Ternium

LATIN AMERICA EPD®

Environmental Product Declaration
In accordance with ISO 14025:2006 and EN 15804:2012

Galvanized, painted and die rolling steel manufactured by Ternium Mexico

Programme:	The International EPD® System www.environdec.com
EPD registered through the fully aligned regional programme/hub:	EPD Latin America, www.epd-latinamerica.com
Programme operator:	EPD International AB
Regional Hub:	EPD Latin America
EPD registration number	S-P-01428
Issue date:	2019-07-01
Validity date:	2024-06-26

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

Revision date:	2019-06-27
Geographical scope:	Mexico

EPD Content

1. Ternium Mexico

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 17 production 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.

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

2. General information

Product:	Galvanized, painted and die rolling steel
Declaration owner:	Ternium Mexico S.A. de C.V. Avenida Universidad 992 Colonia Cuauhtemoc, C.P. 66 450 San Nicolas De Los Garza. Nuevo León, México. Contact person: Luis Rechy lrechy@ternium.com.mx
Description of the construction product:	Coated steel for use in multiple industrial sectors. The coating can be: a) galvanized or b) galvanized and painted The final presentation can be: a) coil, b) sheet or c) die rolling sheets
Declared Unit:	1 metric ton of galvanized, painted and die rolling steel
Construction product identification:	Central Product Classification: CPC 4123 Flat-rolled products of steel, further worked than hot-rolled or cold-rolled;
Main product components:	Galvanized steel: Steel 97.7%, zinc 2.3%, coating agents (<0.1%) Painted steel: Steel 96.2%, zinc 2.2%, paint 1.5%, coating agents (<0.1%)
Life cycle stages not considered:	Distribution, use, end of life.
Content of the declaration:	This EPD is based on information modules that do not cover the aspects of use and end of life of the product. It contains in detail, for Module A1, A2 and A3: • Product definition and physical data. • Information about raw materials and origin. • Specifications on manufacturing the product. • Notes on product processing. • LCA based on a declared unit, cradle-to-gate. • LCA results. • Evidence and verifications.
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 Ejido La Victoria Pesquería (66650) 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. Universidad 992 Nte. Colonia Cuauhtémoc, San Nicolás de los Garza (66450) Nuevo León (52) 81 8865-2828 Industrial Center: Boulevard Harold R. Pape 1349 Fraccionamiento Elizondo, Monclova, Coahuila
Intended public:	B2B (Business to Business)

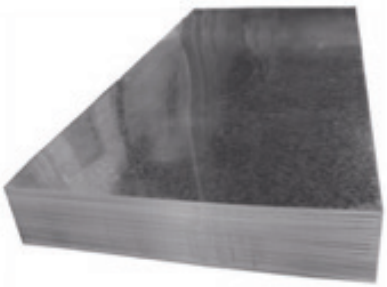
3. Product Description

3.1 Galvanized steel coil and sheet (Ternium Zintro)

Galvanized steel (coil and sheet) covered with zinc or Zinc-Aluminum, offers more corrosion resistance and better appearance.

The treatment during the coating of the sheets gives some characteristics that favor its use in the industry in weathering or humidity conditions.

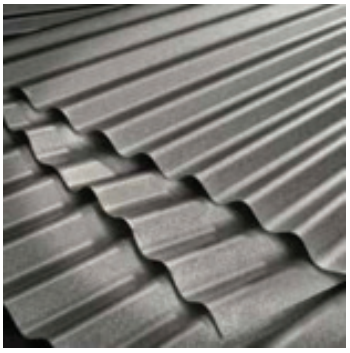
Also, it is useful in the installation of walls, roofs and fences in the construction industry.



3.2 Galvanized die rolling steel (corrugated and rectangular).

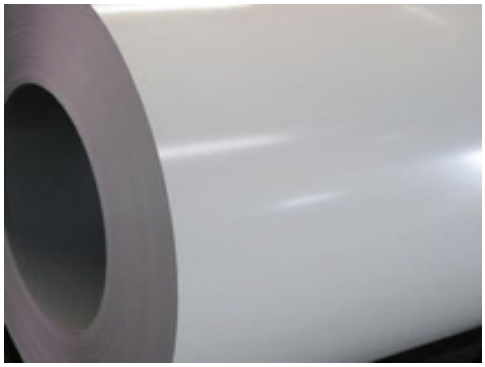
From Ternium Zintro die rolling (rectangular or corrugated shape) steel is made. It can be used as an exposed fixing cover.

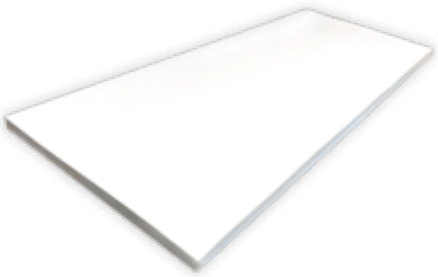
Galvanized corrugated or rectangular steel manufactured by Ternium Mexico is corrosion resistant, heat reflective and ideal for humidity conditions.



3.3 Painted steel coil and sheet (Ternium Pintro)

It is designed to be used as an exposed fixing cover. Ideal for walls, roofs and skirts of buildings in general. The steel has excellent relationship between economy, structural capacity and drainage capacity.

