Ternium

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THE INTERNATIONAL EPD® SYSTEM

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LATIN AMERICA

Ternium TRD 91.5 Roof Deck

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

Programme:	The International EPD® System EPD registered through the fully aligned regional programme/ hub: Latin American Hub, www.epd-latinamerica.com info@environdec.com
Programme operator:	EPD® Latin America EPD International AB
	Regional Hub: Latin American Hub of the International EPD® System
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Geographical scope:	Mexico

ECO PLATFORM EPD VERIFIED

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.

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. The 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/AC:2021 Sustainability of Construction Works – Environmental Product Declarations - Core rules for the product category of construction products. The Central Product Classification is CPC 4219: Other structures (except prefabricated buildings) and parts of structures, of iron, and steel; plates, rods, angles, shapes, sections, profiles, tubes and the like, prepared for use in structures, of iron and steel.

For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterization factors); have equivalent content declarations; and be valid at the time of comparison For further information about comparability, see EN 15804:2012+A2:2019/AC:2021 and ISO 14025:2006.

1. Ternium México

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 20 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 12.3 million tons, Ternium's shares are listed and traded on the New York Stock Exchange.

2. General information

Product:	Ternium TRD 91.5 Roof Deck
Declaration owner:	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: lbetanzo@ternium.com.mx Víctor Bernal: vbernalh@ternium.com.mx
Description of the construction product:	Product manufactured from Ternium Zintro (galvanized steel), and Ternium Pintro steel (galvanized and painted steel). The geometry of Ternium TRD 91.5 Roof Deck complies with the dimensions established by the Steel Deck Institute (SDI) for the profile called "Wide Rib" or Type B, and the ANSI/SDIRD1.0 Standard (American National Standards Institute).
Declared Unit:	1000 kg TRD 91.5 Roof Deck.
Construction product identification:	Central Product Classification: CPC 4219 Other structures (except prefabricated buildings) and parts of structures, of iron, and steel; plates, rods, angles, shapes, sections, profiles, tubes and the like, prepared for use in structures, of iron and steel.
Main product components:	96.5% steel, 2.7% zinc and 0.8% paint.
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
Site for which this EPD is representative:	Manufacturing Plants Industrial Center: Ave. Guerrero Nte. 151 Colonia Cuauhtémoc, San Nicolás de los Garza (66450) Nuevo León (+52) 81 8865-2828 Industrial Center: Ave. Churubusco 1000 Colonia Santa Fe Monterrey (64540) Nuevo León (+52) 81 83295000 Industrial Center: Carretera Pesquería Los Ramones Km 15, Santa María La Floreña, Pesquería (66601) Nuevo León (+52) 81 88652828 Industrial Center: Ave. Universidad 992 Nte. Colonia Cuauhtémoc, San Nicolás de los Garza (66450) Nuevo León (52) 81 8865-2828. Industrial Center: Ave. Juventud 340 Colonia Cuauhtémoc San Nicolás de los Garza (66450) Nuevo León (+52) 81 8865-2828. Industrial Center: Ave. Juventud 340 Colonia Cuauhtémoc San Nicolás de los Garza (66450) Nuevo León (+52) 81 8865-2828.
Intended Public:	B2B (Business to Business)

2. General information

Accountabilities for PCR, LCA and independent, third-party verification

Product Category Rules (PCR)

CEN standard EN 15804:2012+A2:2019/AC:2021 serve as the core Product Category Rules (PCR)

Product category rules (PCR): 2019:14 Construction products. Version 1.3.4 published April 30, 2024.

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: Elena Rosa Domínguez, Andrea Solano and Mireya González, Center for Life Cycle Assessment and Sustainable Design – CADIS.

Third-party verification

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

☑ EPD verification by individual verifier

Third-party verifier: Ruben Carnerero, IK Ingeniería SL.

