0, 17.5 y 18.0
Presentation	• 1 600 kg per coil. • Internal coil diameter: 0.90m. • External coil diameter: 1.20 m. • Coil height: 1.10 m.

4. CONTENT DECLARATION

The steel wire rod manufactured from steel scrap is produced in an electric arc furnace with a percentage greater than 90% of recycled material, the material contained in this product is found in Table 5. The total raw materials that make up the product were not declared, only the materials with a more representative percentage that make up the billet.

For reasons of confidentiality, a more detailed description of the composition of the Billet is not made, which is the primary raw material of the steel wire rod.

4.1 Recycled material content

In the Industrial Center of TA 2000 manufactured the steel wire rod is manufactured from steel scrap with a percentage greater than or equal to 90% of recycled material.

4.2 Distribution packaging

Packaging: The product is sent to the customers in no packaging, only the casting number distinction.

HOMOGENEOUS MATERIAL OR CHEMICAL SUBSTANCES	CHEMICAL SUBSTANCES	WEIGHT (%)	MATERIAL WEIGHT PRE AND POST CONSUMER (%)	CAS NUMBER	FUNCTION OF CHEMICAL SUBSTANCE	HEALTH CLASS[1]
Steel scrap	Not applicable	>90 %	90%	Not applicable	Iron content in steel	Not listed
Anthracite	Anthracite	2 %	0%	8029-10-5	Carbon content in steel	Not listed
Ferro silico manganese	Manganese and silicon	1 %	0%	8029-10-5	Carbon content in steel	Not listed
Lime	calcium oxide	3 %	0%	471-34-1	Iron ore sintering agent steel foundry	Not listed
Dolomite	Calcium carbonate magnesium	3 %	0%	16389-88-1	Iron ore sintering agent steel foundry	Not listed
Others	Not applicable	<1 %	0%	Not applicable	Carbon content in steel	Not listed

1 According to EN15804 declaration of material content of the product shall List of Substances of Very High Concern (SVHC) that are listed by European Chemicals Agency.

*Steel manufactured in the Industrial Center of T A 2000 uses 100% steel scrap as source of iron.

** Packaging: The product transported to customers packed with a steel wire rod and a label detailing the product information, but this is an insignificant quantity, which not included in the previous table

1 According to EN15804 declaration of material content of the product shall List of Substances of Very High Concern (SVHC) that are listed by European Chemicals Agency.

Table 1. Content product

5. LCA RULES

Environmental potential impacts were calculated in conformity to EN 15804:2012+A2:2019 sustainability of construction works and PCR 2019:14 Construction products Version 1.11 UN CPC 4124 bars and rods, hot rolled, of iron or steel. This EPD is in accordance with ISO 14025:2006.

Environmental potential impacts were calculated through Life Cycle Assessment (LCA) methodology in conformity to ISO 14040:2006 and ISO 14044:2006. An external third-party veri-fication process of the EPD was conducted according to General Programme Instructions for the International EPD® System Version 4.0. Verifi¬cation includes a documental review and a validation of both the underlying LCA study and documents describing additional environmental information that justify data provided in the EPD.

5.1 Declared unit

1000 kg of steel wire rod manufactured from billets that uses 99% ferrous scrap as raw material, manufactured during the year 2022 by TYASA at the Ixtaczoquitlán plant, Veracruz, used by the construction industry as re-inforcement of concrete structures.

5.2 System boundaryt

The potential environmental impacts were calculated through Life Cycle Assessment (LCA) methodology of steel wire rod to ISO 14040:2006 and ISO 14044:2006. This study went through a critical review process in accordance with ISO / TS 14071: 2014.

According to EN 15804 section 5.2 the following type of EPD is “cradle to gate with modules C1-C4 and module D (A1-A3 +C+D). This EPD is based on information upstream processes and core processes, modules A1 to A3, and approximations of scenarios C1, C2, C3, C4, and D based on construction sector statistics in Mexico (see table 2).

Does not include A4-A5 Construction stage and B Usage stage.

Life cycle stage	Information about the modules contained in the stages	EPD			
		Cradle-to-gate with modules C1-C4 and module D	Cradle-to-gate with modules C1-C4, module D and optional modules	From cradle to grave and module D	EPD construction services: Cradle to door with modules A1-A5 and optional modules
A1-A3 products stage	A1) Raw material procurement A2) Transport A3) Manufacture	Mandatory	Mandatory	Mandatory	Mandatory
A4-A5 Construction stage	A4) Transport A5) Construction / installation	-	Optional for goods Required for services	Mandatory	Mandatory
B Usage stage	B1) Use B2) Maintenance B3) Reparation B4) Replacement B5) Remodeling B6) Operational energy use B7) Operational water use	-	Optional	Mandatory	Mandatory
C End of life stage	C1) Deconstruction, demolition C2) Transport C3) Waste processing C4) Final disposition	Mandatory	Mandatory	Mandatory	Optional
D Benefits and charges beyond the system limit	D) Reuse, recycling or energy recovery potential.	Mandatory	Mandatory	Mandatory	-
Declared unit	Inclusion of reference useful life	Optional	Mandatory	Mandatory	-

Table 2 System boundary

5. LCA RULES

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Description of the modules included in this EPD.

	Product stage			Construction process phase		Usage stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction facility	Use	Maintenance	Repair	Restoration	Operational energy use	Operational use of water	Demolition/ Deconstruction	Transport	Waste processing	Disposal	Reuse – Recovery – Recycling - potential
Module	A1	A2	A3	A4	A5	B1	B2	B4	B5	B6	B7	C1	C2	C3	C4	D
Declared modules	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	MX	MX	MX	ND	ND	ND	ND	ND	ND	ND	ND	MX	MX	MX	MX	MX
Specific data used	>99%			-	-	-	-	-	-	-	-	-	-	-	-	-
Product variation	ND			-	-	-	-	-	-	-	-	-	-	-	-	-
Site variation	ND			-	-	-	-	-	-	-	-	-	-	-	-	-

5.3 Description of information modules

Description of information modules included in this EPD.

