

ENVIRONMENTAL PRODUCT DECLARATION

HOT-ROLLED
IN WIRE ROD

 **ALFA ACCIAI**

 **ALFA ACCIAI**
Group



Based on:

PCR ICMQ-001/15 v3

EN:15804:2012+A2:2019

UNI EN ISO 14025:2010

Certification N°:

EPDITALY0502

Product CPC code:

41

Date of issue:

2023/07/28

Valid until:

2028/07/28

Declaration number:

AA_EPD_004

GENERAL INFORMATION

EPD REFERENCES

EPD OWNER: ALFA ACCIAI, VIA SAN POLO 152, 25134, BRESCIA – ITALY; MANUFACTURING PLANT IS LCOATED IN THE SAME SITE

PROGRAM OPERATOR: EPDITALY, VIA GAETANO DE CASTILLIA 10, 20124 MILANO - ITALY

INDEPENDENT VERIFICATION

This declaration has been developed referring to the EPDItaly, following the last version of "Regolamento di EPDItaly"; further information and the document itself are available at: www.epditaly.it. EPD document valid within the following geographical area: Italy and other countries worldwide according to sales market conditions.

CEN standard EN 15804 served as the core PCR (PCR ICMQ-001/15 v3)
PCR review conducted by Daniele Pace, contact via info@epditaly.it

Independent verification of the declaration and data, according to UNI EN ISO 14025:2010

Third party verifier: ICMQ SpA, via De Castilla, 10 20124 Milano (www.icmq.it)

EPD process certification (Internal)

EPD verification (External)

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.

CONTACTS

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Technical support to Alfa Acciai was provided by Life Cycle Engineering, Italy.
(info@studiolce.it, www.lcengineering.eu).



1. ALFA ACCIAI GROUP



For almost 70 years, the Alfa Acciai Group has been one of the leading Italian and European producers of reinforced concrete steel and wire rod, with 1,200 employees and with a total production capacity of 2.5 million tons per year and today represents a technologically advanced reality, attentive to the environment and present throughout the steel supply chain.

The Group is characterized by a marked industrial flexibility and maximum operational efficiency upstream and downstream of the smelting process, responds successfully to the continuous changes in the national and foreign steel market and to the growing attention of citizens towards environmental issues and always maintains high attention to its collaborators and customers.

ALFA ACCIAI

ALFA ACCIAI, the Brescia-based parent company, is one of the leader and major producer of steel for reinforced concrete and wire rod in Italy and Europe. The production process in the EAF (electric arc furnace) steel mill sites involves two EAF (electric arc furnaces) followed by 2 LF (ladle furnaces), 2 continuous casting machines (10 lines) and a shredder for proler production. Hot rolling is equipped with two bars and spool mills and a wire rod mill. The production cycle is completed by cold rolling mills that produce welded wire mesh and recoiled wire.

ACCIAIERIE DI SICILIA

ACCIAIERIA DI SICILIA located in the industrial area of Catania, has been part of the Alfa Acciai Group since 1998, is the only steel mill in Sicily and is located in the heart of the Mediterranean. It is one of the main industrial centers of the Region and is characterized by a strong export vocation thanks to its proximity to significant port infrastructures. The company stands out for its constant technological innovation and steel know-how, factors that guarantee increasingly high-quality standards, respecting the environment and the health and safety of its employees. The production process includes an EAF (electric arc furnace), a continuous casting machine (4 lines) and a hot rolling mill to produce bars and spool.

Tecnofil

TECNOFIL, located in Gottolengo (BS), has been part of the Alfa Acciai Group since September 2016. The company is a drawing mill that has the largest galvanizing plant in Italy and among the largest in Europe and completes the production chain of wire rod downstream. It produces galvanized wires and tapes, , alu-zinc and bright wire fzinc aluminum and polished wires for use in construction, household appliances, automotive and numerous other applications of everyday life. Over the years the company has significantly expanded its overall production capacity (currently over 100,000 tons / year) and the range of products to be offered on the market.

FERROBERICA

FERRO BERICA has been part of the Alfa Acciai Group since September 2016 and has 4 operational sites located in: Vicenza, Montirone (BS), Catania and Sedegliano (UD). The company is the largest Italian player (second in Europe) in the pre-shaping and assembly of reinforced concrete bars destinates to the main construction companies for use in structural works. Ferroberica thanks to the know-how acquired, reliability in supplies, competitiveness on the market and attention to quality and customer care, represents a cutting-edge production reality, equipped with latest generation machinery and with an annual production capacity of more than 300,000 tons.

