Ternium

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LATIN AMERICA

Ternium steel rebar
manufactured from steel scrap

Environmental Product Declaration
In accordance with ISO 14025:2006 y EN 15804:2012+A2:2019/AC:2021

Programme:	The International EPD System www.environdec.com
Programme operator:	EPD International AB EPD Latin America
EPD registration number	EPD-IES-0000700:001 (S-P-00700).
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Geographical scope:	Mexico

ECO PLATFORM EPD VERIFIED

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Content

This EPD was prepared in conformity with the international standard ISO 14025:2006 and EN15804:2012+A2:2019/AC:2021 Sustainability of Construction Works.

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but published in different EPD programmes, may not be comparable if they do not comply with the Product Category Rules (PCR) "Construction Product" and the EN 15804:2012+A2:2019/AC:2021 Sustainability of Construction Works – Environmental Product Declarations - Core rules for the product category of construction products. The Central Product Classification is CPC 4124: Bars and rods, hot rolled, of iron or steel.

For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

1. Information About EPD owner

Ternium is a leading company in Latin America that manufactures and processes a broad range of steel products using the most advanced technology. The company provides customers that operate in such diverse and essential steel consuming industries, such as construction, automotive and energy, as well as manufacturers of heavy and agricultural machinery, household appliances and packaging, among others.

Ternium and its subsidiaries have 18 productive centers in Argentina, Brazil, Colombia, Guatemala, Mexico, and the United States. It is also part of the controlling group of Usiminas, a leading steelmaker of the Brazilian market.

Ternium supplies with high quality steel all the main regional markets and it also promotes the development of its customers from the metallurgical industry. The company's distinctive position is a result of its highly integrated production procedure. Its facilities feature the whole manufacturing process of steelmaking, from the mining of iron ore to the production of high value-added products. With a yearly achievable production capacity of 15.4 million tons, Ternium's shares are listed and traded on the New York Stock Exchange.

Company Information

Ternium México S.A. de C.V.
Avenida Universidad 992 Colonia Cuauhtémoc, C.P. 66450
San Nicolas de Los Garza. Nuevo Leon, Mexico.
mx.ternium.com

Contact Information

Contact person:
Lucia Betanzos: lbetanzo@ternium.com.mx
Víctor Bernal: vbernalh@ternium.com.mx

2. General information

Product:	Ternium steel rebar manufactured from steel scrap
Description of the construction product:	Steel rebars used to reinforce concrete in the construction industry. The surface of the rebar is corrugated to limit the relative longitudinal movement between the steel and the surrounding concrete.
Declared Unit:	1 metric ton of Steel rebar manufactured from steel scrap, which is used as reinforcing steel for the construction industry.
Construction product identification:	Central Product Classification: CPC 4124 Bars and rods, hot rolled, of iron or steel.
Main product components:	100% low-alloyed steel manufactured using 100% steel scrap 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. • Product definition. • 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/AC:2021 b. Environmental product declarations within the same product category from different programs may not be comparable.
For more information consult:	mx.ternium.com
Sites for which this EPD is representative:	Manufacturing Plants Camino Mezquital-Sta. Rosa no. 200 Col. Industrial Los Parques, San Nicolás de los Garza, CP 66440. Entre calle Camino a Lagrange y Ave. Aceros.
Intended Public:	B2B (Business to Business)

2. General information

Programme Information	
Programme	The International EPD System
Address:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden
Website:	www.environdec.com
Email:	support@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the core Product Category Rules (PCR)
Product category rules (PCR): 2019:14 *Construction products*. *Version* 1.3.4 published April 30, 2024. Central Product Classification: CPC 4124 Bars and rods, hot rolled, of iron or steel.
PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Life cycle assessment (LCA)

LCA accountability: CASOSTENIBLE S.A.S.

Third-party verification

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

☑ EPD verification through an individual EPD verification

Third-party verifier: Ruben Carnerero, IK Ingeniería SL

Approved by: The International EPD System

EPD Process Certification involves an accredited certification body certifying and periodically auditing the EPD process and conducting external and independent verification of EPDs that are regularly published. More information can be found in the General Programme Instructions on www.envrondec.com. International EPD System

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

☑ Yes

☐ No

3. Product information

Steel rebar are used to reinforce concrete in the construction industry. The surface of the rebar is corrugated to limit the relative longitudinal movement between the steel and the surrounding concrete. Steel reinforcing bar produced by Ternium Largos Apodaca Works in San Nicolas de los Garza, Nuevo León is produced using 100% steel scrap as source of iron.

The product is manufactured according to Mexican standard NMX-B506-CANACERO-2019 and U.S. standard ASTM A615/A615M-16. The characteristics of steel reinforcing bars produced by Ternium México are provided in the following tables:

Table 1. Physical properties of Steel rebar manufactured from steel scrap - Masses and dimensions.

Masses and dimensions					
Product	Designation number	Nominal Diameter mm	Cross sectional area mm^2	Perimeter mm	Nominal mass kg/m
Ternium Steel rebar manufactured from steel scrap	2.5	7.9	49	24.8	0.384
	3	9.5	71	29.8	0.560
	4	12.7	127	39.9	0.994
	5	15.9	198	50.0	1.552
	6	19.05	285	60.0	2.235
	8	25.4	507	79.8	3.973
	10	31.75	794	99.9	6.225
	12	38.1	1140	119.7	8.938

Table 2. Physical properties of Steel rebar manufactured from steel scrap - Bending requirements.

