

In accordance with ISO 14025 for:

# HOT-ROLLED BAR STEEL PRODUCT IN HOFORS, OVAKO

Program	The International EPD® System <a href="http://www.environdec.com">www.environdec.com</a>
Program operator	EPD International AB
EPD registration number	S-P-01135
Publication date	2017-11-28    Version 2020-10-28
Validity date	2025-10-27
Geographical scope	Global. The production site is Hofors, Sweden



## General information

### Information about the organization

**Owner of the EPD:** Johan Uljons  
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**Description of the organization:** Ovako is a producer of high-performance engineering steel, with sustainability as a core element of its business.

**Product-related or management system-related certifications:** Certified compliance with ISO 9001, ISO 14001, ISO 45001, ISO 50001 and IATF 16949-certificates.

**Name and location of production site:** Hofors, Sweden

## About the company

Ovako is a leading European producer of high-performance engineering steel, with sustainability at the core of all its activities. Ovako serves customers in the bearing, transport and general 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 the largest recycler in the Nordics. Customers are generally leading manufacturers in their segments, and they place high demands on the performance of their steel.

Ovako belongs to the Nippon Steel Group, together with Sanyo Special Steel. This has formed a strong, world-leading collaboration in specialty steels, with expertise, products and support combined in a global offering. Optimized global production and the joint strength of R&D resources is helping to further accelerate innovation and competitiveness.

Ovako's steel mill in Hofors has steel melting and casting and billet and bar rolling as well as tube and ring mills. Some of its products are further processed in the company's production unit in Hällefors. The steel produced

is used in a number of applications, including bearings, wind power, transmission, diesel engines, mining and other specialty applications.

The impurity levels in steel are important for performance. Ovako's clean steel from Hofors has evolved to meet tough requirements. It enhances fatigue performance and helps extend the life of critical components. It also helps designs to create stronger, lighter more compact and energy efficient components.

Among the best-known steel grades are IQ-Steel® and BQ-Steel®. Thanks to their excellent properties, these clean steel grades offer the opportunity to create new designs and reliable components.

IQ-Steel® is a smart solution for designing reliable components that can withstand higher and more complex loads. This ultra clean steel is optimized for fatigue strength by the strict control of steel cleanliness and offers uniform and excellent properties in all loading directions. BQ-Steel® (Bearing Quality) has for decades been the problem-solver in the bearing industry.



## Product information

**Product name:** Hot-rolled bar steel product

**Product identification:** The product is made from Low Alloyed Steels. The steel is in the massive product forms; semi-finished bar products. They are marketed under Ovako's trademarks, attribute brands and EN grade designations, as well as 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's gates from the production site in Hofors. 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.

The bar products are hot-rolled. Ovako hot-rolled bars from Hofors are available in dimensions between 78-230 mm, and characterized by close tolerances, excellent

straightness as well as roundness, good surface finishes and low decarburization.

**Process description:** As shown in the illustration below, the main inputs to the steel making process are scrap, alloys, coal, lime, electrodes, fuels, oxygen and inbound transportation.

Scrap is melted in the electric arc furnace, alloyed in the ladle furnace and cast into ingots. The ingots are rolled into hot-rolled bars, which are delivered to customers, transported by train to Hällefors for further processing or rolled in Hofors into tubes or rings. Major additional processes include waste and slag handling and treatment of wastewater. The production units are equipped with filters that reduces emissions to 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 2019.

**Database(s) and LCA software used:** Ecoinvent 3.6 as applied in SimaPro 9.1.0.11, 2020. For calculation of environmental impacts, the method EPD (2018) Version 1.01 in SimaPro was used.

**Description of system boundaries:** Cradle-to-gate

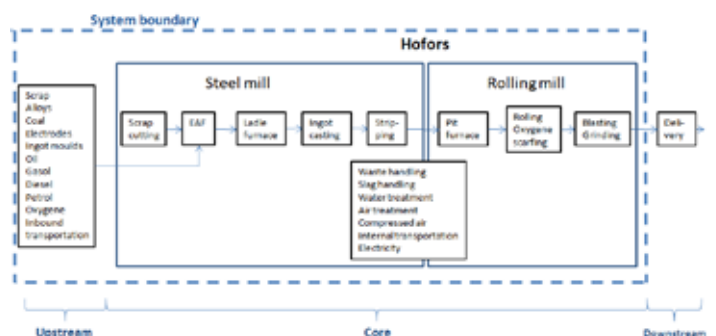
**Cut-off criteria:** Cut-off allocation of waste burdens and benefits in accordance with the polluter pays principle as stipulated in the PCR. Raw material inflows less than 0.0003% of the output flow was disregarded unless there were reasons to suspect significant environmental impact.