SCOPE AND TYPE OF EPD

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

TABLE OF MODULES																	
	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
	Raw material supply	Transport	Manufacturing	Transport from 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 potential
MODULE	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module declared	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography	IT	IT	IT	WLD	-	-	-	-	-	-	-	-	WLD	WLD	WLD	WLD	WLD
Specific data used	> 90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	NOT RELEVANT			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-sites	NOT RELEVANT			-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOFTWARE: SimaPro ver. 9.5

MAIN DATABASE: Ecoinvent 3.9.1

REPORT LCA: Life Cycle Assessment (LCA) for hot and cold rolled structural steel and for Sinstone recycled aggregate produced by Alfa Acciai for EPD® purposes - Final Report

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

TYPE OF EPD: specific for hot rolled steel products

2. THE PRODUCT



HOT-ROLLED IN WIRE ROD

This EPD refers to both ribbed and smooth wire rod, produced at Alfa Acciai plant placed in Brescia (Italy), with electric arc furnace technology, starting from post and pre consumer steel scrap. The homogeneous and repeatable mechanical features of steel guarantee stable performances in any type of application. Furthermore, the wide range of products offers the customer a vast choice of steels in order to choose the most suitable one for the final use.

The products made by ribbed wire rods have a chemical composition in compliance with national regulation of destination countries where they are sent. On the other hand smooth wire rods have a specific composition based on the type of steel requested by the customer. The main materials of the final product are: *iron >96%; alloy elements (e.g. manganese, silicon, carbon) 2% c.a.; other elements (e.g. copper, nickel, chromium), complementary to 100%.*











DECLARED UNIT

According to EN:15804, the declared unit is **1 ton of hot rolled product in wires**

INFORMATION	DESCRIPTION												
Product identification	Ribbed wire for welded mesh fencing and lattices. Smooth low, medium and high carbon wire rod for drawing and mechanical sector												
Product features	Ribbed wire: diameters from 6 mm to 16 mm Smooth wire: diameters from 5.5 mm to 16 mm Coil weight: 1.450 kg Coil size: Ø int. 850-900 mm; Ø ext. 1100-1200 mm; height 1100-1200 mm												
Product properties (under EN10080:2005)	Steel coming from post and pre consumer steel scraps produced in electric arc furnace route (EAF) and further hot rolling process.												
	<table border="1"> <thead> <tr> <th></th> <th>Max Ø tolerances</th> <th>Max roundness tolerances</th> </tr> </thead> <tbody> <tr> <td>Ø 5.5 - 6 - 6.5 - 7 - 7.6 - 8 - 8.7 - 9</td> <td>+/- 0.3</td> <td>+/- 0.48</td> </tr> <tr> <td>Ø 10 - 11 - 12 - 13 - 14 -15</td> <td>+/- 0.4</td> <td>+/- 0.64</td> </tr> <tr> <td>Ø 16</td> <td>+/- 0.5</td> <td>+/- 0.8</td> </tr> </tbody> </table>		Max Ø tolerances	Max roundness tolerances	Ø 5.5 - 6 - 6.5 - 7 - 7.6 - 8 - 8.7 - 9	+/- 0.3	+/- 0.48	Ø 10 - 11 - 12 - 13 - 14 -15	+/- 0.4	+/- 0.64	Ø 16	+/- 0.5	+/- 0.8
		Max Ø tolerances	Max roundness tolerances										
	Ø 5.5 - 6 - 6.5 - 7 - 7.6 - 8 - 8.7 - 9	+/- 0.3	+/- 0.48										
Ø 10 - 11 - 12 - 13 - 14 -15	+/- 0.4	+/- 0.64											
Ø 16	+/- 0.5	+/- 0.8											
Products covered by this EPD, year 2022: 485 717 t													
Plant features	Total production, for selling purpose, year 2022: 1 168 521 t												
	On-site air emission control system												
	On-site waste water control system												
	On-site system to recycle water used in process												
	In/out materials/products and melting process monitored to prevent nuclear radiation												
	Plant air emissions accounted under ETS (Emission Trading System)												

ENVIRONMENTAL PERFORMANCE

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. For this reason total results could slightly differ from the sum of contributions of the different phases. The energy sources behind the electricity grid used in manufacturing is the Italian residual mix 0,457 kg CO₂ eq./kWh (AIB report May 2023) to which LCE adds emissions related to network losses and transformation.

