Environmental Product Declaration

In accordance with ISO 14025 for:

37MnSiV6R Microalloyed steel

SIDENOR ACEROS ESPECIALES S.L.

Programme	The International EPD System - www.environdec.com
Programme operator:	EPD International AB
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Geographical scope:	Europe
Reference PCR	PCR 2015:03 Basic iron or steel products, except construction products (CPC 412) v1.01

SIDENOR ACEROS ESPECIALES S.L.

Sidenor is a steel company, leader in the European steel industry for the production of special steel long products and one of the main producers of forged and cast pieces. It is also an important supplier of cold finished products in the European market. The company has production centers in Basque Country, Cantabria and Catalonia as well as business delegations in Germany, France, Italy and the U.K.

The company has highly specialized facilities offering solutions for all industrial sectors requiring high quality steel services.

Sidenor's steel production capacity exceeds one million tons annually, primarily destined to the automobile, machinery, capital equipment, naval and civil construction, defense, energy, mining and petrochemical industries. In all of these industries, Sidenor's special steel is used to manufacture reliable products.

The company is at the frontline of the sector thanks to their intense research commitment. Having one of the largest R&D centers in the European steel sector, Sidenor's technological developments offer optimization of products and processes.

Sidenor believes that the continuity of a business is related to its environmental performance. This concern is reflected in its daily practices, in investments for continued upgrading of equipment and in environmental awareness programs.

Sidenor invests millions of euros annually in research and technology to reduce particle and CO2 emissions in the atmosphere . The Sidenor Special Steel Production Plants include modern systems of smoke aspiration and purification, effectively capturing the particles generated during the steel production process. This filtered material, which in the past was sent to landfills, is currently treated as a by-product, used as raw material in the zinc recycling industry. In this way, Sidenor reaffirms its commitment to discovering sustainable solutions for their activities.

Sidenor also seeks to continually implement improvements to reduce CO2 production, such as the substitution of Fueloil for natural gas in treatment ovens, the development of energy-efficiency projects, continuous technological

updating and the use of scrap as a principle raw material.

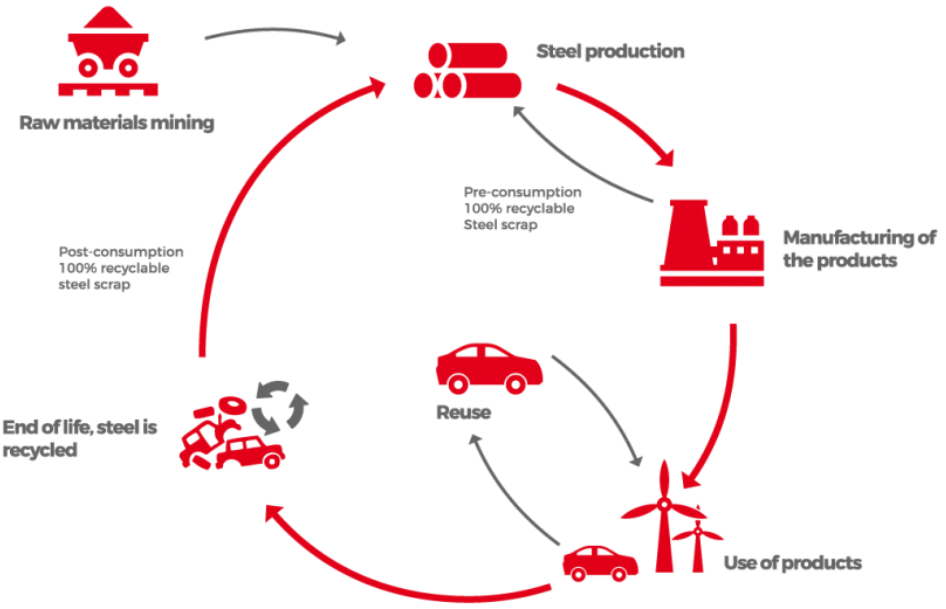
During the steel production process, water is used on a large scale for equipment and product refrigeration. This process is conducted in a closed-loop process through chemical-physical treatment of the water, allowing for its internal reuse and thereby considerably reducing its consumption. Today the company manages to reuse up to 100% of the total water used in its activities.

Additional Informaion
Information on recycling: Steel is 100% recyclable as a raw material to new steel products.