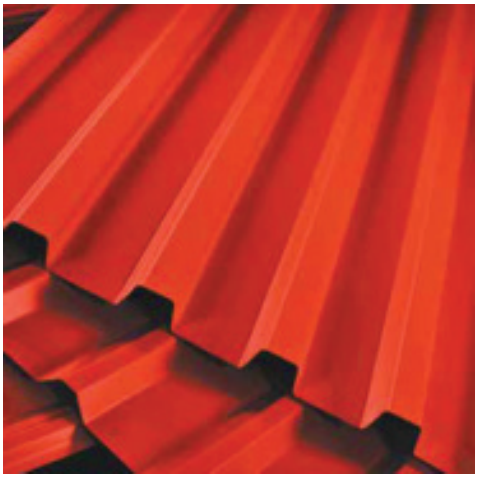




3.4 Painted die rolling steel (corrugated and rectangular)

This product offers an excellent appearance and great resistance to different environments. It is also a product of easy installation and handling, which does not suffer deformations or cracks over time.

Ternium Galvateja is one example of this group of products which is made of galvanized and painted steel sheet, similar in appearance to the traditional tile with the durability of the coated steel. Ideal for commercial and residential use.



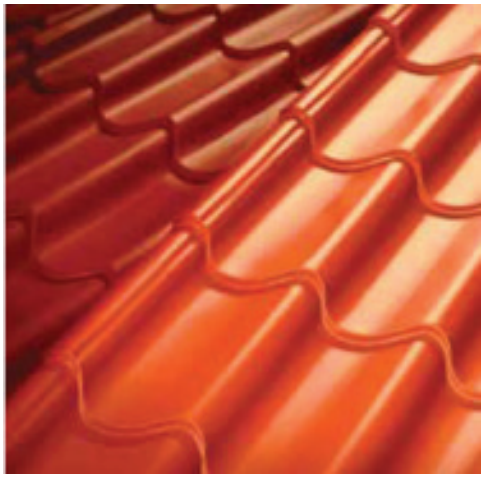


Table 1 Product characteristics						
Product	Thickness	Effective width (cm)	Cant (mm)	Finishing*	Nominal thickness mm (inch)	Weight (approx.) kg/m2
TR-72	22, 24, 26, 28,30,32	72	25	Z, ZA, P	0.2464 (0.0097) -0.9119 (0.0359)	2.81-9.00
TR-101	20, 22, 24, 26, 28, 30	100.8	25	Z. ZA, P	0.2464 (0.0097) -0.9119 (0.0359)	2.81-9.00
TRN-100/35	22,24,26,28	100	35	Z, ZA, P	0.4547 (0.0179)- 0.7595 (0.0299)	4.69-7.61
TR-90	24, 26	90	120	Z, ZA, P	0.4547 (0.0179)- 0.5309 (0.0209)	5.21-6.02
T0-100	22, 24, 26,28	103.2 Walls 95.3 covers	19	Z, ZA, P	0.3785 (0.0149)- 0.7595 (0.0299)	3.83 Wall 4.15 Cover 7.37 Wall 7.99 Cover
T0-725	26, 28, 30	71.5	19	Z, ZA, P	0.3785 (0.0149)- 0.7595 (0.0299)	3.83 Wall 4.15 Cover
T0-30	28,32	77.8	15	Z , ZA, ZC	0.2464 (0.0097)- 0.3785 (0.0149)	2.60-3.81
Galvalock	22,24	61	76	ZA,P	0.6071 (0.0239)- 0.7595 (0.0299)	6.40-7.92
Galvateja	26	100	42	P	-	--

*Z= Ternium Zintro, ZA = Ternium Zintro Allum, P = Ternium Pintro, ZC=Zintro Color

4. Content declaration

Table 2. Typical content in Ternium Galvanized steel					
Homogeneous Material or Chemical Substance	Chemical Substances	Weight (%)	CAS Number	Function of Chemical Substance	Health class[1]
Steel	Not applicable	97.7%	Not applicable	Structural	Not listed
Zinc	Zinc	2.3%	7440-66-6	Coating agent	Not listed

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
European Chemical Agency (ECHA):
d) 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
e) 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
f) 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

Table 3. Typical content in Ternium Painted steel					
Homogeneous Material or Chemical Substance	**Chemical Substances**	**Weight (%)**	**CAS Number**	**Function of Chemical Substance**	**Health class**
Steel	Not applicable	96.2%	Not applicable	Structural	Not listed
Zinc	Zinc	2.2%	7440-66-6	Coating agent	Not listed
Paint	Commercial formulation	1.5%	-	Aesthetic performance	Data lacking

5. LCA Rules

Environmental potential impacts were calculated according to EN 15804:2012 and PCR 2012:01 Construction products and construction services Version 2.3 (2018-11-15). This EPD is in accordance with ISO 14025:2006.

Environmental potential impacts were calculated through Life Cycle Assessment (LCA) methodology according to ISO 14040:2006 and ISO 14044:2006. An external third-party verification process of the EPD was conducted according to General Programme Instructions for the International EPD® System Version 3.0. 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.