ENVIRONMENTAL IMPACTS											
 TABLE OF MODULES POTENTIAL ENVIRONMENTAL IMPACTS	UNITS / D.U.	UPSTREAM		CORE PROCESS		DOWNSTREAM					
		A1 	A2 	A3 	A1:A3	A4 	C1 	C2 	C3 	C4 	D 
GWP	kg CO ₂ eq	5,60E+02	2,65E+01	1,42E+02	7,28E+02	1,83E+01	5,38E+01	1,82E+01	2,36E+00	2,78E-01	1,54E+02
GWP,f	kg CO ₂ eq	5,59E+02	2,65E+01	1,42E+02	7,28E+02	1,83E+01	5,38E+01	1,82E+01	2,35E+00	2,78E-01	1,54E+02
GWP,b	kg CO ₂ eq	3,43E-01	1,95E-03	1,80E-01	5,25E-01	1,35E-03	3,94E-03	1,34E-03	7,09E-03	3,59E-05	1,44E-02
GWP,luluc	kg CO ₂ eq	1,53E-01	5,13E-04	6,67E-02	2,20E-01	3,55E-04	2,16E-03	3,52E-04	5,79E-03	1,36E-05	1,41E-02
GWP,ghg	kg CO ₂ eq	5,60E+02	2,65E+01	1,42E+02	7,28E+02	1,83E+01	5,38E+01	1,82E+01	2,36E+00	2,78E-01	1,54E+02
ODP	kg CFC11 eq	1,36E-05	5,65E-07	5,17E-07	1,47E-05	3,91E-07	8,29E-07	3,88E-07	1,44E-08	4,02E-09	2,77E-06
AP	mol H+ eq	1,92E+00	5,26E-02	3,40E-01	2,31E+00	3,65E-02	5,04E-01	3,59E-02	1,12E-02	2,51E-03	5,73E-01
EP,f	kg P eq	1,10E-02	2,05E-05	2,66E-03	1,37E-02	1,42E-05	4,50E-05	1,41E-05	1,16E-04	9,54E-07	6,48E-03
EP,m	kg N eq	3,74E-01	1,84E-02	1,33E-01	5,26E-01	1,28E-02	2,37E-01	1,26E-02	2,16E-03	1,14E-03	1,13E-01
EP,t	mol N eq	4,17E+00	1,92E-01	1,39E+00	5,75E+00	1,33E-01	2,57E+00	1,31E-01	2,38E-02	1,24E-02	1,31E+00
POCP	kg NMVOC eq	1,80E+00	8,83E-02	3,59E-01	2,24E+00	6,12E-02	7,57E-01	6,06E-02	7,15E-03	3,71E-03	7,00E-01
ADPE*	kg Sb eq	1,40E-04	8,99E-07	2,22E-06	1,43E-04	6,21E-07	2,21E-06	6,18E-07	6,57E-08	1,07E-08	1,30E-03
ADPF*	MJ	1,00E+04	3,41E+02	7,77E+02	1,12E+04	2,36E+02	6,80E+02	2,35E+02	3,96E+01	3,48E+00	1,88E+03
WDP*	m ³	3,57E+01	3,20E-01	1,53E+02	1,89E+02	2,21E-01	8,92E-01	2,20E-01	4,19E-01	4,82E-03	1,80E+01

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.

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

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

RESOURCE USE PER DECLARED UNIT

 USE OF RENEWABLE MATERIAL RESOURCES	UNITS / D.U.	UPSTREAM		CORE PROCESS		DOWNSTREAM					
		A1 	A2 	A3 	A1:A3	A4 	C1 	C2 	C3 	C4 	D 
PERE	[MJ]	4,96E+02	9,14E-01	1,20E+02	6,17E+02	6,32E-01	1,35E+00	6,28E-01	4,34E+00	1,55E-02	1,06E+02
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]	4,96E+02	9,14E-01	1,20E+02	6,17E+02	6,32E-01	1,35E+00	6,28E-01	4,34E+00	1,55E-02	1,06E+02
PENRE	[MJ]	9,67E+03	3,51E+02	7,74E+02	1,08E+04	2,43E+02	7,00E+02	2,42E+02	4,01E+01	3,57E+00	1,89E+03
PENRM	[MJ]	4,27E+02	0,00E+00	1,46E+01	4,42E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	1,01E+04	3,51E+02	7,88E+02	1,12E+04	2,43E+02	7,00E+02	2,42E+02	4,01E+01	3,57E+00	1,89E+03
SM	[kg]	1,46E+03	0,00E+00	0,00E+00	1,46E+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]	1,19E+00	1,45E-02	3,84E+00	5,05E+00	1,01E-02	3,44E-02	1,00E-02	1,76E-02	1,82E-04	3,60E-01

