TOSYALI ALGERIE Fer et Acier

Environmental Product Declaration

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

High Scrap Content Wire Rod

DRI - EAF Routed Steel

from

Tosyalı Algeria

Programme	The International EPD® System
Programme operator	EPD International, EPD MENA
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at: **www.environdec.com**

Programme Information

Programme Information

Programme
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LCA Study & EPD Design Conducted by
Semtrio Sustainability Consulting
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Information about verification and reference PCR

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR)
PCR 2019:14 Construction products (EN 15804:2012+A2:2019/AC:2021) Version 1.3.2

PCR review was conducted by
The Technical Committee of the International EPD® System. See www.environdec.com/TC 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.

Independent verification of the declaration and data, according to ISO 14025:2006:

☐ EPD process verification ☑ EPD verification

Third party verifier
Sunil Kumar
SIPL Pvt Ltd, New Delhi, India

Approved by
The International EPD® System Technical Committee, supported by the Secretariat

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

☐ Yes ☑ No

Tosyalı Algeria 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. For further information about comparability, see EN 15804 and ISO 14025.

Company Information

TOSYALI ALGERIE Fer et Acier

Owner of the EPD

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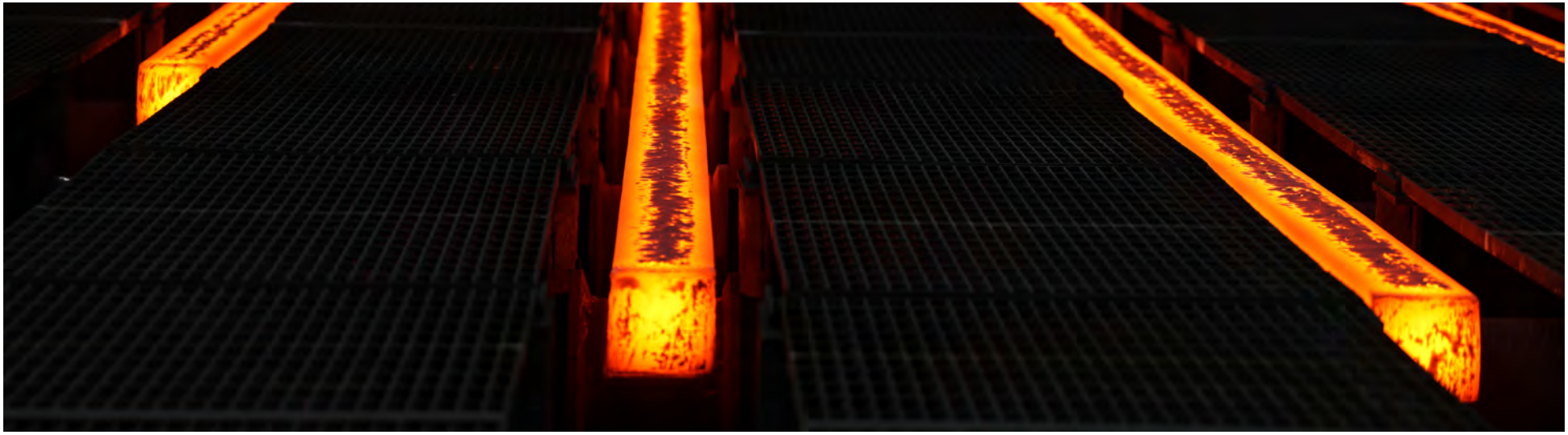
Tosyalı Algerie Fer at Acier is an integrated iron and steel facility located in Algeria. Tosyalı Algeria complex was established in 2007 and boasts cutting-edge facilities like rolling mills, wire rod production units, beneficiation and pelletization plants, DRI plant and steel melting shop and rolling mills enabling the complete manufacturing process from iron ore to finished products. With a focus on quality, efficiency, and technological advancement, Tosyali Algeria stands out as a cornerstone of the Algerian steel industry, playing a vital role in the nation's industrial development and economic progress.

TOSYALI Algerie started to produce steel products by the second half of 2013, meeting Algeria's rapidly increasing construction needs and making a significant contribution to reducing imports to the country. Nowadays, TOSYALI Algerie stands as the largest integrated facility on the continent, providing direct employment opportunities for nearly 6000 individuals. The facility produces a wide array of steel products including DRI, pellets, billets/blooms, reinforced bars, reinforcing steel bar in coils, wire rods, and spiral pipes catering to sectors such as construction, hydrocarbon transportation, automobile manufacturing, and shipbuilding.

