

Environmental Product Declaration



For **hot rolled steel in bars**
produced by
Industrie Riunite Odolesi
I.R.O. S.P.A.



DECLARATION N°:
IRO-01

DATE OF ISSUE:
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BASED ON:
PCR ICMQ-001/15, REV. 3
15804:2012+A2:2019

DATE OF UPDATE:
09/01/2024

REGISTRATION N°:
EPDITALY0498

VALID UNTIL:
05/12/2028

CPC CODE:
41

General Information

REFERENCES AND CONTACTS

EPD OWNER: Industrie Riunite Odolesi I.R.O. S.p.A., via Brescia 12, 25076, Odolo (BS) – ITALY; manufacturing plant is located in the same site

PROGRAM OPERATOR: EPDItaly, Via Gaetano De Castilia 10, 20124 Milano - ITALY - www.epditaly.it;

GENERAL INFORMATION

This declaration has been developed referring to the EPDItaly, following the "Regolamento di EPD Italy" V5.2; further information and the document itself are available at: www.epditaly.it.

EPD document valid within the following geographical area: Italy and other countries according to sales market conditions.

CEN standard EN 15804 served as the core PCR
(PCR ICMQ-001/15 Construction products, REV.3, 2019-12-02)

PCR review was conducted by ICMQ S.p.A, contact via info@epditaly.it.

Independent verification of the EPD and its data,
in accordance with EN ISO 14025:2010

EPD proces certification (Internal)

EPD verification (External)

Third party verification performed by ICMQ SpA, via De Castilia, 10 20124 Milano (www.icmq.it).

Accredited by: Accredia

Environmental declarations published within the same product category, though originating from different programs, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804. EPD owner has the sole ownership, liability and responsibility of the EPD.

CONTACTS

Environmental Manager: Paolo Tonolini

Phone: +39 0365826089

Fax : +39 0365860564

E-mail: sicurezzaambiente@iro-spa.it



Technical support to IRO (Industrie Riunite Odolesi) S.p.A. was provided by Life Cycle Engineering, Italy (info@studiolce.it, www.lceengineering.eu)



The Company

The company Industrie Riunite Odolesi I.R.O. S.p.A. (in the following **IRO**) is located in Odolo (BS), in via Brescia 12. Since **1951**, IRO has been producing **steel billets** in electric arc furnace route (EAF) and hot-rolled reinforcing steel for concrete, coming from post and pre-consumer steel scraps.

The production is divided in two areas in which steel is produced in continuous cycle through melting, casting and hot-rolling.



IRO
SINCE 1951

Odolo (BS)
Via Brescia 12, Odolo (BS),
Lombardia, Italy

The Product

Steel bars are produced using steel scrap in a mill that uses electric-arc furnace technology, followed by casting of steel billets (squared diameter 115-120-130-140 and 160 mm and up to 12 m long) that feed rolling mill in real time. The plant turns out rebar meeting various national and international specifications.

The rolling mill plant produces:



Hot-rolled reinforcing steel for concrete*, diameter 8-40 mm and up to 18m long, with exceptional features regarding toughness and ductility, particularly suitable for anti-seismic purposes.



Hot rolled product round cross-section bars at steel for use in structural steelworks*, composite metal structures and composite concrete structures, CE marked, diameter 10-40mm, various length up to 18m. Steel grades produced in 2022 are the following: S275JR, S275J0, S275J2, S355JR, S355J0, S355J2, S355K2



Hot-rolled reinforcing steel with continuous thread ribbing*, diameter 12-40 mm and up to 18m long, with exceptional features regarding toughness and ductility, particularly suitable for anti-seismic purposes and geotechnical works.

*Technical datasheets of the products covered by this EPD can be downloaded at the company website: www.iro-spa.it

All IRO production is monitored through continuous plant controls and periodic controls made by ministerial official laboratories and competent bodies.

