ENVIRONMENTAL PRODUCT DECLARATION

REBAR
MANUFACTURED IN GERLAFINGEN

STAHL GERLAFINGEN
AFV BELTRAME GROUP

EPD® ENVIRONMENTAL PRODUCT DECLARATION

ECO PLATFORM EPD VERIFIED

Based on PCR	Certification N°	Issue date	Valid until
PCR 2019:14 Construction products v 1.11, 2021-02-05 EN:15804:2012+A2:2019 ISO 14025	S-P-05247	2022-03-07	2027-01-17

CPC Code	Programme:	Programme operator:
41	The International EPD System www.environdec.com	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

v.1, 2022-01-18

GENERAL INFORMATION

EPD REFERENCES

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

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: Switzerland 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 : 2010

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.

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AFV BELTRAME GROUP

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

LCE

THE COMPANY

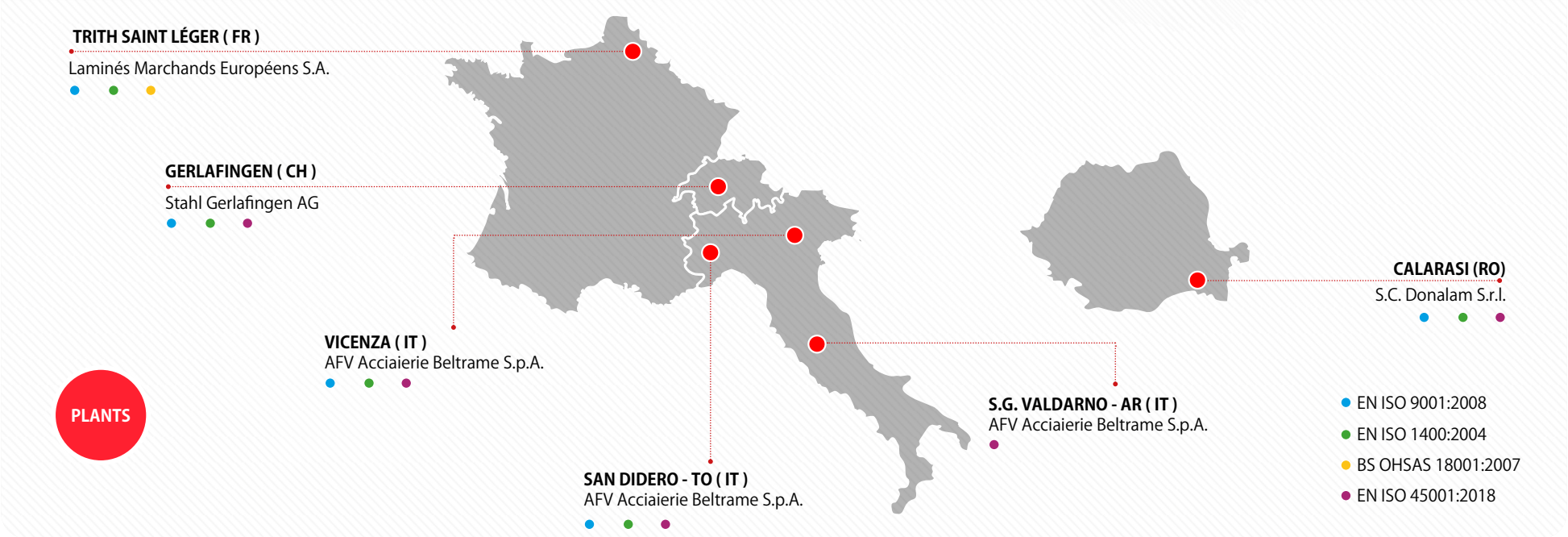
The AFV Beltrame Group has operated in the steel industry for over a century, producing rolled sections for use in construction, shipyards, and excavators.

