



ENVIRONMENTAL PRODUCT DECLARATION

GREENSTONE RECYCLED CONSTRUCTION AGGREGATE



Based on:

PCR 2012:01

Construction products
and Construction services,

v 2.3 2018-11-15

EN:15804:2014

Certification N°:

S-P-01699

CPC code:

41

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2019 - 10 - 17 - revision 1

Valid until:

2024 - 10 - 17

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: THE INTERNATIONAL EPD® SYSTEM - SWEDEN

INDEPENDENT VERIFICATION

This declaration has been developed referring to the International EPD System, following the General Programme Information; further information and the document itself are available at: www.environdec.com. 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 2012:01 v 2.3)
PCR review conducted by the technical committee of the International EPD® System

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 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.

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 (2018)

	2 503 million tons	Steel production
	2 089 million tons	Hot rolled production
	799 137 tons	Cold rolled products and derivatives
	1 320 million euros	Turnover
	62%	Turnover abroad
	1 548	Employees (2018)
	60.6 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
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. 9.0.0.47

MAIN DATABASE: Ecoinvent 2.2

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 a recycled 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 12620, 13043 and 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	<p>CE mark using 2+ scheme according to the following standards:</p> <ul style="list-style-type: none"> - GREENSTONE 4-20: UNI EN 13242-12620-13043 - 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)	<p>Granulometry [d/D]:</p> <ul style="list-style-type: none"> - GREENSTONE 4-20: 4/16 - GREENSTONE 0-90: 0/90 - GREENSTONE 0-120: 0/100 - GREENSTONE 0-200: 0/150 - GREENSTONE 20-120: 16/125 <p>Volumic mass [t/m³]:</p> <ul style="list-style-type: none"> - GREENSTONE 4-20: 3.58 - GREENSTONE 0-90: 3.48 - GREENSTONE 0-120: 3.58 - GREENSTONE 0-200: 3.56 - GREENSTONE 20-120: 3.48 <p>Watr absorption [%]:</p> <ul style="list-style-type: none"> - GREENSTONE 4-20: 1.80 - GREENSTONE 0-90: 1.90 - GREENSTONE 0-120: 1.90 - GREENSTONE 0-200: 1.30 - GREENSTONE 20-120: 1.60 <p>Chemical evaluation and release of substances within the thresholds included in DM 186/06 for the whole Greenstone spectrum</p> <p>Total amount of products covered by this EPD, year 2018: 92 017 t</p> <p>Total production, for selling purpose, year 2018: 1 122 481 t</p>
PLANT FEATURES	<p>On-site air emission control system</p> <p>On-site system to recycle process water</p> <p>On-site system to recycle water used in process</p> <p>In/out materials/products and melting process monitored to prevent nuclear radiation</p> <p>In house photovoltaic plant of 625 kW peak capacity operating since 2011</p>

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). 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.

TABLE OF MODULES						
 POTENTIAL ENVIRONMENTAL IMPACTS	UNITS / D.U.	UPSTREAM		CORE		TOTAL
		A1 	A2 	A3 	A4 	
GWP	kg CO ₂ eq	24	7	10	7	49
ODP	g CFC 11eq	0.0030	0.0012	0.0004	0.0014	0.0058
POCP	kg C ₂ H ₄ eq	0.004	0.001	0.001	0.001	0.007
AP	kg SO ₂ eq	0.086	0.029	0.050	0.031	0.196
EP	kg PO ₄ ³⁻ eq	0.0108	0.0056	0.0113	0.0064	0.0341
ADPE	g Sb eq	0.00315	0.00002	0.00587	0.00001	0.00905
ADPF	MJ	458	93	45	102	698