Bending requirements	
Designation number	Mandrel diameter for bending test Grade 42
2.5	3.5 d
3	
4	
5	
6	5d
8	5d
10	7d
12	8d

Table 3. Physical properties of Steel rebar manufactured from steel scrap - Corrugations and rib requirements.

Corrugations and rib requirements				
Ternium Grade	Designation number	Corrugation height mm	Rib wire rod width mm	Rib spacing mm
		min	max	max
NMX B506 R42	2.5	0.3	3.0	5.6
	3	0.4	3.6	6.7
	4	0.5	4.9	8.9
	5	0.7	6.1	11.1
	6	1.0	7.3	13.3
	8	1.3	9.7	17.8
	10	1.6	12.2	22.3
	12	1.9	14.6	26.7

Table 4. Physical properties of Steel rebar manufactured from steel scrap - Mechanical properties.

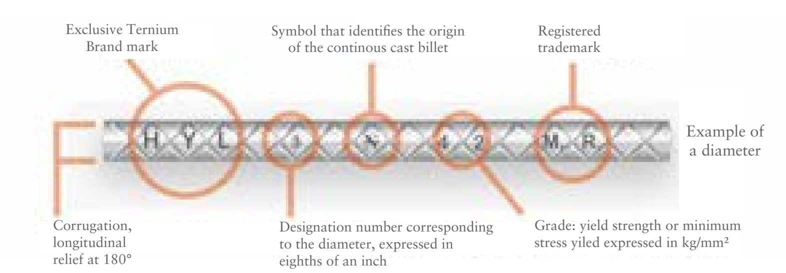
Mechanical properties				
Ternium Grade	Designation number	Tensile strength in kg/mm²	Yield stress in kg/mm²	Elongation
		min	min	min
NMX B506 R42	2.5	63.0	42.0	9
	3			
	4			
	5			
	6			
	8			8
	10			7
	12			

Figure 1. Adherence and nomenclature of Steel rebar manufactured from steel scrap.

Rust contributes to microscopic porosity in steel, which increases its adherence to concrete and avoids structure slipping.

North American Regulation ACI 318 95, recommendation R7.4

Nomenclature



Name of manufacturer: Ternium México S.A. de C.V.
Location of the production site: Ternium Largos Apodaca Works Camino al Mezquital 200, San Nicolás de los Garza
Product Classification: CPC 4124 Bars and rods, hot rolled, of iron or steel

4. Content declaration

A list of materials and chemical substances including information about their hazardous properties is provided next: Steel rebar manufactured in the Largos Apodaca Plant (also called Largos Norte) of Ternium México uses 100% steel scrap as source of iron.

Table 5. Composition of Steel rebar manufactured from steel scrap by Ternium México.

Product components	Weight (kg)	Weight (%)	Post-Consumer recycled material (%)	Biogenic material (kg)	Biogenic material (kg C/product)
Steel Scrap	1000	100%	100	0	0

5. Distribution packaging

Table 6. Content declaration of packaging of Steel rebar from steel scrap by Ternium México.

Material	Weight (kg)	Weight, -% (versus the product)	Biogenic material, kgC / product of declared unit
Wire	2	0.2%	0
Plate	0.01	<0.01%	0
Label	<0.01	<0.01%	0
Total	2	0.2%	0

6. Biogenic Carbon Content Information

Steel rebar manufactured from steel scrap does not contain biogenic carbon. Biogenic carbon from packaging and products was excluded from the system, as it represents less than 5% by mass ("2019:14 Construction products, Version 1.3.4").

7. LCA Information

Environmental potential impacts were calculated in accordance with EN 15804:2012+A2:2019/AC:2021 sustainability of construction works and PCR 2019:14 Construction products Version 1.3.4. This EPD is in accordance with ISO 14025:2006.

Environmental potential impacts were calculated through Life Cycle Assessment (LCA) methodology conformity to ISO 14040:2006 and ISO 14044:2006. An external third-party verification process of the EPD was conducted according to General Programme Instructions from the International EPD® System Version 4.0. Verification 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.

7.1 Declared unit

1 metric ton of Steel rebar manufactured from steel scrap in 2022 by Ternium México.

7.2 System boundary

The potential environmental impacts were calculated through Life Cycle Assessment (LCA) methodology of Steel rebar manufactured from steel scrap 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 15804:2012+A2:2019/AC:2021 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 7).

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

Infrastructure and capital goods are excluded from the system boundaries, in accordance with PCR 2019:14, as they are not considered to have a significant environmental impact.

7. LCA Information

Table 7. System boundary of Steel rebar manufactured from steel scrap.

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 product 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 disposal	Mandatory	Mandatory	Mandatory	Optional
D Benefits and charges beyond the system limit	D) Reuse, recycling or energy recovery potential.	Mandatory	Mandatory	Mandatory	-

7. LCA Information

Table 8. 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	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-
Product variation	0%			-	-	-	-	-	-	-	-	-	-	-	-	-
Site variation	0%			-	-	-	-	-	-	-	-	-	-	-	-	-

X = Declared module; ND = No declared module; NR = No reported; MX= Mexico

Geographical scope: Mexico

Summary of Data Quality Assessment
Data quality was assessed considering geographical, technical, and temporal representativeness, as well as precision, completeness, consistency, and data sources. For stages A1 and A2, consumption values and transport distances were provided directly by the manufacturer; however, selected generic datasets from the Ecoinvent 3.10 database (updated as of December 2024) were used and subsequently regionalized. Therefore, while the datasets are secondary, the quantities used reflect real, process-specific values. For stage A3, primary data was collected by Ternium at the Largos Apodaca plant (Mexico) during 2022. The share of primary data used across modules A1-A3 is 91.1% (>90%). The data quality assessment followed the criteria set out in Annex E, Table E.1 of EN 15804:2012+A2:2019/AC:2021.