The facilities, which have a production capacity of approximately **3,2 million tons**, include three electric furnaces and ten rolling mills. These are scattered in six 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 **2,000 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

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	CH	CH	CH	WLD	–	–	–	–	–	–	–	–	WLD	WLD	WLD	WLD	WLD
Specific data used	> 90%			–	–	–	–	–	–	–	–	–	–	–	–	–	–
Variation-products	< 10%			–	–	–	–	–	–	–	–	–	–	–	–	–	–
Variation-sites	NOT RELEVANT			–	–	–	–	–	–	–	–	–	–	–	–	–	–

TYPE OF EPD® : Product EPD®
REPORT LCA: Life Cycle Assessment (LCA) applied to Rebar (WK)
REFERENCE PERIOD: 2020
GEOGRAPHICAL SCOPE OF THE EPD: World according to sales market conditions.
AVERAGING: Not applied.

SOFTWARE: SimaPro ver. 9.2.0.1 (www.pre.nl)
MAIN DATABASE: Ecoinvent 3.6
Environmental declarations published within the same product category, though originating from different programs, may not be comparable.

DETAILED PRODUCT DESCRIPTION

This EPD refers to Rebar (WK), produced at **Gerlafingen (Switzerland)** plant via electric arc furnace route and rolling mill, starting from post and pre consumer steel scraps, varying steel grades, e.g. S235, S275, S355 etc.. The total amount of products covered by this EPD, year 2020: 593 883 t.

CONTENT DECLARATION

MATERIAL	MASS SHARE
IRON	96 %
ALLOY ELEMENTS	2 %
OTHER ELEMENTS	2 %

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

PRODUCT DIMENSIONS AND SPECIFIC STANDARDS:

- SIA 262
- DIN 488-2
- NFA 35-080-1
- NEN 6008

PRODUCT	STANDARD	THICKNESS (mm)	
		from	to
Compact coils	B500B	6	20
Bars	B500C	14	40
Meshes / Accessoires	B500B/A	5	10

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

DECLARED UNIT (D.U.) The declared unit is 1 tonne (1 000 kg) of Rebar

GERLAFINGEN - AFV BELTRAME GROUP - REBAR

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 indicator 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.

ENVIRONMENTAL IMPACTS PER DECLARED UNIT

POTENTIAL ENVIRONMENTAL IMPACTS	UNITS / D.U.	UPSTREAM	CORE		DOWNSTREAM					TOTAL*	D
		A1	A2	A3	A4	C1	C2	C3	C4		
GWP	kg CO_2 eq	1,19E+02	1,09E+01	2,38E+02	7,92E+00	5,11E+01	2,60E+01	2,64E+00	1,26E-01	**4,57E+02**	-1,20E+02
GWP,f	kg CO_2 eq	1,19E+02	1,09E+01	2,38E+02	7,92E+00	5,11E+01	2,60E+01	2,63E+00	1,26E-01	**4,56E+02**	-1,20E+02
GWP,b	kg CO_2 eq	2,21E-01	5,56E-04	3,03E-01	4,09E-04	3,44E-03	1,41E-03	7,89E-03	1,67E-05	**5,38E-01**	-2,57E-02
GWP,luluc	kg CO_2 eq	6,83E-02	7,87E-05	1,23E-01	5,75E-05	7,48E-04	1,99E-04	5,44E-03	3,11E-06	**1,98E-01**	-1,23E-02
GWP,ghg	kg CO_2 eq	1,19E+02	1,09E+01	2,38E+02	7,92E+00	5,11E+01	2,60E+01	2,64E+00	1,26E-01	**4,56E+02**	-1,20E+02
ODP	kg CFC11 eq	3,46E-05	2,47E-06	4,06E-06	1,80E-06	1,15E-05	6,08E-06	9,70E-08	2,63E-08	**6,06E-05**	-3,72E-06
AP	mol H+ eq	7,14E-01	8,55E-02	6,04E-01	5,09E-02	5,52E-01	1,21E-01	1,32E-02	1,30E-03	**2,14E+00**	-4,53E-01
EP,f	kg P eq	4,29E-03	5,20E-06	4,71E-03	3,93E-06	3,82E-05	1,43E-05	1,38E-04	4,55E-07	**9,20E-03**	-5,10E-03
EP,m	kg N eq	2,14E-01	3,61E-02	1,90E-01	2,15E-02	2,47E-01	4,52E-02	2,41E-03	5,65E-04	**7,57E-01**	-9,23E-02
EP,t	mol N eq	2,35E+00	3,96E-01	2,10E+00	2,36E-01	2,71E+00	4,96E-01	2,67E-02	6,20E-03	**8,32E+00**	-1,01E+00
POCP	kg NMVOC eq	6,76E-01	1,04E-01	5,34E-01	6,17E-02	7,42E-01	1,29E-01	7,23E-03	1,73E-03	**2,25E+00**	-5,37E-01
ADPE	kg Sb eq	9,51E-05	3,06E-07	1,90E-04	2,60E-07	2,54E-06	1,11E-06	5,01E-08	5,83E-09	**2,90E-04**	-1,88E-03
ADPF	MJ	9,52E+03	1,51E+02	1,15E+03	1,10E+02	7,07E+02	3,71E+02	3,41E+01	1,68E+00	**1,20E+04**	-9,89E+02
WDP	m^3	1,25E+02	-3,39E-02	5,83E+01	-2,43E-02	1,44E-01	-7,92E-02	3,83E-01	5,89E-04	**1,84E+02**	-1,06E+01