5.1 Declared unit

One metric ton of galvanized, painted and die rolling steel.

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
European Chemical Agency (ECHA):
d) 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
e) 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
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5.2 System boundary

The declared EPD is a "Cradle-to gate EPD" in line with ISO 14025:2006. Description of the system boundary is in Table 4.

Table 4. Galvanized, painted and die rolling steel manufactured by Ternium Mexico product system

Life cycle environmental information of Galvanized, painted and die rolling steel															Other environmental information
A1 - A3			A4 - A5		B1 - B7							C1 - C4				D
Product stage			**Construction process stage**		**Use stage**							**End of life stage**				**Reuse recovery stage**
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw materials acquisition	Transport	Manufacturing	Distribution	Construction and installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational wáter use	De-construction, demolition	Transport	Waste processing	Disposal	Reuse – recovery – recycling potential
X	X	X	MND	MND	MND							MND				MND
Cradle-to-gate Declared unit: one square meter of Galvanized, painted and die rolling steel																

(X = included in LCA; MND = Module Not Declared).

Table 5. Description of information modules included in this EPD.

A1) Raw materials supply

•Pre-processing of steel scrap

• Production of raw materials: ferroalloys, lime, carbon, graphite electrodes

• Production of packaging materials for raw materials

• Generation and distribution of the electricity consumed in manufacturing

• Generation and distribution of the natural gas consumed in manufacturing

• Production of steel slab by external provider

• Production of zinc and paint

A2) Transportation

• Transportation of steel scrap

• Transportation of iron pellet

• Transportation of other raw materials

• Transportation of ancillary materials

• Internal transportation requirements

• Transport of steel slab from external provider facilities

• Transport of zinc and paint

A3) Manufacturing

• Fresh water consumption.

• Production and consumption of ancillary materials: oxygen, nitrogen, textiles for cleaning and maintenance, lubricating oils and grease

• Waste generation and waste management processes

• Emissions to air

• Transport of waste to treatment and final disposal sites

5.3 Description of the manufacturing process

Ternium Mexico manufactures galvanized, painted and die rolling steel as follows:

Steelmaking and hot rolling of steel

The iron pellets are prepared for steelmaking through a direct reduction process. Later, steelmaking is conducted in an Electric Arc Furnace using direct reduced iron and steel scrap as raw material. Steel pass to the stage of secondary metallurgy and finally to hot rolling process to obtain coils. Ternium also acquired slab from external providers following a similar steelmaking process, and in this case, the Ternium process starts in the Hot Rolling Process directly.

Galvanized steel (coil and sheet) (Ternium Zintro)

Pickling of coils is applied to remove impurities before cold rolling. High-precision cold rolling process is applied to obtain desired thickness of steel. Finally, the steel is galvanized with Zinc through hot dip process. Galvanized steel may be commercialized in coil or sheets after a cutting process.

Galvanized die rolling steel (corrugated and rectangular)

Shape is applied to galvanized steel passing it by an additional die rolling process. And cut to the required length.

Painted steel (coil and sheet) (Ternium Pintro)

Painting process is applied to galvanized steel coils. Painted steel may be commercialized in coil or sheets after cutting process.

Painted die rolling steel (corrugated and rectangular)

Shape is applied to painted steel passing it by an additional die rolling process. And cut to the required length.

Figure. 1. Flow diagram of Galvanized, painted and die rolling sheet manufacturing process

5.4 Assumptions

Assumptions regarding Ternium operation:

- Metallic drums are supposed to be sent for recycling by a third party at the end of their useful life.
- Used oil from the pickling and cold rolling process in the Guerrero plant are sent to the same supplier as those generated in the steel mill.
- Process additives used in the Churubusco plant have a density of 1 kg/liter.
- An Ecoinvent model was used as a generic inorganic chemical to represent the manufacture of these elements, because 99% (by mass) are inorganic chemicals.
- Towing and maintenance textiles are supposed to absorb 55% of their weight.
- Acid cleaning residues are supposed to be impregnated textiles.
- When the company did not report the origin, the assumption was made that oil, tow, grease, textiles and mechanical components are sourced from the same municipality.
- When the generation of soil with hydrocarbons was declared, it was assumed that the soil absorbs 72% of its weight.
- When the generation of contaminated industrial waste was reported, tow and rags weight were added to supplement the material balance, under the assumption that 50% by weight are tow and 50% are rags from reused garments (recycling).
- Tow and rags leave the system in the form of contaminated industrial waste or impregnated textiles and that they have the capacity to absorb 55% of their weight.

• A distance of 400 meters is assumed for sheet transports between processes within the same plant and that internal transport is done in trailers of 16 to 32 tons.
• Steel scrap generated by Ternium was considered a by-product for allocation purposes since it represents an economic input for the company.
• It is assumed that the acid supplier of the Guerrero plant is the same as that of the Churubusco plant.
• The hot rolled sheet consumed by the pickling lines in Pesquería and Universidad plants comes from the Guerrero and Churubusco plants in the production ratio of each plant in 2017.
• Residual liquids generated in the Juventud plant painting lines are mainly composed of water.
• Solvents consumed in Juventud plant are the same and in the same proportion as in the University plant in the painting areas.
• Material used to clean stacks in the Juventud plant is an organic chemical.
• Natural gas consumed by Ternium Mexico comes from the Burgos gas processing complex of PEMEX and that the transport distance is as follows:

Natural gas transport	Distance (km)
Burgos - Guerrero	228
Burgos - Universidad	228
Burgos - Pesquería	212
Burgos - Churubusco	225
Burgos - Juventud	226
Burgos - Monclova	408

5.5. Cut-off criteria

A minimum of 95% of the total flows (matter and energy) in modules A1 and A3 were included. Company infrastructure, employee's transportation and administrative were kept out of the scope of this study.

