

Environmental Product Declaration

In accordance with the standards UNE-EN ISO 14025:2010, UNE-EN 15804: EN 15804:2012 + A2:2019 and PCR 2019:14 Construction products version 1.11

GALVANIZED STEEL

MAGHREB STEEL

Program:	The International EPD [®] System, www.environdec.com
Program operator:	EPD International AB
EPD registration number:	S-P-09924
Added date:	2023-07-28
Valid until:	2028-07-27



1 Programme information

Program:	The International EPD® System
Address	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website	www.environdec.com
Email:	info@environdec.com
Product category rules (PCR):	PCR 2019:14 Construction products version 1.11 (EN 15804+A2)
<p>The PCR review was performed by: The Technical Committee of the International EPD® System. Members of the Committee were requested on www.environdec.com (Members of the Committee were requested to state any potential conflict of interest with the PCR moderator or PCR committee and if so were excused from the review)</p> <p>Chair: Claudia A.Peña Contact via info@environdec.com</p>	
<p>Independent third-party verification of the DAP and data, according to ISO 14025:2006:</p> <p><input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification</p>	
<p>Third Party Verifier: Verifier accredited by the International EPD® System.</p> <p>Marcel Gómez Ferrer.</p> <p>Marcel Gómez Consultoría Ambiental (www.marcelgomez.com)</p> <p>Tlf: 0034 630 64 35 93</p> <p>Email: info@marcelgomez.com</p> <p>Approved by: The International EPD® System</p>	
<p>The procedure for tracking data during the validity of the EPD involves a third-party verifier:</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	
<p>Manufacturer information:</p> <p>Owner of the EPD: MAGHREB STEEL</p> <p>Address: Route N°9, km 10, Ahl Loughlam, Casablanca, Maroc</p> <p>Contact: maghrebsteel@maghrebsteel.ma</p> <p>Website: www.maghrebsteel.ma</p>	
<p>Development of the EPD: SGS TECNOS S.A.U</p>	



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2 MAGHREB STEEL

Founded in Morocco in 1975, Maghreb Steel has continued to develop and expand, diversifying its activities and steadily increasing its production capacity. In 2000, the company set up a cold-rolling mill. Four years later, the company doubled its capacity to meet the needs of the local and export markets for cold-rolled, galvanized and prepainted products, reaching a total capacity of 600,000 tons.

In 2010, Maghreb Steel built its new steel making production facility, including a electrical arc furnace with a capacity of 1,000,000 tons, and 2 hot-rolling steel mills: a 1,000,000 tons steel **coils mill** and a 500,000-ton **heavy plate hot-rolling mill**.

Maghreb Steel, Morocco's sole flat steel producer, has become a key player in the Moroccan steel industry. Driven by the desire to produce durable and high-quality steel. Maghreb Steel is the leading supplier of steel to major industries such as construction, automotive, energy and infrastructure.

Sustainability Strategy

The climate change is one of the major challenges facing mankind in the 21st century. Maghreb steel policies are aligned with reducing CO₂ emissions through scrap recycling using electric arc furnace technology and the use of renewable energy. The company plans to increase the use of green electricity to cover over 98% of its needs by 2024 and aims to reduce energy consumption through continuous process improvement.

Although steel is infinitely recyclable, Maghreb Steel remains attentive to technological and economic developments, such as hydrogen-based technologies, in order to remain among the world leaders in carbon-free steel production.

Management systems

Maghreb Steel is certified ISO 14001, ISO 45001 and ISO 9001.