**Excluded lifecycle stages:** The use and end-of-life stages are excluded since hot-rolled bar steel products can be used in many different applications which also affect end-of-life.

**More information:** For more information on the product and Ovako steel products, see [www.ovako.com/en/](http://www.ovako.com/en/)

**Name and contact information of LCA practitioner:** Mats Zackrisson at RISE IVF AB has carried out the underlying LCA study. [Mats.Zackrisson@ri.se](mailto:Mats.Zackrisson@ri.se)

**Additional information:** Vattenfall's unspecified electricity mix (16 gram CO<sub>2</sub>eq/kWh) is used for melting and rolling operations. Liquefied petroleum gas (LPG) and oil are used for heating operations.



# Content declaration

## Products

Materials/Chemical substances	[kg/tonne]	%	Environmental/hazardous properties
Iron	Balance	Balance	
Nickel	0.6-60.2	0.06-6.02	Nickel is classified in EC Directive 67/548/EEC as a suspect carcinogen (category 3 – R40) and as a skin sensitizer (R43).
Chromium	0.7-50.2	0.07-5.02	
Molybdenum	0.1-9.6	0.01-0.96	
Manganese	0.9-17.4	0.09-1.74	
Silicon	5-16.8	0.05-1.68	

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 and 2015/863/EU) 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 <sub>2</sub> eq.	232	235	INA	467
	Biogenic	kg CO <sub>2</sub> eq.	0	0	INA	0
	Land use and land transformation	kg CO <sub>2</sub> eq.	0	0	INA	0
	Total	kg CO <sub>2</sub> eq.	232	235	INA	467
Acidification potential (AP)		kg SO <sub>2</sub> eq.	7.5	0.20	INA	7.5
Eutrophication potential (EP)		kg PO <sub>4</sub> <sup>3-</sup> eq.	0.57	0.069	INA	0.64
Formation potential of tropospheric ozone (POCP)		kg NMVOC	1.8	0.27	INA	2.1
Abiotic depletion potential –elements		g Sb eq.	35	0.44	INA	36
Abiotic depletion potential – fossil resources		MJ, net calorific value	4170	153	INA	4320
Water scarcity potential		m <sup>3</sup> eq.	1849	94	INA	1943

## 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	1271	1771	INA	3042
	Use as raw materials	MJ, net calorific value	0	0	INA	0
	Total	MJ, net calorific value	1271	1771	INA	3042
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	5409	6193	INA	11602
	Use as raw materials	MJ, net calorific value	0	0	INA	0
	Total	MJ, net calorific value	5409	6193	INA	11602
Secondary material		kg	959	0	INA	959
Renewable secondary fuels		MJ, net calorific value	0	0	INA	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	INA	0
Net use of fresh water		m <sup>3</sup>	INA	4,9	INA	4,9

## Waste production per 1000 kg hot-rolled bar steel product

Parameter	Unit	Upstream	Core	Downstream	Total
Hazardous waste disposed	kg	INA	17	INA	17
Non-hazardous waste disposed	kg	INA	0,65	INA	0,65
Radioactive waste disposed	kg	INA	0	INA	0

## 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	253	INA	253
Materials for energy recovery	kg	INA	10	INA	10
Exported energy, electricity	MJ	INA	0	INA	0
Exported energy, thermal	MJ	INA	INA	INA	INA