IRO is committed to ensure the best results in terms of technology, patents and quality certification and it has always boasted excellent management of the relations between human resources and the surrounding environment.

IRO is also committed to research and development for reducing atmospheric emissions and limiting energy consumption, adopting state-of-the-art technologies, quality certifications and system management UNI EN ISO 9001 (certificate number IGQ 9114, 1991/10/18) and UNI EN ISO 14001 (certificate number IGQ A2F11, 2005/12/15), certified by IGQ – Istituto italiano di Garanzia della Qualità.

Detailed Product Description

INFORMATION	DESCRIPTION
Product identification	Hot rolled steel in bars
Product features	Bars: Diameter from Ø 8 mm to Ø40 mm Length from 6 to 18 m
Product properties - ribbed bars and continuous thread bars	Steel coming from post and pre-consumer steel scraps produced in electric arc furnace route (EAF) and further hot rolling process. Asherence and surface geometry fR or fP : - for 8 < Ø ≤ 12 mm fR or fP ≥ 0.040 - for Ø > 12 mm fR or fP ≥ 0.056 Weldbility: Ceq < 0,52 Typical yield stress Cv: 400 ≤ Re and/or Rp0.2 ≤ 600 MPa Elongation Agt: ≥ 7,5% Successful in bend and rebend test Successful in strength test and oligocyclic strength test
Product properties - round cross section bars (under EN10025)	S275JR, S275J0, S275J2, S355JR, S355J0, S355J2, and S355K2 (produced in 2022). Additional steel grades manufactured by the company: S235JR, S235J0, S235J2, S450J0, S355J0W
Plant features	On-site air emission control system On-site dumping water control system On-site system to recycle water used in process In/out materials/products and casting process monitored to prevent nuclear radiation Plant air emissions accounted under ETS (Emission Trading System)

THE PRODUCT DOES NOT CONTAIN SUBSTANCES DANGEROUS TO THE SENSES OF REACH (REGULATION (EC) N. 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF COUNCIL OF 18 DECEMBER 2006 ON REGISTRATION, EVALUATION, AUTHORIZATION AND RESTRICTION OF CHEMICALS)

IN GENERAL, THE MAIN MATERIALS IN THE FINAL PRODUCT ARE:

IRON >97%

ALLOY ELEMENTS (e.g. manganese, silicon, carbon): 2% c.a.

OTHER ELEMENTS (e.g. copper, nickel, chromium): complementary to 100%

Scope and Type Of EPD

THE APPROACH USED IN THIS EPD IS "CRADLE TO GATE WITH OPTIONS" ONE.

TYPE OF EPD: specific for hot rolled steel products

MAIN DATABASE: Ecoinvent v 3.9.1

APPLIED LCA SOFTWARE: Simapro v 9.5.0.1

REPORT LCA: Life Cycle Assessment applied to hot rolled steel in bars for EPD purposes - final report

GEOGRAPHICAL SCOPE OF THE EPD: worldwide according to sales market conditions

TABLE OF MODULES contains the list of modules included or not included in the EPD¹:

MODULE	PRODUCTION STAGE			CONSTRUCTION PROCESS STAGE				USE STAGE					END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	
	Raw material supply	Transport	Manufacturing	Transport to the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De - construction demolition	Transport	Waste processing	Disposal	Reuse - Recovery - Recycling
MODULE DECLARED	✓	✓	✓	✓	MND	MND	MND	MND	MND	MND	MND	MND	✓	✓	✓	✓	✓
GEOGRAPHY	IT	IT	IT	WLD	-	-	-	-	-	-	-	-	WLD	WLD	WLD	WLD	WLD
SPECIFIC DATA USED	> 90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
VARIATIONS-PRODUCTS	NOT RELEVANT			-	-	-	-	-	-	-	-	-	-	-	-	-	-
VARIATIONS-SITES	NOT RELEVANT			-	-	-	-	-	-	-	-	-	-	-	-	-	-

¹ ✓ = module included;

MND = module not declared;

LCA Results

ENVIRONMENTAL IMPACTS PER DECLARED UNIT: 1 TON OF BARS, READY TO BE DELIVERED TO THE FINAL CUSTOMERS.