GERLAFINGEN
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REBAR

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					TOTAL*	D
		A1	A2	A3	A4	C1	C2	C3	C4		
PERE	MJ	8,00E+02	2,62E-01	1,42E+02	1,82E-01	1,12E+00	5,46E-01	4,04E+00	6,99E-03	**9,48E+02**	-8,74E+01
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	8,00E+02	2,62E-01	1,42E+02	1,82E-01	1,12E+00	5,46E-01	4,04E+00	6,99E-03	**9,48E+02**	-8,74E+01
PENRE	MJ	1,02E+04	1,47E+02	1,40E+03	1,07E+02	6,92E+02	3,63E+02	4,45E+01	1,68E+00	**1,29E+04**	-1,48E+03
PENRM	MJ	0,00E+00	0,00E+00	4,53E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**4,53E+00**	0,00E+00
PENRT	MJ	1,02E+04	1,47E+02	1,41E+03	1,07E+02	6,92E+02	3,63E+02	4,45E+01	1,68E+00	**1,30E+04**	-1,48E+03
SM	kg	1,16E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,16E+03**	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	6,38E+00	7,61E-03	1,76E+00	4,50E-03	1,78E-02	7,36E-03	1,44E-02	4,81E-05	**8,19E+00**	-1,60E-01

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

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REBAR

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

WASTE GENERATION AND TREATMENT	UNITS / D.U.	UPSTREAM	CORE		DOWNSTREAM					TOTAL*	D
		A1	A2	A3	A4	C1	C2	C3	C4		
HWD	kg	0,00E+00	0,00E+00	3,09E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**3,09E-01**	0,00E+00
NHWD	kg	0,00E+00	0,00E+00	1,02E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,02E+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	2,57E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**2,57E+02**	0,00E+00
MER	kg	0,00E+00	0,00E+00	7,82E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**7,82E-01**	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

*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 v.3.01 issued by the International EPD System[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 at plant level, was described by using specific data from manufacturing facility (Gerlafingen) for year 2020.

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 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%.

[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.