A1) RAW MATERIALS SUPPLY	A2) TRANSPORTATION	A3) MANUFACTURING	C) END OF LIFE	D) BENEFITS AND CHARGES BEYOND THE SYSTEM LIMIT
• Consumption and production of raw materials the billet. • Consumption and production of electrical energy. • Consumption and production of natural gas.	• Transport distance of raw materials and supplies to the manufacturing site. • Fuel consumption and emissions related to transportation requirements. • Transportation distance for waste disposal and treatment.	• Consumption of auxiliary inputs. • Consumption and production of water. • Air emissions • Waste generation. • Waste treatment processes, consumption of related materials and energy.	• Demolition • Transport final destination • What can be recycled. • What goes to fill what is wasted and not recycled.	• The avoided loads, benefits of stopping the production of the mineral billet

Table 3. Description of the modules included in this EPD

5. LCA RULES

5.4 Description of the manufacturing process

The manufacturing process is described in Figure 1

Figure 1 Flow diagram of scrap yard processing by T A 2000

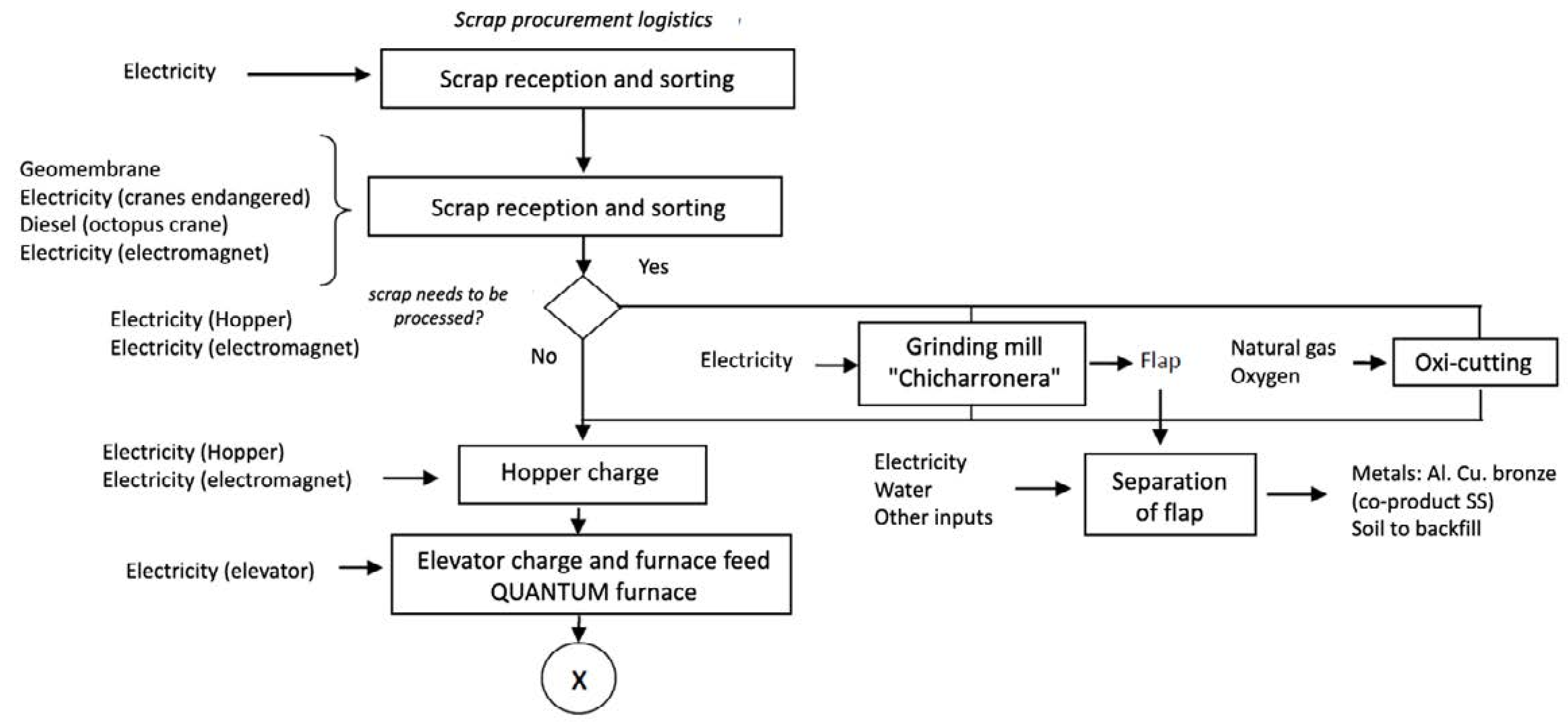
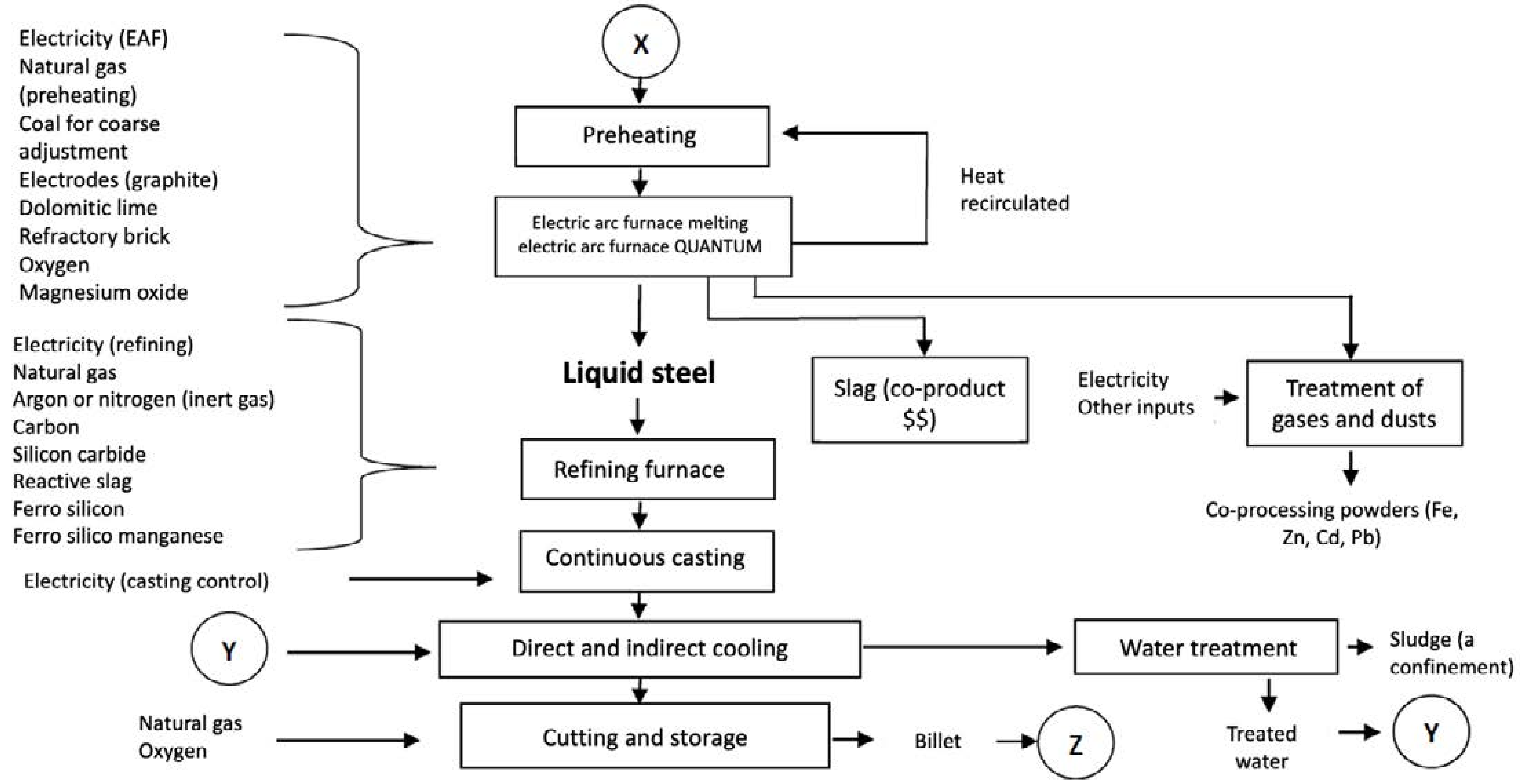


