ENVIRONMENTAL PRODUCT DECLARATION

GREENSTONE INDUSTRIAL CONSTRUCTION AGGREGATE

FERALPI GROUP

EPD® ENVIRONMENTAL PRODUCT DECLARATION

ECO PLATFORM EPD EN 15804 VERIFIED

Based on:
PCR 2019:14
Construction products
v 1.11, 2021-02-05

EN:15804:2012+A2:2019

ISO 14025

Certification N°:
S-P-01699

CPC code:
41

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2021-10-08- revision 1

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2026-01-22

PROGRAMME:
The International EPD System
www.environdec.com

PROGRAMME OPERATOR:
EPD International AB

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

EPD REFERENCES

EPD OWNER: FERALPI SIDERURGICA SPA - FERALPI GROUP, VIA NICOLA PASINI 11, 25017 LONATO, BRESCIA - ITALY
MANUFACTURING PLANT IS LOCATED IN THE SAME SITE

PROGRAM OPERATOR: EPD INTERNATIONAL AB, BOX 21060, SE-100 31 STOCKHOLM, SWEDEN; INFO@ENVIRONDEC.COM

INDEPENDENT VERIFICATION

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.

ISO standard ISO 21930 and CEN standard EN 15804 served as the core PCR
PCR 2019:14 Construction products, Version 1.11, 2021-02-05
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 Concepciòn, 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 : 2018

Third party verifier: ICMQ SpA, via De Castillia, 10 20124 Milano (www.icmq.it) ☐ EPD process certification (Internal) ☑ EPD verification (External)

Accredited by: Accredia
Procedure for follow-up during EPD validity involves third party verifier: ☑ YES ☐ NO

Environmental declarations published within the same product category, but from different programmes 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

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

COMPANY PROFILE

The Feralpi Group is one of Europe's leading manufacturers of steels for use in building construction. The parent company Feralpi Siderurgica, which was set up in 1968 in Lonato del Garda, near Brescia, has developed steadily over the years to form a group of industries that currently more than two million tonnes of steel and rolled products a year, and has a workforce of 1500 permanent employees in Italy, Europe and North Africa.
In over fifty years of business, the company has branched out to foreign markets and have been able to face the challenge of an increasingly globalized steel industry. Starting from its lengthy tradition in steel manufacturing, the Group has developed according to a strategy of diversification into new products and markets, which has involved not only the internal organisation but also external transactions thanks to the acquisition of numerous enterprises operating in this industry. The Feralpi Group also operates in the field of special steels, cold working, structural steelwork, the environment and fish farming, not to mention financial activities and investments.

Since its very origins, Feralpi has focused not only on producing the best steel grades for building construction but also on doing it in the most sustainable possible way, which has involved reducing energy consumption and emissions by using the latest technology available or developing in-house new solutions covered by patents as a result of intensive innovation and research.

Feralpi, an international diversified group (2020)

2.48 million tons	Steel production
2.28 million tons	Hot rolled production
1.31 million tons	Cold rolled productis and derivatives
1 238 million euros	Turnover
63%	Turnover abroad
1 710	Employees (2020)
55.6 million euros	Technical investments

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. 9.1.1.1
MAIN DATABASE: Ecoinvent 3.6
REPORT LCA: Life Cycle Assessment (LCA) applied to steel mill products and derivatives for EPD® purposes - final report
GEOGRAPHICAL SCOPE OF THE EPD: World according to sales market conditions
TYPE OF EPD: specific for Greenstone recycled construction aggregate

THE PRODUCT

Greenstone is an industrial construction aggregate. Black slag arising from the Electric Arc Furnace process represents the core material of the aggregate. This residue is a ternary blend of oxides which is 100% inert thanks to a customized process patented in collaboration with Politecnico di Milano.
Once produced and transformed, the black slag becomes Greenstone; the product has several granulometries certified via 2+ system and according to UNI EN 13242.

The aggregate is sold to external companies to be used in road pavements, cement aggregates and bituminous conglomerates. The adoption of the Greenstone aggregate allows to avoid the depletion of inert natural materials such as gravel, with savings in terms of land use.

Declared unit for the study is **one tonne of Greenstone construction aggregate**.

