Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

Steel Core Piles

UAB Scandia Steel Baltic

Programme:	The International EPD® System www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	EPD, S-P-00904
Approval date:	2016-06-20
Valid until:	2021-06-20
Revision date:	2016-06-20
Geographical scope:	Europe

Company

Scandia Steel is a leading supplier of steel piling pipes. Our piles are supplied to the Scandinavian building industry and used by well-known construction companies.

UAB Scandia Steel Baltic
Upplandsgatan 7
111 23 Stockholm
Sweden
Phone: +46 702 95 04 06
Homepage: www.scandiasteel.se

Product

Steel core piles are round bars of solid steel that are drilled into the ground in combination with steel tubes. The space between pipe and the steel core pile is filled up with concrete.
The steel core piles is offered in sizes from 70mm to 230mm.

The steel tube pipes consist of 100% steel. The steel grade used for the steel core piles are S355J2H

Product Life Cycle

This study goes from cradle-to-gate. That means that all processes needed for raw material extraction, transport to manufacturing and manufacturing is included in the study.

According to the PCR the life cycle should be divided into two different life cycle stages:

- **Upstream processes** (from cradle-to-gate). Includes life cycle stage referred to as A1 Raw Material Supply. In this case extraction and processing of steel raw material.

  The raw material for the steel Core Piles comes from two steelworks in Europe. The main one that stands for 80% of the raw material supply is called BMZ and is located in Zhlobin, Belarus.

  The steelwork BMZ produces the raw material for the steel core piles using Electric Arc Furnace (EAF) technology. For the EAF a high amount of recycled steel scrap can be used as input material. In this case 93% of the raw material comes from recycles steel scrap.

  To manufacture the round form of the steel core piles hot rolling technique is used. To produce on tone of steel core piles 1091kg of steel is needed, the steel waste from the production process is reused at the plant.

  The second producer that stood for 20% of the supply 2015 is Huta Bankowa and is located in Poland. This steelwork uses electric arc technology.

- **Core processes** (from gate-to-gate). Includes life cycle stages referred to as A2 Transport and A3 Manufacturing.
  The transport of the raw material from the steel work in Belarus and Poland to Kretinga, Lithuania for manufacturing is done with lorry Euro 5 and is 657km respective 494km.

  In the facility in Kretinga the massive steel core pile is processed in two ways. First it is cut to the preferred length and then given a thread at the bottom of the pile.

  The cutting and threading is done using lathing technique. The length of the threading depends of the size of the pile, but an average is 12cm.

  This uses a total of 17,6kWh per ton of finished material (per FU). Approximately 1% waste is generated in the process. This waste is handled by licensed subcontractors.

  The electricity mix used for manufacturing in Lithuania is based on the market average 2015 and have a GWP 697g CO2 eq. per kWh.

  The finished products is then packed together in groups using 32x0,8 mm metal bars. This bars are not reused and it is needed 0,36kg per finished FU.