DECLARED UNIT

Rods are usually traded in mass so that the declared unit is **1 ton of Rebar.**

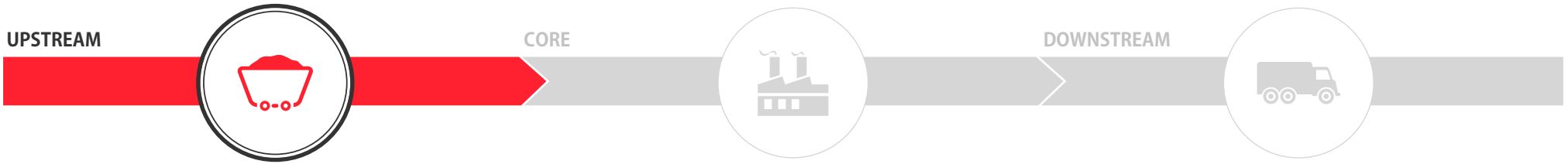
CALCULATION RULES

According to the PCR 2019:14 v. 1.11 the main activities are listed and divided in three subsystems: **UPSTREAM Process**, **CORE Module**, **DOWNSTREAM Process**

UPSTREAM PROCESS	CORE MODULE	DOWNSTREAM PROCESS
Scrap pretreatment	Supplying transport	A4 Distribution
Demolition	Steel mill process	C1 De-construction demolition
Shearing	Rolling mill + stretching process	C2 Transport
A1 Crushing	Packaging	C3 Waste processing
Material and energy ware production	A2+A3 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).

Steel scrap collection

Specific secondary materials
pre-treatments, where appropriate

A1 - Raw Materials Supply

Production of virgin materials,
alloy elements and ancillaries

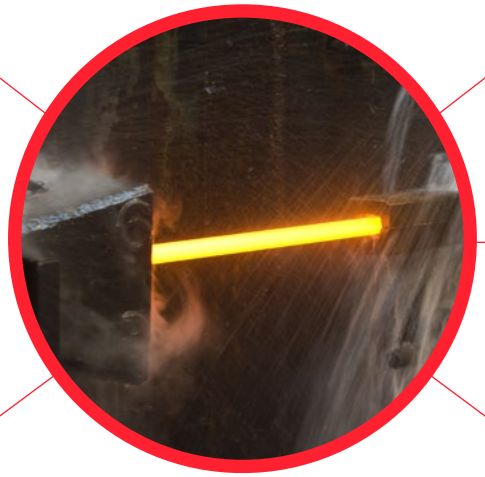
Generation of electricity and other fuels from primary and
from secondary energy resources
(excluding waste treatments)

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

A4 Distribution

Transport to the customers (general market average). Distances estimated considering the transported quantities and the distances average from Gerlafingen 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,

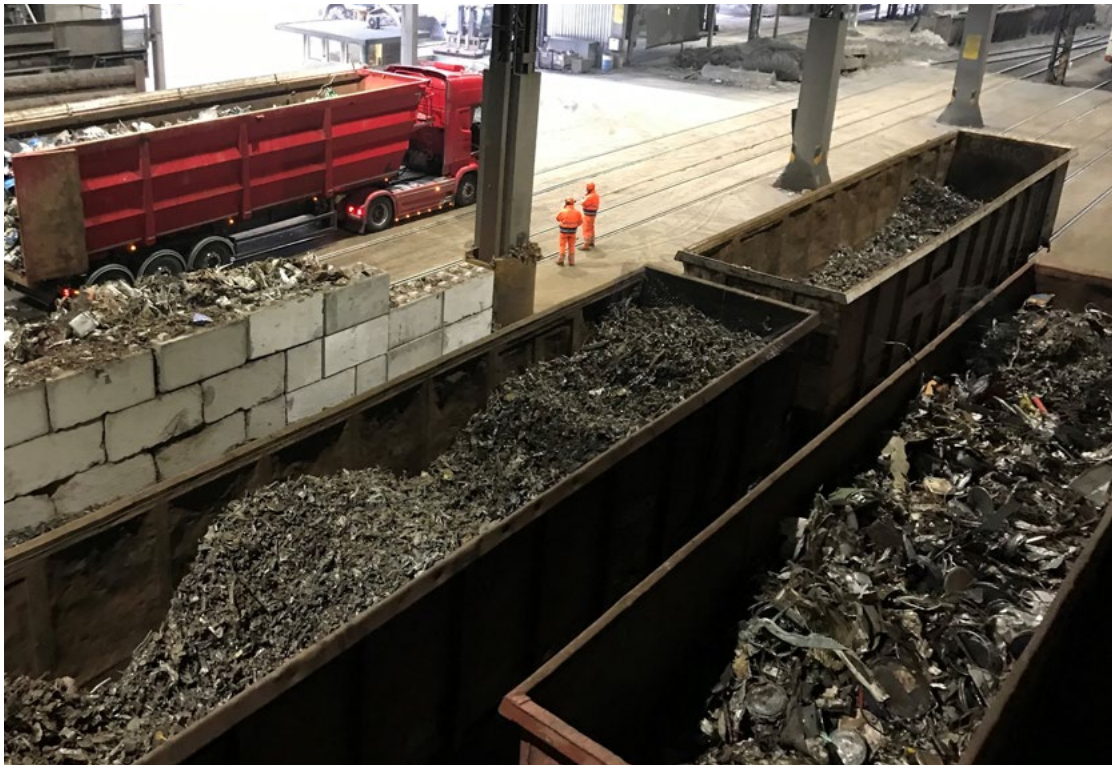
- appropriate rapid quenching of the EAF off-gas
- injection of adsorption agents into the duct
- final dedusting with a bag filter.

