

ENVIRONMENTAL PRODUCT DECLARATION



MERCHANT BARS

EPD Registration n°: S-P-11659

CPC code: 412

Based on PCR: PCR 2019:14 Construction products v 1.3.1

EN:15804:2012+A2:2019 - UNI EN ISO 14025:2010

ISO 21930:2017

Programme: The International EPD System www.environdec.com

Programme operator: EPD international AB

San Giovanni Valdarno plant

Issue date: 2023-12-18

Revision date: 2024-02-20

Validity date: 2028-12-18


THE INTERNATIONAL EPD® SYSTEM



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



GENERAL INFORMATION

**AFV BELTRAME GROUP:
LIFE CYCLE ASSESSMENT OF SAN GIOVANNI VALDARNO MERCHANT BARS**

PROGRAM INFORMATION

EPD REFERENCES

PROGRAM OPERATOR: EPD INTERNATIONAL AB, BOX 21060,
SE-100 31 STOCKHOLM, SWEDEN; info@environdec.com

INDEPENDENT VERIFICATION

ISO standard ISO 21930 and CEN standard EN 15804 served as the core PCR.
PCR 2019:14 Construction products, Version 1.3.1.
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 EN ISO 14025:2010.

Third party verifier: Rina Service S.p.A. Via Corsica 12,
Genova - Italy. ACCREDIA: Registration number 0002VV

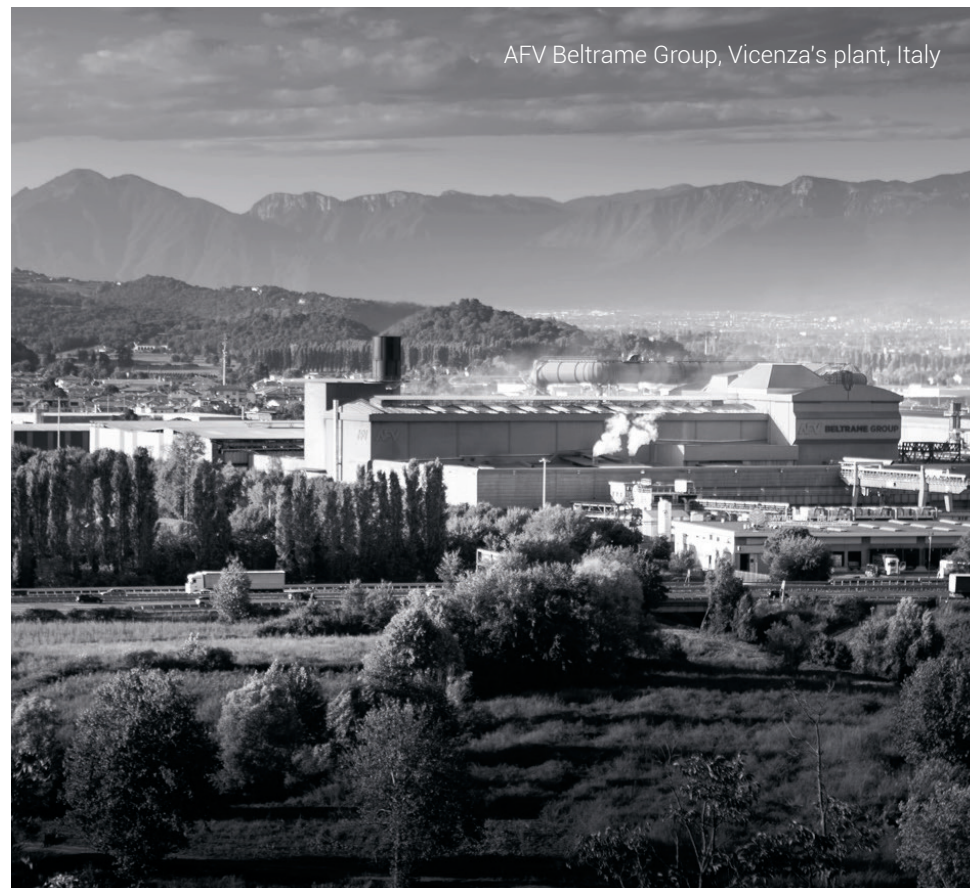
☐ EPD process
certification (internal) ☒ EPD verification
(external)

