ENVIRONMENTAL PRODUCT DECLARATION

REBAR TOPAR-RC

STRETCHED COIL MANUFACTURED IN GERLAFINGEN

STAHL GERLAFINGEN

AFV BELTRAME GROUP

EPD ITALY

Based on PCR	Certification N°	Issue date	Valid until
PCR ICMQ-001/15 – rev. 2, Construction products and construction services (21/04/2017)	EPDITALY0019	V.5, 2017-12-19	2022-11-22

GENERAL INFORMATION

ECO EPD REFERENCES

EPD OWNER: STAHL GERLAFINGEN AG - AFV BELTRAME GROUP, BAHNHOFSTRASSE, 2-3 4563 - GERLAFINGEN (CH)

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

INDEPENDENT VERIFICATION

This declaration has been developed referring to the EPDItaly, following the General Programme Information; 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 (North Africa and Europe).

CEN standard EN 15804 served as the core PCR (PCR ICMQ-001/15 rev 2 PCR review was conducted by Daniele Pace, contact via info@epditaly.it.

Independent verification of the declaration and data, according to EN ISO 14025 : 2010 ☐ EPD process certification (Internal) ☑ EPD verification (External)

Third party verifier: ICMQ SpA, via De Castillia, 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.

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

LIFE CYCLE ENGINEERING
we support your sustainable business

THE COMPANY

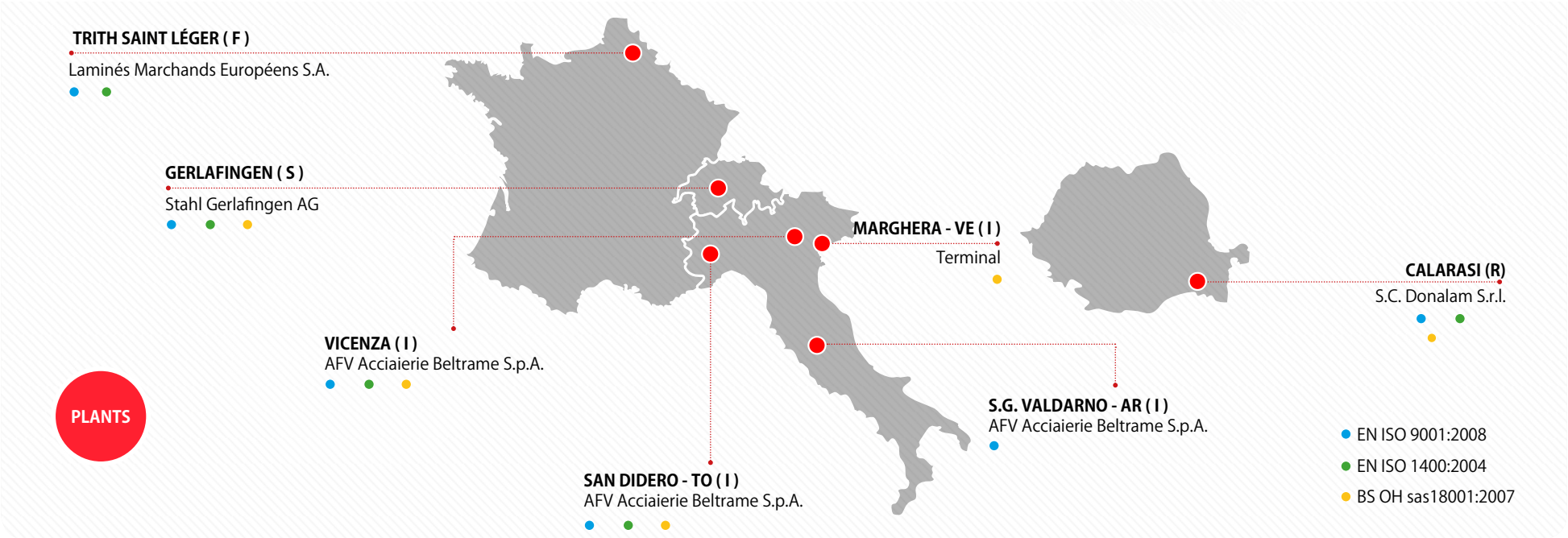
The AFV Beltrame Group has operated in the steel industry for over a century, producing rolled sections for use in construction, shipyards, and excavators.