7. LCA Information

7.3. Description of information modules

In Table 9 the description of information modules is included.

Table 9. Description of information modules in this EPD.

A1) Raw materials	A2) Transportation	A3) Manufacturing	C) End of life	D) Benefits and charges beyond the system boundaries
•Production of other raw materials: ferroalloys, lime, carbon, graphite electrodes, calcium carbide. •Production of packaging materials for raw materials. •Generation and distribution of the electricity consumed in manufacturing. •Production and processing of natural gas used as fuel during the manufacturing process. •Steel scrap supply	• Transportation of steel scrap. • Transportation of other raw materials. • Transportation of ancillary materials. • Internal transport.	• Fresh water consumption. • Production and consumption of ancillary materials: chemicals for water treatment, lubricating oils and grease. • Waste generation and waste management processes. • Emissions to air and water. • Transportation of waste to the treatment and final disposal site.	• De-construction, demolition, transport, waste processing, disposal.	•Re-use •Recovery-Recycling-potential.

7. LCA Information

7.4. Description of the manufacturing process

Product stage (modules A1, A2, A3).
This stage includes raw material acquisition, transportation, and the manufacturing process. It covers the production of steel rebar from steel scrap, electricity generation, and fuel production for manufacturing activities. It also includes the transportation of raw materials to the manufacturing site, production of ancillary materials, freshwater consumption, as well as waste and emissions generated during the manufacturing process.

End of life stage (modules C1, C2, C3, C4).
This stage includes the deconstruction process, use of machinery, demolition hours, and fuel consumption during demolition. It also covers the transportation of waste to recycling facilities and sanitary landfills. According to the Latin American Steel Association (ALACERO, 2022), 98% of the deconstruction waste per metric ton of steel rebar is processed for recycling, while the remaining 2% is disposed of in construction and demolition waste sites.

Resource recovery stage (module D).
Avoided loads and benefits of stopping the production of mineral for steel are evaluated and produce Steel rebar with scrap steel.

Ternium México produces Steel rebar using 100% Steel scrap. The production process includes steelmaking through an electric arc furnace, continuous casting, and hot rolling. Each of these processes is carried out at the Apodaca plant. Figure 2 shows a diagram of the production process of Steel rebar manufactured from steel scrap by Ternium México.

Electric Arc Furnace
The process begins with the reception and classification of ferrous scrap, which is the primary raw material. The scrap is analyzed using a radiation detection portal to ensure it is free from contamination. Once cleared, the scrap is loaded into the Electric Arc Furnace (EAF), where it is melted into liquid steel using an electric arc generated by graphite electrodes. Oxygen is injected to enhance melting efficiency.

Ladle Furnace
The liquid steel from the EAF is transferred to a Ladle Furnace for refining. Here, the steel's chemical composition is adjusted to meet specified requirements through the addition of ferroalloys. The Ladle Furnace also ensures that the steel reaches the optimal temperature for the next stage, significantly improving its quality and performance.

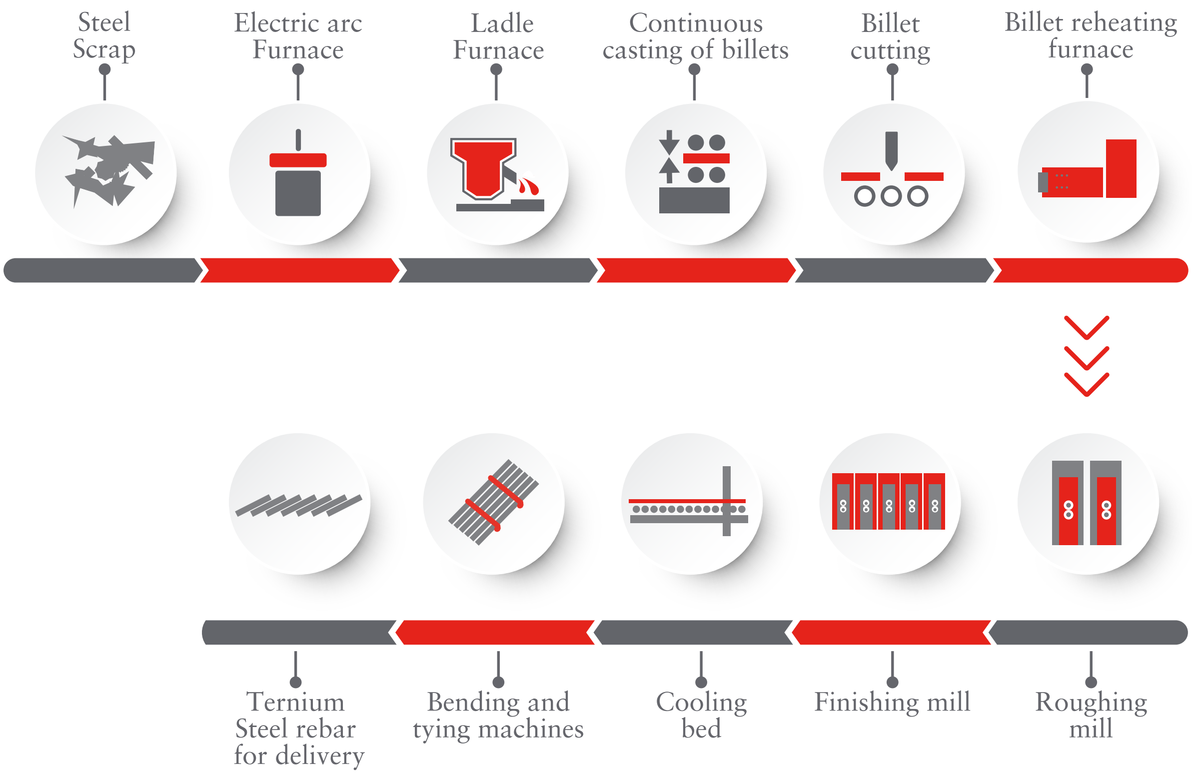
Continuous Casting
The refined liquid steel is transported to the Continuous Casting machine, where it is solidified into semi-finished products called billets. The liquid steel is poured into water-cooled copper molds, where it begins to solidify. The billets are then cut to predetermined lengths using oxygen-gas torches and prepared for the final stage of production.