Every year, at Sidenor, we invest to improve our behaviour towards the environment, thus improving the prevention of our environmental impacts. Based on this principle, all of the Sidenor plants have adopted the Environmental Management System under ISO standard 14001. The goal is to ensure the complete process overview, from the use of primary materials, the industrial and product distribution stages, to the appropriate destination of by-products created in the process. Our Environmental Management System relates Sidenor activities in an integrated management system certified according to:

- **ISO 9001:2015** Quality management systems – Requirements
- **ISO/TS16949** Quality management systems— Particular requirements for the application of ISO 9001:2008 for automotive production and relevant service part organizations
- **ISO 14001:2015** Environmental management systems - Requirements with guidance for use
- **ISO 50001** Energy management systems - Requirements with guidance for use
- **OHSAS 18001** Occupational Health & Safety Management

At Sidenor, 100% of the steel produced is from post-consumer ferrous scrap, recycling every year about 1,000,000 tons of industrial waste and obsolete materials for community. By using scrap in its production process, Sidenor also reduces the energy required in the steel production process, and consequently, CO2 emissions. Most of the scrap recycled by Sidenor are materials that are no longer useful to community, such as kitchens or old cars. These materials are reused and transformed into new steel products.
We also recycle the waste steel from the production process of the automobile industries or household appliances, among others. Recycling scrap also generates work for thousands of people through an extensive chain of scrap collection and processing.



LCA INFORMATION

Declared unit: 1 Ton of 37MnSiV6R, microalloyed steel product at the SIDENOR BASAURI manufacturing plant gate.

Time representativeness: data from the year 2018 has been using for the LCA calculation.

Database and LCA software used: An internal LCA software has been developed and our processes to produce EPDs have been quality assured by an external certification body with an EPD Process Certification. Ecoinvent 3.1 database and CML LCA characterisation factors (as updated in January 2016) has been used.

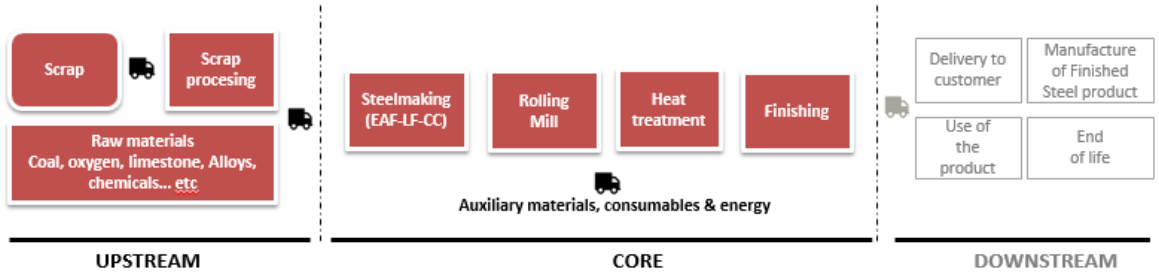
LCA references:
The LCA study has been carried out in accordance with the following standards:
-ISO 14040:2006. Environmental management. Life cycle assessment. Principles and framework
-ISO 14044:2006. Environmental management. Life cycle assessment. Requirements and guidelines
-ISO 14025:2006. Environmental labels and declarations. Type III environmental declarations. Principles and procedures
-PCR 2015:03 Basic iron or steel products & special steels, except construction steel products 1.01