5.6 Allocation

Allocation of inputs and outputs between product and byproducts was based on a mass relation, considering the quantity produced per year of each product and byproduct at the level of unit process.

Table 6 shows the byproducts generated during hot rolled steel manufacturing.

Table 6. Byproduct generated during Galvanized, Painted and Die rolling steel manufacturing

	Process	Byproduct
Guerrero	Direct reduction	CO2, REDI sludge, iron dust
	Electric arc furnace	Slag, Mixrock (Steel dust), hematite
	MC1 Mill	Steel scale
	MC2 Mill	Steel scale
Churubusco	MC3 Mill	Steel scrap, slab cutting slag
	Pickling	Steel scrap
Universidad	Pickling	Steel scrap
	Cold Rolling (line 2)	Steel scrap
	Cold Rolling (line 3)	Steel scrap
	Galvanizing (line 3)	Steel scrap, zinc dross
	Galvanizing (line 4)	Steel scrap, zinc dross
Juventud	Galvanizing (line 1)	Steel scrap, zinc dross
	Galvanizing (line 2)	Steel scrap, zinc dross
	Galvanizing (line 3)	Steel scrap, zinc dross
Monclova	Galvanizing (line 5)	Steel scrap, zinc dross
CSC Apodaca	Die rolling	Steel scrap

The polluter pays principle was applied for the allocation procedure during recycling. In this way, in each case when there was an input of secondary material to the Galvanized, Painted and Die Rolling Steel, product system, recycling process and transportation to the site were included in life cycle inventory (for example, steel scrap). In those cases, in which output of material to recycling were presented, material transportation to recycling plant was included. This principle was applied to plastic and metal containers recycled by a third party as well as waste used as energy source by third parties.

For generic data Mexicaniuh and Ecoinvent 3.3 (Allocation - Recycled Content version) databases were used.

5.7 Time representativeness

Direct data obtained from Ternium Mexico is representative for 2017.

5.8 Data quality assessment

Data quality assessment per information module is provided in Tables 7, 8 and 9.

Table 7. Raw material supply module data quality assessment

Data	Time related coverage	Geographic coverage	Technological coverage	Data source	Measured or estimated
Raw materials and energy consumption, waste generation and emissions for iron ore extraction	1999 - 2016	Europe adapted to Mexico	Modern	Ecoinvent 3	M&E
Raw materials and energy consumption, waste generation and emissions for iron pellet manufacturing	2017	Mexico	Modern	Ternium Mexico	M
Energy consumption for scrap steel pre-processing	2018	Europe	Modern	Scrap steel processing equipment provider	E
Raw materials consumption for manufacturing.	2017	Mexico	Modern	Ternium Mexico	M
Energy consumption for manufacturing.	2017	Mexico	Modern	Ternium Mexico	M
Consumption of fuels and emissions related to electricity production in Mexico at country level	2017	Mexico	Modern Mexican energy mix	Mexicaniuh	M&E
Consumption of fuels and emissions related to electricity production by independent providers	2000 - 2016	Mexico	Modern Natural gas Combined cycle	Ecoinvent 3.3 adapted	M&E
Energy and materials consumption and emissions related to natural gas production in Mexico	2017	Mexico	Modern	Mexicaniuh	M&E
Energy and materials consumption and emissions related to the production of other raw materials for steelmaking	1990-2016	Europe	Modern	Ecoinvent 3.3	M&E
Consumption of electricity, fuels and water for production of steel slab by independent provider	2016	Mexico	Modern	Independent provider	M
Consumption of other inputs, waste treatment, process efficiency and byproducts during production of steel slab by independent provider	2017	Mexico	Modern	Ternium Mexico	E

M&E: Measured and Estimated, M: Measured, E: Estimated

Table 8. Transportation module data quality assessment

Data	Time related coverage	Geographic coverage	Technological coverage	Data source	Measured or estimated
Transport distance of scrap and other raw materials	2017	Mexico	N/A	Ternium Mexico	M
Transport distance of ancillary supplies	2017	Mexico	N/A	Ternium Mexico	M
Consumption of materials and energy and emissions related to the transport requirements of raw materials and auxiliary inputs.	1992-2014	Worldwide average based on Europe	Worldwide average based on Europe	Ecoinvent 3.3	M&E