Moreover, TOSYALI Algeria is among the facilities producing green and environmentally friendly steel in the world, thanks to its (DRI) technology. TOSYALI Algerie, which has the world's largest DRI production facilities with an annual capacity of 2.5 million tons and the world's largest arc furnace working with DRI, will be the company with the world's largest twin DRI facility with a total capacity of 5 million tons when the new DRI investment is completed.

Product Information



Product Name:

High Scrap Content Wire Rod

The production process commences with the treatment of iron ores to produce iron ore pellets, which serve as the raw material for producing Direct Reduced Iron (DRI). Following this, the DRI undergoes melting in the Electric Arc Furnace (EAF) to form liquid metal, which is subsequently refined in the ladle furnace to eliminate impurities and chemical composition.

Additionally, specific alloy additions are incorporated to impart specific properties to the steel. Liquid steel is then cast into steel billets, which are later transported to the rolling mill where they undergo shaping and rolling to achieve the necessary dimensions for the final wire rod.

Wire rods serve as raw materials for manufacturing various wire products such as nails, screws, fencing, mesh, cables, and wires for electrical applications. They are cold drawn into different diameters and shapes to meet specific requirements.

The products then are packed with steel wires to bind the products. Wire Rod products including the steel ties do not include any biogenic materials.

Intended Use of Product

Wire Rod are vital components in construction and industrial sectors, providing strength, support, and flexibility. They are extensively used in various applications, **including construction mesh, automotive industry, agricultural sector, wire rope production and household and consumer goods.**

Product Information

Technical Specifications

Product	Standards	Description
High Scrap Content Rebar	ASTM A 510/A510M	General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel
	SAE J403	Chemical Composition of SAE Carbon Steels
	BS 4482:2005	Steel wire for the reinforcement of concrete products. Specification

UN CPC Code: 4124 - Bars and rods, hot-rolled, of iron or steel.

Content Declaration

Content Declaration of 1000kg of High Scrap Content Wire Rod					
Product	**Steel Scrap, %**	**DRI, %**	**Additives, %**	**Renewable material weight, %**	**Biogenic carbon weight, %**
High Scrap Content Wire Rod	60-70	20-30	10-20	0	0

Product Information

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LCA Information

Declared unit

1 tonne (1000kg) of High Scrap Content Wire Rod manufactured in Algeria facility (DZ).

Reference service life

Not applicable

Time representativeness

The production data in this LCA study represents the period of 1st January 2023 and 31st December 2023.

Database(s) and LCA software used

SimaPro v9.5.0.2 and ecoinvent 3.9.1

Description of system boundaries

Cradle to gate (A1-3) with options, modules C1-C4, module D

Data quality and data collection

Data collection for this LCA study has been carried out in accordance with data requirement stated in ISO 14040-44, ISO 14025, ISO 14020, and the requirements given in the General Program Instructions v3.01; PCR Construction products 2019:14, version 1.3.2 by The International EPD® System and EN 15804:2012+A2:2019.

There are two different data classifications has been used as primary (specific) and secondary (selected generic) data. All primary data has been collected from the manufacturing plant. For secondary data Ecoinvent v3.9.1 database has been used. Upstream data, raw materials production, transportation, fossil fuels and electricity mix data have been obtained from Ecoinvent v3.9.1 as secondary data. All manufacturing data in core processes has been gathered from the manufacturing plant. The manufacturing data are collected based on a mass balance. The high scrap content wire rod data in this LCA study represents the period of 1st January 2023 and 31th December 2023.

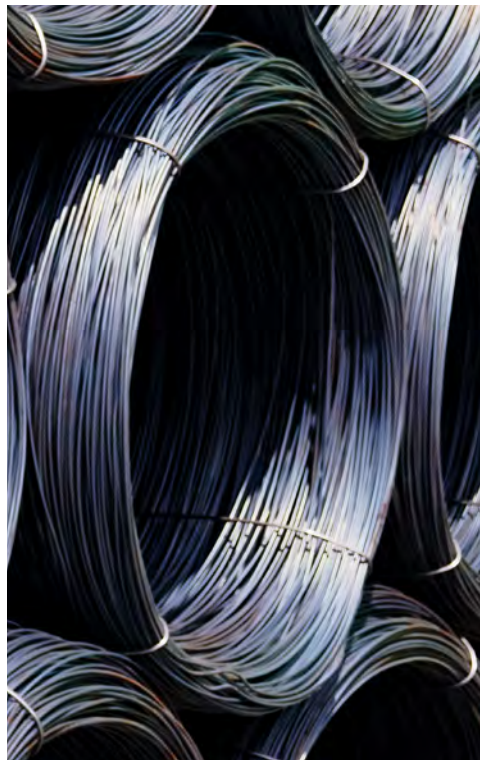
Mileage and tonnage figures for transport data to the core processes were provided by Tosyalı's other plant procurement department specifically per origin of departures, however roadway and seaway upstream data per ton per kilometres were taken from Ecoinvent v3.9.1.