INFORMATION	DESCRIPTION
PRODUCT IDENTIFICATION	Greenstone recycled construction aggregate coming from black slag
PRODUCT FEATURES	**CE mark using 2+ scheme according to the following standards**: - GREENSTONE 0-90: UNI EN 13242 - GREENSTONE 0-120: UNI EN 13242 - GREENSTONE 0-200: UNI EN 13242 - GREENSTONE 20-120: UNI EN 13242
PRODUCT PROPERTIES (UNDER EN10080:2005)	**Granulometry [d/D]**: - GREENSTONE 0-90: 0/90 - GREENSTONE 0-120: 0/100 - GREENSTONE 0-200: 0/150 - GREENSTONE 20-120: 16/125
	Volumic mass [t/m³]: - GREENSTONE 0-90: 3.48 - GREENSTONE 0-120: 3.58 - GREENSTONE 0-200: 3.56 - GREENSTONE 20-120: 3.48
	Watr absorption [%]: - GREENSTONE 0-90: 1.90 - GREENSTONE 0-120: 1.90 - GREENSTONE 0-200: 1.30 - GREENSTONE 20-120: 1.60
	Chemical evaluation and release of substances within the thresholds included in DM 186/06 for the whole Greenstone spectrum
PLANT FEATURES	Total amount of products covered by this EPD, year 2020: 35 880 t
	Total production, for selling purpose, year 2020: 35 880 t
	On-site air emission control system
	On-site system to recycle process water
	On-site system to recycle water used in process
	In/out materials/products and melting process monitored to prevent nuclear radiation
	In house photovoltaic plant of 625 kW peak capacity operating since 2011

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.

ENVIRONMENTAL IMPACTS PER DECLARED UNIT

TABLE OF MODULES POTENTIAL ENVIRONMENTAL IMPACTS	UNITS / D.U.	UPSTREAM	CORE PROCESS		DOWNSTREAM					TOTAL	D
		A1	A2	A3	A4	C1	C2	C3	C4		
GWP	kg CO_2 eq	1,46E+01	6,04E+00	9,76E+00	2,75E+00	5,38E+01	3,44E+01	0,00E+00	2,52E+00	**1,24E+02**	0,00E+00
GWP,f	kg CO_2 eq	1,46E+01	6,04E+00	9,76E+00	2,75E+00	5,38E+01	3,44E+01	0,00E+00	2,52E+00	**1,24E+02**	0,00E+00
GWP,b	kg CO_2 eq	5,90E-03	2,65E-03	5,25E-03	1,49E-04	3,62E-03	1,86E-03	0,00E+00	3,34E-04	**1,98E-02**	0,00E+00
GWP,luluc	kg CO_2 eq	1,24E-03	6,23E-05	1,75E-03	2,10E-05	7,88E-04	2,63E-04	0,00E+00	6,21E-05	**4,18E-03**	0,00E+00
GWP,ghg	kg CO_2 eq	1,46E+01	6,04E+00	9,76E+00	2,75E+00	5,38E+01	3,44E+01	0,00E+00	2,52E+00	**1,24E+02**	0,00E+00
ODP	kg CFC11 eq	3,60E-06	1,40E-06	2,01E-07	6,44E-07	1,21E-05	8,05E-06	0,00E+00	5,26E-07	**2,65E-05**	0,00E+00
AP	mol H+ eq	6,23E-02	3,49E-02	8,89E-02	1,59E-02	5,81E-01	1,99E-01	0,00E+00	2,60E-02	**1,01E+00**	0,00E+00
EP,f	kg P eq	2,75E-04	7,80E-06	1,22E-04	1,51E-06	4,02E-05	1,89E-05	0,00E+00	9,10E-06	**4,75E-04**	0,00E+00
EP,m	kg N eq	1,11E-02	1,39E-02	3,99E-02	6,41E-03	2,60E-01	8,01E-02	0,00E+00	1,13E-02	**4,23E-01**	0,00E+00
EP,t	mol N eq	1,24E-01	1,52E-01	4,39E-01	7,04E-02	2,86E+00	8,80E-01	0,00E+00	1,24E-01	**4,64E+00**	0,00E+00
POCP	kg NMVOC eq	3,89E-02	3,97E-02	1,16E-01	1,83E-02	7,81E-01	2,29E-01	0,00E+00	3,45E-02	**1,26E+00**	0,00E+00
ADPE	kg Sb eq	2,05E-06	2,52E-07	3,02E-06	1,18E-07	2,68E-06	1,47E-06	0,00E+00	1,17E-07	**9,71E-06**	0,00E+00
ADPF	MJ	3,06E+02	8,65E+01	3,45E+01	3,93E+01	7,44E+02	4,92E+02	0,00E+00	3,36E+01	**1,74E+03**	0,00E+00
WDP	m^3	1,26E+00	7,54E-02	5,01E+00	-8,38E-03	1,52E-01	-1,05E-01	0,00E+00	1,18E-02	**6,39E+00**	0,00E+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*
*: The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator

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

RESOURCE USE PER DECLARED UNIT

USE OF RENEWABLE MATERIAL RESOURCES	UNITS / D.U.	UPSTREAM	CORE PROCESS		DOWNSTREAM					TOTAL	D
		A1	A2	A3	A4	C1	C2	C3	C4		
PERE	[MJ]	1,40E+01	6,82E-01	3,85E+00	5,79E-02	1,18E+00	7,23E-01	0,00E+00	1,40E-01	**2,06E+01**	0,00E+00
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]	1,40E+01	6,82E-01	3,85E+00	5,79E-02	1,18E+00	7,23E-01	0,00E+00	1,40E-01	**2,06E+01**	0,00E+00
PENRE	[MJ]	3,37E+02	8,50E+01	3,88E+01	3,84E+01	7,28E+02	4,80E+02	0,00E+00	3,35E+01	**1,74E+03**	0,00E+00
PENRM	[MJ]	0,00E+00	0,00E+00	3,03E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**3,03E+00**	0,00E+00
PENRT	[MJ]	3,37E+02	8,50E+01	4,19E+01	3,84E+01	7,28E+02	4,80E+02	0,00E+00	3,35E+01	**1,74E+03**	0,00E+00
SM	[kg]	9,74E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**9,74E+02**	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]	4,02E-02	4,18E-03	1,30E-01	7,79E-04	1,87E-02	9,74E-03	0,00E+00	9,61E-04	**2,04E-01**	0,00E+00

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

WASTE GENERATION AND TREATMENT	UNITS / D.U.	UPSTREAM	CORE PROCESS		DOWNSTREAM					TOTAL	D
		A1	A2	A3	A4	C1	C2	C3	C4		
HWD	[kg]	0,00E+00	0,00E+00	4,44E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**4,44E-02**	0,00E+00
NHWD	[kg]	0,00E+00	0,00E+00	7,85E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**7,85E-01**	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	2,26E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**2,26E+01**	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

CALCULATION RULES

The environmental burden of the product has been calculated according to EN 15804:2012+A2:2019 and PCR 2019:14 v 1.11.

This declaration is a cradle to gate with options EPD type, based on the application of Life Cycle Assessment (LCA) methodology to the whole life-cycle system.
In the whole LCA model, infrastructures and production equipments are not taken into account. Greenstone production at plant level were described by using specific data from manufacturing facility (Lonato del Garda, BS, Italy) for year 2020.