Accredited by: Accredia

Procedure for follow-up during EPD validity involves
third party verified

☒ Yes ☐ No

EPDs within the same product category but from different programmes blished 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. EPD owner has the sole ownership, liability and responsibility of the EPD.
This declaration has been developed referring to the International EPD System, following the General Programme Instructions v 4.0; further information and the document itself are available at: www.environdec.com. EPD document valid within the following geographical area: Italy and other countries worldwide according to sales market conditions.



Life Cycle Assessment of San Giovanni Valdarno merchant bars.

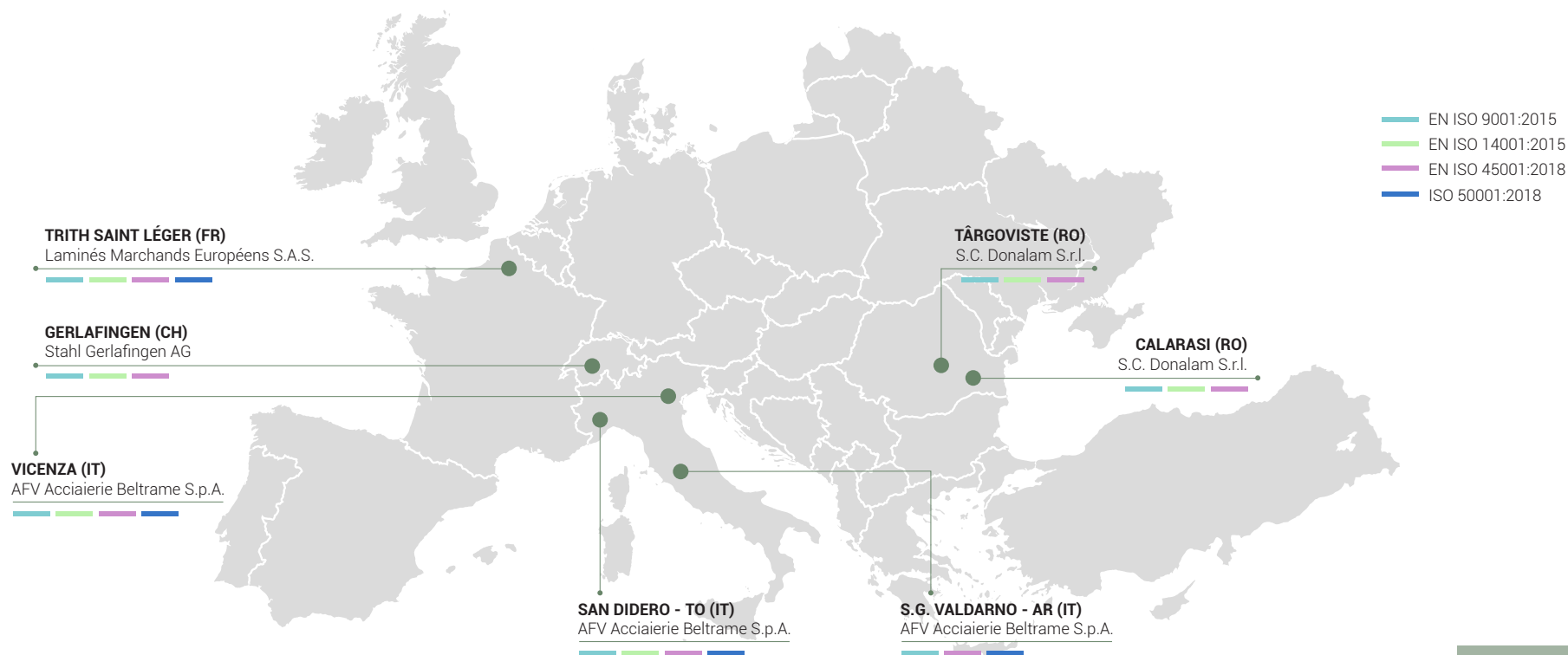
THE COMPANY



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 twelve 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. The AFV Beltrame Group is commercially present in all European markets as well as in the Mediterranean region through shares in local companies, agents, or the internal sales force.