The facilities, which have a production capacity of approximately **3,2 million tons**, include four electric furnaces and ten rolling mills. These are scattered in seven plants located in **Italy**, **France**, **Switzerland**, and Romania. Their geographical distribution is very advantageous given the areas where the products are consumed and those where raw materials are purchased.

Stahl Gerlafingen AG is a member company of the Beltrame Group and is specialized in reinforcing and section steel for construction and industry. products are used in for building, bridges, tunnels, ships and industrial goods.

All employees, amounting to approximately **469 people**, are strongly committed and motivated to satisfy the customers' needs through constant improvements in production, organization and level of service.

In order to support the principles in the code of ethics and the policy regarding **Quality**, **Health** and **Safety**, and the Environment (QHSE), all production plants have adopted an Integrated Management System.



SCOPE AND TYPE OF EPD®

The approach used in this EPD is "Cradle to gate with options" one; cold rolled rebars have been chosen since this product represents the best selling item manufactured in Gerlafingen. From primary company data, on average impacts arising from hot and cold rolled rebar production do not differ more than 10%.

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
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

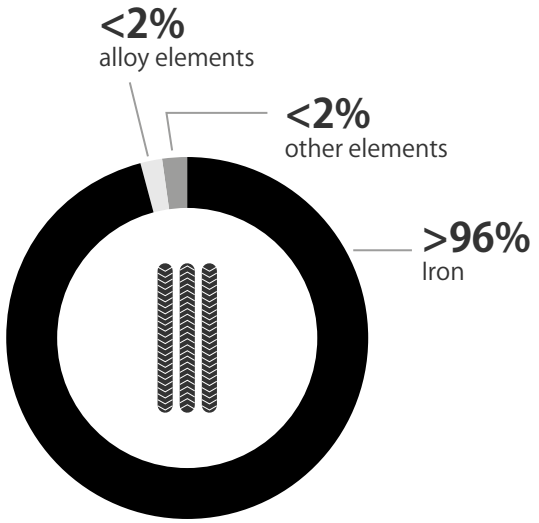
SOFTWARE: SimaPro ver. 8.3.0.0 (www.pre.nl)
MAIN DATABASE: Ecoinvent 2.2
REPORT LCA: Life Cycle Assessment (LCA) of hot rolled bars via EAF process.
GEOGRAPHICAL SCOPE OF THE EPD: World according to sales market conditions.
AVERAGING: Not applied.
Environmental declarations published within the same product category, though originating from different programs, may not be comparable.

DETAILED PRODUCT DESCRIPTION

This EPD refers to rebars produced at Gerlafingen (Switzerland) via electric arc furnace route and cold rolling starting from post and pre consumer steel scraps, varying steel grades (ductility level), i.e. B500B and B500C.

CONTENT DECLARATION

The product here considered has the following composition:



PRODUCT DIMENSIONS AND SPECIFIC STANDARDS:

» SIA 262 (CH)
» DIN 488-2 (D)
» NFA 35-080-1 (F)

TOPAR-RC							
DIAMETER	**mm**	6	8	10	12	14	16
AREA	**mm²**	28.3	50.3	78.5	113	154	201
WEIGHT	**kg/m**	0.222	0.395	0.617	0.888	1.21	1.58

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GWP Global warming potential
ODP Depletion potential of the stratospheric ozone layer
AP Acidification potential of land and water
EP Eutrophication potential
POCP Formation potential of tropospheric ozone photochemical oxidants
ADPE Abiotic depletion potential for non-fossil resources
ADPF Abiotic depletion potential for fossil resources