The detailed environmental performance (in terms of use of resources, pollutant emissions and waste generation) is presented for the three phases, Upstream, Core and Downstream and related sub-phases (A1-A2-A3-A4-C1-C2-C3-C4-D). The numbers reported in the following tables are the outcome of rounding.

UNIT	UPSTREAM	CORE PROCESS				DOWNSTREAM					
	A1	A2	A3	A1:A3	A4	C1	C2	C3	C4	D	
GWP	kg CO ₂ eq	5,12E+02	4,42E+01	3,13E+02	8,69E+02	3,11E+01	5,85E+00	7,57E+00	1,61E-01	2,65E-01	3,66E+01
GWP,f	kg CO ₂ eq	5,10E+02	4,41E+01	3,11E+02	8,66E+02	3,11E+01	5,84E+00	7,57E+00	1,52E-01	2,65E-01	3,66E+01
GWP,b	kg CO ₂ eq	1,33E+00	2,63E-03	1,27E+00	2,60E+00	1,82E-03	3,48E-04	4,51E-04	8,98E-03	5,44E-05	2,84E-03
GWP,luluc	kg CO ₂ eq	6,09E-02	8,72E-04	1,18E-01	1,79E-01	6,15E-04	2,40E-04	1,49E-04	1,09E-04	2,30E-05	3,51E-03
GWP,ghg	kg CO ₂ eq	5,12E+02	4,42E+01	3,13E+02	8,69E+02	3,11E+01	5,85E+00	7,57E+00	1,61E-01	2,65E-01	3,66E+01
ODP	kg CFC-11 eq	1,60E-05	9,61E-07	2,78E-06	1,97E-05	6,63E-07	9,22E-08	1,65E-07	3,55E-09	4,78E-09	6,89E-07
AP	mol H+ eq	1,75E+00	1,63E-01	5,48E-01	2,46E+00	1,27E-01	5,60E-02	2,79E-02	1,03E-03	1,89E-03	1,43E-01
EP,f	kg P eq	9,46E-02	3,03E-04	7,60E-02	1,71E-01	2,10E-04	4,41E-05	5,21E-05	2,95E-05	1,33E-05	1,71E-02
EP,m	kg N eq	3,94E-01	7,01E-02	1,49E-01	6,14E-01	5,05E-02	2,63E-02	1,20E-02	4,26E-04	8,50E-04	3,05E-02
EP,t	mol N eq	4,21E+00	7,50E-01	1,48E+00	6,43E+00	5,41E-01	2,86E-01	1,28E-01	4,61E-03	9,20E-03	3,25E-01
POCP	kg NMVOC eq	1,81E+00	2,50E-01	5,12E-01	2,58E+00	1,79E-01	8,41E-02	4,29E-02	1,29E-03	2,80E-03	1,74E-01
ADPE*	kg Sb eq	7,78E-05	1,53E-06	2,89E-04	3,68E-04	1,05E-06	2,46E-07	2,62E-07	3,86E-08	9,97E-09	3,24E-04
ADPF*	MJ	9,16E+03	5,91E+02	1,76E+03	1,15E+04	4,10E+02	7,69E+01	1,01E+02	1,28E+01	3,51E+00	3,12E+02
WDP*	m ³	1,37E+02	5,41E-01	1,69E+02	3,07E+02	3,75E-01	9,85E-02	9,29E-02	7,84E-02	-7,67E-04	3,08E+00

GWP Global warming potential, total
GWP,f Global warming potential, fossil
GWP,b Global warming potential, biogenic
GWP,luluc Global warming potential, land use & land use change
GWP,ghg Global warming potential, excluding

biogenic uptake, emission and storage
ODP Ozone depletion potential
AP Acidification potential
EP,f Eutrophication potential, freshwater
EP,m Eutrophication potential, marine
EP,t Eutrophication potential, terrestrial

POCP Photochemical ozone creation potential
ADPE Abiotic depletion potential minerals & metals*
ADPF Abiotic depletion potential fossil fuels*
WDP Water use deprivation potential*

Additional environmental impact indicators are computed in the LCA report but not reported in the EPD.