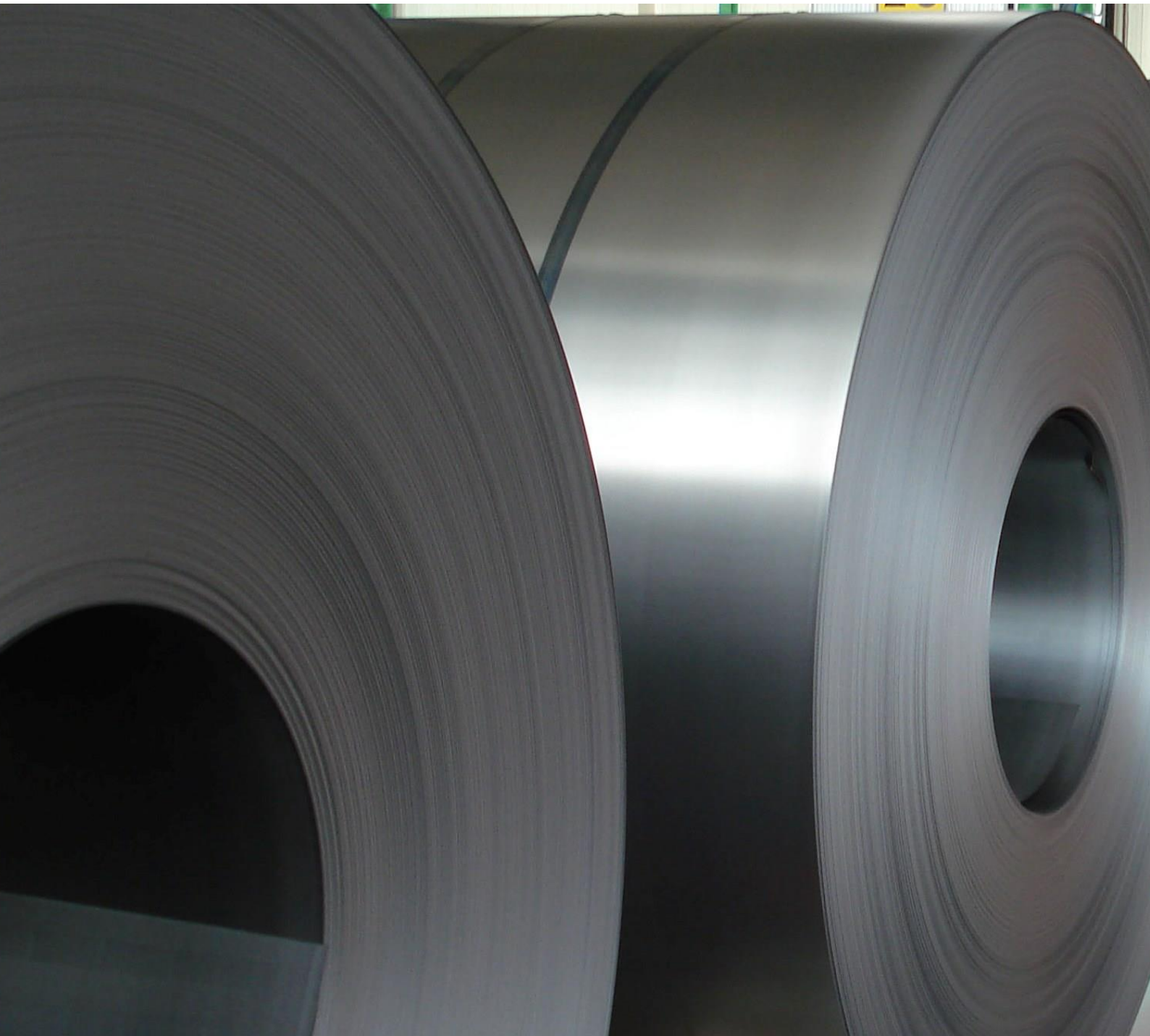
Manufacturer

MAGHREB STEEL

Route N°9, km 10, Ahl Loughlam, Casablanca, Maroc

Product categorie rules (PCR): PCR 2019:14 Construction products version 1.11 (EN 15804+A2)

More information www.maghrebsteel.ma



3 Product description

Name of the product or product family

This EPD describes the product of **one ton of galvanized steel** manufactured at Tit Mellil site of MAGHREB STEEL located in Casablanca (Morocco).

Description of the product and its use:

Maghreb Steel's steel is produced from scrap in an electric arc furnace (EAF), while additional alloying elements are added according to the steel grade to give the required steel characteristics.

The steel slabs produced by the steel mill are then hot-rolled in the hot-rolling mill, where they are preheated according to specific parameters, descaled and then rolled.

The hot-rolled steel is then pickled to remove the rust layer, cold-rolled and transferred to the continuous galvanizing line, while a zinc coating is applied for excellent corrosion resistance.

The zinc metal coating process is available in a very wide range of steel grades, and enables zinc thicknesses of up to 450 g/m² (total) to be deposited on both sides.

The product in question is classified in UN CPC as 412.

3.1 Applicability

Hot-dip galvanized steels have a wide range of applications, both indoors and out, the most common of which are: structural sections and components, household appliances, electrical cabinets, air conditioners, road equipment, etc.