Allocation

The total values for raw material, energy consumption and water consumption over a one-year period have been divided by the annual output of each product to provide a value per kg of high scrap content wire rod.

Cut-off rules

Life Cycle Inventory data for a minimum of 99 % of total inflows to the three life cycle stages have been included and a cut-off rule of 1% regarding energy, mass, and environmental relevance was applied.



Product Information

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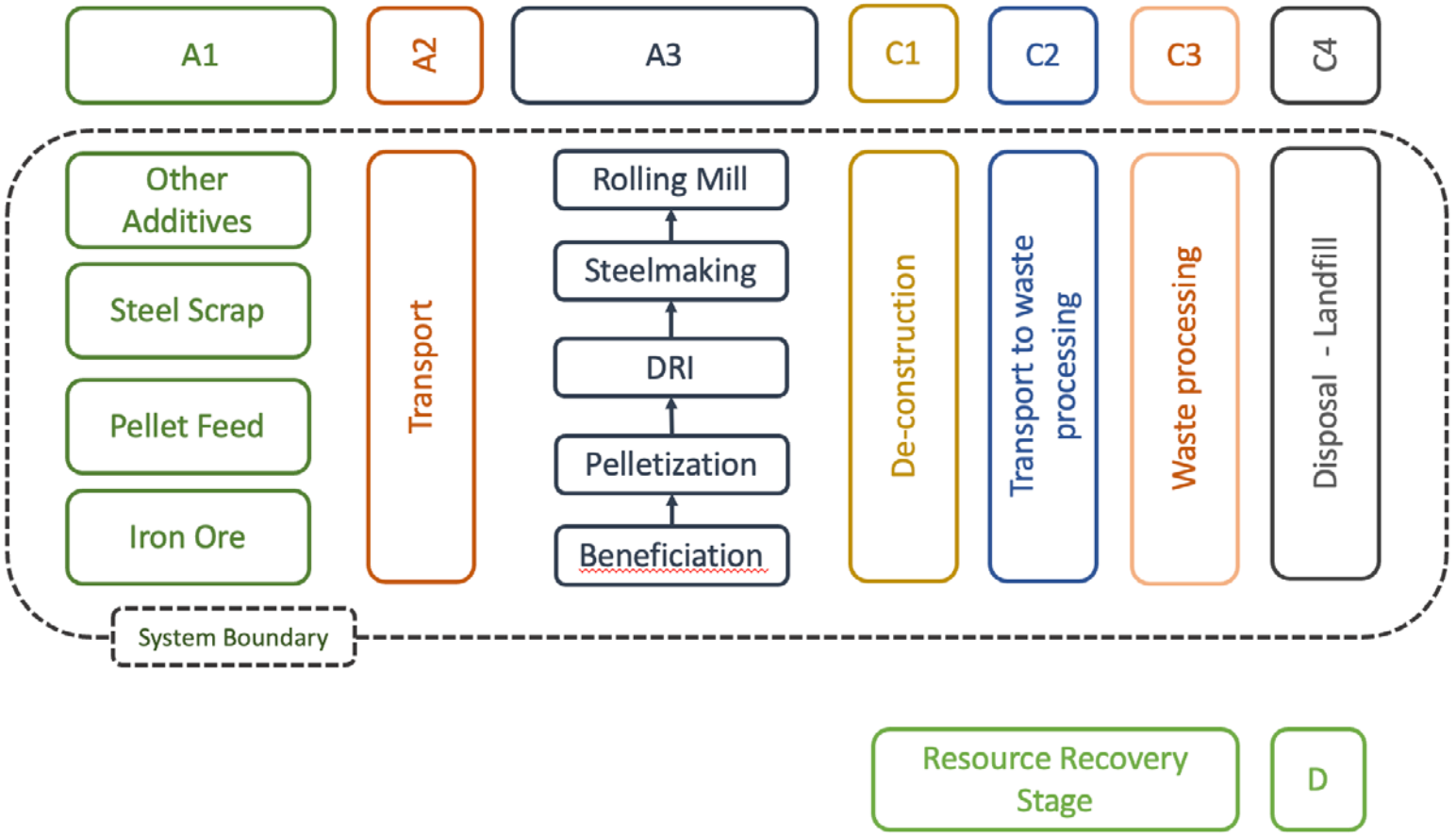
Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product Stage			Construction Process Stage		Use Stage							End Of Life Stage				Resource Recovery Stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintanence	Repair	Replacement	Refurbishment	Operaitional energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	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	GLO	GLO	DZ	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	>99.5%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-sites	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X: Declared; ND: Not Declared