Approved by: The International EPD System

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

☑ Yes

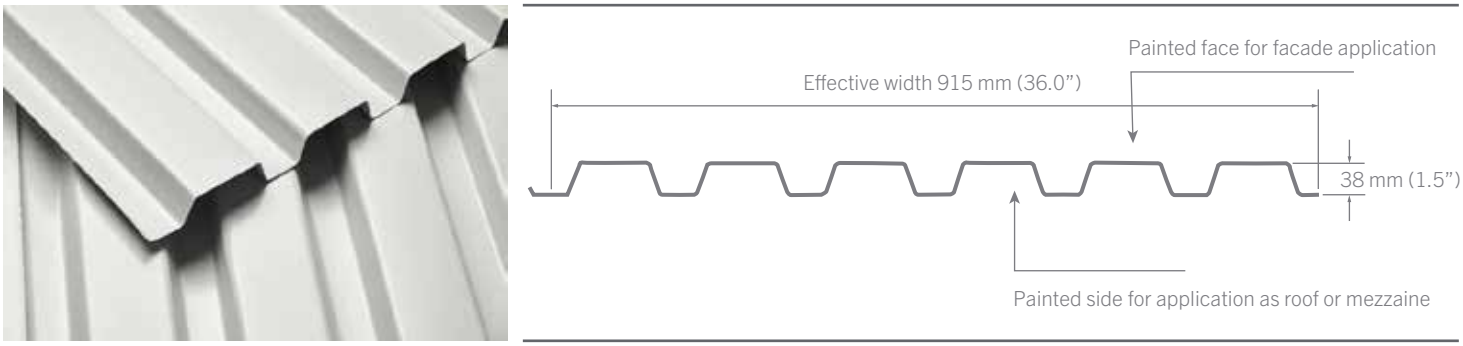
☐ No

3. Product declaration

Product manufactured with stationary roller from Ternium Zintro (galvanized steel) and Ternium Pintro (galvanized and painted steel). The geometry of Ternium TRD 91.5 Roof Deck complies with the dimensions established by the Steel Deck Institute (SDI) for the profile called "Wide Rib" or Type B, and the ANSI / SDIRD1.0 Standard (American National Standards Institute).

It can be used as a composite cover or facade. Figure 1 shows a representative image of the TRD 91.5 Roof Deck manufactured by Ternium México.

Figure 1. TRD 91.5 Roof Deck manufactured by Ternium México.



The substrate and coating properties of the TRD 91.5 Roof Deck are shown in Table 1 (Ternium, 2024).

Table 1. Substrate properties and coatings for the TRD 91.5 Roof Deck manufactured by Ternium.

Product	Grade
Ternium Zintro	Structural steel GR37 Fy=37ksi min.
Ternium Pintro	Structural steel GR37 Fy=37ksi min.

Product specifications are shown in **Table 2** (Ternium, 2024).

Table 2. TRD 91.5 Roof Deck profile weight and thickness.

Caliber	Base steel nominal thickness mm (inch)	Approximate weight kg/ml	Weight aproximate kg/m²
24*	0.0209 (0.5309)	6.11	6.68
22	0.0299 (0.7595)	7.62	8.33
20	0.0359 (0.9119)	9.17	10.02
18*	0.0478 (1.2141)	12.02	13.14

*Only manufactured under technical consultation

4. Content declaration

Table 3 presents the product content declaration TRD 91.5 Roof Deck, including the biogenic carbon content, the properties of hazardous substances according to the Candidate List of Substances of High Concern according to the European Chemicals Agency (ECHA) and the recycled material content for TRD 91.5 Roof Deck by Ternium México during 2022. It should be noted that the packaging is not reported because the products are delivered according to customer requirements, which is different for each customer, which are not considered for the LCI.

Table 3. Composition of TRD 91.5 Roof Deck manufactured by Ternium México.

Product components	Weight (kg)	Weight (%)	Chemical substances	CAS number	Function of the substance	Health class[1]	Post-consumer recycled material (%)	Biogenic material (kg)	Biogenic material (kg C/ product)
Steel	965	96.5%	Not applicable	Not applicable	Structural	Not include	33	0	0
Zinc	27	2.7%	Zinc	7440-66-6	Coating agent	Not include	0	0	0
Paint	8	0.8	Commercial formulation	Not applicable	Aesthetic performance	Lack of data	0	0	0

NOTE: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2

1 European Chemical Agency (ECHA):
a) Candidate List: https://echa.europa.eu/es/candidate-list-table?p_p_id=disslists_WAR_disslistsportlet&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_pos=2&p_p_col_count=3&_disslists_WAR_disslistsportlet_javax.portlet.action=searchDissLists
b) Authorisation list https://echa.europa.eu/es/authorisation-list?p_p_id=disslists_WAR_disslistsportlet&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_pos=1&p_p_col_count=2&_disslists_WAR_disslistsportlet_javax.portlet.action=searchDissLists
c) Restriction list https://echa.europa.eu/es/substances-restricted-under-reach?p_p_id=disslists_WAR_disslistsportlet&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_pos=1&p_p_col_count=2&_disslists_WAR_disslistsportlet_javax.portlet.action=searchDissLists

5. Distribution packaging

Packaging: The product is delivered to the customers without any packaging.