3.2 Specifications

Steel consists mainly of iron, with small quantities of alloying elements (mainly carbon, manganese, copper, chromium, nickel, phosphorus, silicon and) accounting for up to 5% of its composition. These alloying elements influence the steel's chemical and physical properties, such as hardness, durability, and corrosion resistance. Carbon content depends on the type of steel and its grades.

Table 1: Characteristics of product

PARAMETERS	SPECIFICATIONS
Thickness	0.20mm - 3mm
Width	600mm -1500mm
Zinc	80 g/m ² -275 g/m ² (1.5 oz)
Grades	EN 10346 EN 10143

3.3 Description of system components

Table 2: Product content

Product content	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Hot rolled steel coil	>980	94.5%	0%
Zinc	<20	0%	0%
Total	1000		
Packaging material	Weight, kg	Weight-% (versus the product)	
Metal Strapping	0.5	<0.05%	
Kraft Paper	0.2	<0.02%	
Plastic	0.2	<0.02%	
TOTAL	0.9	<0,09%	

Table 3: Amount of biogenic carbon in the product.

Content per declared unit		
Content of biogenic carbon	Unit	Amount
Biogenic carbon in the product	kg C	0
Biogenic carbon in the packaging	kg C	6,31E-01

During the life cycle of the product, no hazardous substances included in the "Candidate List for Authorisation (SVHC)" have been used in a percentage greater than 0.1% of the weight of the product. All quantities specified in the steel component description table together, unifying all stages of the life cycle.



4 LCA information

4.1 Declared Unit

The declared unit is **1 ton (1000 kg) of galvanized steel** at the gate of the Maghreb steel factory located in Tit Mellil.

NAME	VALUE	UNIT
Declared Unit	1	ton

4.2 Reference Service life

Sheets and coils are used in the main structure of the project, so the reference service life will be equal to the useful life of the project being, from: 50 years for buildings and infrastructures.

- 50 years for buildings and infrastructures.

4.3 Representativity

The specific data referring to the year 2021 have been used for the calculation of the LCA which is consider a representative year.

4.4 Geographical scope

Global.

4.5 Database and LCA: software used

Ecoinvent 3.8 (allocation, cut-off by classification)) with Simapro 9.3.0.2 database used for LCS calculations. The LCA methods used are in accordance with the Standard UNE-EN ISO 14025:2010.

4.6 System limits

This environmental product declaration is from “**Cradle to gate with module C1-C4 and module D**”

4.7 Data quality

The data collected regarding components and energy corresponds to the year 2021 and includes data on raw materials consumed and energy consumption. The plausibility and consistency of the data collected has been verified. Good data quality can therefore be considered. In the calculation of the LCA of the system, flows related to the construction of production plants, application machines and the staff transportation.

4.8 Cutt-off rules

According to EN 15804 a minimum of 95% of total inflows (mass and energy) per module are included and more than 99% of the inflows are accounted for. The following processes have been excluded:

- Manufacture of equipment used in the production, buildings or any other capital goods.
- Transportation of staff to the plant.
- Transportation of staff to other work centers.
- Transportation of staff within the plant.
- Research and development activities including production and manufacture of laboratory equipment.
- Long term emissions.

4.9 Allocation

Wherever possible, assignments have been avoided. For cases where this has not been possible, a mass-based physical allocation is made. The data referring to the composition of the system have been obtained directly and

have been analyzed following the principles of *modularity and polluter pays*.

4.10 Other information

This LCA has been carried out by **SGS TECNOS S.A.U & SGS Maroc S.A.**

4.11 Lifecycle and compliance

This EPD includes the steps shown in Figure 1. This statement is from Cradle to gate with module C1-C4 and module D.

This statement may not be comparable with those developed in other programmes or according to different reference documents; in particular it may not be comparable with Declarations not prepared in accordance with the UNE-EN ISO 14025:2010 Standard. Similarly, environmental claims may not be comparable if the source of the data is different, the same information modules are not included or are not based on the same data scenarios.

Figure 1: System limits.

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transportation	Manufacturing	Transportation	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transportation	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	MA	MA	MA	ND	ND	ND	ND	ND	ND	ND	ND	ND	GLO	GLO	GLO	GLO	GLO
Specific data used	>90% GWP-GHG					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	1 product to analyze					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	1 production center					-	-	-	-	-	-	-	-	-	-	-	-

MA: Morocco, MND: Non declared module;GLO:Global



5 Life cycle stages

Product Stage A1 - A3

A1- Extraction and production of raw materials.