All employees, amounting to approximately **2,250 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, Environment and Energy (QHSEE)**, all production plants have adopted an Integrated Management System.



Life Cycle Assessment of San Giovanni Valdarno merchant bars.

DETAIL PRODUCT DESCRIPTION

This EPD refers to construction products hot rolled structural merchant bars produced at Vicenza plant, with electric arc furnace route, starting from post and pre consumer steel scraps, varying steel grades, e.g. S235, S275, S355, etc.

DECLARED UNIT (D.U.) The declared unit is 1 tonne (1000 kg) of hot rolled merchant bars.

PRODUCT DIMENSIONS AND SPECIFIC STANDARDS:

- ▶ EN 10025-1:2019
- ▶ EN 10025-2:2019
- ▶ EN 10025-5:2019,
- ▶ Attestation of conformity system 2+ (CE marking)

PRODUCT	STANDARD	DIMENSIONS (mm)		THICKNESS (mm)	
		from	to	from	
Tees	EN 10055:1995/DIN 59051	20	35	3	5,5
Angles	EN 10056-1:1998 EN 10056-2:1993	15	50	3	5
Angles sharp edges	DIN 1022:2004	20	50	3	5
Flats	EN 10058:2003	10	50	3	10
Squares	EN 10059:2003	-	-	10	30
Rounds	EN 10060:2003	-	-	6	30
U channels	EN 10279:2000	25	30	4	5

CONTACTS

EPD OWNER: AFV ACCIAIERIE BELTRAME SPA, Piazza Giacomo Matteotti, 13, 52027 San Giovanni Valdarno Arezzo - Italy
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Technical support to Beltrame Group was provided by Spinlife
(via Enrico degli Scrovegni, Padova) and Alperia (Via Dodiciville, Bolzano).



Life Cycle Assessment of San Giovanni Valdarno merchant bars.

SCOPE AND TYPE OF EPD®

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

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-C1-C2-C3-C4-D). Construction installation (A5) and use phase (B1-B7) are modules not declared (ND).

The electricity mix used for AFV is modeled as a mix of electricity taken from the grid with warranty certificates and some without, resulting in a GWP-GHG of 0.265 kg CO₂e/kWh.



TYPE OF EPD®: Product EPD®



REPORT LCA: Report LCA SGV rev. finale 18-12-2023



REFERENCE PERIOD: 1st semester 2023



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



SOFTWARE: SimaPro ver. 9.3 (www.pre.nl)



MAIN DATABASE: Ecoinvent 3.8
Environmental declarations published within the same product category, though originating from different programs, may not be comparable.