6. Biogenic Carbon Content Information

The TRD 91.5 Roof Deck doesn't have biogenic carbon content. Biogenic carbon from packaging and products was excluded from the system, since by mass it represents less than 5% ("2019:14 Construction products, Version 1.3.4").

7. LCA Rules

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

1000 kg of TRD 91.5 Roof Deck manufactured in 2022 by Ternium México

7.2 System boundary

The potential environmental impacts were calculated through Life Cycle Assessment (LCA) methodology of TRD 91.5 Roof Deck 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 15804:2012+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 4).

7. LCA Rules

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

Table 4. System boundary of TRD 91.5 Roof Deck.

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 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 Rules

Table 5. 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**		<10%		-	-	-	-	-	-	-	-	-	-	-	-	-

X = Declared module; ND = No declared module; NR = No reported; MX= México
* The consumption of slabs comes only from Ternium.
**This variation of sites corresponds to equal, unweighted products and processes.

7. LCA Rules

7.3 Description of information modules

In Table 6 the description of information modules is included.

Table 6. Description of information modules included in this EPD.





A1) RAW MATERIALS	A2) TRANSPORTATION	A3) MANUFACTURING	C) END OF LIFE	D) BENEFITS AND CHARGES BEYOND THE SYSTEM BOUNDARIES
• Raw materials production and consumption. • Electricity generation and consumption. • Generation and distribution of the natural gas consumed in manufacturing.	• Transportation of raw materials from the production site to each of the Ternium México Plants involved in the production process of TRD 91.5 Roof Deck, including the transportation of scrap from local, national and imported suppliers. • Fuels consumption related to internal transportation.	• Water consumption. • Production of auxiliary inputs. • Emissions to air. • Emissions to water. • Generation and treatment of waste. • Transportation of waste to final disposal sites or recycling sites.	• Demolition • Transport final destination. • Whatever can be recycled. • What goes to fill what is wasted and not recycled.	• The avoided loads, benefits of stopping producing steel with virgin material.

7. LCA Rules

7.4 Description of the manufacturing process

Product stage (modules A1, A2, A3). In this life cycle stage are included raw materials acquisition, transport and manufacturing process. It includes production of galvanized and painted sheets, zinc and paint, generation of electrical energy and fuel production for manufacturing process; also, transportation of raw materials to manufacturing sites; related to manufacturing process is included production of ancillary materials, freshwater consumption, waste and emissions generated.

End of life stage (modules C1, C2, C3, C4). In this life cycle stage includes deconstruction, machinery for deconstruction, hours of demolition and fuel consumption for demolition. Waste transportation to recycling and sanitary landfill. Waste processing of deconstruction waste 98% per 1000 kg of coating steel for recycling and waste disposal of 2% in sanitary landfill.

Resource recovery stage (module D). Avoided loads and benefits of stopping the production of mineral for steel are evaluated and produce sheets with scrap steel.
The manufacturing process of TRD 91.5 Roof Deck is shown in Figure 1 and is described below: The TRD 91.5 Roof Deck is manufactured from Ternium Zintro (galvanized and painted steel sheet coils), and Ternium Pintro (painted steel sheet). Ternium México manufactures the TRD 91.5 profile through a complete production process that includes the manufacture of sponge iron from the direct reduction of iron ore pellets, including steelmaking through an electric arc furnace, continuous casting, hot rolling, pickling, cold rolling, galvanizing, painting, cutting and die rolling. Each of these processes is carried out in more than one plant in parallel, except for the steelmaking, which is carried out only at the Guerrero plant. Figure 2 shows a diagram of the production process of the TRD 91.5 Roof Deck by Ternium México.

The raw material for obtaining TRD 91.5 Roof Deck is galvanized and painted steel sheet in coils.