GWP Global warming potential

ODP Depletion potential of the stratospheric ozone layer

POCP Formation potential of tropospheric ozone photochemical oxidants

AP Acidification potential of land and water

EP Eutrophication potential

ADPE Abiotic depletion potential for non-fossil resources

ADPF Abiotic depletion potential for fossil resources

RESOURCE USE PER DECLARED UNIT

USE OF RENEWABLE MATERIAL RESOURCES	UNITS / D.U.	UPSTREAM		CORE		DOWNSTREAM	TOTAL
		A1 	A2 	A3 	A4 		
PERE	[MJ]	17	1	2	0	20	
PERM	[MJ]	0	0	0	0	0	
PERT	[MJ]	17	1	2	0	20	
PENRE	[MJ]	503	95	56	103	756	
PENRM	[MJ]	9	0	0	0	9	
PENRT	[MJ]	512	95	56	103	765	
SM	[kg]	995	0	0	0	995	
RSF	[MJ]	0	0	0	0	0	
NRSF	[MJ]	0	0	0	0	0	
FW	[m ³]	0.125	0.07	0.164	0.005	0.300	

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		DOWNSTREAM	TOTAL
		A1	A2	A3	A4		
HWD	[kg]	0	0	4	0	4	
NHWD	[kg]	0	0	2	0	2	
RWD	[kg]	0	0	0	0	0	
CRU	[kg]	0	0	0	0	0	
MFR	[kg]	0	0	35	0	35	
MER	[kg]	0	0	0	0	0	
EEE	[MJ]	0	0	0	0	0	
EET	[MJ]	0	0	0	0	0	

- 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



CALCULATION RULES



The environmental burden of the product has been calculated according to EN 15804:2014 and PCR 2012:01 v 2.3.

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 2018.

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).

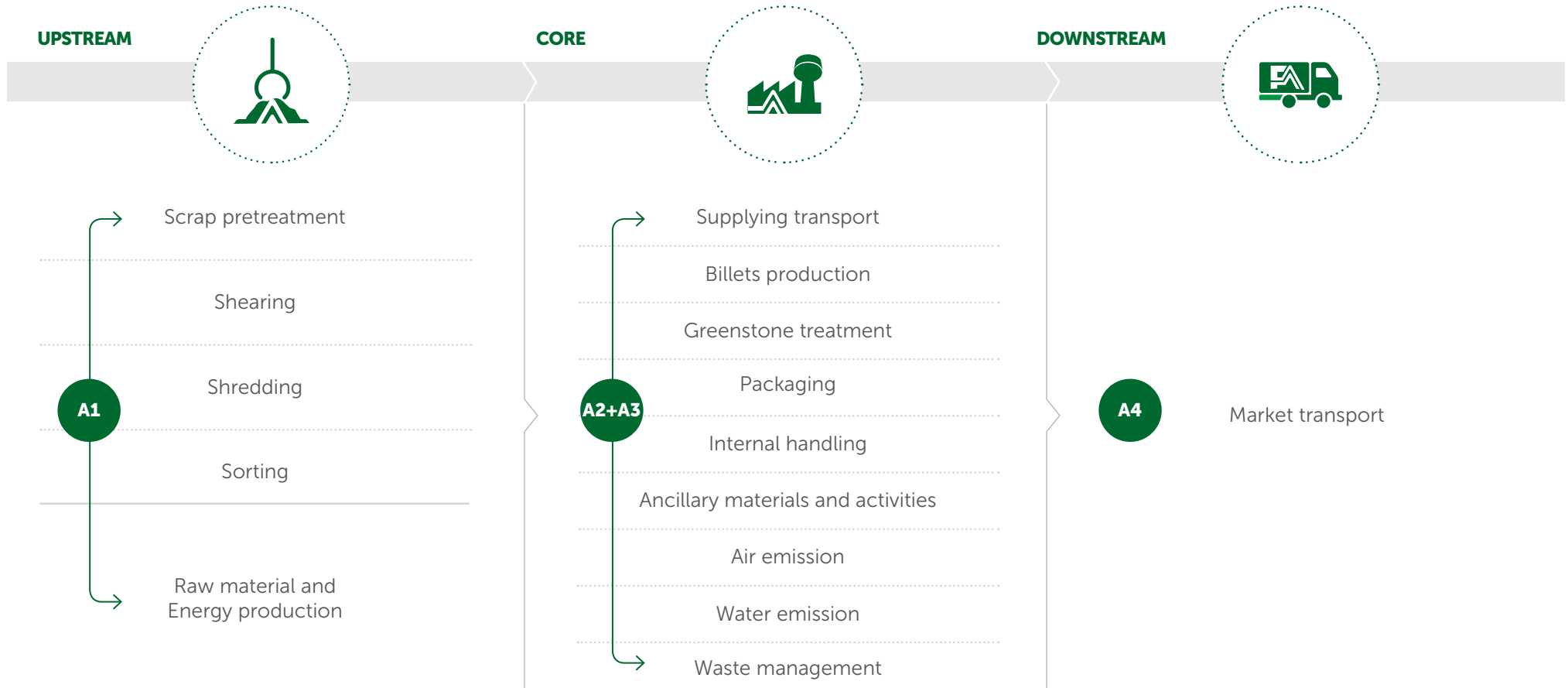
The use phase and end of life were not considered according to EN:15804 and PCR 2012:01 v 2.3, while transport to final destination was considered (A4).