Figure 2 Flow chart of steel manufacturing by T A 2000 (BILLET)



5. LCA RULES

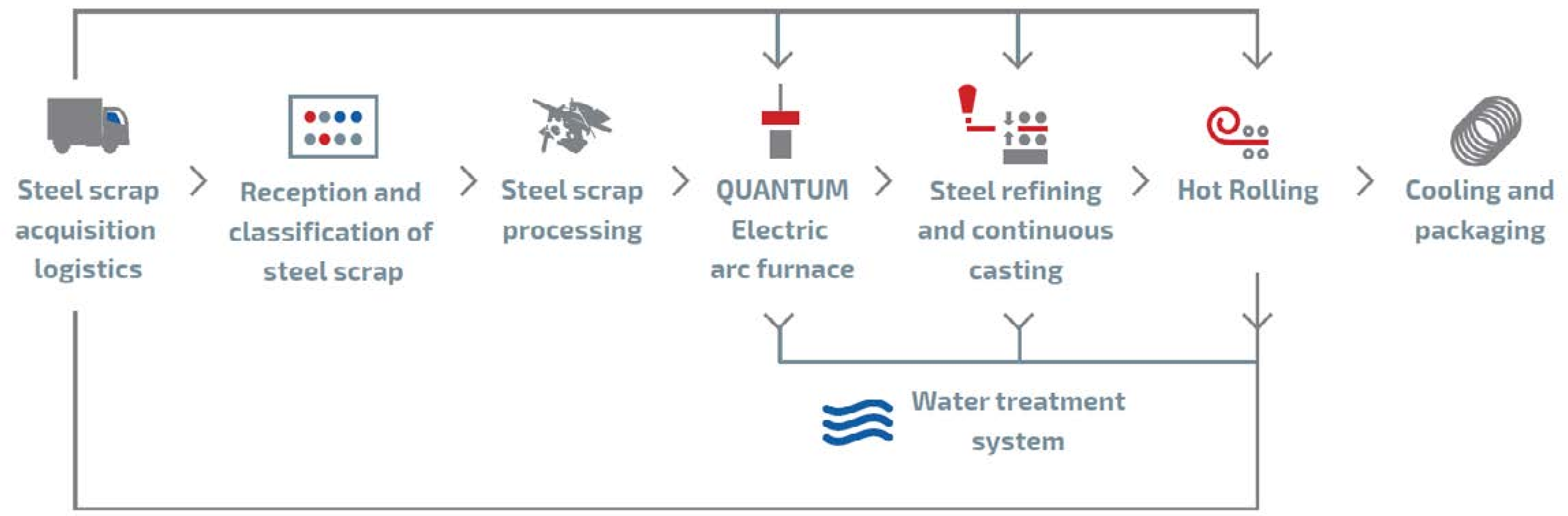
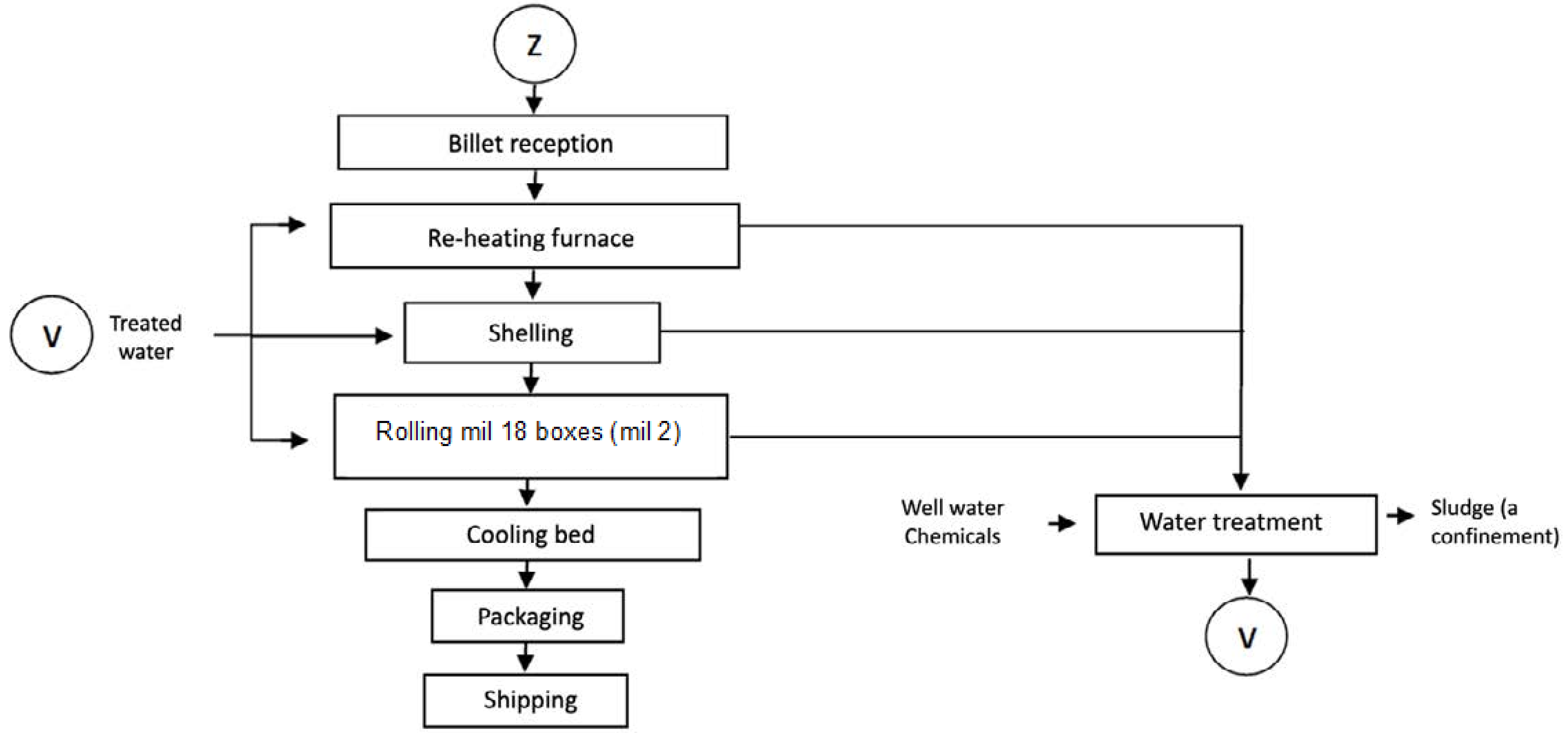