SCIENTIFIC NOTATION
Reading guide
GWP: 4.01E+02 is equal to
$4.01 \times 10^{+2} = 4.01 \times 100 = 401$

ENVIRONMENTAL IMPACTS

POTENTIAL ENVIRONMENTAL IMPACTS	UNITS / D.U.	UPSTREAM PROCESS	CORE PROCESS		DOWNSTREAM PROCESS	TOTAL*
		A1	A2	A3	A4	
GWP	kg CO_2 eq	1.36E+02	7.24E+00	2.52E+02	5.95E+00	**4.01E+02**
ODP	kg CFC-11 eq	3.53E-05	1.09E-06	7.37E-06	9.01E-07	**4.47E-05**
AP	kg SO_2 eq	6.56E-01	4.67E-02	3.31E-01	4.31E-02	**1.08E+00**
EP	kg PO_4^{3-} eq	1.09E-01	1.07E-02	6.13E-02	1.00E-02	**1.91E-01**
POCP	kg C_2H_4 eq	3.00E-02	1.11E-03	3.58E-02	1.03E-03	**6.80E-02**
ADPE	kg Sb eq	7.91E-05	8.89E-09	1.98E-04	7.31E-09	**2.77E-04**
ADPF	MJ	4.76E+03	9.52E+01	9.42E+02	7.84E+01	**5.87E+03**

*Totals may not correspond to the sum of the individual contributes due to approximations.

ENVIRONMENTAL PERFORMANCE

The detailed environmental performance (in terms of potential environmental impacts, use of resources and waste generation) is presented for the three phases Upstream, Core and Downstream and related sub-phases (A1-A2-A3-A4). Construction installation (A5), use phase (B1 - B7) and end of life (C1 - C4) are modules not declared (MND).

DECLARED UNIT (D.U.) The declared unit is 1 tonne (1000 kg) of fabricated steel product.

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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

RESOURCE USE PER DECLARED UNIT

USE OF RENEWABLE MATERIAL RESOURCES	UNITS / D.U.	UPSTREAM PROCESS	CORE PROCESS		DOWNSTREAM PROCESS	TOTAL
		A1	A2	A3	A4	
PERE	MJ	1.10E+03	1.46E-01	6.48E+01	1.20E-01	**1.17E+03**
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
PERT	MJ	1.10E+03	1.46E-01	6.48E+01	1.20E-01	**1.17E+03**
PENRE	MJ	7.70E+03	9.61E+01	1.17E+03	7.91E+01	**9.05E+03**
PENRM	MJ	0.00E+00	0.00E+00	1.72E+01	0.00E+00	**1.72E+01**
PENRT	MJ	7.70E+03	9.61E+01	1.19E+03	7.91E+01	**9.06E+03**
SM	kg	1.17E+03	0.00E+00	0.00E+00	0.00E+00	**1.17E+03**
RSF	MJ	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**
FW	m^3	2.77E+00	8.48E-03	6.00E+00	6.98E-03	**8.78E+00**

*Totals may not correspond to the sum of the individual contributes due to approximations.

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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
EEE Exported electrical energy
EET Exported thermal energy

OUTPUT FLOWS AND WASTE CATEGORIES PER DECLARED UNIT

WASTE GENERATION AND TREATMENT	UNITS / D.U.	UPSTREAM PROCESS	CORE PROCESS		DOWNSTREAM PROCESS	TOTAL
		A1	A2	A3	A4	
HWD	MJ	0.00E+00	0.00E+00	3.21E+00	0.00E+00	**3.21E+00**
NHWD	MJ	0.00E+00	0.00E+00	1.26E+01	0.00E+00	**1.26E+01**
RWD	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
CRU	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
MFR	MJ	0.00E+00	0.00E+00	2.08E+02	0.00E+00	**2.08E+02**
MER	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**
EEE	kg	0.00E+00	0.00E+00	3.12E-01	0.00E+00	**3.12E-01**
EET	MJ	0.00E+00	0.00E+00	4.80E-01	0.00E+00	**4.80E-01**

*Totals may not correspond to the sum of the individual contributes due to approximations.