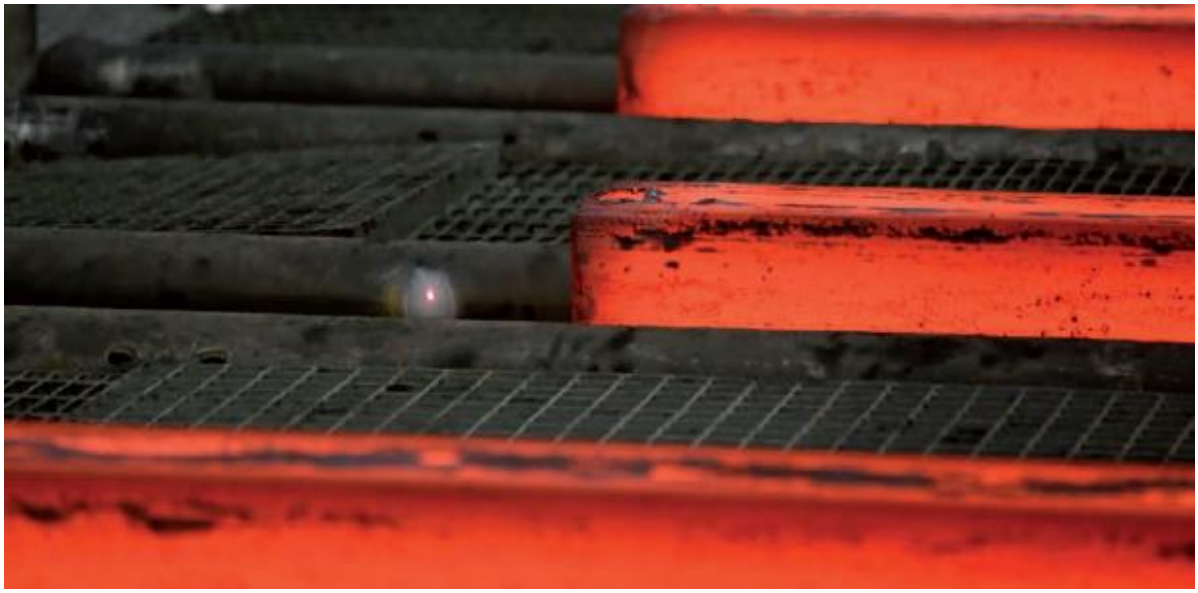
Cut off rules and Allocation criteria
Primary data concerning the energy consumption, resource consumption and waste production on SIDENOR BASAURI PLANT is taken from the internal company quality control system. The data provided is not broken down by the selected declared unit, but they are provided for the total of the company in the year selected. Therefore, distinction has been made between the specific characteristics of each process, the quantity of material processed, and based on calculations it has been estimated the allocation of the proportional part the environmental aspects per ton of the declared steel. No cut off rule has been taken into account on this study, so all the data compiled has been used for the LCA.

Description of system boundaries: This is a cradle-to-gate EPD. The following is included:
-UPSTREAM PROCESSES: Extraction and production of raw materials (scrap, limestone, electrodes, refractory, fluxes, chemicals, alloys....etc.). Transportation of raw materials during the production chain and to the steel manufacturing facility
-CORE PROCESSES: Manufacturing process for special steels (material consumption, energy production and consumption, emissions to air,

water and soil...), waste generated during manufacturing and its treatment, emissions generated during manufacturing.

-DOWNSTREAM PROCESSES: Not included, as this EPD covers intermediate special steels that will be further processed to become a finished consumer product. The environmental impact of the Downstream stage of the finished products made by this special steels should be defined, calculated and allocated by the manufacturers of those finished products (using this EPD data as part of his own Upstream processes).





PRODUCT INFORMATION & CONTENT DECLARATION

MICROALLOYED STEELS:
Steels with high mechanical properties after forging or rolling. The mechanical properties of the pieces or bars are achieved by the combined effect of different mechanism without the need of heat treatment.

Application:
All kind of parts but generally crankshafts, conrods, pistons, parts for suspension systems, wheel rims and constant velocity joints. The tensile strengths achieved on the parts are between 650 and 1150 N/mm2 depending on the type of steel used.

Advantages:

- Save of energy, installations and process time
- Removal of heat treatments
- Save of raw material
- Decrease in number and quantity of alloys

Chemical composition (average values in %)
C 0,38
Mn 1,35
Si 0,60
S 0,06
Al 0,03
V 0,10
Ti 0,01
Fe 97.4

Recycled material
Provenience of recycled materials (pre-consumer or post-consumer) in the product: The hot-rolled bar steel product is made from 97% recycled steel and 3% alloying elements.

More information:
For more information on the product and Sidenor steel products, see www.sidenor.com

ENVIRONMENTAL PERFORMANCE

POTENTIAL ENVIRONMENTAL IMPACT	Upstream	Core	TOTAL
Global warming potential [kg CO_2 eq.]	255	469	724
Ozone depleting potential [Kg CFC 11 eq.]	2,72E-5	5,99E-5	8,71E-5
Acidification potential [kg SO_2 eq.]	1,39	2,02	3,41
Ozone creating potential [kg C_2H_4 eq.]	0,07	0,09	0,16
Eutrophication potential [kg PO_4^{3-} eq.]	0,49	0,42	0,91
USE OF RESOURCES	**Upstream**	**Core**	**TOTAL**
NON-RENEWABLE RESOURCES			
Material [kg]			
Limestone	2,54	43,89	46,43
Iron	0,84	2,16	3,00
Gravel	15,32	25,49	40,80
Others	12,89	50,36	63,25
Energy [Kg]			
Uranium	51,72	2259,75	2311,47
Fuel Oil	5,04	5,64	10,68
Coal	3,89	93,83	97,72
Lignitum	1,85	3,51	5,36
Natural Gas	71,65	4540,46	4612,11
RENEWABLE RESOURCES			
Material [kg]			
Wood	2,68	1,56	4,24
CO2	3,78	2,74	6,51
Others	1,74	1,11	2,85
Energy [MJ]			
Hidroelectric	14,72	342,40	357,12
Biomass	42,48	29,91	72,38
Wind	1,77	588,02	589,79
Solar	9,58E-4	138,00	138,00
Geothermic	1,02	3,03	4,05
WATER (m3)			
Total amount of water (freshwater as LCI flow)	1231,11	1657,82	2888,93
Direct amount of water used by the core process	0	1,02	1,02
WASTE [kg]			
Hazardous waste	3,65E-3	7,79E-3	1,14E-2
Non hazardous Waste	141,35	37,45	178,80
Radioactive waste	0,02	0,04	0,06
SECONDARY RESOURCES			
Material [kg]	1223	0.00	1223
Energy [MJ]	0.00	0.00	0.00
Recovered internal energy flows expressed in [MJ]	0.00	0.00	0.00