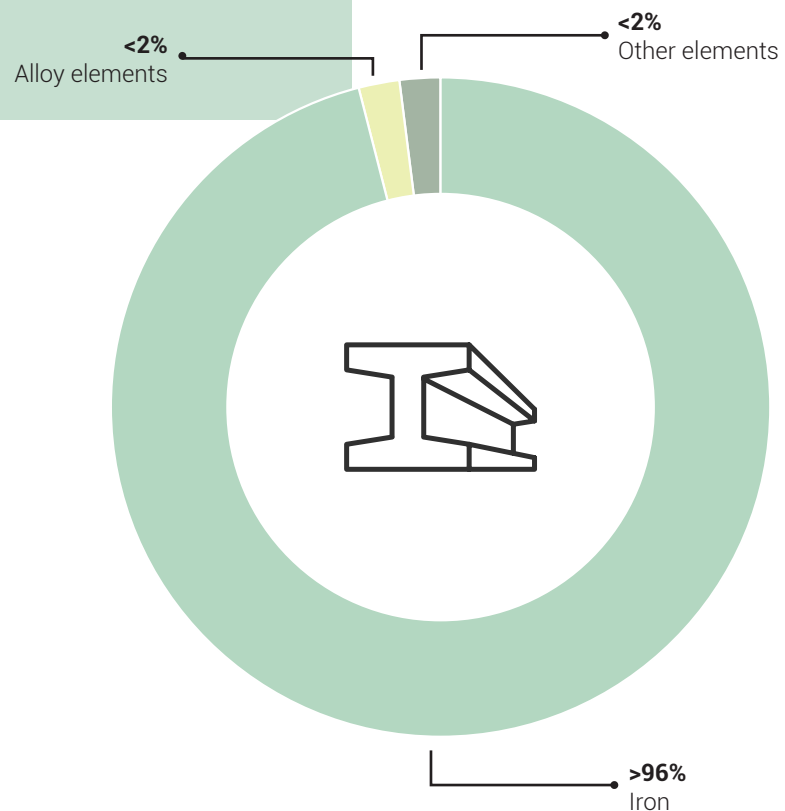
TABLE OF MODULES

	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	
MODULE	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module declared	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	IT	IT	IT	WLD	-	-	-	-	-	-	-	-	WLD	WLD	WLD	WLD	WLD
Specific data used	>75%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	NOT RILEVANT			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-sites	NOT RILEVANT			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Life Cycle Assessment of San Giovanni Valdarno merchant bars.

CONTENT DECLARATION

The product here considered has the following composition:



No packaging is required for functional unit delivery and distribution, and no renewable material is contained in functional unit.

Life Cycle Assessment of San Giovanni Valdarno merchant bars.





ENVIRONMENTAL PERFORMANCE

**AFV BELTRAME GROUP:
LIFE CYCLE ASSESSMENT OF SAN GIOVANNI VALDARNO MERCHANT BARS**

ENVIRONMENTAL PERFORMANCE

GWP: Global warming potential, total;
GWP_b: Global warming potential, biogenic;
GWP_f: Global warming potential, fossil;
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*.

*: The results of these 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.

ENVIRONMENTAL IMPACTS PER DECLARED UNIT

Potential environmental impacts	UNITS / D.U.	UPSTREAM + CORE	DOWNSTREAM					D
		A1-A3 TOTAL	A4	C1	C2	C3	C4	
GWP ^(a)	kg CO ₂ eq	6.00E+02	3.74E+01	6.37E+00	1.65E+01	1.60E+00	8.77E-01	-7.57E+01
GWP _b	kg CO ₂ eq	1.55E+01	4.70E-02	2.14E-03	1.35E-02	4.42E-02	7.49E-04	2.76E-01
GWP _f	kg CO ₂ eq	5.84E+02	3.74E+01	6.37E+00	1.65E+01	1.55E+00	8.76E-01	-7.59E+01
GWP _{luluc} ^(b)	kg CO ₂ eq	2.30E-01	1.55E-02	6.37E-04	6.47E-03	3.49E-03	4.86E-04	-2.23E-02
GWP _{ghg} ^(c)	kg CO ₂ eq	5.88E+02	3.74E+01	6.37E+00	1.65E+01	1.56E+00	8.77E-01	-7.60E+01
ODP	kg CFC11 eq	8.72E-05	8.81E-06	1.38E-06	3.88E-06	9.11E-08	2.52E-07	-2.95E-06
AP	mol H ⁺ eq	1.28E+02	1.66E-01	6.69E-02	1.13E-01	9.26E-03	6.72E-03	-2.75E-01
EP _f	kg P eq	1.73E-01	2.91E-03	1.99E-04	1.07E-03	1.49E-03	6.43E-05	-2.83E-02
EP _m	kg N eq	2.78E+01	5.12E-02	2.96E-02	4.43E-02	1.76E-03	2.52E-03	-6.28E-02
EP _t	mol N eq	1.09E+02	5.58E-01	3.25E-01	4.84E-01	1.62E-02	2.76E-02	-6.66E-01
POCP	kg NMVOC eq	7.93E+01	1.77E-01	8.93E-02	1.33E-01	4.53E-03	7.73E-03	-3.87E-01
ADPE ^(d)	kg Sb eq	9.15E-04	9.09E-05	3.31E-06	5.78E-05	1.47E-05	2.77E-06	8.15E-05
ADPF ^(d)	MJ	9.27E+03	5.86E+02	8.83E+01	2.53E+02	3.24E+01	1.69E+01	-7.67E+02
WDP*	m ³ world eq.deprived	3.21E+02	2.14E+00	1.33E-01	7.40E-01	3.66E-01	3.58E-01	-4.35E+00

