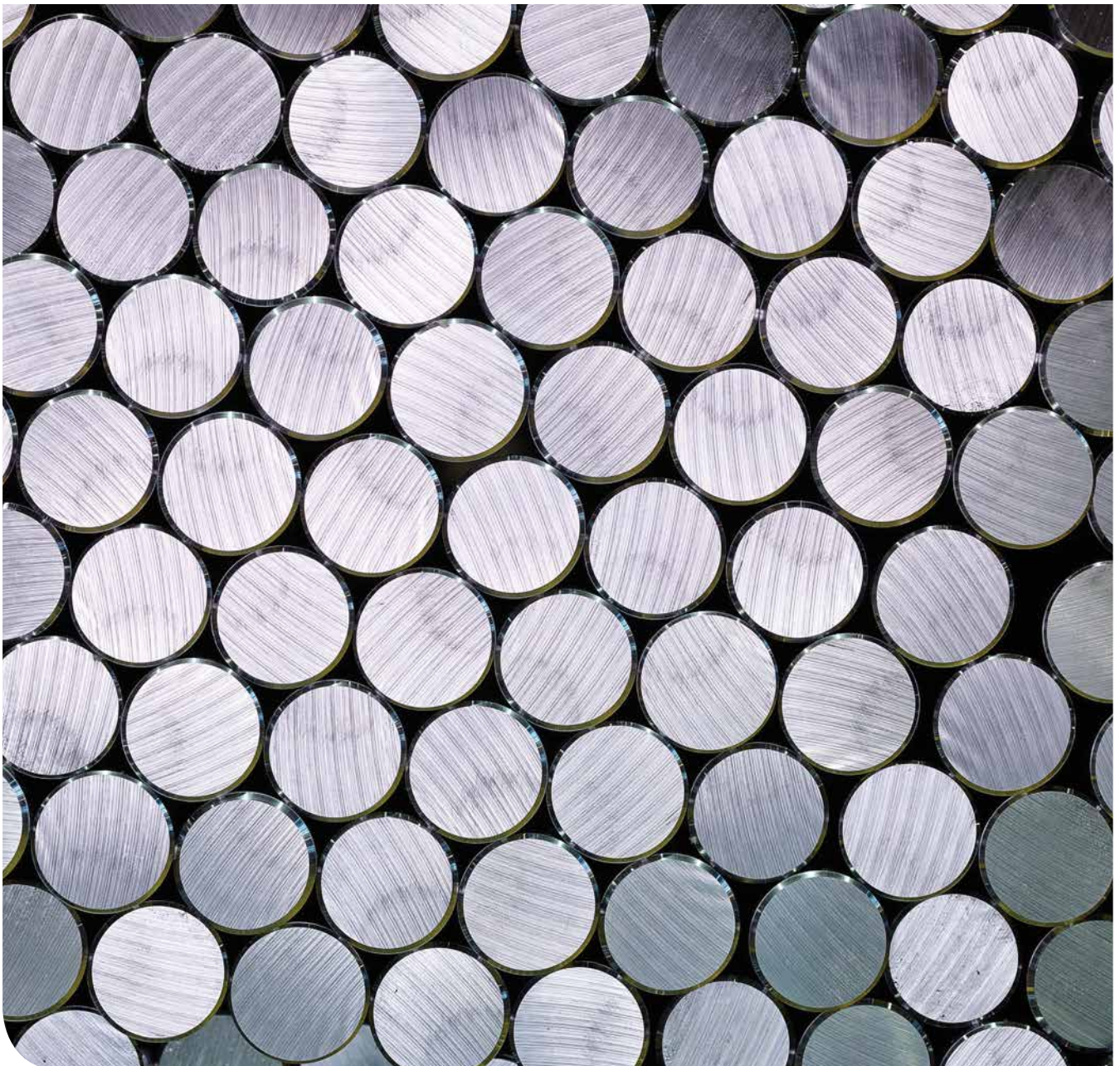


In accordance with ISO 14025 for:

HOT-ROLLED BAR STEEL PRODUCT IN IMATRA, OVAKO

Program	The International EPD® System www.environdec.com
Program operator	EPD International AB
EPD registration number	S-P-01369
Publication date	2019-03-20
Validity date	2022-03-19
Geographical scope	Global. The production site is Imatra, Finland



General information

Information about the organization

Owner of the EPD: Helena Kumpulainen,
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Helena.Kumpulainen@ovako.com
Terästehtaan tie 1
FI-55100 Imatra, Finland

Description of the organization: Ovako is a producer of engineering steel.

Product-related or management system-related certifications: Certified compliance with ISO 9001, ISO 14001, ISO 45001 and IATF 16949-certificates

Name and location of production site: Imatra, Finland

About the company

Ovako is a leading European producer of engineering steel for customers in the bearing, transport and manufacturing industries. Ovako's customers are found mainly in the European engineering industry and its subcontractors. The steel production is based on scrap, making Ovako one of the Nordic region's largest recycler of steel scrap. Customers are generally leading manufacturers in their segments, which place high demands on the properties of the steel.