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

 WASTE GENERATION AND TREATMENT	UNITS / D.U.	UPSTREAM		CORE PROCESS		DOWNSTREAM					
		A1 	A2 	A3 	A1:A3	A4 	C1 	C2 	C3 	C4 	D 
HWD	[kg]	0,00E+00	0,00E+00	2,72E+00	2,72E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NHWD	[kg]	0,00E+00	0,00E+00	7,99E+01	7,99E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,00E+02	0,00E+00
RWD	[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
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	2,12E+02	2,12E+02	0,00E+00	0,00E+00	0,00E+00	9,00E+02	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

- 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



3. CALCULATION RULES

The environmental burden of the product has been calculated according to EN 15804:2012+A2:2019¹ and PCR ICMQ-001/15 v3. This declaration is a cradle to gate with options EPD type, based on the application of Life Cycle Assessment² (LCA) methodology to the whole life-cycle system.

In the whole LCA model, infrastructures and production equipments are not taken into account.

Hot rolled steel products at plant level, were described by using specific data from manufacturing facility (Brescia, Italy) for year 2022.

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).

The use phase was not considered according to EN:15804 and PCR ICMQ-001/15 v3, while transport to final destination (A4) and end of life (C1-C2-C3-C4-D) were considered. The product is designed for being incorporated into concrete structures. Therefore, in nominal installation and operating conditions, no emissions to air nor to water shall occur.

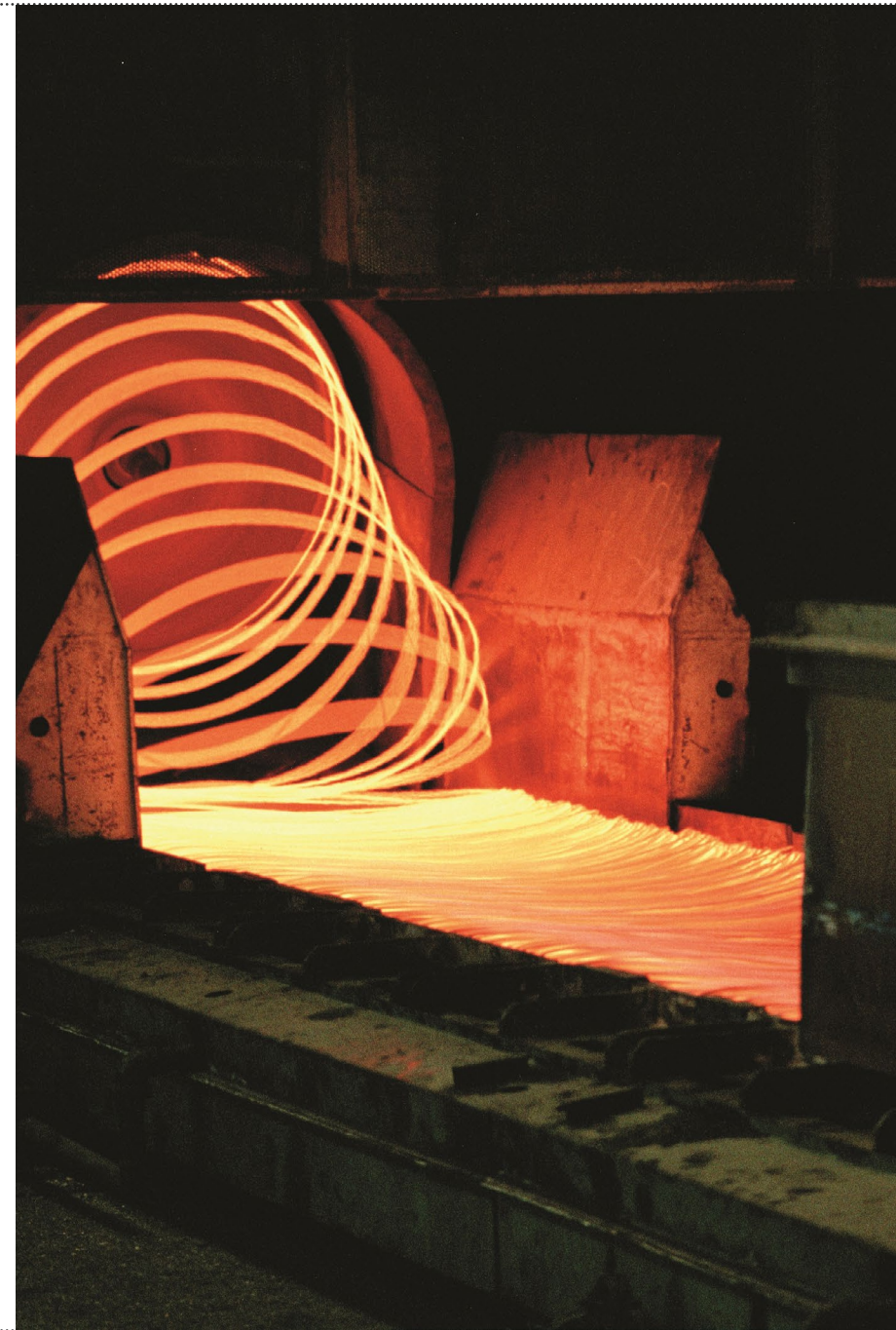
According to ISO 14040 and 14044, allocation is avoided whenever possible by dividing the system into sub-systems. When allocation cannot be avoided physical properties are used to drive flow analysis.