M&E: Measured and Estimated, M: Measured, E: Estimated

Table 9. Manufacture module data quality assessment

Data	Time related coverage	Geographic coverage	Technological coverage	Data source	Measured or estimated
Production yield and generation of by-products.	2017	Mexico	Modern	Ternium Mexico	M
Consumption of auxiliary materials during manufacturing.	2017	Mexico	Modern	Ternium Mexico	M
Consumption of energy and materials for the manufacture of ancillary materials.	1990 - 2017	Worldwide average based on Europe	Worldwide average based on Europe	Ecoinvent 3.3	M&E
Waste generation during manufacture	2017	Mexico	Modern	Ternium Mexico	M
Consumptions of materials and related energy during waste treatment.	1990 - 2017	Worldwide average based on Europe	Worldwide average based on Europe	Ecoinvent 3.3	M&E
Emissions to air during the manufacturing process	2017	Mexico	Modern	Ternium Mexico EPA AP42	M
Waste transport distance	2017	Mexico	Modern	Ternium Mexico and Google Maps	M
Consumption of materials and energy and emissions related to waste transport requirements	1992-2014	Worldwide average based on Europe	Worldwide average based on Europe	Ecoinvent 3.3	M&E
Transport distance of scrap and other raw materials	2017	Mexico	N/A	Ternium Mexico	M&E
Transport distance of ancillary supplies	2017	Mexico	N/A	Ternium Mexico	M
Consumption of materials and energy and emissions related to the transport requirements of raw materials and auxiliary inputs.	1992-2014	Mix european	Mix european	Ecoinvent 3.3	M

M&E: Measured and Estimated, M: Measured, E: Estimated

6. Environmental performance

SimaPro 8.4.0 was used for Life Cycle Impact Assessment.

6.1 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 obtained from life cycle inventory (direct consumption) and with Recipe 2016 Midpoint (H) version 1.00 (indirect consumption) (Huijbregts et al. 2017). The detailed description of the use of resources is provided in Table 10.

Table 10. Resource Indicators per metric ton of Galvanized Steel

Impact Category	Unit	A1) Raw materials supply	A2) Transportation	A3) Manufacturing		Total A1-A3
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ %	1 286 88.9%	27 1.8%	0 0.0%	134 9.3%	1 447 100.0%
Use of renewable primary energy as raw materials	MJ %	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Total use of renewable primary energy resources	MJ %	1 286 88.9%	27 1.8%	0 0.0%	134 9.3%	1 447 100.0%
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ %	19 642 84.4%	1 678 7.2%	0 0.0%	1 947 8.4%	23 267 100.0%
Use of non-renewable primary energy used as raw materials	MJ %	4 317 68.9%	0 0.0%	1 946 31.1%	0 0.0%	6 263 100.0%
Total use of non-renewable primary energy resources	MJ %	23 959 81.1%	1 678 5.7%	1 946 6.6%	1 947 6.6%	29 530 100.0%
Use of secondary material	kg %	67 34.3%	0 0.0%	128 65.7%	0 0.0%	194 100.0%
Use of renewable secondary fuels	MJ %	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Use of non-renewable secondary fuels	MJ %	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Use of net fresh water	m3 %	6.7 62.5%	0.4 3.3%	1.0 9.7%	2.6 24.4%	10.8 100.0%

**The column "A3) Manufacturing (direct) refers to direct data from Ternium operations. The column "A3) Manufacturing (indirect) refers to background data regarding production of ancillary materials and other processes outside Ternium's facilities".

Table 11. Resource Indicators per metric ton of Painted Steel						
Impact Category	**Unit**	**A1) Raw materials supply**	**A2) Transportation**	**A3) Manufacturing**		**Total A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ %	1 658 90.7%	28 1.5%	0 0.0%	141 7.7%	1 828 100.0%
Use of renewable primary energy as raw materials	MJ %	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Total use of renewable primary energy resources	MJ %	1 658 90.7%	28 1.5%	0 0.0%	141 7.7%	1 828 100.0%
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ %	26 612 86.1%	1 752 5.7%	0 0.0%	2 534 8.2%	30 898 100.0%
Use of non-renewable primary energy used as raw materials	MJ %	4 360 68.9%	0 0.0%	1 966 31.1%	0 0.0%	6 326 100.0%
Total use of non-renewable primary energy resources	MJ %	30 972 83.2%	1 752 4.7%	1 966 5.3%	2 534 6.8%	37 223 100.0%
Use of secondary material	kg %	67 34.3%	0 0.0%	129 65.7%	0 0.0%	196 100.0%
Use of renewable secondary fuels	MJ %	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Use of non-renewable secondary fuels	MJ %	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Use of net fresh water	m3 %	8.3 63.0%	0.4 2.8%	1.7 12.8%	2.8 21.3%	13.2 100.0%

**The column "A3) Manufacturing (direct) refers to direct data from Ternium operations. The column "A3) Manufacturing (indirect) refers to background data regarding production of ancillary materials and other processes outside Ternium's facilities".

6.2 Potential environmental impact

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

Parameters describing environmental potential impacts were calculated using CML-IA method version 3.04 (Guinee et al. 2001; Huijbregts et al. 2003; Wegener et al. 2008) as implemented in SimaPro 8.4.0. Water scarcity potential was calculated using AWARE method (Boulay et al. 2018).

The detailed description of the potential environmental impact is provided in Table 12 for Galvanized Steel and Table 13 for Painted Steel.