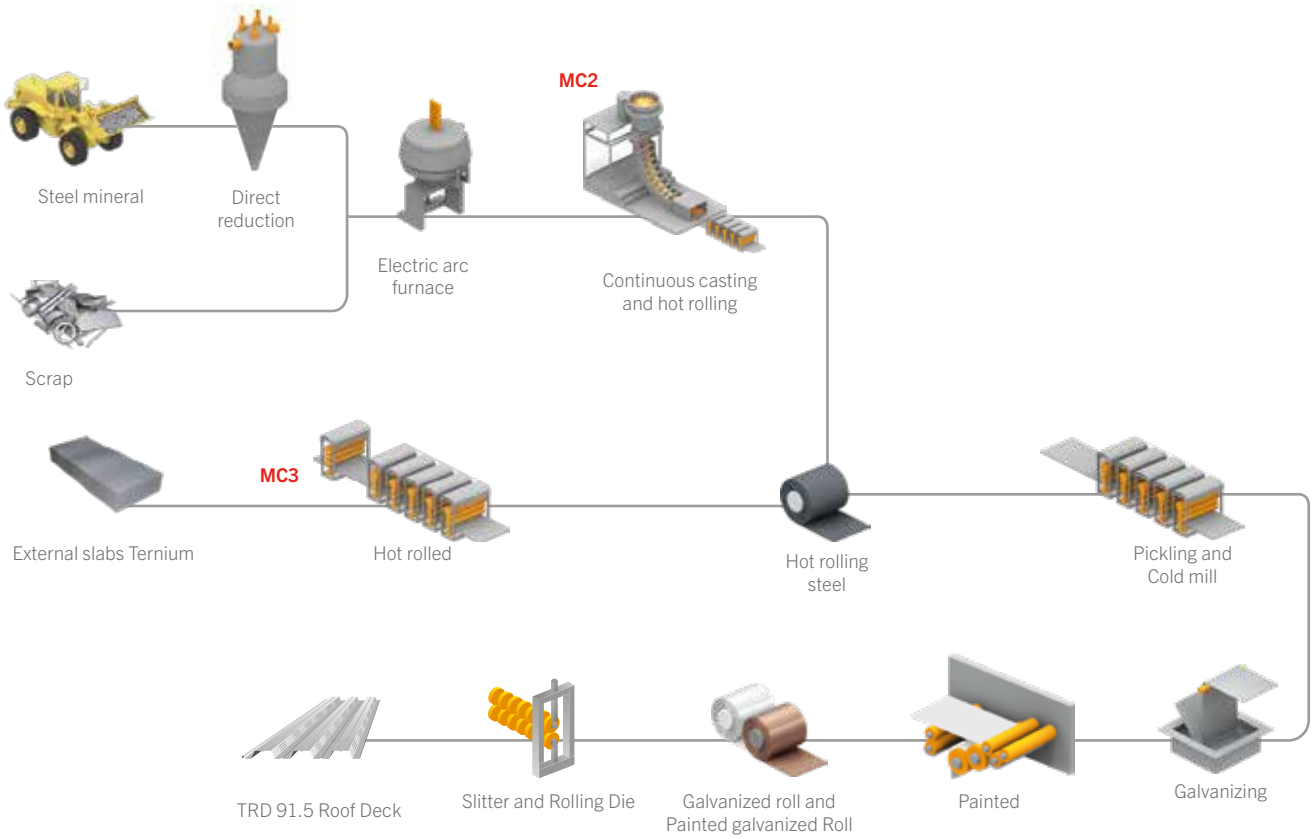
The Direct Reduction, Steelmaking, Continuous Casting and Hot Rolling processes are carried out at the Guerrero plant, located in the municipality of San Nicolás de los Garza, in the State of Nuevo León. The Hot Rolling processes for slabs from external suppliers are carried out at the Churubusco plant. Subsequently, the Pickling and Cold Rolling process are carried out in Churubusco, Pesquería and Universidad plants. The galvanizing process is carried out at the Pesquería, Universidad and Juventud plants.The painting process is carry out at the Juventud plant. The painted sheet and the galvanized sheet go to the Slitter and Die rolling processes described below.

Slitter
Painted and galvanized coils arrive at the Slitter section to be cut according to specifications. The coil is placed on the uncoiler mandrel for semi-continuous feeding to the following stages. Initially, it is leveled to thread towards the head where the blades are located; after this operation, the alignment table is lowered to make available a pit that works as an accumulator. A tension unit pushes the sheet towards the longitudinal cutting circular blades that are in continuous contact with the sheet. A separator keeps each strip in the correct position during the final roll formation; during cutting, the burr generated by the uncoiler is separated and wounded onto reels.