Figure 3. Flow chart of steel wire rod manufactured by T A 2000



5.5 Assumptions

The assumptions related to the steel wire rod manufacturing process are presented below.

- The scenarios and distances associated with modules C1) Deconstruction - demolition, C2) Transport, C3) Waste processing, C4) Disposal and D) Potential for reuse, recycling or energy recovery in the future.
- According to the Latin American Steel Association (ALACERO, 2022), in Mexico, 98% of the steel generated during the demolition of construction buildings is recycled, and only 2% reaches the landfill.
- On the other hand, according to Javeriana University (Pontificia Universidad Javeriana, Faculty of Engineering, 2014) the fuel consumption involved during the demolition of buildings corresponds to 960 liters for the use of a backhoe, 1,590 liters for the use of a backhoe loader, 432 liters for the use of a mobile crusher. In this same process, the emissions of particulate matter associated with the demolition were obtained from Ecoinvent 3.9 "Waste concrete, not reinforced {CH}| treatment of, recycling | Cut-off, U".
- For the transport of waste, an average distance in the State was assumed, corresponding to 250.71 km and one truck (capacity greater than 32 tons).

5.6 Cut-off criteria

All flows of fuel, energy, materials and supplies necessary for the production of the steel wire rod have been considered; materials that could be used in preventive or corrective maintenance of machinery and equipment were disregarded, as well as the use of uniforms and personal protective equipment or other auxiliary materials, leaving out textile impregnated with oils or plastics and the final disposal of these as hazardous waste.

5. LCA RULES

5.7 Allocation

In TYASA's steel wire rod production process, the process begins with obtaining the scrap and its processing in the scrap yard, later it goes to the QUANTUM electric arc furnace, then to refining and continuous casting, to finally move on to hot rolling through the processes of "Steel 1" and Steel 2". These processes are developed in parallel and have the same purpose, only that they process different amounts of product.

During the information gathering process, TYASA provided data for both "Steel 1" and Steel 2", as well as for "Mill 1" and "Mill 2", inputs calculated for the functional unit. In order not to duplicate the allocation of resources, in this study allocation processes were applied for production in the two lines of the company, "Steel 1" and Steel 2".

In the case of the billet, the information on the input base, transportation, emissions, residues, etc. they considered an allocation by the weight of annual production in each one.
In the tables presented below, it is possible to identify the assigned percentage that was applied to the life cycle inventory to avoid double counting in the billet.

	Total production (tons)	Allocation
Billet – Steel 1	244,957.858	22%
Billet – Steel 2	860,690.110	78%
TOTAL	**1,105,647.968**	**100%**

Table 4. Allocation of billet.

In the life cycle inventory, the necessary materials for the manufacture of the billet are contemplated, the allocation of materials is made for 81.2% and, in the case of wire rod for 96.31%, while the rest in each case corresponds to the generation of by-products. The tables below present the detail.

By-product	Total production	Units	Allocation
Billet	1.00E+06	tons	81.18%
Mill scale	3.88E-03	tons	0.31%
Steel slag	2.17E-01	tons	17.59%
Waste Steel for control samples	1.13E-02	tons	0.92%
Total	**1.08E+03**	tons	**100.00%**

Table 5. Allocation of billet.

By-product	Total production	Units	Allocation
Mill scale	1.80E-02	ton	1.75%
Steel scrap	2.00E-02	ton	1.94%
Wire rod	9.93E-01	ton	96.31%
Waste Steel for control samples	1.28E-05	ton	0.001%
Total	1.03E+00	ton	100.00%

Table 6. Allocation of by-products. Wire rod

5.8 Time representativeness

Direct data obtained from T A 2000 S.A. de C.V. is representative for 2022.

6. ENVIRONMENTAL PERFORMANCE

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6.1 Potential environmental impact

SimaPro 9.3 and Ecoinvent 3.8 was used for Life Cycle Impact Assessment.

All information modules are reported and valued separately. However, in the present EPD presents itself the total impact across all stage.

As can be seen in Figure 1, the greatest environmental impacts are ge-nerated by stage A1 for obtaining raw materials, followed by stage A3 manufacturing, while the lowest environmental contributions are gene-rated by stage A2 transportation.

In fact, practically all the basic and additional categories show a similar trend. In the case of A1, the greatest environmental impacts are genera-ted by electricity and billets. On the one hand, the billet is a raw material that is obtained and transformed within the same TYASA plant and re-quires different raw materials and auxiliary energy inputs that have an impact on practically all categories.