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%.

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



CORE PROCESS



A2 - Transportation



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



Greenstone production, including utilities

Scheme of the considered system boundaries (core processes)



Packaging materials
Internal transportation

Steel mill production, including utilities



A3 - Manufacturing



Treatment of waste generated from the manufacturing processes

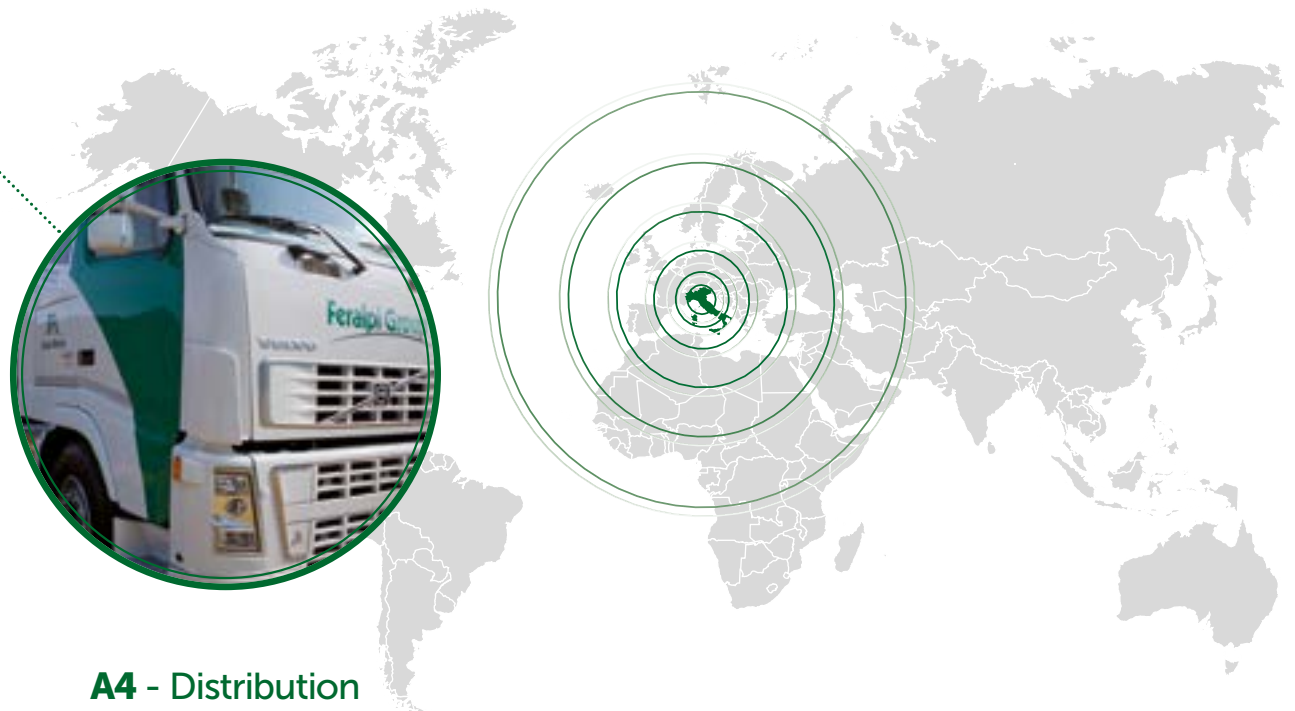
DOWNSTREAM PROCESS



Transport to the customers (general market average). Distances estimated considering the transported quantities and the distances from Brescia's plant to the client.