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:

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 general EPD requirements the LCA study used specific, generic and other generic data. This last data contributes to the environmental indicators less than 10%.



ADDITIONAL INFORMATION - REBAR

ECOLOGICAL SCARCITY METHOD - UBP

POTENTIAL ENVIRONMENTAL IMPACTS	UNITS / D.U.	UPSTREAM	CORE		DOWNSTREAM					TOTAL	D
		A1	A2	A3	A4	C1	C2	C3	C4		
Water resources	UBP	350	0,4	161	0,2	8	1	-10	0,0	**511**	24
Energy resources	UBP	34 529	558	4 289	408	2 621	1 377	128	6	**43 915**	-3 649
Mineral resources	UBP	31 161	1	2 691	1	12	5	1	0,0	**33 871**	-2 795
Land use	UBP	696	0,5	154	0,4	3	1	5	9	**869**	-828
Global warming	UBP	52 342	5 013	38 110	3 632	23 419	11 900	1 182	58	**135 656**	-53 421
Ozone layer depletion	UBP	159	14	21	10	64	34	1	0,1	**303**	-62
Main air pollutants and PM	UBP	67 526	4 797	37 634	2 979	35 976	6 806	943	83	**156 744**	-51 611
Carcinogenic substances into air	UBP	3 742	113	38 283	60	322	62	59	2	**42 642**	-16 771
Heavy metals into air	UBP	1 933	774	41 229	656	496	1 981	42	2	**47 112**	33 789
Water pollutants	UBP	19 785	549	960	400	2 767	1 349	14	6	**25 830**	-2 041
POP into water	UBP	894	348	332	253	1 602	848	10	4	**4 291**	-267
Heavy metals into water	UBP	607 641	85	125 258	61	414	200	43	1	**733 703**	101 663
Pesticides into soil	UBP	10	0,0	5	0,0	0,1	0,0	0,4	0,0	**16**	-6
Heavy metals into soil	UBP	798	372	215	320	6	929	3	0,0	**2 644**	-252
Radioactive substances into air	UBP	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	**0,0**	0,0
Radioactive substances into water	UBP	1 108	0,1	85	0,1	0,3	0,2	2	0,0	**1 195**	8
Noise	UBP	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	**0,0**	0,0
Non radioactive waste to deposit	UBP	149	7	3 746	6	50	26	0,3	0,1	**3 986**	-283
Radioactive waste to deposit	UBP	99 711	8	7 638	6	34	19	155	0,1	**107 571**	755

REFERENCES

- EN 15804:2012+A2:2019
- ISO 14040 : 2021
- ISO 14044 : 2021
- Life Cycle Assessment (LCA) of Merchant bars (WP) and Rebars (WK)
- General Programme Instructions, v3.01 (2019-09-18)
- PCR 2019:14 - Construction products - v 1.11 (2021-02-05)