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

(a) The total global warming potential (GWP-total) is the sum (see C.2) of GWP-fossil, GWP-biogenic, GWP-luluc.

(b) It is permitted to omit GWP-luluc as separate information if its contribution is <5 % of GWP-total over the declared modules excluding module D.

(c) The GWP-GHG indicator is identical to GWP-total except that the characterisation factor (CF) for biogenic CO₂ is set to zero.

(d) The abiotic depletion potential is calculated and declared in two different indicators: ADP-minerals&metals include all non-renewable, abiotic material resources (i.e. excepting fossil resources); ADP-fossil include all fossil resources and includes uranium.

(e) Ultimate reserve model of the ADP-minerals&metals model.

Life Cycle Assessment of San Giovanni Valdarno merchant bars.

ENVIRONMENTAL PERFORMANCE

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 resources	UNITS / D.U.	UPSTREAM + CORE	DOWNSTREAM					D
		A1-A3 TOTAL	A4	C1	C2	C3	C4	
PERE	MJ	1.04E+03	7.31E+00	3.83E-01	2.66E+00	5.44E+00	1.42E-01	-7.35E+00
PERM	MJ	1.42E+02	2.09E+00	1.13E-01	8.86E-01	8.21E-01	5.34E-02	-6.48E+00
PERT	MJ	1.18E+03	9.40E+00	4.96E-01	3.55E+00	6.26E+00	1.96E-01	-1.38E+01
PENRE	MJ	9.27E+03	5.86E+02	8.83E+01	2.53E+02	3.24E+01	1.69E+01	-7.68E+02
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	9.27E+03	5.86E+02	8.83E+01	2.53E+02	3.24E+01	1.69E+01	-7.68E+02
SM	MJ	1.19E+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
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	8.51E+00	7.39E-02	4.45E-03	2.62E-02	2.66E-02	8.81E-03	-1.16E-01

ENVIRONMENTAL PERFORMANCE

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.

OUTPUT FLOWS AND WASTE CATEGORIES PER DECLARED UNIT

Use of resources	UNITS / D.U.	UPSTREAM + CORE	DOWNSTREAM					D
		A1-A3 TOTAL	A4	C1	C2	C3	C4	
HWD	kg	1.38E-02	1.41E-03	2.42E-04	6.62E-04	2.83E-05	3.59E-05	-8.60E-03
NHWD	kg	2.58E+02	5.28E+01	1.20E-01	1.29E+01	1.25E-01	5.05E+01	-2.23E+00
RWD	kg	2.56E-02	3.95E-03	6.10E-04	1.71E-03	2.35E-04	1.12E-04	-6.59E-04
CRU	kg	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	0.00E+00	0.00E+00	9.50E+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
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00



CALCOLATION RULES

**AFV BELTRAME GROUP:
LIFE CYCLE ASSESSMENT OF SAN GIOVANNI VALDARNO MERCHANT BARS**

CALCOLATION RULES

METHODOLOGY

The environmental burden of the product has been calculated according to the GPI v. 4.0 issued by the International EPD System¹ (Cradle to gate with options).