On the other hand, electricity has impacts associated with the gene-ration and distribution of electrical energy in our country, within these activities greenhouse gases are emitted that directly impact categories such as climate change, ozone layer depletion and Photochemical ozone formation.

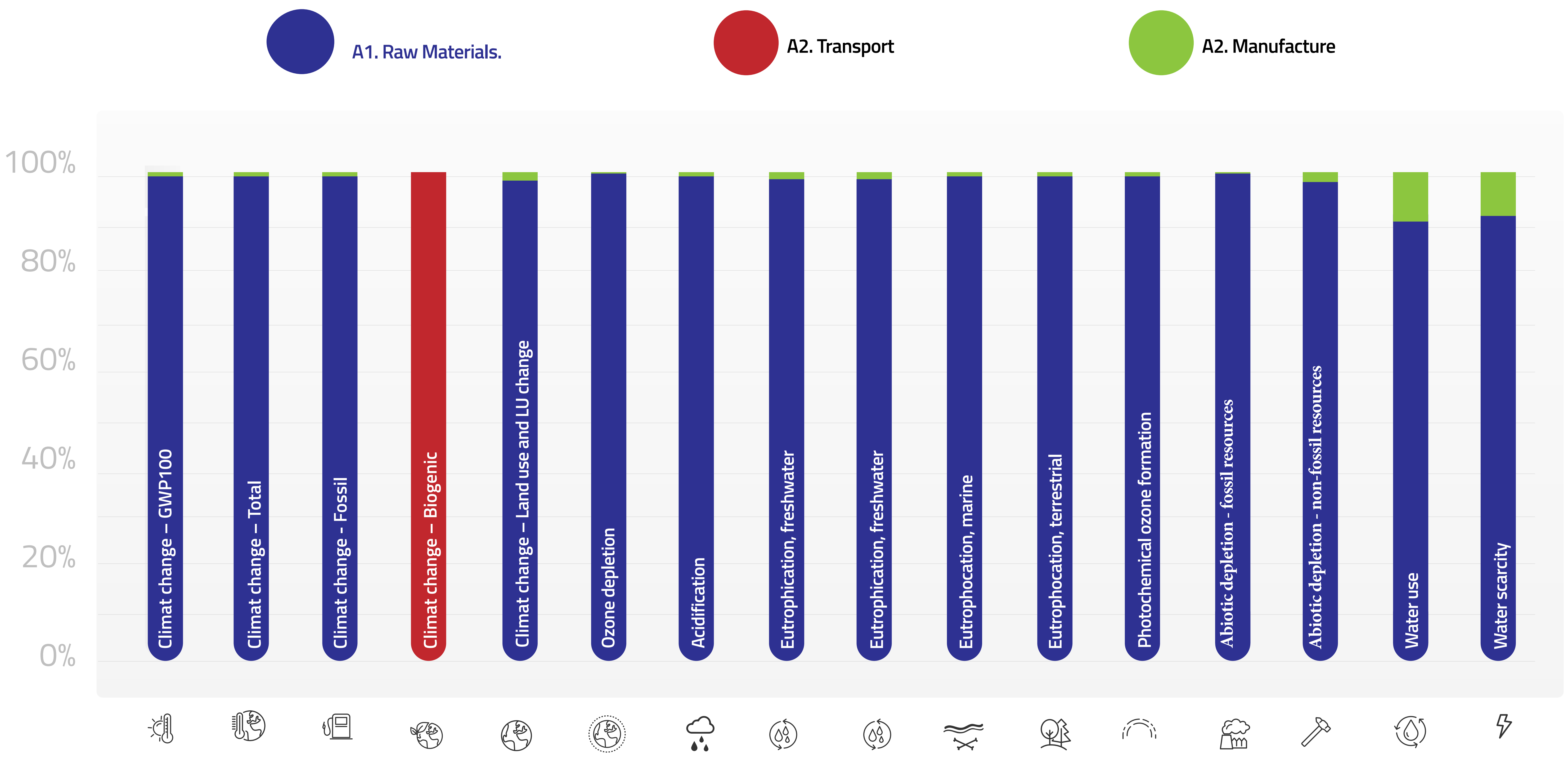

Figure 4. A1-A3 Basic impact categories results.