Dierolling
The coil is placed on the uncoiler for semi-continuous feeding to the fluting operation.
This is carried out by a cold deformation process when the smooth sheet passes between several sets of dies that progressively form the profile. There are several die cassettes, which are selected according to the requirements. At the output of the last set of dies, there is a scissor, which when making the cut is synchronized with the speed of the sheet, thus obtaining the required cutting tolerances. Finally, the die rolling sheets are automatically stacked in a device designed for this purpose.

7. LCA Rules

Figure 2. Flow diagram of TRD 91.5 Roof Deck manufacturing process.



7.5 Assumptions

The assumption related to the TRD 91.5 Roof Deck manufacturing process is presented below.

• For secondary data and when it was not possible to acquire direct information from the company, the Ecoinvent 3.9.1 life cycle databases, in their Cut-off version, were used.

The characteristics of the generic data used in this study from the Ecoinvent 3.9.1 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.

• Achieves limitations regarding nature.

• The datasets used represent cradle-to-gate systems, thus respecting the technological limits of the complete system under study.

This LCA study and the derived EPD were calculated using specific data for those processes on which Ternium México has influence, and generic data were used for those processes on which it does not. Generic data refers to inventories related to the manufacturing of raw materials, such as iron ores, zinc, and paints. Generic data is also used for the manufacture of packaging materials, means of transportation, and waste treatment.

7. LCA Rules

7.6 Cut off criteria

All flows of fuel, energy, materials and supplies necessary to produce TRD 91.5 Roof Deck 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, 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 performances of each plant and process involved in the manufacture of TRD 91.5 Roof Deck were used in the assignment of the input and output flows of the LCI.

7.8 Time representativeness

Direct data obtained from Ternium México is representative for 2022.

8. Environmental performance

SimaPro 9.5 and Ecoinvent 3.9.1 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 Potential environmental impact

The results of the LCIA for the basic categories of 1000 kilograms of TRD 91.5 Roof Deck are presented in Figure 3 and Table 10. 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 3.9.1 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 México. 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 7. 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_2 eq of the electricity used in the manufacturing process of TRD 91.5 Roof Deck is reported in Table 8. This impact was calculated using the GWP-GHG indicator.

8. Environmental performance

Table 8. Electricity Global Warming Potential (kg CO_2 eq/kWh).

Type of electricity	Unit	Quantity
Weighted total of electrical energy sources	kg CO_2 eq	4.00E-01

Table 9. Scrap use, Global warming potential.

Impact Basic Category	Unit	Quantity
Global warming potential (GWP-GHG) of scrap use	kg CO_2 eq	0.0219

Global warming potential (GWP-GHG) of Scrap use

Another specific topic in accordance with the new requirements of the PCR is the report of the Global warming potential of the scrap inputs per 1000 kg of TRD 91.5 Roof Deck. This impact was calculated using the GWP-GHG indicator.

All information modules are reported separately. However, the total impact across all stages is also presented. Parameters describing environmental potential impacts were calculated using EN15804+2 Adapted version 1 (https://eplca.jrc.ec.europa.eu/permalink/EN_15804.zip) as implemented in SimaPro 9.5.

The EICV results for 1000 kg of Ternium TRD 91.5 Roof Deck are presented in Figure 3. Table 10 shows the EICV by module and the environmental impact contribution analysis for 1000 kg of Ternium TRD 91.5 Roof Deck. Module A1 has the highest contribution in all impact categories. This is due to the impact produced when manufacturing galvanized sheets and painted sheets, which constitute the essential raw materials for obtaining the TRD 91.5 Roof Deck. The results for freshwater eutrophication are favorable due to the reuse of city sewer as process water.

8. Environmental performance

Figure 3. A1-A3 Basic impact categories result of TRD 91.5 Roof Deck.

8. Environmental performance

Table 10. A1-A3 Basic impact categories result of TRD 91.5 Roof Deck.