Beside the lake Saimaa and river Vuoksi in southeast Finland lies the city of Imatra. Around 600 people work at Ovako's facility, often in close cooperation with the customers, to create innovative solutions that help to

build a better future. Among other things, Ovako develops and manufactures innovative high-tech steel for the demanding automotive and engineering industries.

The steel produced by Ovako Imatra is used in a number of areas, including power transmission and equipment, axles, gears, crankshafts, springs, bearings, bolts and mining tools.

Ovako Imatra's steel makes the end products stronger and more durable. One important family of steel products produced in Imatra is M-Steel®, a steel developed for excellent machining properties, cost savings and improved productivity in the customer's process.



Product information

Product name: Hot-rolled bar steel product

Product identification: Product name Carbon steels and Low alloyed steels. The steels are in the massive product forms; semi-finished bar products. The products are marketed under Ovako's trademarks, attribute brands and EN grade designations, also with designations according to various international and national standards.

Product description: The declared unit is 1 tonne (1000 kg) of hot-rolled bar steel product at Ovako gates from their production site in Imatra. With respect to alloying content, the product represents an average product from the site. The average consists of different steel qualities with alloying content varying according to

the Content declaration below. With respect to finishing, the products are hot-rolled, ground and blasted. Ovako hot-rolled bars from Imatra are available in dimensions between 25-200 mm, and characterized by close tolerances, excellent straightness as well as roundness, good surfaces and low decarburization. This makes them ideally suited for forging and machining.

As can be seen in the figure below, the main inputs to the steel making are scrap, alloys, coal, electrodes, fuels, oxygen and inbound transportation. Scrap is melted in the electric arc furnace, alloyed in the ladle furnace and casted to blooms. The blooms go straight to the rolling mill and are reheated, hot-rolled, grinded and blasted. Major additional processes include waste and slag handling and treatment of water and air.

UN CPC code: 412

Geographical scope: Global

LCA information

Functional unit/ declared unit: 1 tonne (1000 kg) of hot-rolled bar steel product.

Reference service life: Not applicable.

Time representativeness: Production data are from 2017. Electricity mix data are from 2018.

Database(s) and LCA software used: Ecoinvent 3 as applied in SimaPro 8.5.0.0, 2019. For calculation of environmental impacts, the method EPD (2013) Version 1.04 in SimaPro was used. Primary energy demand was calculated with the method Cumulative Energy Demand version 1.10.

Description of system boundaries: Cradle-to-gate

Cut-off criteria: Cut-off allocation of waste burdens and benefits in accordance with the polluter pays principle as stipulated in the PCR. Raw material inflows less than 0.0003% of the output flow was disregarded unless there were reasons to suspect significant environ-

mental impact. Core process data from site production records and thus of good quality.

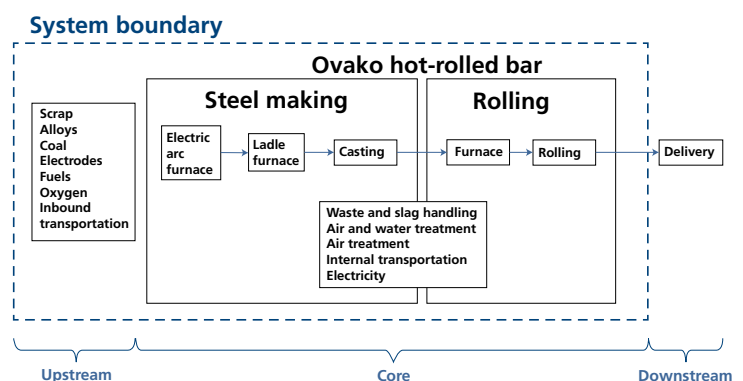
Excluded lifecycle stages: Use stage and end-of-life stage excluded since hot-rolled bar steel products can be used in many different applications which also affects end-of-life.

More information: For more information on the product and Ovako steel products, see www.ovako.com/en/

Name and contact information of LCA practitioner:

Mats Zackrisson at Swerea IVF AB has carried out the underlying LCA study. Mats.Zackrisson@ri.se

Additional information: Nuclear electricity mix is used for melting and rolling operations and natural gas is used for heating operations.



Content declaration

Products

Materials/Chemical substances	[kg/tonne]	%	Environmental/hazardous properties
Iron	Balance	Balance	
Nickel	0.6-41	0.06-4.1	Nickel is classified in EC Directive 67/548/EEC as a suspect carcinogen (category 3 – R40) and as a skin sensitizer (R43).
Chromium	0.6-44	0.06-4.4	
Molybdenum	0.1-11	0.01-1.1	
Manganese	2-22	0.2-2.2	

Standards describing the methods used for chemical composition analysis are: ASTM E 415-17 and ASTM E 1019-18.