6. ENVIRONMENTAL PERFORMANCE

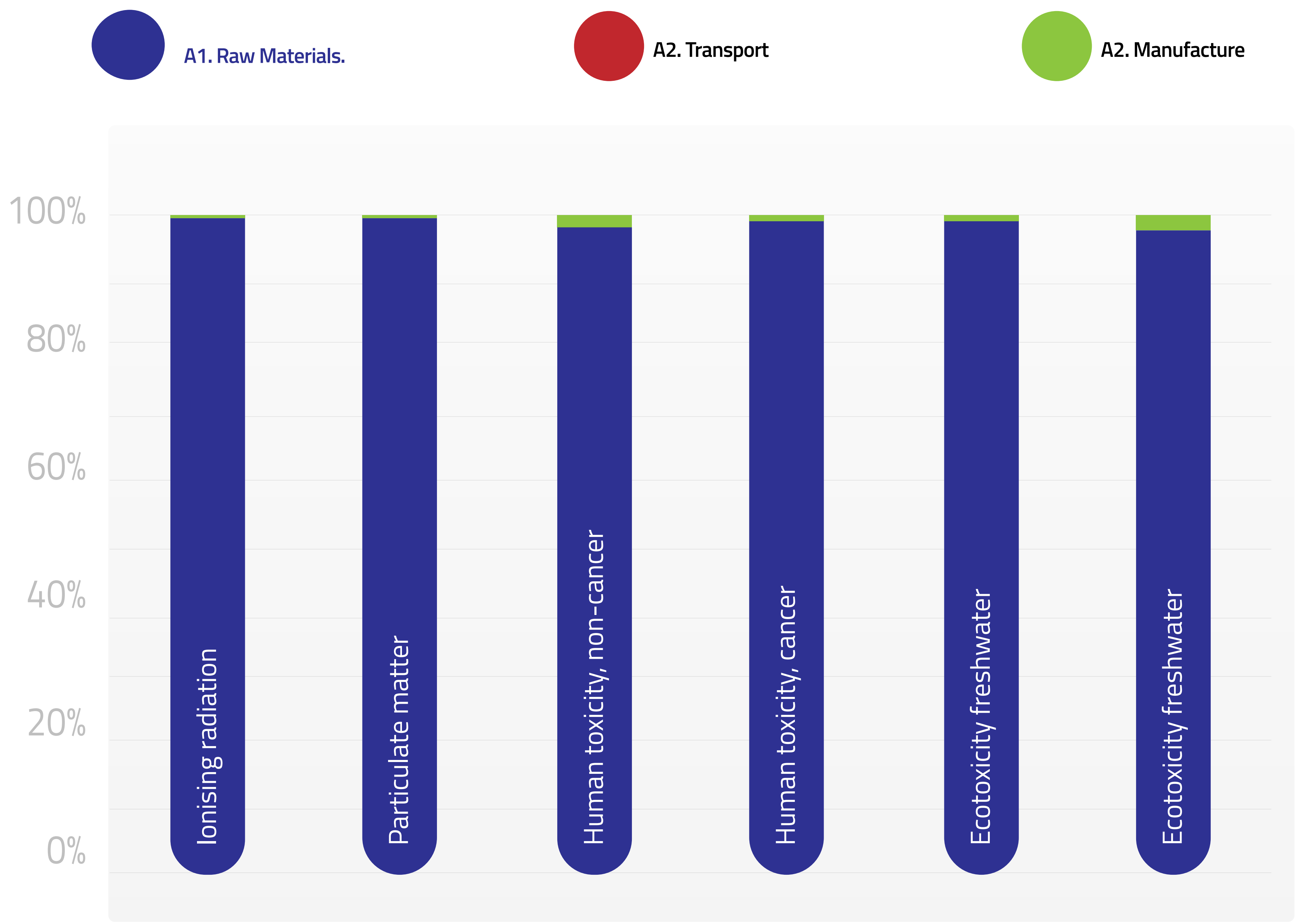

Figure 5. A1-A3 Additional impact categories results.

Table 7. A1-A3 Basic impact categories results

IMPACT CATEGORY	UNIT	A1) RAW MATERIALS	A2) TRANSPORT	A3) MANUFACTURE	A1 – A3
Climat change- GWP100	kg CO2 eq	6.05E+02	1.22E-01	4.62E+00	6.10E+02
	%	99.22%	[illegible]	[illegible]	[illegible]
Climat change - Total	kg CO2 eq	[illegible]	[illegible]	[illegible]	[illegible]
	%	[illegible]	[illegible]	[illegible]	[illegible]
Climate change - Fossil	kg CO2 eq	[illegible]	[illegible]	[illegible]	[illegible]
	%	[illegible]	[illegible]	[illegible]	[illegible]
Climate change - Biogenic	kg CO2 eq	0.00E+00	6.66E-05	0.00E+00	6.66E-05
	%	0.00%	100.00%	0.00%	100.00%
Climate change - Land use and LU change	kg CO2 eq	[illegible]	[illegible]	[illegible]	[illegible]
	%	[illegible]	[illegible]	[illegible]	[illegible]
Ozone depletion	kg CFC11 eq	[illegible]	[illegible]	[illegible]	[illegible]
	%	[illegible]	[illegible]	[illegible]	[illegible]
Acidification	mol H+ eq	[illegible]	[illegible]	[illegible]	[illegible]
	%	[illegible]	[illegible]	[illegible]	[illegible]
Eutrophication, freshwater	kg P eq	1.24E-01	9.32E-06	2.12E-03	1.26E-01
	%	98.31%	0.01%	1.68%	100.00%
Eutrophication, freshwater 2	kg PO4 eq	3.80E-01	2.86E-05	6.50E-03	3.87E-01
	%	98.31%	0.01%	1.68%	100.00%
Eutrophication, marine	kg N eq	9.63E-01	7.39E-05	5.06E-03	9.68E-01
	%	99.47%	0.01%	0.52%	100.00%
Eutrophication, terrestrial	mol N eq	1.04E+01	8.05E-04	4.94E-02	1.04E+01
	%	99.52%	0.01%	0.47%	100.00%
Photochemical ozone formation	kg NMVOC eq	3.00E+00	3.02E-04	1.91E-02	3.02E+00
	%	99.36%	0.01%	0.63%	100.00%
Abiotic depletion - fossil resources	MJ	1.03E+04	1.82E+00	5.33E+01	1.03E+04
	%	99.47%	0.02%	0.52%	100.00%
Abiotic depletion - non-fossil resources	kg Sb eq	1.89E-03	4.28E-07	4.17E-05	1.93E-03
	%	97.82%	0.02%	2.16%	100.00%
Water use	m3 depriv.	9.05E+01	6.37E-03	1.30E+01	1.04E+02
	%	87.43%	0.01%	12.57%	100.00%
Water scarcity	m3H2Oeq	4.71E+00	4.16E-04	5.86E-01	5.29E+00
	%	88.92%	0.01%	11.08%	100.00%

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6. ENVIRONMENTAL PERFORMANCE

Impact categories	Unit	C1) Demolition	C2) Waste transport	C3) Waste treatment	C4) Waste dis-posal	D) Benefits and charges beyond the system boundary, re-cycling scenario
Climate change- GWP	kg CO2 eq	1.11E+03	2.24E+01	0.00E+00	6.57E+00	2.30E+03
	%	100%	100%	100%	100%	100%
Climate change- total	kg CO2 eq	1.14E+03	2.26E+01	0.00E+00	6.69E+00	2.35E+03
	%	100%	100%	100%	100%	100%
Climate change- Fuel	kg CO2 eq	1.13E+03	2.26E+01	0.00E+00	6.61E+00	2.34E+03
	%	100%	100%	100%	100%	100%
Climate change- Biogenic	kg CO2 eq	2.37E+00	1.69E-02	0.00E+00	7.09E-02	5.62E+00
	%	100%	100%	100%	100%	100%
Climate change – Land use and LU change	kg CO2 eq	2.98E-01	8.78E-03	0.00E+00	3.79E-03	2.34E+00
	%	100%	100%	100%	100%	100%
Ozone depletion	kg CFC11 eq	2.05E-03	5.31E-06	0.00E+00	3.91E-07	2.50E-04
	%	100%	100%	100%	100%	100%
Acidification	mol H+ eq	1.43E+01	7.36E-02	0.00E+00	2.14E-02	1.18E+01
	%	100%	100%	100%	100%	100%
Photochemical ozone formation	kg NMVOC eq	7.04E-02	1.70E-03	0.00E+00	1.82E-03	7.37E-01
	%	100%	100%	100%	100%	100%
Eutrophication, freshwater 1	kg P eq	2.16E-01	5.22E-03	0.00E+00	5.58E-03	2.26E+00
	%	100%	100%	100%	100%	100%
Eutrophication, freshwater 2	kg PO4 eq	1.70E+00	1.64E-02	0.00E+00	6.19E-03	3.66E+00
	%	100%	100%	100%	100%	100%
Eutrophication, marine	kg N eq	1.86E+01	1.79E-01	0.00E+00	6.94E-02	3.18E+01
	%	100%	100%	100%	100%	100%
Eutrophication, terrestrial	mol N eq	7.84E+00	6.95E-02	0.00E+00	1.81E-02	1.01E+01
	%	100%	100%	100%	100%	100%
Abiotic depletion - fossil resources	MJ	1.23E+05	3.60E+02	0.00E+00	4.07E+01	3.21E+04
	%	100%	100%	100%	100%	100%
Abiotic depletion - non-fossil resources	kg Sb eq	1.22E-03	5.37E-05	0.00E+00	1.95E-05	1.01E-02
	%	100%	100%	100%	100%	100%
Water deprivation potential	m3 depriv.	1.40E+01	6.52E-01	0.00E+00	3.37E-01	1.84E+04
	%	100%	100%	100%	100%	100%