Hot Rolling
The billets are reheated in a furnace to the optimal temperature and passed through a series of rolling stands in the Hot Rolling process. This reduces their cross-section and shapes them into Steel rebar with the required dimensions and mechanical properties.

Finally, the rebar undergoes cutting to the required lengths and bundling for storage and shipment. The finished product is prepared for delivery, either as straight bars or bending and tying, depending on customer requirements.

7. LCA Information

Figure 2. Flow diagram of Steel rebar manufactured from steel scrap process.



7.5. Assumptions

The assumption related to the Steel rebar manufactured from steel scrap manufacturing process are presented below

- For secondary data and when it was not possible to acquire direct information from the company, the Ecoinvent 3.10 life cycle databases, in their Cut-off version, were used.

The characteristics of the generic data used in this study from the Ecoinvent 3.10 database are presented below.

- They are representatives of the world average, excluding Europe (RoW).
- They represent technological equivalence to those used by Ternium México suppliers.
- The datasets used represent cradle-to-gate systems, thus respecting the technological limits of the complete system under study.
- For raw materials and inputs where the country of origin was known with certainty, a global database was used as the primary source of data. The energy matrix of the global database was regionalized by adjusting it to reflect the energy profile of the country of origin.

This LCA study and the resulting EPD were based on specific data for processes under Ternium México's control, while generic data were used for processes outside its influence. Generic data refers to inventories related to the production of raw materials. Additionally, generic data was employed for the manufacture of packaging materials, transportation methods, and waste treatment.

7. LCA Information

7.6. Cut off criteria

All flows of fuel, energy, materials and supplies necessary to produce Steel rebar manufactured from steel scrap 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.

7.7. Allocation

In this study, the first preferred allocation procedure was applied, as mentioned in the PCR (PCR, 2024), which constitutes the partition of the inputs and outputs of the system, reflecting the physical relationships between the product and each by product. The partition of inputs and outputs was based on a mass relationship, considering the quantity produced per year of each product or by product at the unit process level.

This procedure constitutes a conservative approach, because the products represent the largest proportion when analyzing the outputs (based on the mass produced) in each unit process evaluated. This procedure was used in the same way for material flows as for energy flows throughout the evaluated modules. Also, the performance and process involved in the manufacture of Steel rebar manufactured from steel scrap were used in the assignment of the input and output flows of the LCI.

Table 10. By-product allocation for Steel rebar manufactured from steel scrap.

Process	By-product	Allocation
Steelmaking	Steel mill slag	9.25%
	Steel mill dust	1.55%
Hot rolling	Rolling mill fines	0.37%
	Rolling mill flake	0.95%

7.8. Time representativeness

Direct data obtained from Ternuim México is representative for 2022.

7.9. Characterisation methods

The following table presents the characterisation methods used for each of the declared environmental performance indicators, including the corresponding sources and version.

Table 11. Characterisation methods for environmental performance indicators.

Characterisation method	Category
EN 15804. Version: EF 3.1, April 2024	Climate change - Total
	Climate change- Fossil
	Climate change - Biogenic
	Climate change - Land use and LU change
	Ozone depletion
	Acidification
	Photochemical ozone formation
	Eutrophication, freshwater
	Eutrophication, marine
	Eutrophication, terrestrial
	Resource use, fossils
	Resource use, minerals and metals
ReCiPe Midpoint (H). Version 1.1 2016 AWARE 2.0	Water use
IPCC GWP 100a. Version 1.03 2016	Climate change- GWP
Cummulative Energy Demmand. Version 1.12 2024	Use of renewable primary energy Non-renewable primary energy use
ReCiPe Midpoint (H). Version 1.1 2016	Use of fresh water (FW)
EDIP 2003. Versión 1.07 2018	Hazardous waste
	Non-hazardous waste
	Radioactive waste

8. Environmental performance

SimaPro 9.5 and Ecoinvent 3.10 were used for Life Cycle Impact Assessment. Potential impacts were calculated using the EN15804+A2 (adapted) V1.0 / EF 3.1 normalization and weighting set method (PRé-Sustainability, 2021).

8.1. Potencial environmental impact

The results of the LCIA for the basic categories of 1 metric ton of Steel rebar manufactured from steel scrap are presented in Figure 3 and Table 15. The LCIA is shown with the reference substance corresponding to each impact category and the percentage contribution. All information modules are reported and valued separately. However, this EPD presents the full impact at all stages.