*The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Resource Use Per Declared Unit

	UNIT	UPSTREAM	CORE PROCESS			DOWNSTREAM					
		A1	A2	A3	A1:A3	A4	C1	C2	C3	C4	D
PERE	MJ	4,73E+02	1,55E+00	2,28E+02	7,03E+02	1,07E+00	1,50E-01	2,67E-01	1,19E+01	3,59E-02	2,64E+01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4,73E+02	1,55E+00	2,28E+02	7,03E+02	1,07E+00	1,50E-01	2,67E-01	1,19E+01	3,59E-02	2,64E+01
PENRE	MJ	1,08E+04	5,98E+02	2,03E+03	1,35E+04	4,14E+02	7,78E+01	1,03E+02	1,30E+01	3,61E+00	4,71E+02
PENRM	MJ	0,00E+00	0,00E+00	1,05E+01	1,05E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,08E+04	5,98E+02	2,04E+03	1,35E+04	4,14E+02	7,78E+01	1,03E+02	1,30E+01	3,61E+00	4,71E+02
SM	kg	1,24E+03	0,00E+00	0,00E+00	1,24E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	3,90E+00	2,47E-02	4,52E+00	8,44E+00	1,71E-02	3,82E-03	4,24E-03	3,91E-02	1,18E-04	8,95E-02

CAPTION

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 resources
SM Use of secondary raw materials
RSF Use of renewable secondary fuels
NRSF Use of non-renewable secondary fuels
FW Use of net fresh water

Output Flows And Waste Categories Per Declared Unit

	UNIT	UPSTREAM	CORE PROCESS			DOWNSTREAM					
		A1	A2	A3	A1:A3	A4	C1	C2	C3	C4	D
HWD	kg	3,02E-02	3,90E-03	5,38E-03	3,95E-02	2,69E-03	5,14E-04	6,70E-04	9,97E-06	2,22E-05	3,62E-03
NHWD	kg	6,16E+01	2,92E-02	2,37E+02	2,98E+02	2,03E-02	5,71E-03	5,00E-03	3,89E-03	4,98E+01	1,36E+01
RWD	kg	1,17E-02	5,07E-05	7,20E-03	1,89E-02	3,48E-05	3,75E-06	8,70E-06	1,63E-04	1,18E-06	-2,54E-04
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	1,82E+02	1,82E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CAPTION

HWD Hazardous waste disposed
NHWD Non-hazardous waste disposed
RWD Radioactive waste disposed
CRU Components for re-use
MFR Materials for recycling
MER Materials for energy recovery
EE Exported energy

Calculation Rules

DECLARED UNIT

ACCORDING TO EN:15804 and reference PCR, the declared unit is 1 ton of bars, ready to be delivered to the final customers.

ASSUMPTIONS

ALL THE PHASES related to raw materials production and use have been considered, from raw materials purchasing from suppliers to their production and sale.

IN CASE OF TRANSPORTS, all those related to scrap and raw materials supply, waste management (from IRO S.p.A. plant to the place of disposal), internal handling and final product delivery, have been considered.

ANCILLARY ACTIVITIES AND AUXILIARY MATERIALS are included within system boundaries and allocated to the different production stages on mass basis (allocation based on output quantities coming from pre-treatment stage, steel billets production and hot rolling process).

ACCORDING TO THE EN:15804 general prescriptions as well as PCR on construction products, no environmental credits have been given to input scrap materials; only scrap pre-treatment process (necessary to make it suitable for steel production purpose) has been considered.