Table 8. Table. C1-C4, D impact categories results

6. ENVIRONMENTAL PERFORMANCE

IMPACT CATEGORY	UNIT	A1) RAW MATERIALS	A2) TRANSPORT	A3) MANUFACTURE	A1 – A3
Ionising radiation	kBq U-235 eq	5.27E+01	8.35E-03	3.01E-01	5.30E+01
	%	99.42%	0.02%	0.57 %	100.00%
Particulate matter	disease inc.	5.21E-05	9.81E-09	3.44E-07	5.24E-05
	%	99.33%	0.02%	0.66%	100.00%
Human toxicity, non-cancer	CTUh	6.26E-06	1.47E-09	1.22E-07	6.39E-06
	%	98.07%	0.02%	1.91%	100.00%
Human toxicity, cancer	CTUh	2.46E-06	4.63E-11	2.56E-08	2.48E-06
	%	98.97%	0.00%	1.03%	100.00%
Ecotoxicity, freshwater	CTUe	9.52E+04	1.57E+00	1.43E+02	9.67E+04
	%	98.50%	0.02%	1.48%	100.00%
Land use	Pt	3.82E+03	1.25E+00	1.08E+02	3.93+03
	%	97.23%	0.03%	2.74 %	100.00%

Table 8. A1-A3 Additional impact categories results

6.2 Use of resources

Parameters describing resource use were evaluated with the Cumulated Energy Demand method version 1.09 (Frischknecht et al. 2007) except for the indicator of use of net fresh water that was evaluated with Recipe 2016 Midpoint (H) version 1.00 (Huijbregts et al. 2017). The detailed description of the use of resources is provided in table 4.

USE OF RESOURCES PARAMETERS	UNIT	A1) RAW MATERIALS	A2) TRANSPORT	A3) MANUFACTURE	A1 – A3
Use of renewable primary energy excluding renewable primary energy resources used as feedstock	MJ	4.32E+02	2.12E-02	2.09E+01	4.53E+02
Use of renewable primary energy as raw material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy (primary energy and primary energy resources used as feedstock)	MJ	4.32E+02	2.12E-02	2.09E+01	4.53E+02
Non-renewable primary energy use excluding renewable primary energy resources used as feedstock	MJ	1.11E+04	1.93E+00	5.66E+01	1.11E+04
Use of non-renewable primary energy as raw material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy (primary energy and primary energy resources used as raw materials)	MJ	1.11E+04	1.93E+00	5.66E+01	1.11E+04
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary renewable fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary non-renewable fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of fresh water	m^3	2.53E+00	2.11E-04	3.15E-01	2.84E+00

Table 9. Use of resources parameters.

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Use of resources parameters	Unit	C1) Demolition	C2) Waste transport	C3) Waste treatment	C4) Waste disposal	D) Benefits and charges beyond the system boundary, recycling scenario
Use of renewable primary energy excluding renewable primary energy resources used as feedstock	MJ	2.49E+02	3.98E+00	0.00E+00	1.81E+00	1.74E+03
Use of renewable primary energy as raw material	MJ	2.91E+01	6.39E-01	0.00E+00	2.43E-01	3.02E+02
Total use of renewable primary energy (primary energy and primary energy resources used as feedstock)	MJ	2.49E+02	3.98E+00	0.00E+00	1.81E+00	1.74E+03
Non-renewable primary energy use excluding renewable primary energy resources used as feedstock	MJ	1.30E+05	3.83E+02	0.00E+00	4.32E+01	3.43E+04
Use of non-renewable primary energy as raw material	MJ	1.30E+05	3.78E+02	0.00E+00	4.17E+01	3.25E+04
Total use of non-renewable primary energy (primary energy and primary energy resources used as raw materials)	MJ	1.30E+05	3.83E+02	0.00E+00	4.32E+01	3.43E+04
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary renewable fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary non-renewable fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of fresh water	m^3	9.70E-01	4.51E-02	0.00E+00	2.33E-02	2.54E+01

Table. Table. C1-C4, D use of resources parameters

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6.3 Other indicators describing waste categories

Environmental indicators describing waste generation were obtained from LCI except for background information which has been calculated using EDIP 2003 method (Hauschild and Potting, 2005). Environmental parameters describing waste generation are provided below:

OUTPUT PARAME-TER	UNIT	TOTAL	1) RAW MATE-RIALS SUPPLY	A2) TRANSPORTA-TION	A3) MANU-FACTURING
Hazardous waste	kg	1.84E-02	1.80E-02	4.80E-06	3.70E-04
Non hazardous waste	kg	2.87E+02	2.85E+02	9.42E-02	1.50E+00
Radioactive waste*	kg	4.29E-02	4.28E-02	1.19E-05	1.19E-04
Components for reuse	kg	0.00E 00	0.00E 00	0.00E 00	0.00E 00
Materials for recycling	kg	9.08E-01	9.08E-01	0.00E 00	0.00E 00
Materials for energy recovery	kg	0.00E 00	0.00E 00	0.00E 00	0.00E 00
Exported electri-city	MJ	0.00E 00	0.00E 00	0.00E 00	0.00E 00
Exported heat	MJ	0.00E 00	0.00E 00	0.00E 00	0.00E 00

Table 7. A1-A3 Other indicators describing waste categories.