Electricity Impact

The electricity generation data in Mexico comes from the Ecoinvent 3.10 database and information from the National Center for Energy Control (CENACE), which is a decentralized public body whose purpose is to manage the Operational Control of the National Electric System in Mexico. With both references a dataset was created, named “Electricity, high voltage, 2023 {MX} | market for electricity, high voltage | Cut-off, U”, this dataset represents the most recent electricity Mexican grid by type of technology. But adjusts were required to reflect that Ternium México in 2022 also use Electricity from Independent Producers and this one has at least GWP lower emission factors.

Table 12. Mexican electricity grid.

Type of technology	Total
Deep geothermal	1%
Hard coal	4%
Hydro, run-of-river	6%
Natural gas, combined cycle power plant	59%
Natural gas, conventional power plant	9%
Nuclear, boiling water reactor	3%
Wind, 1-3MW turbine, onshore	5%
Photovoltaic, 570kWp open ground installation, multi-Si	5%
Ethanol production from sweet sorghum	<0%
Oil	2%
Natural gas, burned in gas turbine, for compressor station	6%
TOTAL	**100%**

As part of the requirements of the PCR, the climate impact as kg CO_2eq of the electricity used in the manufacturing process of Steel rebar manufactured from steel scrap is reported in Table 12. This impact was calculated using the GWP-GHG indicator.

Table 13. Electricity Global Warming Potential (kg CO_2 eq/kWh).

Type of electricity	Unit	Quantity
Weighted total of electrical energy sources	kg CO_2 eq	3.50E-01

Global warming potential (GWP-GHG) of Scrap use

An additional specific requirement introduced by the new PCR is the need to report the global warming potential (GWP) of the scrap inputs, calculated per declared unit. This impact was assessed using the GWP-GHG indicator.

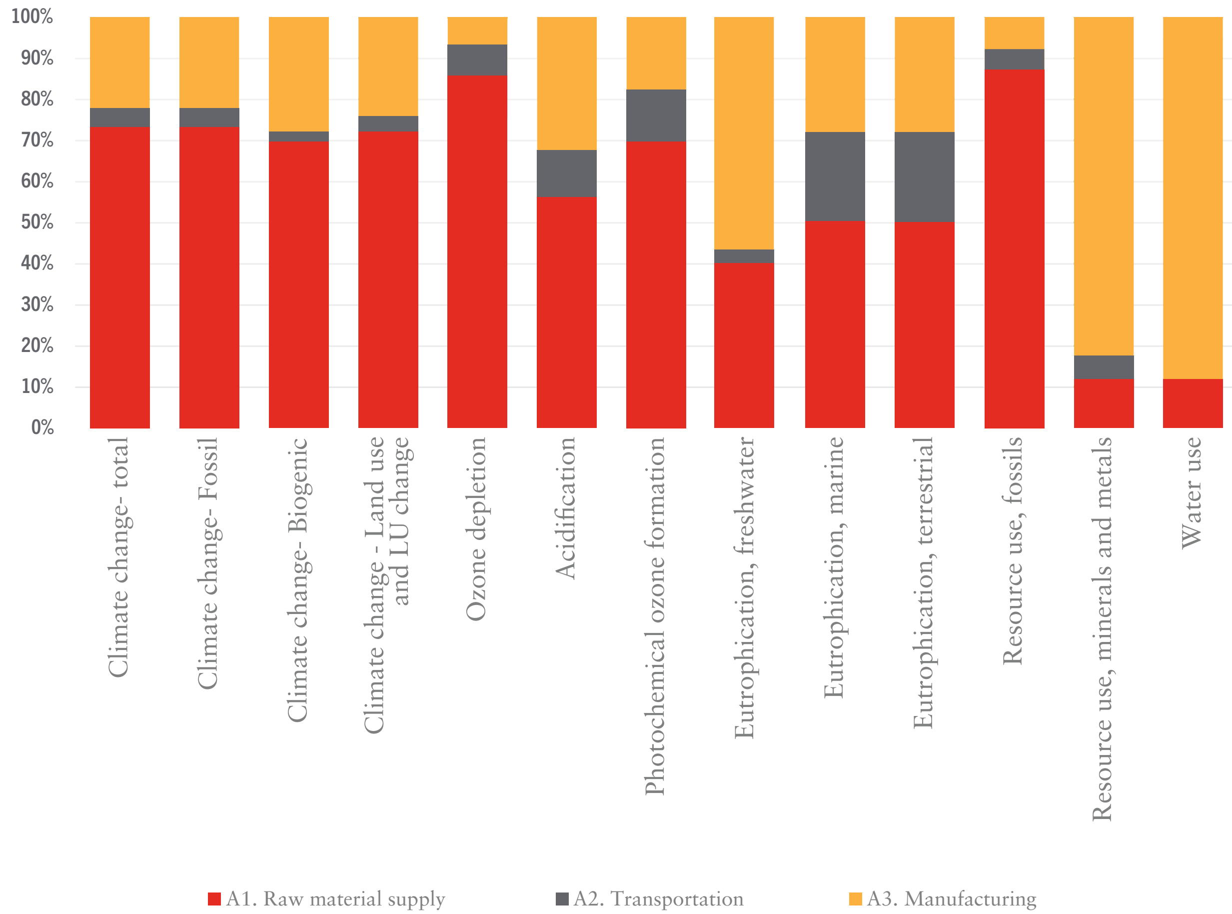
Table 14. Scrap use, Global Warming Potential. (kg CO_2eq/ metric ton).