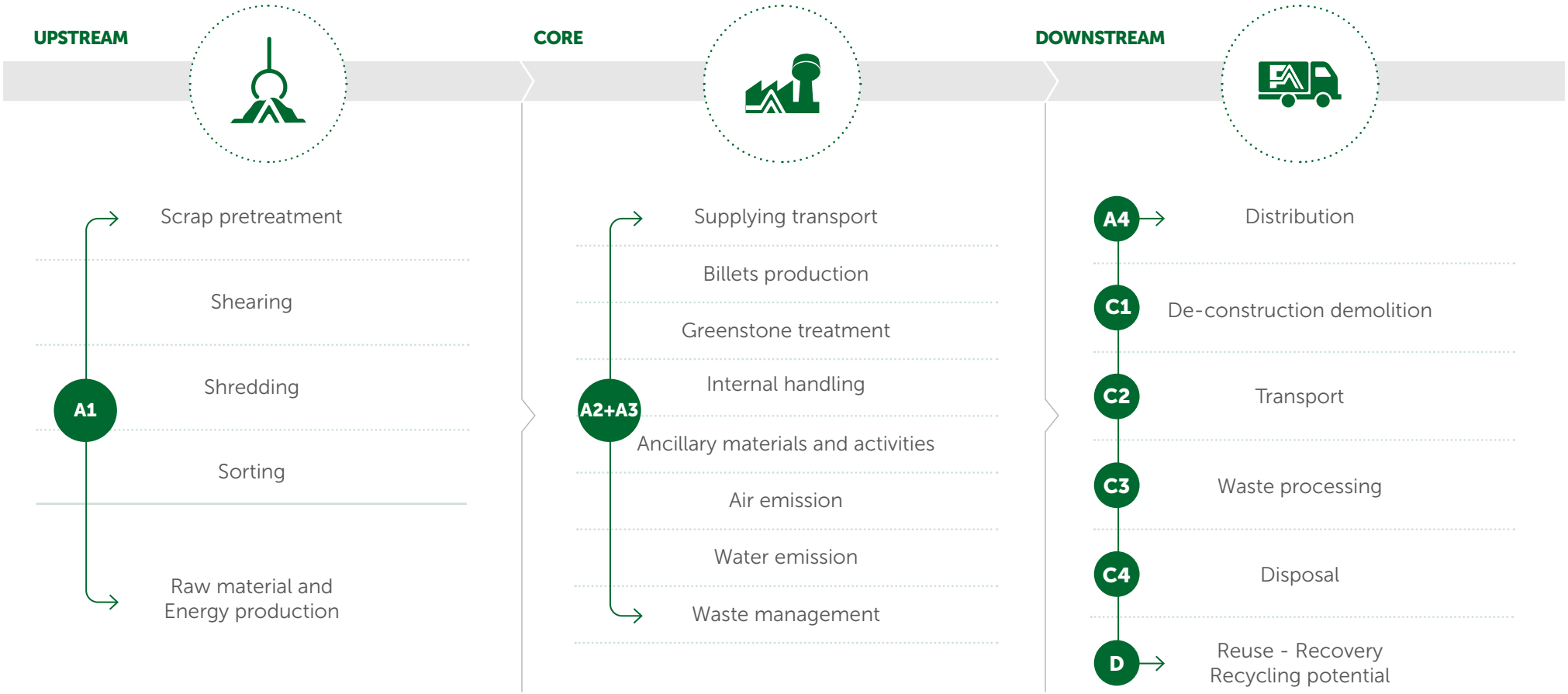
Customized LCA questionnaires were used to gather in-depth information about all aspects of the production system (for example, raw materials contents and specifications, pre treatments, process efficiencies, air and water emissions, waste management), in order to provide a complete picture of the environmental 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 2019:14 v 1.11, while transport to final destination (A4) and end of life (C1-C2-C3-C4-D) were considered. Greenstone product is certified as inert acording to multiple laboratory tests performed by Feralpi Group; therefore no emissions to air nor to water occur during operation. 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%.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION



Broad scheme of Greenstone construction aggregate 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**.

UPSTREAM PROCESS

UPSTREAM | CORE | DOWNSTREAM

Steel scrap collection (shredded both in external and internal plants) and other raw materials production

Production of alloy elements

Scheme of the considered system boundaries (Upstream processes)

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

CORE PROCESS

UPSTREAM | **CORE** | **DOWNSTREAM**

A2 - Transportation

Raw materials transportation from production or collection facilities to the production plant

Scheme of the considered system boundaries (core processes)

Steel mill production, including utilities

Greenstone production, including utilities

Internal transportation

Treatment of waste generated from the manufacturing processes

A3 - Manufacturing

DOWNSTREAM PROCESS

UPSTREAM | CORE | DOWNSTREAM

A4
Distribution

Transport to the customers (general market average). Distances estimated considering the transported quantities and the distances from Lonato del Garda (BS) plant to the client. Final products are delivered to many national (100% of the total sold product). The means of transport used to deliver the greenstone aggregate are truck. On average, finished product is transported for 20 km by road.

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).