OUTPUT PARAMETER	UNIT	C1) DEMOLITION	C2) WASTE TRANSPORT	C3) WASTE TREATMENT	C4) WASTE DISPOSAL	D) BENEFITS AND CHARGES BEYOND THE SYSTEM BOUNDARY, RE-CYCLING SCENARIO
Hazardous waste	kg	3.26E-01	8.85E-04	0.00E+00	4.21E-05	7.19E-02
Non hazardous waste	kg	3.08E+01	3.33E+01	0.00E+00	4.04E+01	1.13E+03
Radioactive waste*	kg	8.73E-01	2.38E-03	0.00E+00	1.90E-04	1.26E-01
Components for reuse	kg	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
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported heat	MJ	3.26E-01	8.85E-04	0.00E+00	4.21E-05	7.19E-02

*No radioactive waste is produced during T A 2000 operations.

** The column "A3) Manufacturing direct and indirect, refers to direct data and background data regarding production of ancillary materials and other processes outside T A 2000's facilities".

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6.4 Additional environmental information

In Steelworks II the production of the billet is carried out, the water plant is in charge of cooling the furnace system and other equipment that is important for the manufacture of the billet. There are two types of systems, the open system that is from cooling towers where the water quality is a combination of soft water and raw water, and the closed system where the water is cooled from heat exchangers. considering only soft water. To preserve the quality of the water and the equipment, we take care of extremely important factors such as corrosion, scale and microbiological presence.

ICW system

The ICW system or also known as 8211 is an open system in which the water cooling is from cooling towers, the equipment that this system provides cooling is to hydraulic power plants and compressors. To care for the quality of the water, chemical treatment is used, such as 98% sulfuric acid and sodium hypochlorite, a phosphate-based corrosion inhibitor and a polymer-based scale inhibitor.

CWS system

The CWS system or also known as 8232 is an open system which cools the water from a cooling tower, this system cools the raw material that is the billet. To care for the quality of the water, chemical treatment is used, such as 98% sulfuric acid and sodium hypochlorite, a phosphate-based corrosion inhibitor and a polymer-based scale inhibitor.

The CWC system is a closed system, the cooling of the water is from heat exchangers, this system cools the casting molds, rotary valves and rollers. To care for the quality of the water, chemical treatment is used, such as 50% sodium hydroxide and a nitrite-based corrosion inhibitor.

WFC system

The CWF system is a closed system, the water cooling is from heat exchangers, this system is responsible for cooling the furnace. To care for the quality of the water, chemical treatment is used, such as 50% sodium hydroxide and a nitrite-based corrosion inhibitor.

7. VERIFICATION AND REGISTRATION

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CEN STANDARD EN 15804 SERVED AS THE CORE PCR	
Programme	EPD® International EPD® System www.environdec.com LATIN AMERICA EPD® EPD registered through the fully aligned regional programme/hub: EPD Latin America www.epdlatinamerica.com
Programme operator	EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden Latin American Hub of the International EPD® System Chile: Alonso de Ercilla 2996, Ñuñoa, Santiago Chile. Mexico: Bosques De Bohemia 2 No. 9, Bosques del Lago. Cuautitlan Izcalli, Estado de México, México
EPD registration number:	S-P-00703
Date of validity:	2028-07-12
Revision date:	2023-07-13
Date of publication (issue):	2018-08-23
Reference year of data:	2022
Geographical scope:	Mexico
Central product classification:	UN CPC 4124 Bars and rods, hot rolled, of iron or steel
Product category rules:	PCR 2019:14 construction products, Version 1.11 (EN 15804:A2)
PCR review was conducted by:	Martin Erlandsson, IVL Swedish Environmental Research Institute,
	martin.erlandsson@ivl.se
Independent verification of the declaration data, according to ISO 14025:2006.	☐ EPD process certification (Internal) ☒ EPD verification (External)
Third-party verifier: Approved by:	Francisco J. Campo Approved EPD verifier f.campo@ik-ingenieria.com The International EPD® Systemz
Procedure for follow-up of data during EPD validity involves third-party veri¬fier:	☐ Yes ☒ No

8. CERTIFICATIONS

ISO 9001:2015

ISO 14001

We have an Implementation Plan for the Environmental Management System for ISO 14001 with a progress of 45%, led by the Management Systems Department, according to the progress of the project, we are planning the certification in June 2024.

9. CONTACT INFORMATION

EPD LATIN AMERICA

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TYASA	Center for Life Cycle Assessment and Sustainable Design	EPD THE INTERNATIONAL EPD® SYSTEM
TA 2000 S.A. de C.V. ORIZABA: Carretera Federal México-Veracruz Km. 321, s/n, interior 2, Ixtaczoquitlán, Veracruz, C.P. 94450 https://tyasa.com/ Contact: Guadalupe Román Hernández	Center for Life Cycle Assessment and Sustainable Design – CADIS Bosques De Bohemia 2 No. 9, Bosques del Lago. Cuautitlan Izcalli, Estado de México, México. C.P. 54766 www.centroacv.mx LCA Study: Life Cycle Assessment (LCA) methodology of Expandable Polystyrene (EPS) insulation board LCA Authors: Luque Claudia, Ochoa Gabriel, Sojo Amalia. Contact person: Juan Pablo Chargoy jpchargoy@centroacv.mx	EPD International AB Box 210 60, SE-100 31, Stockholm, Sweden. www.environdec.com info@environdec.com EPD registered through the fully aligned regional programme/hub: EPD LATIN AMERICA Chile: Alonso de Ercilla 2996, Ñuñoa, Santiago Chile. México: Av. Convento de Actopan 24 Int. 7A, Colonia Jardines de Santa Mónica, Tlalnepantla de Baz, Estado de México, México, C.P. 54050

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APPENDIX 1

From 2017 up to the present, there have been no technological changes in the manufacturing of steel rebars. However, there have been shifts in suppliers and the installation of a larger number of energy and fuel consumption meters. This has enabled the current report to include more precise data and to rely on fewer assumptions regarding the information. Similarly, the same applies to raw materials, as there is an accounting system in place that tracks the quantities of materials purchased.

The primary changes are linked to the update of the Product Category Rule (PCR) and the Intergovernmental Panel on Climate Change (IPCC) emission factor.