Impact Basic Category	Unit	Quantity
Global Warming Potential (GWP-GHG) of scrap use	kg CO_2 eq	4.32E-01

8. Environmental performance

The EICV results for 1 metric ton of Ternium Steel rebar manufactured from steel scrap are presented in Figure 3 and Table 15. The contribution analysis shows that Module A1 (Raw material supply) is the main contributor to most impact categories, followed by Module A3 (Manufacturing). Module A2 (Transportation) presents a relatively low contribution across all categories.

Figure 3. A1-A3 Basic impact categories result of Steel rebar manufactured from steel scrap.



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8. Environmental performance

Table 15. A1-A3 Basic impact categories result of Steel rebar manufactured from steel scrap.

Basic impact categories	Unit	A1) Raw materials	A2) Transportation	A3) Manufacturing	Total
Climate change - Total	kg CO_2 eq	3.80E+02	2.05E+01	1.17E+02	5.17E+02
	%	73.42%	3.95%	22.63%	100%
Climate change- Fossil	kg CO_2 eq	3.80E+02	2.05E+01	1.17E+02	5.17E+02
	%	73.42%	3.95%	22.63%	100%
Climate change - Biogenic	kg CO_2 eq	7.97E-02	2.34E-03	3.31E-02	1.15E-01
	%	69.19%	2.03%	28.78%	100%
Climate change - Land use and LU change	kg CO_2 eq	1.44E-02	6.03E-04	5.43E-03	2.04E-02
	%	70.44%	2.96%	26.61%	100%
Ozone depletion	kg CFC11 sq.	1.12E-05	9.70E-07	7.81E-07	1.29E-05
	%	86.43%	7.52%	6.05%	100%
Acidification	mol H+ eq	3.98E-01	9.14E-02	2.21E-01	7.11E-01
	%	56.02%	12.85%	31.13%	100%
Photochemical ozone formation	kg NMVOC eq	7.49E-01	1.37E-01	1.93E-01	1.08E+00
	%	69.38%	12.70%	17.91%	100%
Eutrophication. freshwater	kg P eq	7.24E-04	4.22E-05	1.02E-03	1.78E-03
	%	40.65%	2.37%	56.98%	100%
Eutrophication. freshwater	kg PO_4^{3-}eq	2.22E-03	1.30E-04	3.12E-03	5.47E-03
	%	40.65%	2.37%	56.98%	100%
Eutrophication, marine	kg N eq	8.85E-02	3.92E-02	5.01E-02	1.78E-01
	%	49.79%	22.03%	28.18%	100%
Eutrophication, terrestrial	mol N eq	9.61E-01	4.29E-01	5.50E-01	1.94E+00
	%	49.51%	22.13%	28.37%	100%
Resource use, fossils	MJ	6.20E+03	2.70E+02	6.25E+02	7.10E+03
	%	87.38%	3.81%	8.81%	100%
Resource use, minerals and metals	kg Sb eq	2.49E-06	1.08E-06	1.74E-05	2.10E-05
	%	11.89%	5.15%	82.96%	100%
Water use	m^3 depriv	1.17E+01	1.12E-01	8.54E+01	9.72E+01
	%	12.05%	0.12%	87.83%	100%

Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.
Disclaimer: The results of the end-of-life stage (module C) should be considered when using the results of the production stage (modules A1-A3).
The environmental performance results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

8. Environmental performance

The results of stages C1-C4 are presented next as well as stage D.

Table 16. Impact assessment of end-of-life scenario.

Basic impact categories	Unit	C1) Deconstruction	C2) Waste transport	C3) Waste treatment	C4) Waste disposal	D) Benefits and charges beyond the system boundary
Climate change- GWP GHG	kg CO_2 eq	1.16E+00	1.55E+01	0.00E+00	5.44E-02	2.47E+01
Climate change- total	kg CO_2 eq	1.16E+00	1.54E+01	0.00E+00	5.43E-02	2.47E+01
Climate change- Fossil	kg CO_2 eq	1.16E+00	1.54E+01	0.00E+00	5.43E-02	2.47E+01
Climate change- Biogenic	kg CO_2 eq	9.79E-05	1.82E-03	0.00E+00	1.84E-05	-2.25E-03
Climate change - Land use and LU change	kg CO_2 eq	2.47E-05	4.51E-04	0.00E+00	2.22E-06	8.78E-04
Ozone depletion	kg CFC11 eq	1.49E-08	2.07E-07	0.00E+00	8.05E-10	3.67E-07
Acidification	mol H+ eq	9.23E-04	4.19E-02	0.00E+00	4.93E-04	7.92E-01
Photochemical ozone formation	kg NMVOC eq	1.89E-03	6.25E-02	0.00E+00	7.43E-04	2.98E-01
Eutrophication, freshwater	kg P eq	6.56E-07	3.82E-05	0.00E+00	1.95E-07	8.56E-05
Eutrophication, freshwater	kg PO_4^{3-}eq	2.01E-06	1.17E-04	0.00E+00	6.00E-07	2.63E-04
Eutrophication, marine	kg N eq	1.17E-04	1.52E-02	0.00E+00	2.24E-04	9.03E-02
Eutrophication, terrestrial	mol N eq	1.25E-03	1.67E-01	0.00E+00	2.46E-03	1.05E+00
Resource use, fossils	MJ	1.46E+01	2.06E+02	0.00E+00	6.98E-01	2.68E+02
Resource use, minerals and metals	kg Sb eq	3.78E-08	9.16E-07	0.00E+00	2.15E-09	1.36E-05
Water use	m^3 depriv	2.73E-03	1.00E-01	0.00E+00	3.49E-04	1.96E+00

Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.
The environmental performance results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

8. Environmental performance

8.1.1 Global Warming Potential (GWP-GHG)

Table 17 shows the results of the Global Warming Potential of 1 metric ton of Steel rebar manufactured from steel scrap evaluated with the IPCC GWP100 method for modules A1-A3 and Table 18 for modules C1-C4 and D.