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

Merchant bars at plant level was described by using specific data from San Giovanni Valdarno plant for the 1st semester 2023, the amount of merchant bars produced is 25.375 tons.

Customized LCA² 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 was not considered according to PCR, while transport to final destination (A4) and end-of-life phases (C1-C2-C3-C4-D) were considered. A distance of 200 km from operation plant and dismantling site was adopted. According to PEFCR a collection rate of 0,95 was adopted. Therefore, in nominal installation and operating conditions, no emissions to air nor to water shall occur.

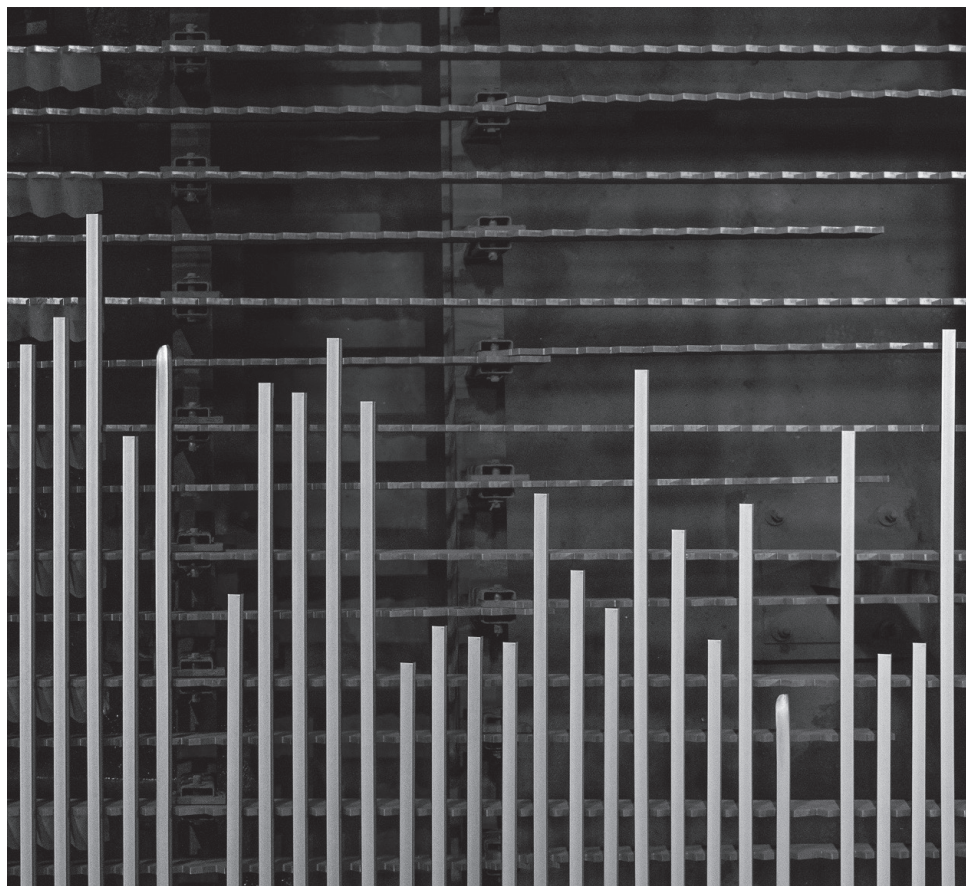
Data quality has been assessed and validated during data collection process. According to EN:15804 the applied cut-off criterion for mass and energy flows is 1%.