Data quality has been assessed and validated during data collection process.

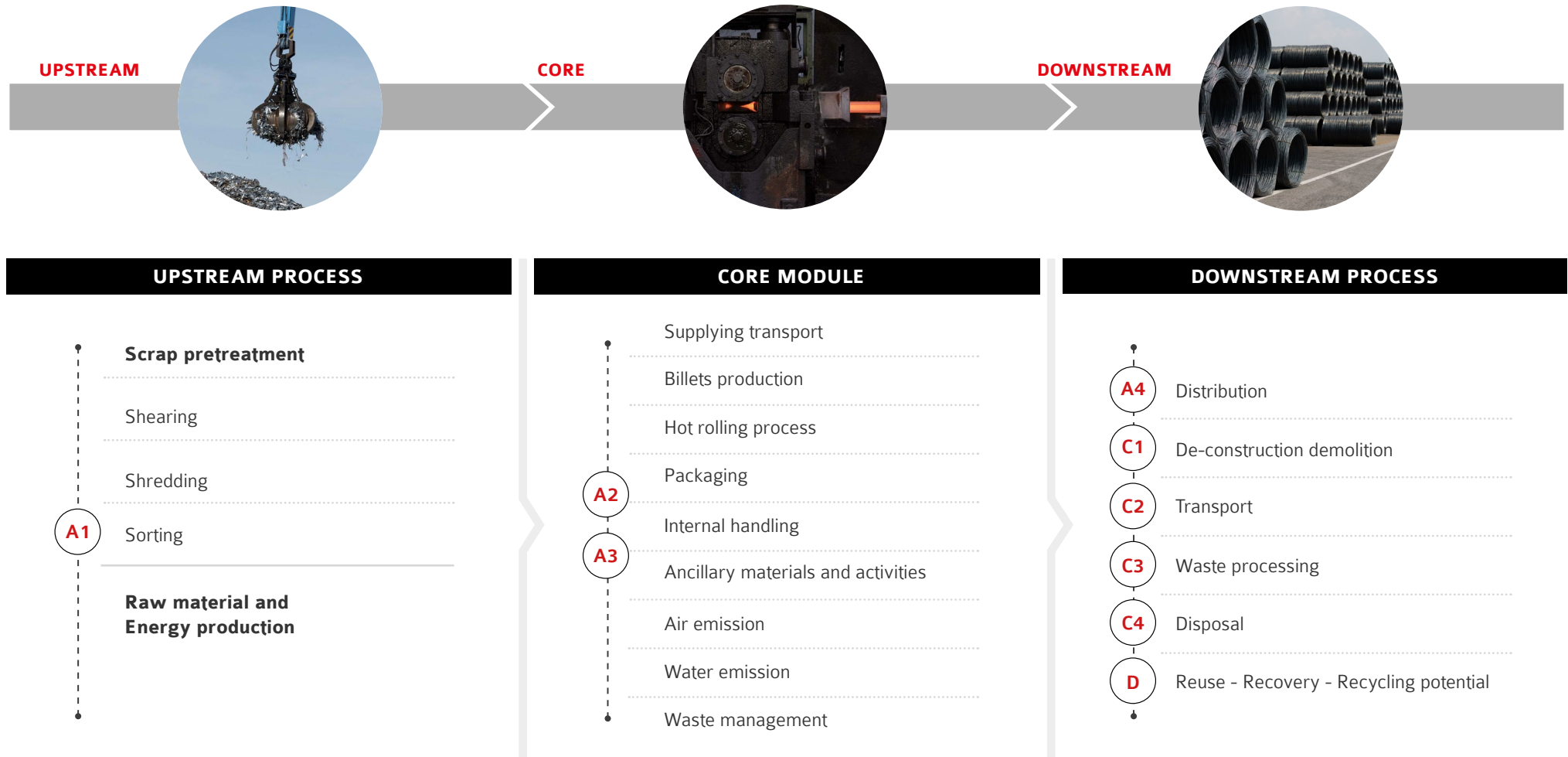
According to EN:15804 the applied cut-off criterion for mass and energy flows is 1%.