Basic impact categories	Unit	A1) Raw materials	A2) Transportation	A3) Manufacturing	Total
Climate change - Total	kg CO_2 eq	1.88E+03	3.28E-01	2.95E-01	1.88E+03
	%	99.97%	0.017%	0.016%	100%
Climate change- Fossil	kg CO_2 eq	1.87E+03	3.28E-01	2.95E-01	1.87E+03
	%	99.97%	0.017%	0.016%	100%
Climate change - Biogenic	kg CO_2 eq	1.45E+00	2.03E-05	2.82E-04	1.46E+00
	%	99.98%	0.001%	0.019%	100%
Climate change - Land use and LU change	kg CO_2 eq	2.46E+00	1.24E-05	8.40E-05	2.46E+00
	%	100.00%	0.001%	0.003%	100%
Ozone depletion	kg CFC11 eq	5.08E-05	4.77E-09	1.29E-06	5.21E-05
	%	97.51%	0.009%	2.479%	100%
Acidification	mol H+ eq	3.85E+01	1.26E-03	1.43E-03	3.85E+01
	%	99.99%	0.003%	0.004%	100%
Photochemical ozone formation	kg NMVOC eq	3.34E+01	1.75E-03	1.16E-03	3.34E+01
	%	99.99%	0.005%	0.003%	100%
Eutrophication, freshwater	kg P eq	-5.57E-01	7.55E-07	5.15E-06	-5.57E-01
	%	-100.00%	0.000%	0.001%	-100%
Eutrophication, marine	kg N eq	6.62E+00	5.13E-04	2.37E-04	6.62E+00
	%	-99.99%	-0.008%	-0.004%	-100%
Eutrophication, terrestrial	mol N eq	1.23E+02	5.50E-03	2.73E-03	1.23E+02
	%	99.99%	0.004%	0.002%	100%
Resource use, fossils	MJ	1.82E+04	4.35E+00	7.02E+00	1.82E+04
	%	99.94%	0.024%	0.039%	100%
Resource use, minerals and metals	kg Sb eq	4.82E-02	1.92E-08	3.80E-07	4.82E-02
	%	100.00%	0.000%	0.001%	100%
Water use	m^3 H_2O eq	2.06E+02	6.04E-03	2.38E+01	2.29E+02
	%	89.62%	0.003%	10.382%	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 discouraging the use of the results of modules A1-A3 without considering the results of module C.
The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

8. Environmental performance

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

Table 11. 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	2.68E+00	1.91E+01	0.00E+00	6.69E+00	-1.71E+02
Climate change- total	kg CO_2 eq	2.68E+00	1.91E+01	0.00E+00	6.68E+00	-1.79E+02
Climate change- Fuel	kg CO_2 eq	1.76E+04	1.23E-03	0.00E+00	6.28E-03	1.58E+00
Climate change- Biogenic	kg CO_2 eq	1.10E-04	7.52E-04	0.00E+00	1.92E-03	5.97E-01
Climate change - Land use and LU change	kg CO_2 eq	4.23E-08	2.89E-07	0.00E+00	2.26E-08	-1.62E-05
Ozone depletion	kg CFC11 eq	2.57E-02	3.09E-02	0.00E+00	2.02E-02	3.78E-02
Acidification	mol H+ eq	3.86E-02	4.42E-02	0.00E+00	1.86E-02	-2.12E+00
Photochemical ozone formation	kg NMVOC eq	2.29E-06	4.58E-05	0.00E+00	8.03E-05	6.85E-02
Eutrophication, freshwater	kg P eq	1.20E-02	7.18E-03	0.00E+00	5.97E-03	1.25E-01
Eutrophication, marine	kg N eq	1.31E-01	7.18E-02	0.00E+00	6.76E-02	-1.02E+00
Eutrophication, terrestrial	mol N eq	3.53E+01	2.64E+02	0.00E+00	3.24E+01	-1.18E+03
Resource use, fossils	MJ	1.13E-07	1.17E-06	0.00E+00	1.05E-05	1.06E-03
Resource use, minerals and metals	kg Sb eq	4.52E-02	3.66E-01	0.00E+00	3.15E-01	-7.07E+02
Water use	m^3 depriv.	4.52E-02	3.66E-01	0.00E+00	3.15E-01	-7.07E+02

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 estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

8. Environmental performance

8.1.1 Global Warming Potential (GWP-GHG)

Table 12 shows the results of the Global warming potential of 1000 kg of TRD 91.5 Roof Deck evaluated with the IPCC GWP100 method for modules A1-A3 and Table 13 for modules C1-C4 and D.

Table 12. A1-A3. Climate Impact (GWP-GHG) of TRD 91.5 Roof Deck.

Impact category	Unit	A1) Raw materials	A2) Transportation	A3) Manufacturing	Total
Climate change- GWP	kg CO_2 eq	1.88E+03	3.28E-01	2.95E-01	1.88E+03

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

Table 13. C1-C4 and D. Climate Impact (GWP-GHG) of TRD 91.5 Roof Deck.