DECLARED UNIT

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

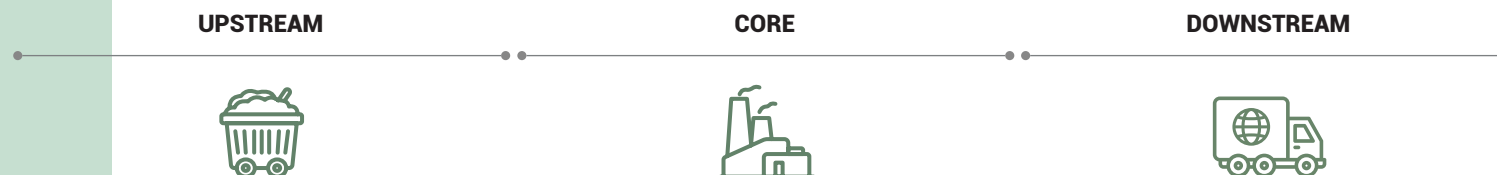
¹⁾ International EPD System is managed by EPD International AB (www.environdec.com).

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



Life Cycle Assessment of San Giovanni Valdarno merchant bars.

CALCOLATION RULES



According to the PCR 2019:14 v. 1.3.1 the main activities are listed and divided in three subsystems: **UPSTREAM Process, CORE Module, DOWNSTREAM Process.**

UPSTREAM		CORE		DOWNSTREAM	
A1	Scrap pre-treatment	A2/ A3	Supplying transport	A4	Distribution
	Demolition		Billets production	C1	De-costruction/demolition
	Shearing		Hot rolling process	C2	Transport
	Crushing		Packaging	C3	Waste processing
	Material and energy ware production		Internal handing	C4	Disposal
	Other raw materials		Ancillary activities	D	Reuse-Recovery-Recycling potential
	Energy		Air emission		
			Water emission		
			Wastes		

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 consume steel scrap collection.



Production of virgin materials, alloy elements and ancillaries.



Specific secondary materials pre-treatments, where appropriate.



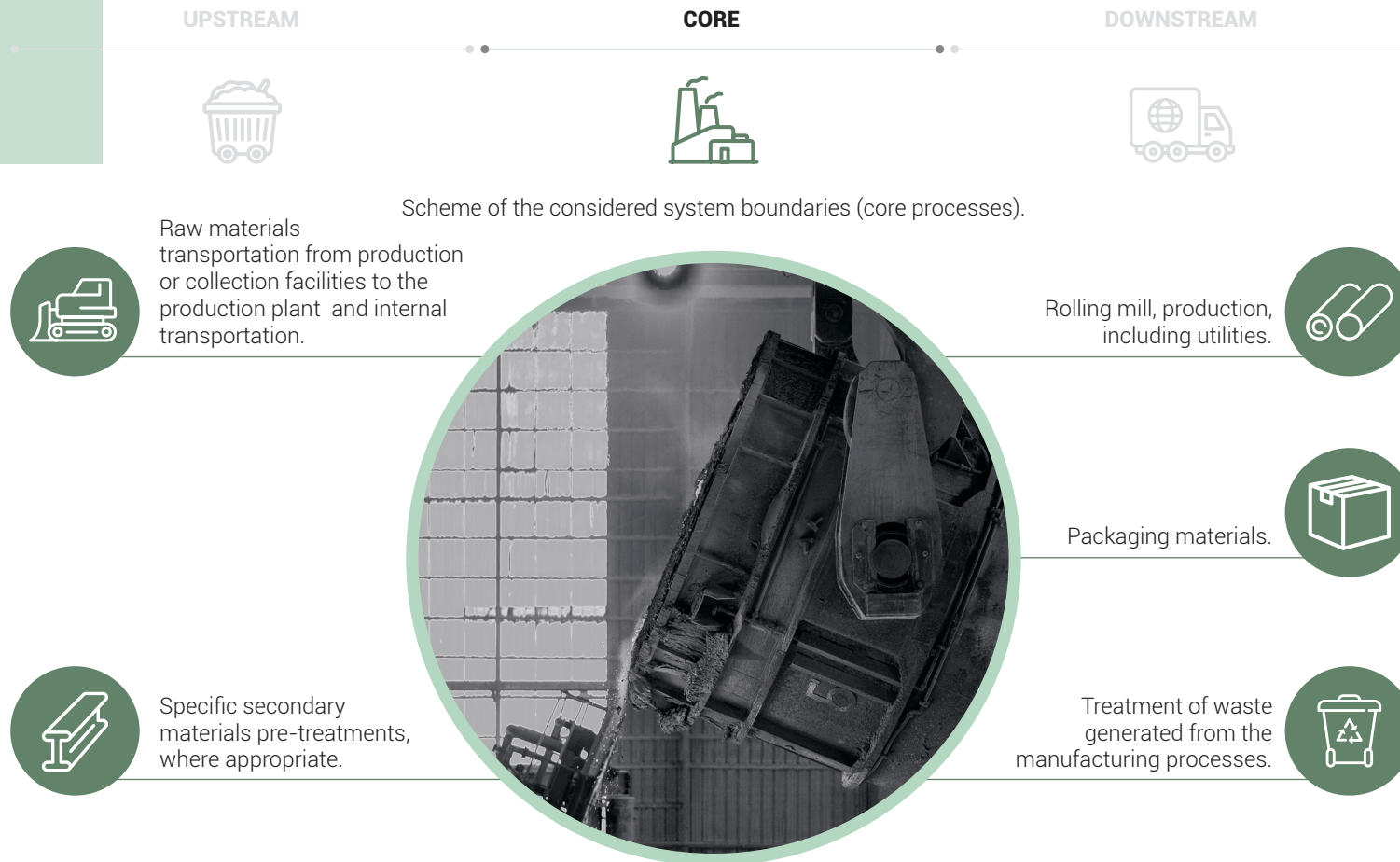
Generation of electricity and other fuels from primary and from secondary energy resources (excluding waste treatments).