CALCULATION RULES

METHODOLOGY

The environmental burden of the product has been calculated according to the GPI issued by the EPDItaly[1] (Cradle to gate with options).

This declaration is based on the application of Life Cycle Assessment (LCA) methodology to the whole life-cycle system.

Rebar production at plant level, was described by using specific data from the manufacturing facility in Gerlafingen - Switzerland for year 2016.

Customized LCA[2] questionnaires were used to gather in-depth information about all aspects of the production system (for example, raw materials specifications, pre treatments, process efficiencies, air emissions, waste management), ultimately providing a complete picture of the environmental burden of the system from raw materials supply (A1) to Transport (A2) and Manufacturing (A3).

The use phase and end of life were not considered according to PCR, while transport to final destination was considered (A4).

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.

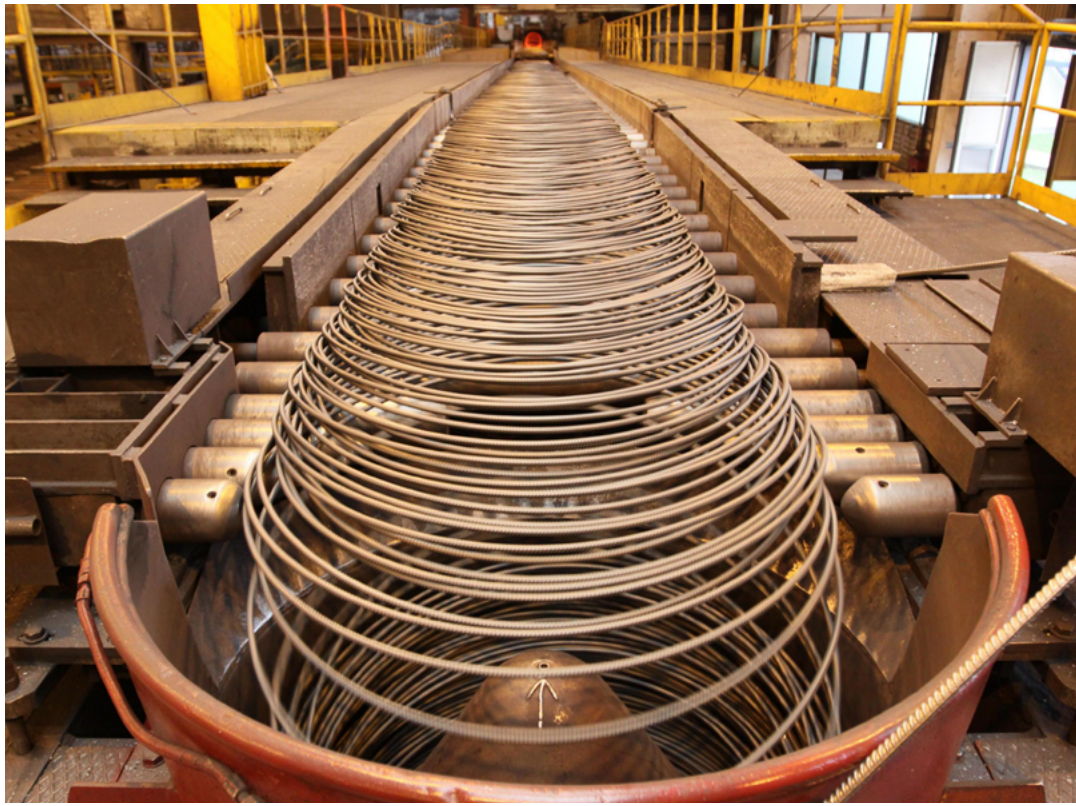
According to EN:15804 the applied cut-off criterion for mass and energy flows is 1%.