END OF LIFE: A representative distance (50 km by truck, EURO4) has been considered for the transportation of waste materials at the end-of-life to a recycling/disposal site (C2). At the end-of-life, the product is assumed to be recycled (95% of the total) and disposed (the remaining 5%).

CUT OFF RULES

ACCORDING TO EN: 15804, cut off limit is 1% for both mass and energy flows in the considered system.

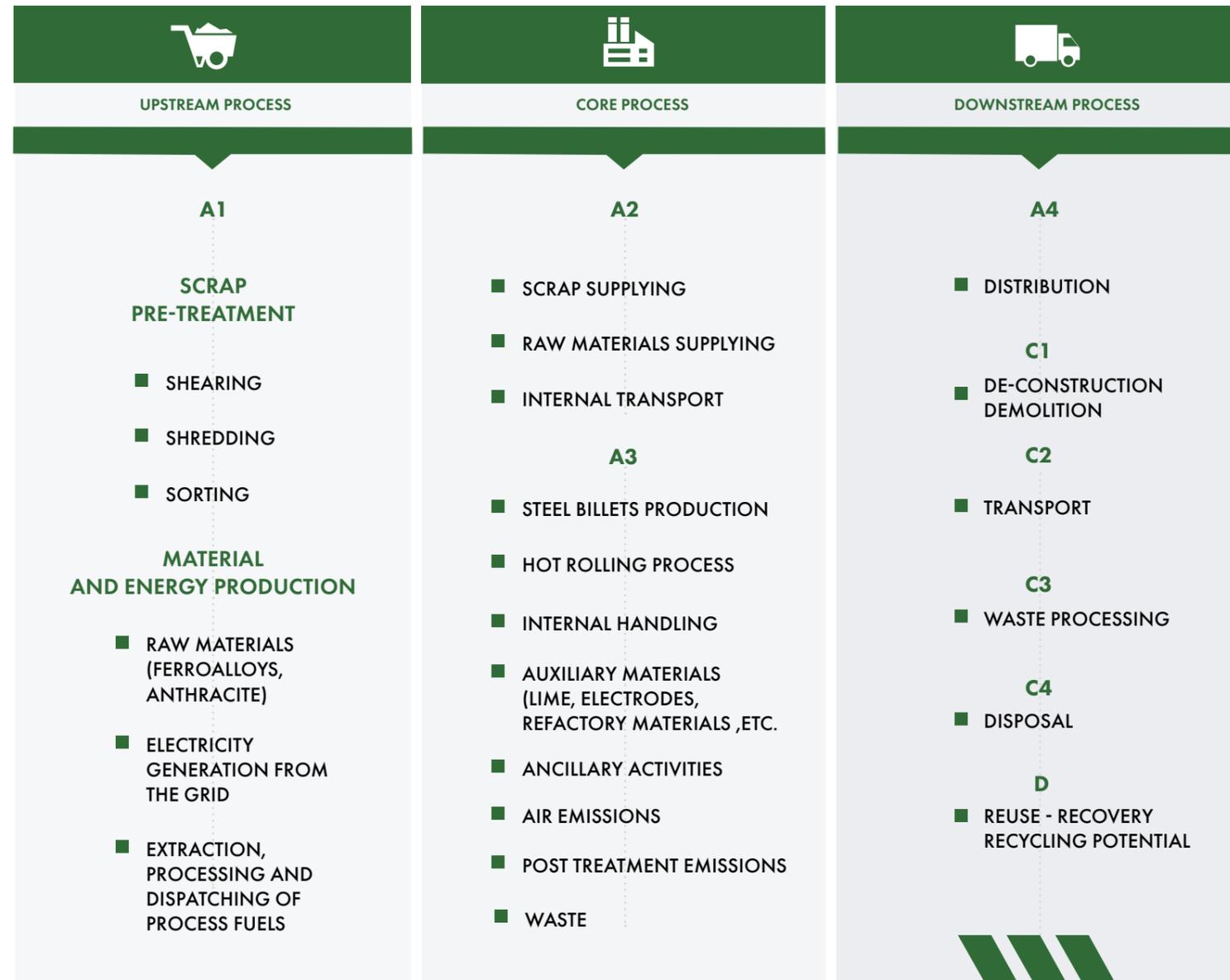
DATA QUALITY

CUSTOMIZED LCA QUESTIONNAIRES were used to gather in-depth information about all aspects of the production system (for example, raw materials contents and specifications, pre-treatments, process efficiencies, air and water emissions, waste management), in order to provide a complete picture of the environmental burden of the system from **Raw Materials supply (A1) to Transport (A2) and Manufacturing (A3)**.

Scenarios And Additional Technical Information

SYSTEM BOUNDARIES

Hot rolled steel in bars production system has been evaluated from raw materials extraction and production, steel production and transport of semi-finished products and final products (Scheme 1).



Scheme 1: Broad scheme of hot-rolled reinforcing steel for concrete production, in which the main activities included in the system boundaries, are listed and divided in the three subsystems: UPSTREAM Process, CORE Module and DOWNSTREAM Process.

Scenarios And Additional Technical Information

SYSTEM BOUNDARIES

The subsystems identified within hot rolled steel in bars for concrete production are the following:



UPSTREAM PROCESS

Subsystem **“SCRAP PRE-TREATMENT”**: all the scrap materials is treated before being used in steel billets production (upstream processes); scrap pre-treatments take place in **external plants**; Raw Material and Energy Production



CORE PROCESS