A1 - Raw Materials Supply

Life Cycle Assessment of San Giovanni Valdarno merchant bars.

CORE PROCESS



A2 - Transportation + A3 - Manufacturing

Life Cycle Assessment of San Giovanni Valdarno merchant bars.

DOWNSTREAM PROCESS

UPSTREAM

CORE

DOWNSTREAM



A4

DISTRIBUTION

Transport to the customers. Distances estimated considering the transported quantities and the distances from Vicenza plant to the client. Final products are delivered to many national and international areas.



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).

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:
 - appropriate collection and storage to facilitate specific treatments;
 - on-site recovery and recycling of specific by-products from the different processes;
 - external recovery of filter dusts in the non-ferrous metal industry (zinc, lead);
 - separation of scale in the water treatment process and external recovery in the cement and blast-furnace industry;
 - 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 general EPD[®] requirements the LCA study used specific, generic and other generic data. This last data contributes to the environmental indicators (less than 10%).
6. There is pre-consumer and post-consumer recycled material content in all products, derived from iron scrap. The environmental indicator "Use of secondary raw materials - SM" does not indicate the precise amount of recycled, as the recycled content must take into account any percentages of internal waste generated during the production process, not counting these as recycled. The total recycled content (>95%) represents the sum of the purchased scraps splitted between Pre-consumer and Post-consumer.

PRODUCT	PRE-CONSUMER RECYCLED CONTENT (%)	POST-CONSUMER RECYCLED CONTENT (%)
Billets / Hot rolled merchant bars	41%	55%



Life Cycle Assessment of San Giovanni Valdarno merchant bars.

REFERENCES

- EN 15804:2012+A2:2019
- ISO 14040 : 2021
- ISO 14044 : 2021
- General Programme Instructions, v 4.0
- PCR 2019:14 - Construction products - v 1.3.1
- REPORT LCA: Report LCA SGV rev. finale 18-12-2023
- **Differences Versus Previous Versions**
 - 2023-12-18 Version 1
 - 2024-01-30 Version 1.1
 - Editorial change:* Modify EPD title
 - 2024-02-20 Version 2
 - New verification:* Insert climate impact for the electricity (GWP-GHG).
 - Modify % specific data





 **EPD**®
THE INTERNATIONAL EPD® SYSTEM