The main component of the product is what is known as scrap. This material is supplied to Maghreb steel. This material is manufactured with a recycled steel (post-consumer scrap). This component is not classified as dangerous in the REACH regulation 1907/2006. The scrap used is 100% recycled steel.

A2- Transport of raw materials

All raw and secondary materials are transported by road in trucks with an average load of 16-32 with EURO 6 standard and freight.

A3- Manufacturing

Manufacture of primary and secondary packaging

Packaging elements have been included at this stage. Waste produced by the packaging of raw materials it is considered not relevant.

Manufacture of galvanized steel

The manufacture of galvanized steel begins in steel mill where scrap steel and other raw materials are melted in electric arc furnace. This process results in a liquid steel that undergoes a refining process for the adjustment of its chemical composition in a ladle furnace. The liquid steel is then molded into slabs using continuous casting mill.

Afterwards, the steel slabs produced are galvanized mills, where they are preheated according to specific parameters.

To get the galvanized steel, the hot-rolled coils undergo the processes of pickling, cold-rolling then galvanization.

In addition, the production process requires, water and gas.

Electricity mix

MAGHREB STEEL has two types of electricity suppliers:

- COUNTRY MIX (Morocco)
- SUPPLIER OF RENEWABLE ENERGY

In 2021, renewable energy in MAGHREB STEEL's electricity mix is 41%.

Figure 2: Galvanizing process.



Construction process stage A4 - A5

The construction process stage is subdivided into modules A4 transport to the site and A5 installation.

A4 Transport to the construction site

This module covers the transport of system components from the production site to the application site, including the possibility of intermediate storage. This stage is out of scope of this declaration.

A5 Installation

This module covers the application of the product on site. As the applications of the product depend on the type of use and manufacture of the components and this is not under the control of the MAGHREB STEEL company, this module has not been included in the life cycle. This stage is out of scope of this declaration. Waste treatments of packaging materials have a contribution lesser than a 1% over the life cycle environmental impacts

Stage of Use (excluding possible savings) B1 - B7

This stage refers to the operation of the building including any emission to the environment caused by the use of the product (module B1) or by subsequent technical operations: maintenance (B2), repair (B3),

replacement (B4) or rehabilitation (B5). These stages are not considered.

End of life stage, C1 - C4

This phase consists of the modules related to the end of useful life, C1 to C4, detailed below:

- C1 Deconstruction, demolition: As the demolition and/or disassembly of the product is an integral part of the project where the product is installed, it is not taken into account as it is outside the scope of the organization.
- C2 Transport: Includes the transfer of construction waste from the construction site to the waste treatment plant.
- C3 Waste treatment: Includes the reuse, recovery and/or recycling of waste. The recycling of product is taken into account on module D. The pre-processing of sorting of steel at recycling is taken into account.
- C4 Waste disposal: It is assumed that 5% of the waste is taken to a controlled landfill.

Table 4: End of life assumptions

PARAMETER	VALUE (expressed by declared unit)
Collection process (mixed with the rest of the RCDs)	1 ton of galvanized steel
Recovery system	95%
Disposal (in landfill)	5% of galvanized steel
Transport assumptions for scenario development	Medium load truck 16-32 t (euro 6)
Distance to recovery center	50km

Packaging

Table 5: Amount of packaging per declared unit

	GALVANIZED STEEL
Papier Kraft (m ³ /tn packed)	0,17
Plastic (kg/tn packed)	0,18
Strapping (kg/tn packed)	0,54

Recycled material content

Steel is a completely recyclable material. Due to the high value of steel scrap, it makes it worthwhile for separate collection and sorting, which is therefore the main reason for its high recycling rates. The high end-of-life recycling rate indicates that steel is recycled efficiently.

As indicated, the main component of steel is recycled steel or scrap which is composed of 94,5% of recycled steel.

Reuse/recovery/recycling potential, D

Steel is a recyclable material, module D reports the environmental aspects of recycled scrap generated at the end of life minus that used at the production stage.

6 Environmental information

The LCA results are detailed in the tables on the following pages together with interpretation of global impacts produced per declared unit (one tonne of galvanized steel).

The estimated impact results are only relative statements that do not indicate impact category endpoints, exceedance of threshold values, safety margins or risks.

Simapro 9.3.0.2 software was used to perform the LCA, together with the Ecoinvent 3.8 database.