From Lonato (northern Italy) final product is delivered on national territory.

The mean of transport used to deliver Greenstone aggregate is the truck. On average, the construction product is transported for 53 km by road.



A4 - Distribution

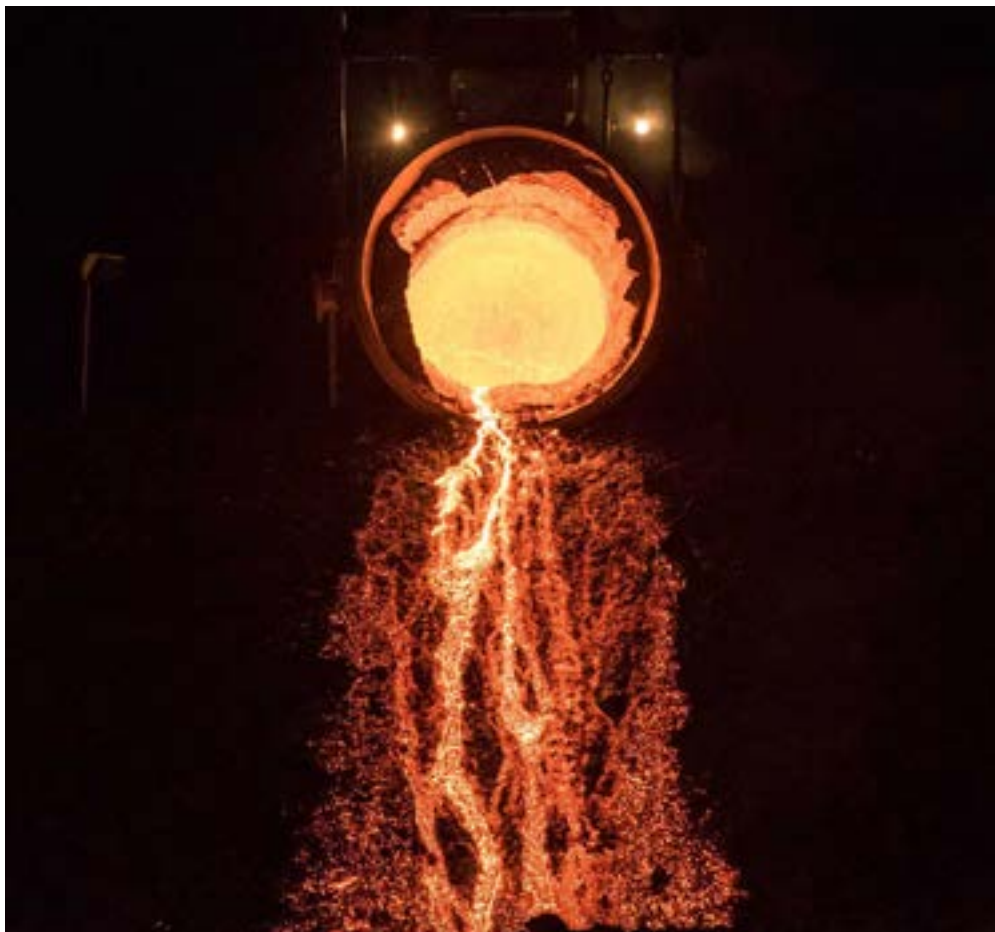
OTHER OPTIONAL ADDITIONAL ENVIRONMENTAL INFORMATION

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]	-	0.109	-	0.109
	CO ₂ from core process	[kg]	-	2.215	-	2.215
WATER EMISSIONS	Total Suspended Solids	[g]	-	0.052	-	0.052

Other environmental indicators per 1 t of Greenstone construction aggregate



REFERENCES

- EN 15804:2014
- ISO 14040
- ISO 14044
- Life Cycle Assessment (LCA) applied to steel mill products and derivatives for EPD® purposes - final report
- General Programme Instructions, v2.5
- PCR 2012:11 - construction products and construction services - v 2.3