Table 12. Potential environmental impact indicators per metric ton of Galvanized Steel						
Impact Category	**Unit**	**A1) Raw materials supply**	**A2) Transportation**	**A3) Manufacture**	**Total A1 - A3**	**A4 - A5, B1-B7, C1-C4, D**
Abiotic depletion	kg Sb eq	0.20	2.01E-04	3.08E-04	0.20	
	%	99.7%	0.1%	0.2%	100.0%	
Abiotic depletion (fossil fuels)	MJ	23 386	1 650	3 750	28 786	
	%	81.2%	5.7%	13.0%	100.0%	
Global warming (GWP100a)	kg CO2 eq	1 048	105	401	1 555	
	%	67.4%	6.8%	25.8%	100.0%	
Ozone layer depletion (ODP)	kg CFC-11 eq	1.73E-04	1.86E-05	4.37E-05	2.35E-04	Modules not declared
	%	73.5%	7.9%	18.6%	100.0%	
Photochemical oxidation	kg C2H4 eq	0.58	0.02	0.04	0.64	
	%	89.5%	3.5%	7.0%	100.0%	
Acidification	kg SO2 eq	8.2	0.5	1.0	9.7	
	%	84.4%	5.3%	10.3%	100.0%	
Eutrophication	kgPO4^{3-}eq	1.12	0.12	0.23	1.47	
	%	76.1%	7.9%	15.9%	100.0%	
Water scarcity potential	m3eq	29	7	354	390	
	%	7.4%	1.8%	90.7%	100.0%	

* Note: AWARE method sets the maximal characterization factor (i.e. 100) for the geographical location of Ternium Works involved in manufacturing. However, AWARE factor is linked to Ecosystem Water Requirement (EWR) which is calculated at global scale and does not account for specific local aspects due to limited data access. EWR is the most uncertain variable of the method (Boulay et al. 2018).

Figure. 2 Potential environmental impact contribution per metric ton of Galvanized steel

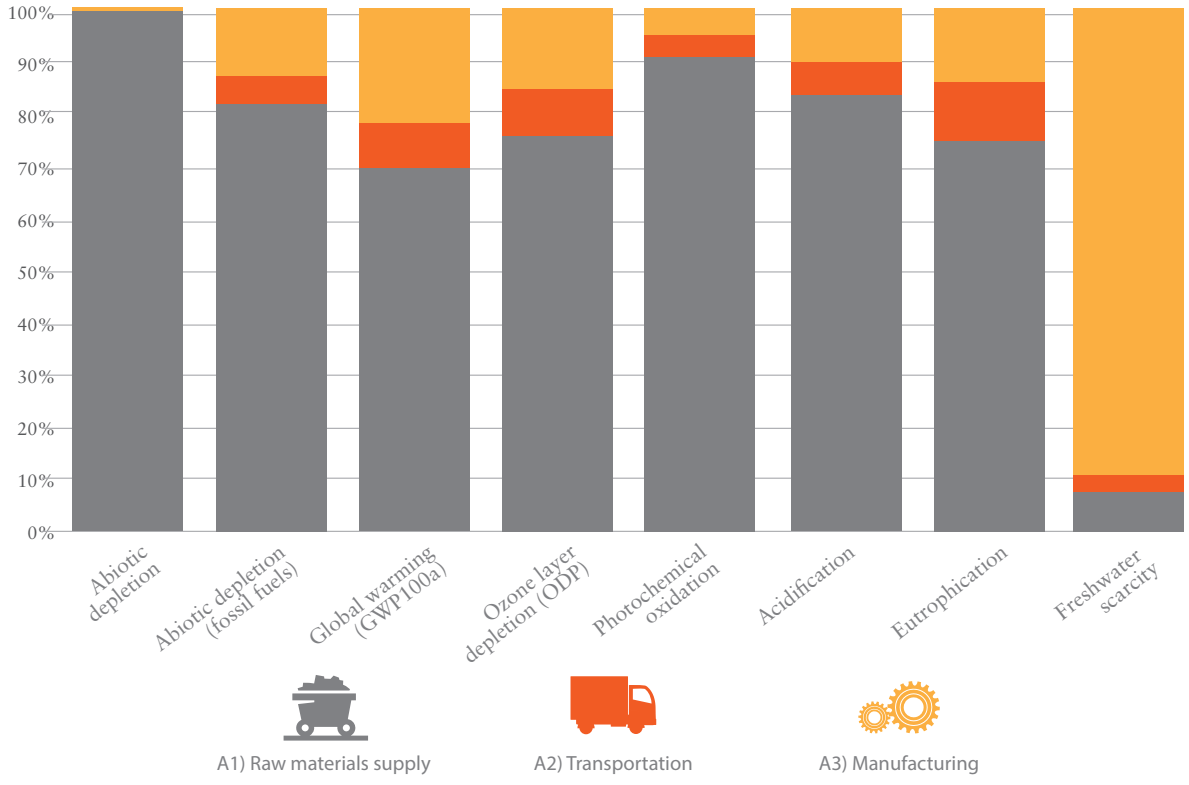
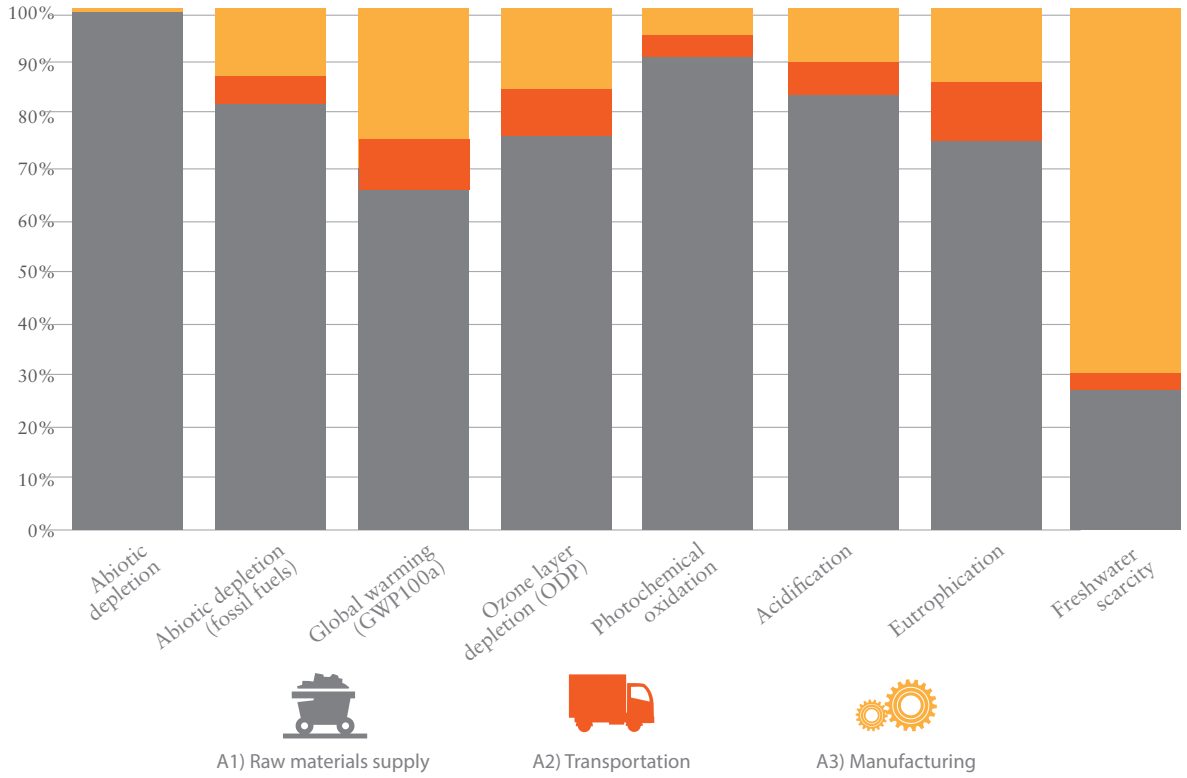