[1] EPDItaly is managed by ICMQ S.p.a (www.epditaly.it).

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

DECLARED UNIT

Bars are usually traded in mass so that the declared unit is **1 ton of rebar products.**



CALCULATION RULES

According to the PCR ICMQ-001/15 – rev. 2 the main activities are listed and divided in three subsystems: **UPSTREAM Process**, **CORE Module**, **DOWNSTREAM Process**

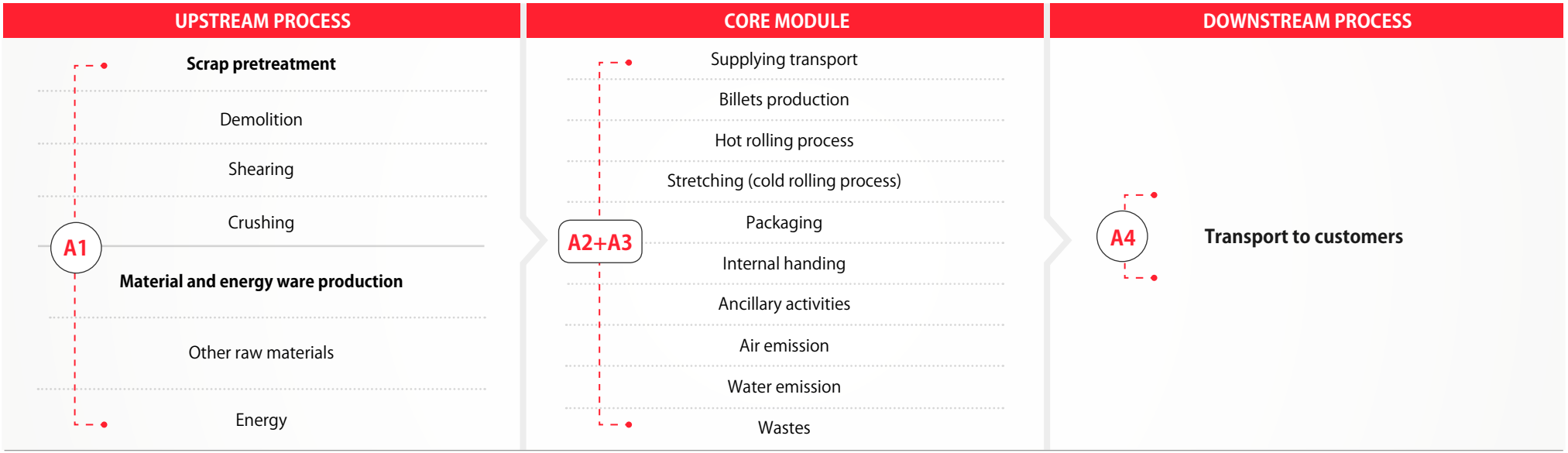
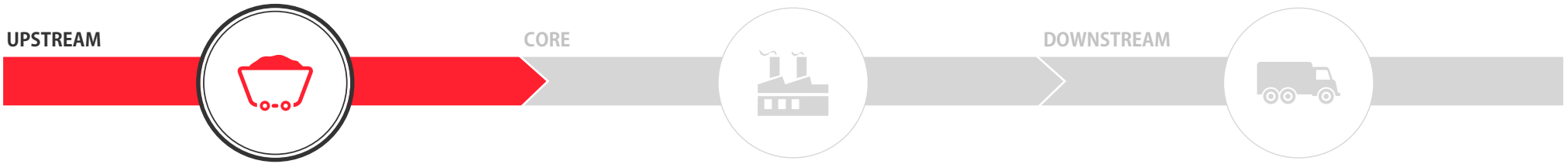


Figure 1. Scheme of the considered system boundaries (including upstream, core and downstream main processes).