Table 17. A1-A3. Climate Impact (GWP-GHG) of Steel rebar manufactured from steel scrap.

Impact category	Unit	A1) Raw materials	A2) Transportation	A3) Manufacturing	Total
Climate change- GWP	kg CO_2 eq	3.80E+02	2.05E+01	1.17E+02	5.18E+02

GWP-GHG = total Global Warming Potential, excluding biogenic carbon, following IPCC AR5 (2013) methodology.
This indicator includes all greenhouse gases covered by GWP-total, but excludes biogenic carbon dioxide consumption and biogenic carbon emissions or storage in the product. Therefore, this indicator is almost equivalent to the original GWP indicator defined in EN 15804:2012+A1:2013. The modeling was performed according to IPCC 2013 GWP 100a. version 1.02 (PCR 2019:14. GPI. IPCC AR5).

Table 18. C1-C4 and D. Climate Impact (GWP-GHG) of Steel rebar manufactured from steel scrap.

Impact category	Unit	C1) Deconstruction	C2) Waste transport	C3) Waste treatment	C4) Waste disposal	D) Benefits and charges beyond the system boundary
Climate change- GWP	kg CO_2 eq	1.16E+00	1.55E+01	0.00E+00	5.44E-02	2.47E+01

GWP-GHG = total Global Warming Potential, excluding biogenic carbon, following IPCC AR5 (2013) methodology.
This indicator includes all greenhouse gases covered by GWP-total, but excludes biogenic carbon dioxide consumption and biogenic carbon emissions or storage in the product. Therefore, this indicator is almost equivalent to the original GWP indicator defined in EN 15804:2012+A1:2013. The modeling was performed according to IPCC 2013 GWP 100a. version 1.02 (PCR 2019:14. GPI. IPCC AR5).

8. Environmental performance

8.2 Use of resources

Parameters describing resource use were evaluated with the Cumulated Energy Demand method version 1.01 (Frischknecht et al. 2007) adjusted with option B of Annex 3 of the PCR 2019:14 Construction products. Version 1.3.4, 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 19.

Table 19. Use of resources parameters of 1 metric ton of Steel rebar manufactured from steel scrap.

Use of resources parameters	Units	Total A1-A3	C1) Deconstruction	C2) Waste transport	C3) Waste treatment	C4) Waste disposal	D) Benefits and charges beyond the system boundary
Use of renewable primary energy excluding renewable primary energy resources used as feedstock (PERE)	MJ	4.30E+02	1.91E-02	3.36E-01	0.00E+00	3.31E-03	1.90E+01
Use of renewable primary energy as raw material (PERM)	MJ	0.00E+00	0.00E+00	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) (PERT)	MJ	4.30E+02	1.91E-02	3.36E-01	0.00E+00	3.31E-03	1.90E+01
Non-renewable primary energy use excluding renewable primary energy resources used as feedstock (PENRE)	MJ	7.84E+03	1.55E+01	2.19E+02	0.00E+00	7.42E-01	2.91E+01
Use of non-renewable primary energy as raw material (PENRM)	MJ	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 (primary energy and primary energy resources used as raw materials) (PENRT)	MJ	7.84E+03	1.55E+01	2.19E+02	0.00E+00	7.42E-01	2.91E+02
Use of secondary materials (SM)	kg	1.17E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary renewable fuels (RSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary non-renewable fuels (NRSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of fresh water (FW)	m^3	2.27E+00	1.89E-04	6.93E-03	0.00E+00	2.42E-05	1.36E-01

These energy parameters are evaluated with the Cumulated Energy Demand method version 1.09 (Frischknecht Rolf, 2007) and adjusted with option B of Annex 3 of the PCR 2019:14 Construction products. Version 1.3.4 published on April 30, 2024 (PCR, 2024).
Water use was evaluated with ReCiPe 2016 Midpoint (H) version 1.08 (Huijbregts, et al., 2017).

8. Environmental performance

8.3. Others 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:

Table 20. Other indicators describing waste categories of Steel rebar manufactured from steel scrap.

Output parameter	Unit	A1-A3	C1) Deconstruction	C2) Waste transport	C3) Waste treatment	C4) Waste disposal	D) Benefits and charges beyond the system boundary
Hazardous waste*	kg	8.42E-02	1.00E-04	1.41E-03	0.00E+00	4.62E-06	2.83E-02
Non-hazardous waste**	kg	3.27E-01	3.51E-04	8.83E-03	0.00E+00	2.00E+01	2.77E-02
Radioactive waste***	kg	1.35E-03	4.58E-07	7.42E-06	0.00E+00	4.27E-08	1.56E-04

* Direct indicators from Ternium México process data.
** Indirect indicators are not related to Ternium México's operations but to the generation during the processes of obtaining auxiliary inputs.
*** No radioactive waste is produced during Ternium México operation.

Table 21. Other indicators describing material and energy output flows categories of Steel rebar manufactured from steel scrap.

Output parameter	Unit	A1-A3	C1) Deconstruction	C2) Waste transport	C3) Waste treatment	C4) Waste disposal	D) Benefits and charges beyond the system boundary
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling*	kg	1.33E-03	0.00E+00	0.00E+00	9.80E+02	0.00E+00	0.00E+00
Materials for energy recovery*	kg	5.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electricity	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported heat	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

* Direct indicators from Ternium México process data.
For more information about Steel rebar manufactured from steel scrap, contact the EPD owner who has LCA study of these products.