PROGRAMME-RELATED INFORMATION AND VERIFICATION

Programme:	The International EPD® System EPD International AB Box 210 60. SE-100 31 Stockholm. Sweden www.environdec.com info@environdec.com
EPD registration number:	S-P-01623
Published:	28-06-2019
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Product Category Rules:	PCR 2015:03 Basic iron or steel products, except construction products v1.01
Product group classification:	UN CPC 4112
Reference year for data:	2018
Geographical scope:	Europe

Product category rules (PCR): PCR 2015:03 Basic iron or steel products, except construction products v1.01. CPC 412+4112
PCR review was conducted by: The Technical Committee of the International EPD® System. The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☒ EPD process certification ☐ EPD verification
Certification Body: TECNALIA R&I CERTIFICACION, S.L. Auditor: Elisabet Amat eli.amat@tecnaliacertificacion.com Accredited by: ENAC nº125/C-PR283 accreditation
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
The verifier and the operator of the program are not responsible for any claim on the product or the legality of the product.
EPDs within the same product category but from different programmes may not be comparable.
More information about the certification system on the Environdec website: www.environdec.com

REFERENCES

- ISO 14040 Environmental management - Life cycle assessment - Principles and framework
- ISO 14044 Environmental management - Life cycle assessment - Requirements and guidelines
- ISO 14025 Environmental labels and declarations - Type III environmental declarations
- General Programme Instructions of the International EPD® System. Version 2.5.
- PCR 2015:03 Basic iron or steel products, except construction products v1.01

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GLOSSARY

GLOBAL WARMING: Greenhouse effect emissions into the atmosphere absorb some of the infrared solar radiation reflected on the earth's surface resulting in a troposphere temperature increase. The global warming potential is an index, in equivalent kg of CO_2, to measure the global warming contribution of a substance released into the atmosphere in a span of 100 years.

ACIDIFICATION: Acidification results from the emission of sulphur dioxide and nitrogen oxides. In the atmosphere, these oxides react with the existing steam, forming acids which fall back to the earth in the form of rain or snow, or as dry deposits. Its effect on the earth generally shows itself in the form of reduced forest development and in aquifer ecosystems affects to the disappearance of some living organisms. Acidification potential measures an emitting substance's contribution to acidification expressed in sulphur dioxide equivalents (SO_2).

OZONE CREATION: The photochemical formation of the ozone in the troposphere is mainly provoked by the decomposition of volatile organic compounds (VOCs) in the presence of nitrogen oxides (NO_x) and light. The formation of ozone by means of this process can be quantified by using the so-called ozone photochemical formation potentials (POCPs) expressed in equivalent kg of ethylene (C_2H_4).

EUTROPHICATION: Eutrophication results in the enrichment of water ecosystems with organic compounds and nutrients, which give rise to an increased production of plankton, algae and other water plants with the resulting reduction in water quality. In this case the main sources related to this phenomenon are nitrogen and phosphorous. A secondary effect is the decomposition of dead organic material, a process which consumes oxygen and may result in anaerobic environments. The eutrophication potential, expressing in equivalent PO_4^{3-}, quantifies nutrient enrichment via the release of a substance in water or land.

OZONE DEPLETION: The ozone layer in the atmosphere protects the flora and fauna from harmful ultraviolet radiation from the sun. Some substances emitted into the atmosphere deplete this layer resulting in a higher level of UV radiation on the earth. The ozone layer depletion potential is the contribution of a substance compared with the impact caused by CFC-11.