¹EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations Core rules for the product category of construction products.

²The LCA methodology is standardized at international level by ISO 14040 and ISO 14044.

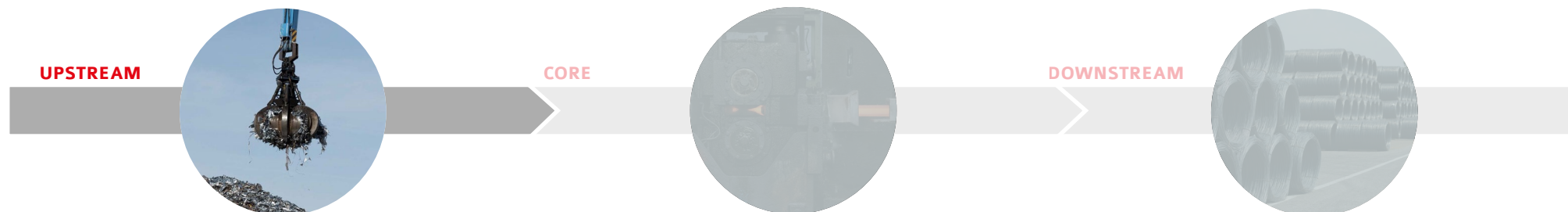


4. SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

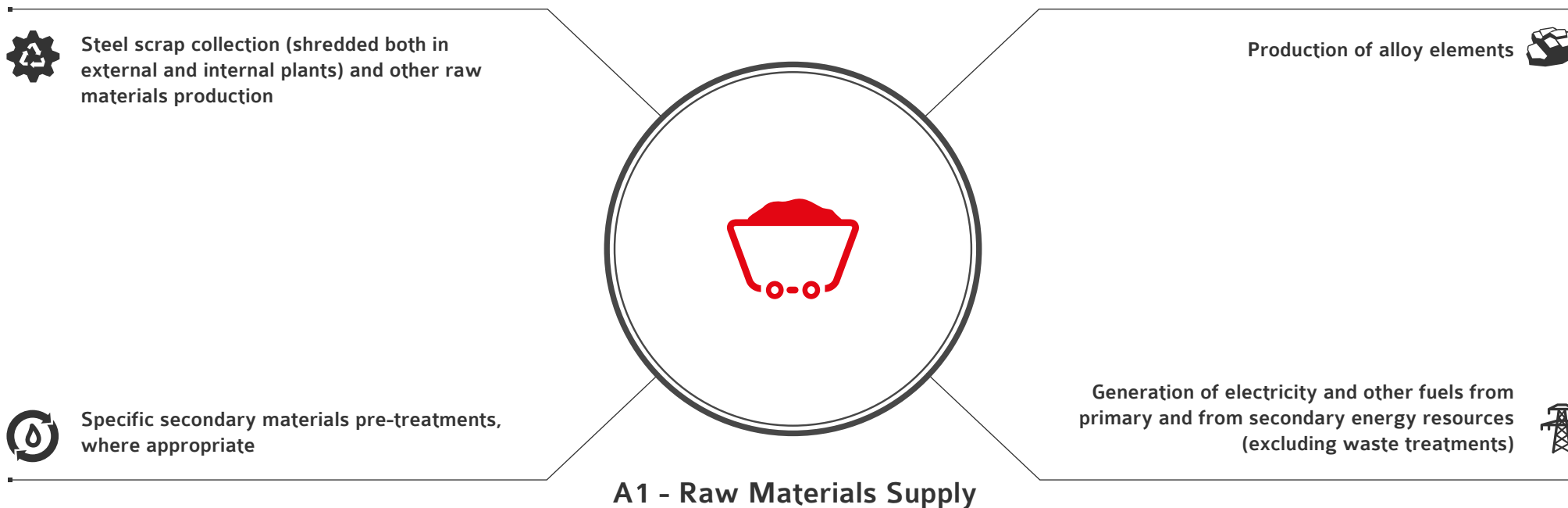


Broad scheme of hot-rolled reinforcing steel for concrete production, in which the main activities included in the system boundaries, are listed and divided in the three sub-systems: **UPSTREAM** Process, **CORE** Module and **DOWNSTREAM** Process.