Subsystem **“HOT ROLLED STEEL IN BARS FOR CONCRETE PRODUCTION”**: it comprehends scrap and raw materials transports from suppliers to IRO S.p.A. steel mill, steel billets production and hot rolling process to produce steel bars, included plant ancillary activities and internal handling, air and water emissions, waste management and transport to disposal plants (core process). The total amount of steel billets used in IRO S.p.A. plant is an **internal production**.



DOWNSTREAM PROCESS

Subsystem **“MARKET TRANSPORT”** related to final product distribution from IRO S.p.A. plant to an average customer or place of use (downstream process). About the **80%** of the final product is delivered to **Italian sites** (66% placed in the North, 10% in the Centre and 4% in the South and islands) and the remaining 20% to foreign countries especially Germany, France, and Switzerland. The means of transport are truck and freight ship. On average, a tons of steel bars (finished product) is transported for 387 km by truck (EURO4) and 105 km by ship.

Other Optional Additional Environmental Information

Content of recycled materials ≥97%

(Calculated pursuant to the Reference Practice UNI/PdR88:2020)

References

- LIFE CYCLE ASSESSMENT (LCA) APPLIED TO STEEL MILL PRODUCTS AND DERIVATIVES FOR EPD PURPOSES - FINAL REPORT, V2 - 09/01/2024
- EN 15804:2012 + A2:2019: 2014 SUSTAINABILITY OF CONSTRUCTION WORKS — ENVIRONMENTAL PRODUCT DECLARATIONS — CORE RULES FOR THE PRODUCT CATEGORY OF CONSTRUCTION PRODUCTS.
- EPDITALY REGULATION, VERSION 5.2 OF 16/02/2023, AVAILABLE AT [HTTPS://WWW.EPDITALY.IT/IL-PROGRAMMA-EPDITALY/](https://www.epditaly.it/il-programma-epditaly/)
- PCR ICMQ-001 / 15 ON CONSTRUCTION PRODUCTS REV. 3.0 (COMPLIANT WITH EN 15804:2012 + A2:2019)
- REFERENCE ENERGY MIX, AIB (ASSOCIATION OF ISSUING BODIES) DATA RELATED TO YEAR 2022
- UNI EN 10080-2005 (STEEL FOR THE REINFORCEMENT OF CONCRETE - WELDABLE)





www.iro-spa.it