Product Information

System Diagram



Product Information

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Description of declared modules

A1 - Raw Material Supply

This module takes into account raw material extraction, processing and energy used in the production process.

A2 - Transport to the Manufacturer

This module includes transportation of the raw materials from supplier to factory gate. Transportation types are considered as roadway and seaway.

A3 - Manufacturing

This stage includes energy and water consumption during the manufacturing process. Additionally, packaging materials are covered in this module. The processing of any waste arising from this stage is also included.

C1 - De-construction

In this module, the energy required for de-construction and demolition of the steel structure is assumed to be approximately 0.239 MJ/kg at the end of their life cycle.

C2 - Transport to Waste Processing

An average distance of 100 km has been assumed for the transport to sorting facility. Transport is calculated on the basis of a scenario with the parameters described in the attached table.

C3 - Waste processing for reuse, recovery and/or recycling

During the pre-recycling process of recycling materials, they are separated so that they can then be effectively recycled. As a result of this processing stage, there are negligible impacts.

Parameters C2 Module	
Transport by road*	Lorry >32 metric ton
Distance (km)	100
Database	Ecoinvent v3.9.1

**Technology is Euro 5*

C4 - Final disposal

100% of end-of-life products will be collected and recycled into the production system. Wire Rod products are recycled. A total of 95% of end-of-life products are recycled and reused in construction projects or construction material production processes. 5% of the products are sent to the landfill.

D - Reuse, Recovery or Recycling Potential

Wire Rod inputs to the production stage are subtracted from the construction to be recycled at end-of-life in order to obtain the Wire Rod from the product system. This remaining net Wire Rod is then sent to recycling. Module D reports the environmental aspects of recycled scrap generated at the end of life minus that used at the production stage.

Information on which life cycle stages are not considered

This EPD only cover the Cradle to Gate with options A1-3 and C1-4 and D stages because other stages are very dependent on particular scenarios and are better developed for specific building or construction works.

Environmental Performance

TOSYALI ALGERIE Fer et Acier

Potential Environmental Impact

Mandatory Indicators According to EN 15804: 2012+A2:2019/AC:2021

Results for 1000 kg of High Scrap Content Wire Rod							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	1,04E+03	23,8	10,2	0	0,31	-318
GWP-biogenic	kg CO_2 eq.	6,87E-01	9,03E-03	0,01	0	6,51E-04	-1,01
GWP-luluc	kg CO_2 eq.	2,03E-01	2,68E-03	5,25E-03	0	1,86E-04	-0,30
GWP-total	kg CO_2 eq.	1,04E+03	23,8	10,2	0	0,31	-319
ODP	kg CFC 11 eq.	1,74E-05	3,77E-07	1,72E-07	0	8,79E-09	-3,23E-06
AP	mol H+ eq.	2,28E+00	0,22	0,03	0	2,29E-03	-1,45
EP-freshwater	kg P eq.	7,44E-03	8,56E-05	9,82E-05	0	2,96E-06	-0,04
EP-Marine	kg N eq.	5,78E-01	0,10	7,16E-03	0	8,74E-04	-0,34
EP-Terrestrial	kg N eq.	6,41E+00	1,11	0,08	0	9,42E-03	-3,12
POCP	kg NMVOC eq.	3,13E+00	3,28E-01	0,04	0	3,28E-03	-1,23
ADP-minerals &metals*	kg Sb eq.	1,30E-03	8,28E-06	2,85E-05	0	4,22E-07	-1,04E-03
ADP-fossil*	MJ	1,58E+04	311	153	0	7,57	-3,42E+03
WDP	m^3	49.9	0.69	0.79	0	0.33	220