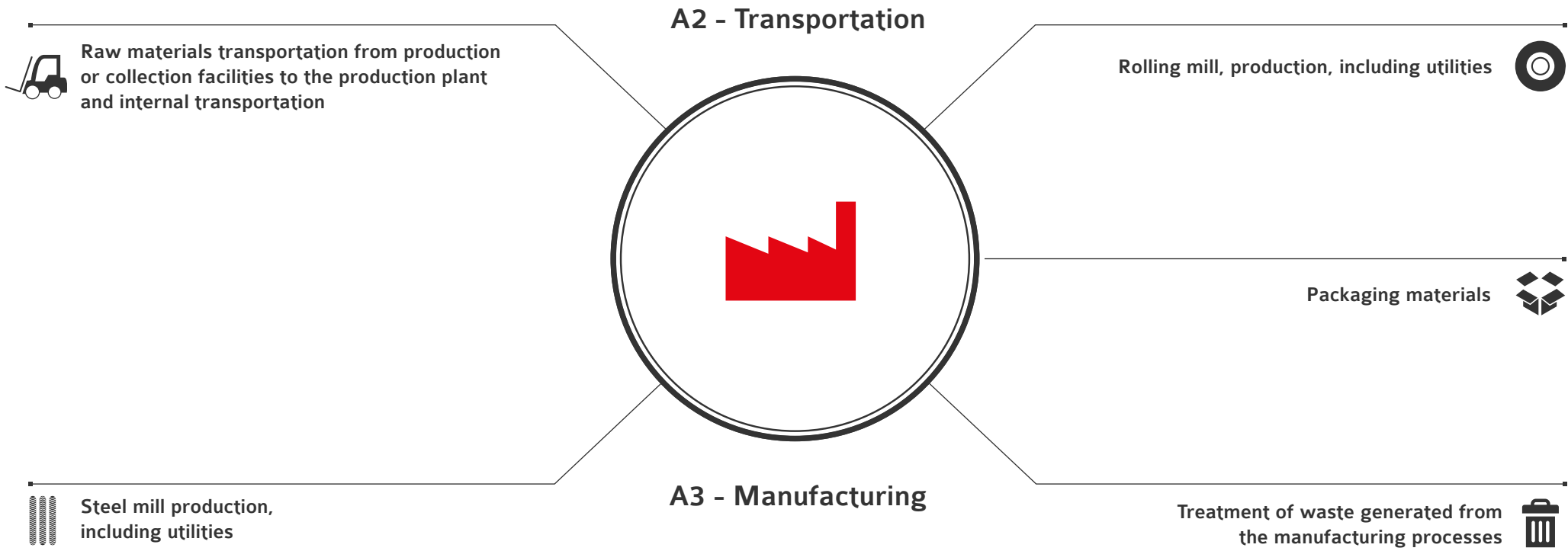
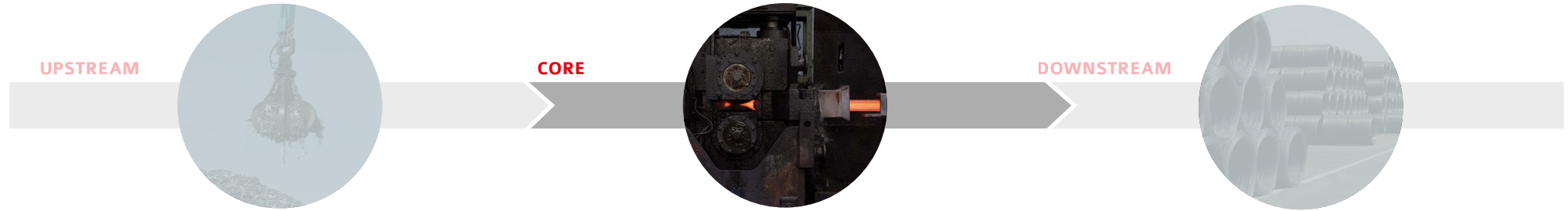
UPSTREAM PROCESS