UPSTREAM PROCESS



Scheme of the considered system boundaries (upstream processes).

Pre and post consumer steel scrap collection

Specific secondary materials pre-treatments, where appropriate

A1 - Raw Materials Supply

Production of virgin materials, alloy elements and ancillaries

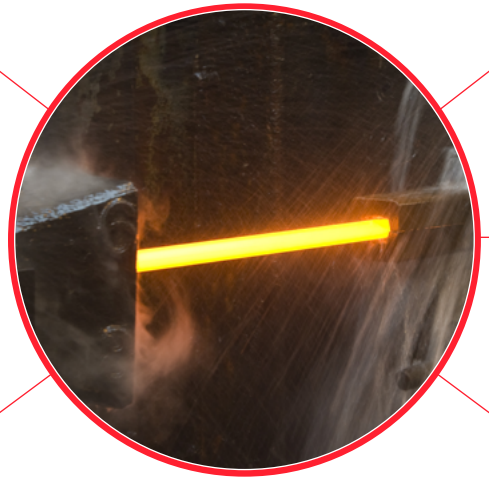
Generation of electricity and other fuels from primary and from secondary energy resources (excluding waste treatments)

CORE PROCESS

Scheme of the considered system boundaries (core processes).

Raw materials transportation from production or collection facilities to the production plant and internal transportation.

Specific secondary materials pre-treatments, where appropriate



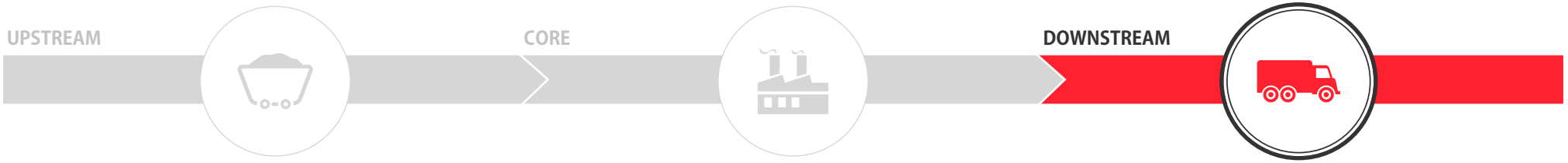
A2 - Transportation
+
A3 - Manufacturing

Rolling mill, production, including utilities

Packaging materials

Treatment of waste generated from the manufacturing processes

DOWNSTREAM PROCESS



Transport to customers (general market average).

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

Switzerland, Gerlafingen, main delivery area:
Europe

A4 - Distribuition

ADDITIONAL INFORMATION

Main environmental characteristics of the considered plants are:

1. EAF primary and secondary dedusting achieve an efficient extraction of all emission sources by using direct off-gas extraction (shaft) and total building evacuation, with subsequent dedusting by means of a bag filter

2. Prevention and reduction of (PCDD/F) and (PCB) emissions by using the combination of the following techniques,

- appropriate rapid quenching of the EAF off-gas
- injection of adsorption agents into the duct
- final dedusting with a bag filter.

3. Minimisation of water consumption by using a recirculating loop cooling system with purge recovery. Removal of solids by sedimentation or filtration, removal of oil with skimming devices.

4. Prevention and reduction of waste generation by using the following techniques:

I. appropriate collection and storage to facilitate specific treatments;
II. on-site recovery and recycling of specific by-products from the different processes;
III. external recovery of filter dusts in the non-ferrous metal industry (zinc, lead);
IV. separation of scale in the water treatment process and external recovery in the cement and blast-furnace industry;
V. recovery of EAF slag as a secondary raw material (inert aggregates) in the construction industry.

5. Radiation monitoring of scraps and raw materials by means of detection equipment installed at the weighing post.
In accordance with EPDItaly's GPI the LCA study used specific, generic and other generic data. This last data contributes to the environmental indicators less than 10%.