The following impact models have been used:

- CML-IA baseline V3.07/ EU25.
- ReCiPe 2016 Midpoint (H) V1.06 / World (2010) H.
- EDIP 2003 V1.07 / Default.
- Cumulative Energy Demand V1.11
- EF 3.0 Method (adapted) V1.02 / EF 3.0 normalization and weighting set.
- IPCC 2022

ENVIRONMENTAL IMPACT

POTENTIAL ENVIRONMENTAL IMPACTS OF GALVANIZED STEEL							
Parameters		Product Stage	End of life stage				Resource recovery stage
		A1 / A2 / A3	C1	C2	C3	C4	D
GWP	Fossil- kg CO2 Eq	9,06E+02	0,00+00	8,50E+00	2,81E+02	2,63E-01	-2,74E+01
	Biogenic- kg CO2 Eq	4,80E+01	0,00+00	4,60E-03	1,70E+00	2,61E-04	8,77E-01
	Land use and transformation- kg CO2 Eq	1,64E+00	0,00+00	3,56E-03	3,57E-01	2,49E-04	5,20E-02
	TOTAL- kg CO2 Eq	9,58E+02	0,00+00	8,51E+00	2,83E+02	2,64E-01	-2,65E+01
ODP	kg CFC11 eq (NA)	4,11E-05	0,00+00	1,83E-06	1,81E-05	4,98E-08	-2,77E-07
AP	mol H+ eq (NA)	7,02E+00	0,00+00	2,50E-02	1,19E+00	1,07E-07	-1,97E-07
EP-freshwater	KG PO4 Eq	1,35E-01	0,00+00	2,21E-04	1,88E-02	2,48E-03	-4,34E-02
	kg P eq	4,40E-02	0,00+00	7,21E-05	6,12E-03	2,76E-06	7,70E-04
EP-marine	- kg N eq (NA)	1,29E+00	0,00+00	4,98E-03	2,01E-01	8,56E-04	1,85E-02
EP-terrestrial	mol N eq (NA)	1,33E+01	0,00+00	5,56E-02	2,31E+00	9,42E-03	-2,28E-01
POCP	kg NMVOC eq (NA)	3,62E+00	0,00+00	2,08E-02	6,59E-01	2,74E-03	-2,00E-01
ADP - minerals & metals	kg Sb eq (2)	3,69E-02	0,00+00	2,95E-05	1,17E-02	6,01E-07	2,24E-04
ADP -fossil	MJ, net calorific value (2)	1,06E+04	0,00+00	1,26E+02	2,10E+03	7,35E+00	-1,42E+02
WDP	m3 depriv. (2)	1,58E+02	0,00+00	4,40E-01	2,82E+02	3,31E-01	1,87E+01
<p>Disclaimer-(1)- This impact category mainly refers to the eventual impact of low doses of ionizing radiation on the human health of the nuclear fuel cycle. It does not take into account the effects due to possible nuclear accidents, occupational exposure or underground radioactive waste disposal facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.</p> <p>Disclaimer-(2)- The results of this environmental impact indicator should be used with caution, as uncertainties about these results are high or experience with the indicator is limited.</p>							
<p><i>GWP =Global Warming Potential; AP = Acidification potential of soil and water resources; EP-freshwater= Eutrophication potential, Fraction of nutrients that reach fresh water as a final compartment; EP-marine = Eutrophication potential, Fraction of nutrients that reach seawater as a final compartment; EP-terrestrial= Eutrophication potential, Accumulated excess; POCP =Tropospheric Ozone Formation Potential; ADP - minerals &metals = Potential for abiotic resource depletion for non-fossil resources; ADP -fossil= Potential for depletion of abiotic resources for fossil resources; WDP= Water (use) potential weighted and water consumption</i></p>							

POTENTIAL ENVIRONMENTAL IMPACTS OF GALVANIZED STEEL ADDITIONAL AND MANDATORY IMPACTS

Parameters		Product Stage	End of life stage				Resource recovery stage
		A1 / A2 / A3	C1	C2	C3	C4	D
GWP – GHG2	kg CO2 eq	9,28E+02	0,00+00	8,48E+00	2,82E+02	2,61E-01	-2,55E+01

Disclaimer-(1)- This impact category mainly refers to the eventual impact of low doses of ionizing radiation on the human health of the nuclear fuel cycle. It does not take into account the effects due to possible nuclear accidents, occupational exposure or underground radioactive waste disposal facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.