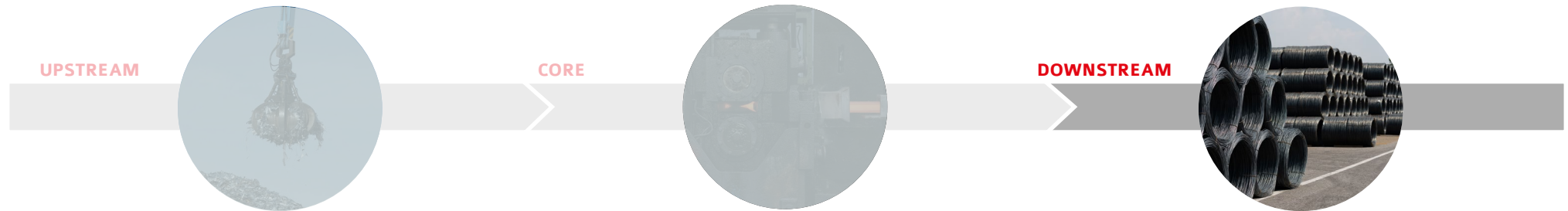
Scheme of the considered system boundaries (upstream processes).



CORE PROCESS



DOWNSTREAM PROCESS



A4 Distribution

Transport to the customers (general market average). Distances estimated considering the transported quantities and the distances from Brescia plant to the client. From Brescia (in the North of Italy) final products are delivered to many national (85% of the total sold product) and international areas such as Germany, France and Austria, mentioning the main countries.

The means of transport used to deliver steel bars and coils are truck and freight ship.

C1 De-construction demolition

Dismantling and demolition operations required to remove the product from the building. Initial onsite sorting of the materials is included as well.

C2 Transport

Transportation of the discarded product as part of the waste processing (to recycling site or to a final disposal site).

C3 Waste processing

Waste processing, including collection of waste fraction from deconstruction and waste processing of material flows intended for reuse, recycling and energy recovery.

C4 Disposal

Waste disposal including physical pre-treatment and management of the disposal site.

D Reuse - Recovery - Recycling potential

Environmental impacts associated to waste use after the investigated system (including recycling).

In this module impacts arising from steel recycling are accounted, including avoided impacts associated to primary steel production. The result is expressed as net value between direct impact (i.e. recycling steel in EAF furnace) and avoided impact (i.e. producing steel from iron ore in BOF furnace).

5. OTHER OPTIONAL ADDITIONAL ENVIRONMENTAL INFORMATION

6. REFERENCES

- EN 15804:2012+A2:2019
- ISO 14040:2021
- ISO 14044:2021
- Life Cycle Assessment (LCA) for hot and cold rolled structural steel and for Sinstone recycled industrial aggregate produced by Alfa Acciai for EPD® purposes - Final Report
- EPDIaly General Programme Information v5.2
- PCR ICMQ-001/15 v3

OTHER ENVIRONMENTAL CHARACTERISTICS OF ALFA ACCIAI PLANT

The production process involves scrap melting in the two electric arc furnaces (EAFs) with a total annual production capacity of about 2,000,000 tonnes, liquid steel tapping and secondary metallurgical processing in the two ladle furnaces, and finally casting in the two 5-line continuous casting machines. Alfa Acciai plant is equipped with powerful off-gas filtering system for both furnaces with active carbons injection to prevent and reduce the organic micro pollutants in air emissions (PCDD /F and PCB). Alfa Acciai in Brescia is a model of circular economy as through the rational consumption of materials and recycling strategies it minimizes the use of raw natural resources and enhances the residues produced. In recent years, environmental issues have assumed increasing importance worldwide, Alfa Acciai has shown itself to be sensitive to these aspects, undertaking actions aimed at reducing its impact. Among the main projects the following stand out:

- SmartGrid Pilot Project recovers heat from the offgas plant cooling system serving the furnaces at the steel mill and through an highly energy-efficient heat exchange system connects the Alfa Acciai process and the A2A district heating network. Thanks to this plant more than 6,000 residential units should be heated and at the same time reduces heat loss into the atmosphere and make-up water consumption;
- Decarbonisation, achieved among other, through the partial replacement of the coal and its derivatives, in the EAF process, with recycled polymers reach in biomass carbon with the aim of reduce CO₂ emissions;
- Energy efficiency, through the implementation of initiatives geared towards optimising the use of energy resources and reducing consumption, e.g., through energy optimisation processes based on the recovery of heat generated by industrial facilities and increased use of energy from renewable sources.

Content of recycled materials \geq 99,0%
(Certified by ICMQ SpA following UNI/PdR 88:2020)