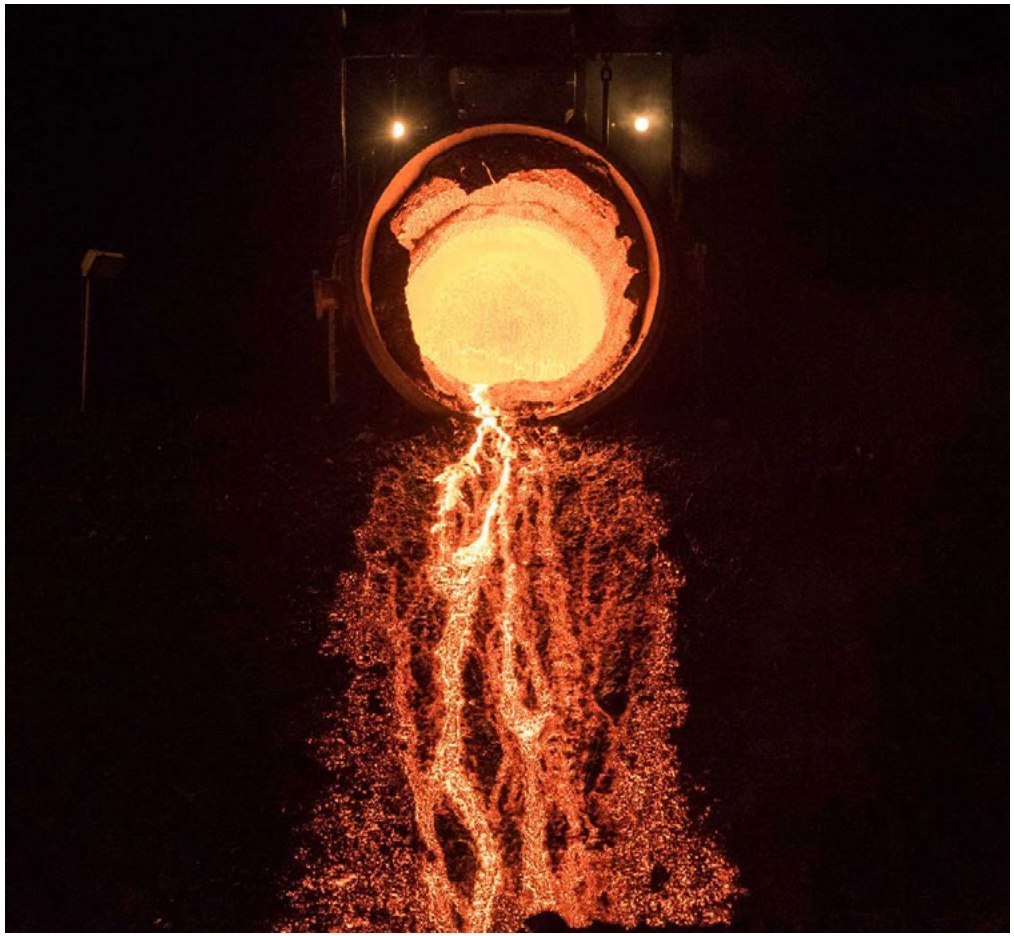
OTHER OPTIONAL ADDITIONAL ENVIRONMENTAL INFORMATION

Feralpi plant in Lonato del Garda (BS) is equipped with prevention and reduction systems for air emissions, a recirculating loop cooling to minimize water consumption and a waste management plan to prevent and reduce waste generation,

In accordance with general EPD® requirements the LCA study used specific, generic and proxy data. These last data are contributing to the environmental indicators less than 10%.

OTHER ENVIRONMENTAL INDICATORS		UNIT	UP	CORE	DOWN	TOTAL
AIR EMISSIONS	Dust from core process	[g]	-	0.15	-	**0.15**
	CO_2 from core process	[kg]	-	3.00	-	**3.00**
WATER EMISSIONS	Total Suspended Solids	[g]	-	0.09	-	**0.09**

Other environmental indicators per 1 t of Greenstone construction aggregate



REFERENCES

- EN 15804:2012+A2:2019

- ISO 14040

- ISO 14044

- Life Cycle Assessment (LCA) applied to steel mill products and derivatives for EPD® purposes - final report

- General Programme Instructions, v4.0

- PCR 2019:14 - Construction products - v 1.11