Steel products are considered as articles under the European Regulation (EC) 1907/2006, concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). All intentionally added alloying elements in Ovako products with the exception of nickel are not classified as hazardous. Nevertheless, there are certain substances covered by European and national chemical legislation and lists (REACH Annex XIV and XVII, RoHS-directive (2011/65/EC) Annex II and Global Automotive Declarable Substance List (“GADSL”)) that cannot physically be measured in steel and others that are difficult to measure due to being present in very low levels. The alloying elements in low alloyed steel are

firmly bonded in its chemical matrix. Due to this bonding and to the presence of a protective oxide film the release of any of the constituents is very low and negligible when the steel is used appropriately.

Packaging

Distribution packaging: Not applicable.

Consumer packaging: Not applicable.

Recycled material

Provenience of recycled materials (pre-consumer or post-consumer) in the product: The hot-rolled bar steel product is made from 96% recycled steel and 4% alloying elements.



Environmental performance

Potential environmental impact per 1000 kg hot-rolled bar steel product

Parameter		Unit	Upstream	Core	Downstream	Total
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	257	188	INA	445
	Biogenic	kg CO ₂ eq.	0	0	INA	0
	Land use and land transformation	kg CO ₂ eq.	0	0	INA	0
	Total	kg CO ₂ eq.	257	188	INA	445
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	4.28E-05	7.78E-10	INA	4.28E-05
Acidification potential (AP)		kg SO ₂ eq.	6.59	0.373	INA	7.0
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	0.506	0.0534	INA	0.56
Formation potential of tropospheric ozone (POCP)		kg C ₂ H ₄ eq.	0.462	0,0517	INA	0.51
Abiotic depletion potential – Elements		kg Sb eq.	0.012	3.56E-05	INA	0.012
Water scarcity potential		m ³ eq.	INA	INA	INA	INA

Use of resources per 1000 kg hot-rolled bar steel product

Parameter		Unit	Upstream	Core	Downstream	Total
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	746	5.2	INA	751
	Use as raw materials	MJ, net calorific value	0	0	INA	0
	Total	MJ, net calorific value	746	5.2	INA	751
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	5176	1131	INA	6308
	Use as raw materials	MJ, net calorific value	0	0	INA	0
	Total	MJ, net calorific value	5176	1131	INA	6308
Secondary material		kg	1008	0	INA	1008
Renewable secondary fuels		MJ, net calorific value	0	0		0
Non-renewable secondary fuels		MJ, net calorific value	0	0	INA	0
Net use of fresh water		m ³	INA	10.5	INA	10.5

Waste production per 1000 kg hot-rolled bar steel product

Parameter	Unit	Upstream	Core	Downstream	Total
Hazardous waste disposed	kg	INA	4.7	INA	4.7
Non-hazardous waste disposed	kg	INA	0.5	INA	0.5
Radioactive waste disposed	kg	0.017	0	INA	0

The nuclear waste is produced upstream when generating the electricity used in the Imatra steel mill.

Output flows per 1000 kg hot-rolled bar steel product

Parameter	Unit	Upstream	Core	Downstream	Total
Components for reuse	kg	INA	0	INA	0
Material for recycling	kg	INA	264	INA	264
Materials for energy recovery	kg	INA	1.0	INA	1.0
Exported energy, electricity	MJ	INA	0	INA	0
Exported energy, thermal	MJ	INA	INA	INA	INA

Additional information

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



Programme-related information and verification

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product

category but from different programmes may not be comparable.

Program	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-01369
Published	2019-03-20
Valid until	2022-03-19
Product Category Rules	PCR 2015:03. BASIC IRON OR STEEL PRODUCTS & SPECIAL STEELS, EXCEPT CONSTRUCTION STEEL PRODUCTS. Version 1.01
Product group classification	UN CPC 412
Reference year for data	2017
Geographical scope	Global

Product category rules (PCR): PCR 2015:03. BASIC IRON OR STEEL PRODUCTS & SPECIAL STEELS, EXCEPT CONSTRUCTION STEEL PRODUCTS. Version 1.01

PCR review was conducted by: The Technical Committee of the International EPD® System.
Full list of TC members available on www.environdec.com/TC

Independent third-party verification of the declaration and data, according to ISO 14025:2006:
 EPD process certification EPD verification

Third party verifier: Carl-Otto Nevén, NEVÉN Miljökonsult

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:
 Yes No

References

General Programme Instructions of the International EPD® System. Version 3.0.

PCR 2015:03. Name. PCR 2015:03. BASIC IRON OR STEEL PRODUCTS & SPECIAL STEELS, EXCEPT CONSTRUCTION STEEL PRODUCTS. Version 1.01

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SimaPro 8.5.0.0. Pré Consultants. 2019.

Contact information

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LCA author	 Swerea IVF AB, Brinellvägen 68, 100 44 Stockholm, Sweden, www.swereaivf.se Mats Zackrisson
Program operator	 EPD International AB, info@environdec.com