Acronyms

GWP-fossil = Global Warming Potential fossil fuels;
GWP-biogenic = Global Warming Potential biogenic;
GWP-luluc = Global Warming Potential land use and land use change;
ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, Accumulated Exceedance;
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment;
EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, Accumulated Exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-minerals&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Abiotic depletion for fossil resources potential;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption

** 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.*

Environmental Performance

TOSYALI ALGERIE Fer et Acier

Potential Environmental Impact

Additional Mandatory and Voluntary Indicators

Results according to PCR2019:14 for 1000 kg of High Scrap Content Wire Rod							
Indicator	**Unit**	**A1:A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq	1,04E+03	23,8	10,2	0	0,31	-319
Results according to EN 15804:2012+A2 for 1000 kg High Scrap Content Wire Rod							
PM	[disease inc.]	3,09E-05	6,06E-06	7,59E-07	0	4,87E-08	-2,99E-05
IRP	[kBq U235 eq]	3,14	6,35E-02	0,06	0	2,00E-03	-5,59
ETP-fw	[CTUe]	2,56E+03	158	88,7	0	3,71	-1,40E+04
HT-C	[CTUh]	6,46E-06	7,26E-09	4,51E-09	0	1,29E-10	-5,00E-06
HT-nc	[CTUh]	5,76E-06	1,63E-07	1,45E-07	0	3,74E-09	-4,00E-05
SQP	[pt]	2,07E+03	20,7	155	0	15,0	-938

Acronyms

GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology;
PM = Potential incidence of disease due to PM emissions;
IRP = Potential Human exposure efficiency relative to U235;
ETP-fw = Potential Comparative Toxic Unit for ecosystems;
HT-C = Potential Comparative Toxic Unit for humans;
HT-nc = Potential Comparative Toxic Unit for humans;
SQP = Potential soil quality index (SQP)

1 The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

*Disclaimer: 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. The use of the results of modules A1-A3 without considering results of module C is not encouraged.

Environmental Performance

TOSYALI ALGERIE Fer et Acier

Resource use indicators

Results for 1000 kg of High Scrap Content Wire Rod							
Indicator	**Unit**	**A1:A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	279	1,77	1,94	0	0,06	-240
PERM	MJ	0	0	0	0	0	0
PERT	MJ	279	1,77	1,94	0	0,06	-240
PENRE	MJ	1,73E+04	330	163	0	8,05	-3,63E+03
PENRM	MJ	0	0	0	0	0	0
PENRT	MJ	1,73E+04	330	163	0	8,05	-3,63E+03
SM	kg	765	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m^3	52,7	0	0	0	0,01	-22,2

Acronyms

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy re-sources;
SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Use of net fresh water

Environmental Performance

TOSYALI ALGERIE Fer et Acier

Waste indicators

Results for 1000 kg of High Scrap Content Wire Rod							
Indicator	**Unit**	**A1:A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0	0	0	0	0	0
Non-hazardous waste disposed	kg	51.2	0	0	0	50,0	0
Radioactive waste disposed	kg	0	0	0	0	0	0

Output flow indicators

Results for 1000 kg of High Scrap Content Wire Rod							
Indicator	**Unit**	**A1:A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0	0	0	0	0	0
Materials for recycling	kg	0	0	0	0	0	950
Materials for energy recycling	kg	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0
Radioactive waste disposed	MJ	0	0	0	0	0	0

Carbon Emission Factor of Electricity

Electricity	Data source	Amount	Unit
Electricity grid mix, DZ	Ecoinvent	0.69	kg CO_2 eq./kWh

References

ISO 14040
2006 Environmental management
Life cycle assessment
Principles and framework

ISO 14044
2006 Environmental management
Life cycle assessment
Requirements and guidelines

ISO 14025
2006 Environmental labels and declarations
Type III environmental declarations
Principles and procedures

EN 15804:2012+A2:2019/AC:2021
Sustainability of construction works
Environmental product declarations
Core rules for the product category of construction products

The International EPD® System
www.environdec.com

The International EPD® System
The General Programme Instructions v3.01

EN 15804 reference package based on EF 3.1
eplca.jrc.ec.europa.eu

The International EPD® System
PCR 2019:14 Construction products v1.3.2 (EN 15804:A2)

Ecoinvent 3.9.1
www.ecoinvent.org

SimaPro LCA Software
www.simapro.com

Tosyali Algeria
www.tosyali-algerie.com

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