Table 13. Potential environmental impact indicators per metric ton of Painted Steel						
Impact Category	**Unit**	**A1) Raw materials supply**	**A2) Transportation**	**A3) Manufacture**	**Total A1 - A3**	**A4 - A5, B1-B7, C1-C4, D**
Abiotic depletion	kg Sb eq %	0.20 99.7%	2.18E-04 0.1%	3.07E-04 0.2%	0.20 100.0%	
Abiotic depletion (fossil fuels)	MJ %	28 247 82.3%	1 718 5.0%	4 355 12.7%	34 320 100.0%	
Global warming (GWP100a)	kg CO2 eq %	1 250 66.4%	110 5.8%	522 27.7%	1 881 100.0%	
Ozone layer depletion (ODP)	kg CFC-11 eq %	2.11E-04 74.9%	1.93E-05 6.9%	5.12E-05 18.2%	2.81E-04 100.0%	Modules not declared
Photochemical oxidation	kg C2H4 eq %	0.68 90.1%	0.02 3.2%	0.05 6.8%	0.75 100.0%	
Acidification	kg SO2 eq %	9.4 85.0%	0.5 4.8%	1.1 10.2%	11.1 100.0%	
Eutrophication	kgPO4^{3-}eq %	1.4 78.9%	0.1 6.7%	0.3 14.4%	1.8 100.0%	
Water scarcity potential	m3eq %	174 28.5%	7 1.2%	429 70.2%	610 100.0%	

* Note: AWARE method sets the maximal characterization factor (i.e. 100) for the geographical location of Ternium Works involved in manufacturing. However, AWARE factor is linked to Ecosystem Water Requirement (EWR) which is calculated at global scale and does not account for specific local aspects due to limited data access. EWR is the most uncertain variable of the method (Boulay et al. 2018).

Figure. 3Potential environmental impact contribution per metric ton of Painted steel



6.3 Waste production

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). The detailed description of waste generation is provided in Table 14 for Galvanized Steel and Table 15 for Painted Steel.