### Influence of alloy content

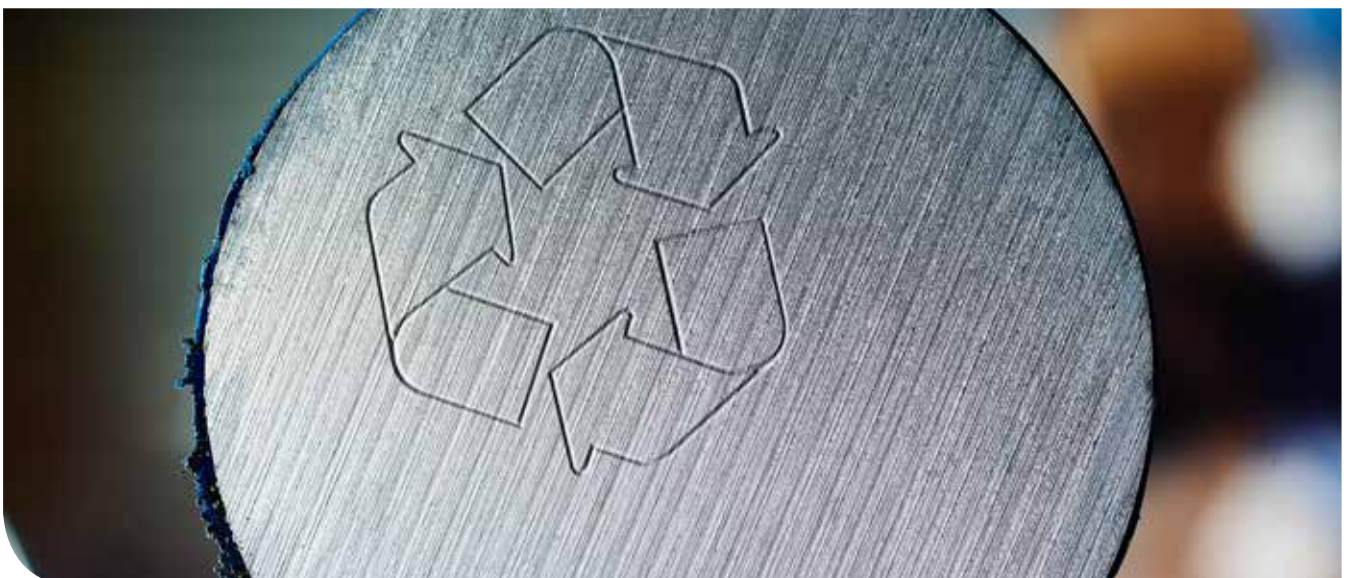
The results above are presented for an average steel with an average alloy metal content. The influence of the alloy content on the environmental impact of the steels produced in produced in Hofors is shown in the table to the right. The average (50%) is the same as the declared product; absolute values are presented for the maximum alloy content of 90% of the production and 10% of the production respectively. The values for specific steel products, both value added operations and alloy differences, can easily be provided on request through a "footprint calculator" for the different environmental aspects.

### Variance of environmental impact due to alloy content. Impacts per 1000 kg hot rolled bar steel product

Share of production	kg CO <sub>2</sub> eq	kg SO <sub>2</sub> eq	kg PO <sub>4</sub> -eq	kg NMVOC
90%	658	33	1,4	5,2
Average; 50%	467	7,7	0,64	2,1
10%	362	0,83	0,30	0,82

## Additional information

Information on recycling: Steel is 100% recyclable as a raw material for the production of 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 programs may not be comparable.

<b>Program</b>	The International EPD® System  EPD International AB Box 210 60 SE-100 31 Stockholm Sweden  <a href="http://www.environdec.com">www.environdec.com</a> <a href="mailto:info@environdec.com">info@environdec.com</a>
EPD registration number	S-P-01135
Published	2017-11-28    Version 2020-10-28
Valid until	2025-10-27
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	2019
Geographical scope	Global

Product category rules (PCR): PCR 2015:03. BASIC IRON OR STEEL PRODUCTS & SPECIAL STEELS, EXCEPT CONSTRUCTION STEEL PRODUCTS. Version 2.0

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

In case of accredited certification bodies:  
Accredited by: Not applicable

In case of recognized individual verifiers:  
Approved by: The International EPD® System

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

## References

EPD® System. Version 3.0.1

PCR 2015:03. Name. PCR 2015:03. BASIC IRON OR STEEL PRODUCTS & SPECIAL STEELS, EXCEPT CONSTRUCTION STEEL PRODUCTS. Version 2.0.

Climate impact of Ovako hot rolled bar steel product. Update with 2019 production data. Mats Zackrisson RISE IVF AB 2020.




Cradle-to-gate. Understanding CO2 footprint of hot-rolled bar steel products. Ovako Group. 2019.

Vattenfall AB Nuclear Power. 2016. Certified Environmental Product Declaration EPD of Electricity from Vattenfall Nordic Nuclear Power Plants. UNCPC Code 17, Group 171 – Electrical energy.

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SimaPro 9.1.0.11. Pré Consultants. 2020.

## Contact information

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