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	2.68E+00	1.91E+01	0.00E+00	6.69E+00	-1.77E+02

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

8. Environmental performance

8.2 Use of resources

Parameters describing resource use were evaluated with the Cumulated Energy Demand method version 1.09 (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 14.

Table 14. Use of resources parameters of 1000 kg of TRD 91.5 Roof Deck.

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	5.50E+02	6.87E-02	3.89E-01	-7.01E+01	1.31E+00	4.75E+02
Use of renewable primary energy as raw material (PERM)	MJ	0.00E+00	0.00E+00	0.00E+00	-7.01E+01	0.00E+00	0.00E+00
Total use of renewable primary energy (primary energy and primary energy resources used as feedstock) (PERT)	MJ	5.50E+02	6.87E-02	3.89E-01	-1.40E+02	1.31E+00	0.00E+00
Non-renewable primary energy use excluding renewable primary energy resources used as feedstock (PENRE)	MJ	1.99E+04	3.75E+01	2.80E+02	2.36E+03	0.00E+00	-1.17E+03
Use of non-renewable primary energy as raw material (PENRM)	MJ	0.00E+00	0.00E+00	0.00E+00	-2.36E+03	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	1.99E+04	3.75E+01	2.80E+02	0.00E+00	0.00E+00	3.13E+02
Use of secondary materials (SM)	kg	0.00E+00	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	6.42E+00	1.75E-03	1.45E-02	0.00E+00	9.41E-03	-1.30E+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 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:

Table 15. Other indicators describing waste categories of TRD 91.5 Roof Deck.

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	1.15E+00	2.36E-04	1.78E-03	0.00E+00	9.53E-05	-8.86E-02
Non-hazardous waste**	kg	4.47E+01	2.62E-03	6.73E-02	0.00E+00	4.00E+01	3.00E+02
Radioactive waste***	kg	8.64E-03	1.72E-06	9.24E-06	0.00E+00	1.55E-05	7.48E-03

* 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 16. Other indicators describe material and energy output flows categories of TRD 91.5 Roof Deck.

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	1.75E-04	0.00E+00	0.00E+00	9.80E+02	0.00E+00	9.80E+02
Materials for energy recovery*	kg	4.45E-02	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	0.00E+00
Exported heat	MJ	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
** 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.

For more information about the TRD 91.5 Roof Deck, contact the EPD owner who has LCA study of these products.

9. Differences between EPD versions

The previous version of this EPD named TRD 91.5 Roof Deck Mexico was published on July 01, 2019, in accordance with PCR 2012:01 Construction products and construction services, Version 2.3 (2018-11-15).

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. México: Bosques de Bohemia 2 No. 9, Bosques del Lago. Cuautitlan Izcalli, Estado de México, México.
EPD registration number:	EPD-IES-0001427:001 (S-P-01427)
Date of publication (issue):	2019-07-01
Date of validity:	2029-12-13
Date of revision:	2024-12-13 (version 001)
Reference year of data:	2022
Geographical scope:	Mexico
Product group classification:	Central Product Classification: CPC 4219 Other structures (except prefabricated buildings) and parts of structures, of iron, and steel; plates, rods, angles, shapes, sections, profiles, tubes and the like, prepared for use in structures, of iron and steel.
PCR:	PCR 2019:14 construction products, Version 1.3.4 (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 certifi cation (Internal) ☑ EPD verification (External)
External third-party verifier and critical reviewer of the LCA:	Ruben Carnerero Approved EPD verifier r.carnerero@ik-ingenieria.com The International EPD® System
Accredited or approved by:	The International EPD® System
Procedure for follow-up of data during EPD validity involves third-party verifier:	☑ Yes ☐ No

11. Ternium's Certifications

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

Quality
To ensure the quality of the steel products that are produced in Ternium plants, the different manufacturing processes are certified with the ISO 9001:2015 quality standard, in its latest version. Additionally, the chemical and physical test labs are certified with ISO 17025:2017 standard, as well in its latest version.

Safety
To ensure the care of the physical integrity and occupational health of all the personnel, of the Ternium Plants that participate in the manufacture the Safety Management System is certified with the ISO45001:2018.

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 6 consecutive years the recognition of Sustainability Champion by the World Steel Assoaciation.

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 México, 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).

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