Table14. Waste and other outputs per metric ton of Galvanized Steel

Parameter	Unit	Total A1-A3	1) Raw materials supply	A2) Transportation	A3) Manufacturing (direct)**	A3) Manufacturing (Indirect)**
Hazardous waste	kg	10.6	5.9	1.01E-03	4.7	3.72E-03
	%	100.0%	55.5%	0.0%	44.4%	0.0%
Non hazardous waste	kg	147	38	103	1.84E-01	6
	%	100.0%	25.8%	69.8%	0.1%	4.2%
Radioactive waste*	kg	0.04	1.95E-02	1.04E-02	0	6.05E-03
	%	100.0%	54.2%	29.0%	0.0%	16.8%
Components for reuse	kg	0.00	0	0	0	0
	%	0%	0%	0%	0%	0%
Materials for recycling	kg	117	65	0	52	0
	%	100.0%	55.8%	0.0%	44.2%	0.0%
Materials for energy recovery	kg	1.24	0.04	0.00	1.20	0.00
	%	100.0%	3.2%	0.0%	96.8%	0.0%
Exported energy	kg	0	0	0	0	0
	%	0%	0%	0%	0%	0%

*No radioactive waste is produced during Ternium Mexico operation.
**The column "A3) Manufacturing (direct) refers to direct data from Ternium operations. The column "A3) Manufacturing (indirect) refers to background data regarding production of ancillary materials and other processes outside Ternium's facilities".

Table 15. Waste and other outputs per metric ton of Painted Steel

Parameter	Unit	Total A1-A3	1) Raw materials supply	A2) Transportation	A3) Manufacturing (direct)**	A3) Manufacturing (Indirect)**
Hazardous waste	kg	11.7	5.9	1.06E-03	5.8	3.67E-03
	%	100.0%	50.6%	0.0%	49.4%	0.0%
Non hazardous waste	kg	184	73	105	1.49E-01	6
	%	100.0%	39.5%	57.0%	0.1%	3.4%
Radioactive waste*	kg	0.04	2.35E-02	1.08E-02	0	1.01E-02
	%	100.0%	53.0%	24.3%	0.0%	22.7%
Components for reuse	kg	0.00	0	0	0	0
	%	0%	0%	0%	0%	0%
Materials for recycling	kg	120	66	0	54	0
	%	100.0%	55.1%	0.0%	44.9%	0.0%
Materials for energy recovery	kg	2.00	0.04	0.00	1.96	0.00
	%	100.0%	2.0%	0.0%	98.0%	0.0%
Exported energy	kg	0	0	0	0	0
	%	0%	0%	0%	0%	0%

*No radioactive waste is produced during Ternium Mexico operation.
**The column "A3) Manufacturing (direct) refers to direct data from Ternium operations. The column "A3) Manufacturing (indirect) refers to background data regarding production of ancillary materials and other processes outside Ternium's facilities".

6.4 Additional environmental information

All the Industrial centers of Ternium Mexico related to the manufacturing process are certified with ISO 14001:2015 and most of them also have the Clean Industry Governmental Award.
Also, an Environmental and Energy Policy is kept in practice in all industrial centers of the company in Mexico. All the industrial centers of Ternium Mexico related to the manufacturing process send a portion of hazardous waste to energy recovery.

Facility	Fraction of waste to energy recovery
Churubusco	4%
Guerrero	40%
Juventud	69%
Pesquería	4%
Universidad	20%
Monclova	14%

Ternium's Certifications

Environment
Ternium plants in Mexico participate in the National Voluntary Environmental Audit Program of the PROFEPA (Federal Attorney for Environmental Protection), thereby ensuring that during the manufacturing processes, compliance with the provisions of current environmental regulations is met.
Likewise, the Environmental Management System of the Ternium Plants that participate in the manufacture are certified under standard ISO 14001:2015.

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 specifies records for the proper operation, maintenance and control of facilities, as well as for the handling of substances.

Quality

In order 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 or ISO/TS 16949:2009 quality standards, 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 physical integrity and occupational health of all the personnel, Ternium Plants that participate in the manufacture have a Health & Safety Management System certified under the OHSAS 18001 standard.

Active Participation

Ternium reports, since 2005, CO2 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. Also, 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).

In 2018 Ternium won the Sustainability Champions Award. This recognition was granted for its work in favor of sustainability.

7. Verification and registration

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 EPD Latin America / Chile: Alonso de Ercilla 2996, Ñuñoa, Santiago Chile. Mexico: Av. Convento de Actopan 24 Int. 7A, Colonia Jardines de Santa Mónica, Tlalnepantla de Baz, Estado de México, México, C.P. 54050
EPD registration number:	S-P-01428
Date of publication (issue):	2019-07-01
Date of validity:	2024-06-26
Date of revision:	2019-06-27
Reference year of data:	2017
Geographical scope:	Mexico
Product group classification:	Central Product Classification: CPC 4123 Flat-rolled products of steel, further worked than hot-rolled or cold-rolled.
PCR:	2012:01 Construction products and construction services Version 2.3
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com
Independent verification of the declaration data, according to ISO 14025:2006.	EPD process certification (Internal) ☐ EPD verification (External) ☑
Third-party verifier: Approved by:	Rubén Carnerero Acosta r.carnerero@ik-ingenieria.com The International EPD® System
Procedure for follow-up of data during EPD validity involves third-party verifier:	Yes ☐ No ☑

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