Disclaimer-(2)- The results of this environmental impact indicator should be used with caution, as uncertainties about these results are high or experience with the indicator is limited.

POTENTIAL ENVIRONMENTAL IMPACTS OF GALVANIZED STEEL ADDITIONAL AND VOLUNTARY IMPACTS

Parameters		Product Stage	End of life stage				Resource recovery stage
		A1 / A2 / A3	C1	C2	C3	C4	D
Potential incidence of PM (PM) emission diseases	disease inc. (NA)	3,01E-05	0,00+00	6,75E-07	1,85E-05	4,98E-08	-2,77E-07
Potential human exposure efficiency relative to U235 (IRP)	kBq U-235 eq (1)	2,44E+01	0,00+00	1,83E-06	1,81E-05	1,07E-07	-1,97E-07
Potential comparative toxic unit for humans (HTP-c)	CTUh (2)	2,93E+04	0,00+00	2,50E-02	1,19E+00	2,48E-03	-4,34E-02
Potential comparative toxic unit for humans (HTP-nc)	CTUh (2)	2,28E-06	0,00+00	7,21E-05	6,12E-03	2,76E-06	7,70E-04
Potential comparative toxic unit for ecosystems	CTUe (2)	1,82E-05	0,00+00	4,98E-03	2,01E-01	8,56E-04	1,85E-02
Potential soil quality index (SQP)	Pt (2)	2,77E+03	0,00+00	5,56E-02	2,31E+00	9,42E-03	-2,28E-01

Disclaimer-(1)- This impact category mainly refers to the eventual impact of low doses of ionizing radiation on the human health of the nuclear fuel cycle. It does not take into account the effects due to possible nuclear accidents, occupational exposure or underground radioactive waste disposal facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.

Disclaimer-(2)- The results of this environmental impact indicator should be used with caution, as uncertainties about these results are high or experience with the indicator is limited.

GALVANIZED STEEL RESOURCE USAGE

Parameters		Product Stage	End of life stage				Resource recovery stage
		A1 / A2 / A3	C1	C2	C3	C4	D
Primary energy resources - Renewables	Used as an energy source MJ, net calorific value	3,65E+03	0,00+00	1,47E+00	2,33E+02	6,27E-02	3,13E+01
	Used as raw material MJ, net calorific value	0,00E+00	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	TOTAL MJ, net calorific value	4,60E+03	0,00+00	1,47E+00	2,33E+02	2,95E-01	-2,28E+00
Primary energy resources - Non-renewable	Used as an energy source MJ, net calorific value	1,13E+04	0,00+00	1,33E+02	2,25E+03	7,81E+00	-1,45E+02
	Used as raw material - MJ, net calorific value	0,00E+00	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	TOTAL MJ, net calorific value	1,13E+04	0,00+00	1,33E+02	2,25E+03	0,00E+00	0,00E+00
Secondary materials	kg	9,50E+02	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Renewable secondary fuels	MJ, net calorific value	0,00E+00	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-renewable secondary fuels	MJ, net calorific value	0,00E+00	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net freshwater use	m3	6,03E+00	0,00+00	1,46E-02	1,18E+00	7,88E-03	7,05E-01

CATEGORY OF GALVANIZED STEEL WASTE

Parameters		Product Stage	End of life stage				Resource recovery stage
		A1 / A2 / A3	C1	C2	C3	C4	D
Hazardous waste disposed of	kg	2,19E-01	0,00+00	3,32E-04	6,27E+00	1,11E-05	-5,83E-03
Non-hazardous waste disposed of	kg	3,65E+02	0,00+00	6,50E+00	1,72E+02	5,00E+01	1,29E+01
Radioactive waste disposed of	kg	2,46E-02	0,00+00	8,20E-04	9,87E-03	4,82E-05	9,64E-04

OTHER OF GALVANIZED STEEL OUTPUT FLOWS

Parameters		Product Stage	End of life stage				Resource recovery stage
		A1 / A2 / A3	C1	D	C3	C4	D
Components for reuse	kg	0,00E+00	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	0,00E+00	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery (energy recovery)	kg	0,00E+00	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Energy exported, electricity	MJ	0,00E+00	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

7 Other information

Information related to Sector EPD

This is an individual EPD

Differences versus previous versions

This is the first version of the EPD

8 References

1. General Programme Instructions of the International EPD® System. Version 3.01.
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