All information modules are reported separately. However, the total impact across all stages is also presented.

Parameters describing environmental potential impacts were calculated using EN 15804:2012+A2:2019/AC:2021 Adapted version 1 (https://eplca.jrc.ec.europa.eu/permalink/EN_15804.zip) as implemented in SimaPro 9.5.

9. Differences between EPD versions

This Environmental Product Declaration (EPD) is an update of the original version of the EPD titled Steel rebar manufactured from steel scrap, originally published on May 25, 2018, in accordance with PCR 2012:01 Construction products and construction services, Version 2.2 (2017-05-30). The previous EPD has now reached the end of its validity period.

The production process has not undergone significant changes; the same steelmaking route and product specifications are maintained. Only minor modifications have been implemented to improve operational efficiency, without affecting the representativeness of the modeled system. This EPD was updated following EN 15804:2012+A2:2019/AC:2021 standard and Construction products PCR 2019:2014 V 1.3.4.

10. Verification and registration

CEN STANDARD EN 15804 SERVED AS THE CORE PCR	
Programme:	International EPD® System www.environdec.com EPD registered through the fully aligned regional programme/hub: EPD Latin America www.epd-americalatina.com
Programme operator:	EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden E-mail: info@environdec.com EPD Latin America Chile: Alonso de Ercilla 2996, Ñuñoa, Santiago Chile. Mexico: Bosques de Bohemia 2 No. 9, Bosques del Lago. Cuautitlan Izcalli, Estado de Mexico, Mexico.
EPD registration number:	EPD-IES-0000700:001 (S-P-00700).
Date of publication (issue):	2018-05-25
Date of version:	2025-06-13
Date of validity:	2030-06-13
Reference year of data:	2022
Geographical scope:	Mexico
Product group classification:	UN CPC 4124 Bars and rods, hot rolled, of iron or steel.
PCR:	PCR 2019:14 construction products, Version 1.3.4 (EN 15804:2012+A2:2019/AC:2021)
PCR review was conducted by:	Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Independent verification of the declaration data, according to ISO 14025:2006.	☐ EPD process certification (Internal) ☑ EPD verification (External)
External third-party verifier and critical reviewer of the LCA:	Ruben Carnerero Approved EPD verifier r.carnerero@ik-ingenieria.com
Accredited or approved by:	The International EPD® System
Procedure for follow-up of data during EPD validity involves third-party verifier:	☑ Yes ☐ No

11. Additional Environmental Information

Environment

The Environmental Management System of the Ternium Plants that participate in the manufacture are certified under standard ISO 14001:2015

Sustainability

Towards sustainability and environmental protection Ternium manufactures 100% recyclable products, with the highest quality and minimizing environmental impact. Recycling is an important part of the company's production process, as well as ensuring a long-term healthy link with the communities neighboring the production centers.

Ternium is deeply committed to sustainable development, so its actions are guided by an Environmental and Energy Policy that involves employees, shareholders, suppliers, customers, and communities. The company has a Management System that foresees procedures, reviews and specific records for the proper operation, maintenance and control of facilities, as well as for the handling of substances.

Active Participation

Ternium reports, since 2005, CO_2 emissions to the World Steel Association. This garnered the recognition of the "Climate Action Member" program. Additionally, Ternium subscribed to the report on sustainability indicators and reports on energy consumption and personnel training. In addition, Ternium also garnered for 7 consecutive years the recognition of Sustainability Champion by the World Steel Association.

In addition, the company is part of different groups that are concerned about environmental issues, mainly the World Business Council for Sustainable Development (National Chapters), the Latin American Steel Association (Alacero), World Steel Association and various work committees in several industrial associations. In Mexico, it participates through the commissions related to environmental issues and energy saving of the National Chamber of Iron and Steel (CANACERO), the Mining Chamber of Mexico (CAMIMEX) and the Environmental Protection Institute of Nuevo León (IPA-NL).

12. Contact information

EPD Owner:

Ternium

Ternium México S.A. de C.V.
Avenida Universidad 992
Colonia Cuauhtémoc,
C.P. 66450
San Nicolás de Los Garza.
Nuevo León, México.
mx.ternium.com

Contact person:
Lucia Betanzos:
Ibetanzo@ternium.com.mx
Víctor Bernal:
vbernalh@ternium.com.mx

LCA Author

Casostenible
Consultoría en Gestión Ambiental & Sostenibilidad

Casostenible S.A.S
Km 2 Vía Chía - Cajicá,
Hacienda Fontanar Ciprés
www.casostenible.com
Bogotá D.C.,
Colombia.

LCA Study:
Life Cycle Impact
Assessment
Steel rebar manufactured
from steel scrap
Ternium México
(Report 2024)

LCA Authors:
Ruge V, Bolañoz A.

Contact person:
Felipe Restrepo
proyectos@casostenible.com

Programme Operator

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EPD International AB

Box 210 60, SE-100 31,
Stockholm, Sweden.
www.environdec.com
info@environdec.com

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www.epd-americalatina.com

Chile:
Alonso de Ercilla 2996,
Ñuñoa, Santiago Chile.

Mexico:
Bosques de Bohemia 2
No.9, Bosques del Lago.
Cuautitlán Izcalli,
Estado de Mexico,
Mexico.
C.P. 54766

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