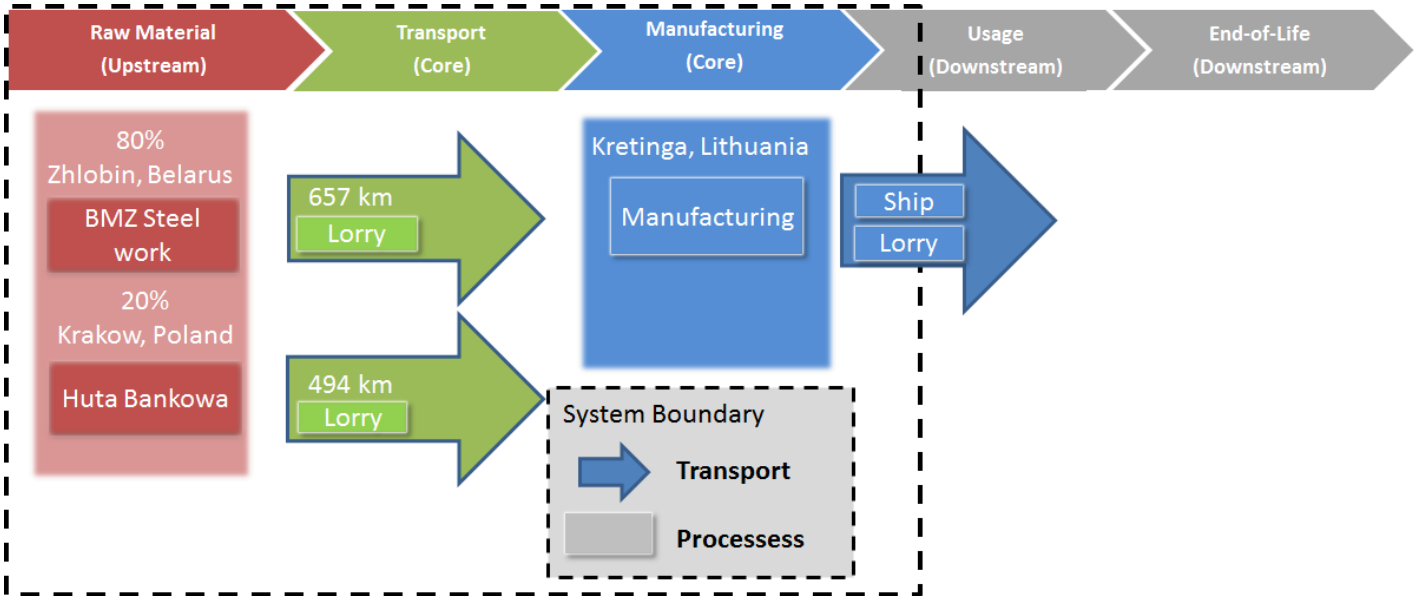
- **Downstream processes.** Includes only the transport to construction site A4. The finished product is transported from Kretinga, Lithuania to Oslo, Norway by using lorry and cargo ship. The distance is 307km with cargo ship and 591km with Lorry.
  This module will be added to be valid with the specific rules set by EPD Norway and sector practice in Norway. For other markets the downstream part of the result can be withdrawn.

The figure below show an overview of the included and accounted modules and life cycle phases.

Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
Raw materials	Transport	Manufacturing	Transport	Construction installation	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

X = Module is accounted for
MND = Module Not Declared

An overview of the life cycle for Steel tube piles from Scandia Steel and the included processes can be seen in the figure below.



After the completeness check all materials and processes are found to be included and represented in a full life cycle Cradle to Grave perspective.

Functional Unit	The functional unit is 1 tone of finished product
Product group classification	UN CPC 41244
Goal and Scope	The result will be used to understand where the environmental burden for the products occurs during the life cycle and aims to lay a road map for development to decrease this burden. The intended use is also to optimize the choice of steel pipes and steel cores during a construction from an environmental perspective. The audience is in first hand construction companies and contractors but also producers of similar steel products.
Manufacturing Site	Promyshlennaya Street, Zhlobin, Gomel region, 247210, Belarus Huta Bankowa Spolka z.o.o. Jana III Sobieskiego PL-41 300 Dabrowa Gornicza Poland
Geographical Area	Europe
Compliant with	This EPD follow the "Book-keeping" LCA approach which is defined as attributional LCA in the ISO 14040 standard. In accordance with ISO 14025 and EN 15804 This EPD follow the PCR 2012:01 version 2.01 Construction products and construction services
Cut-Off Rules	For this LCA study a 1 % cut off rule was applied.
Background Data	Every generic LCI data comes from ecoinvent 3.2
Reference year for data	For specific data 2015 is the reference year. The background data from ecoinvent are from 2012-2015
Allocations	Polluter Pays / Allocation by Classification There are no co-products in the production and therefore no need for co-product allocation.
Impact Assessment methods	Total use of renewable and non-renewable resources was calculated with Cumulative Energy Demand 1.09 method. Emission of greenhouse gases was calculated using the IPCC 2013 GWP method with a 100 year horizon. Emission of acidifying substances, Emission of substances to water contributing to oxygen depletion, Emission of gases that contribute to the creation of ground-level ozone, Abiotic depletion, and ozone depletion emissions where all calculated with the CML-IA baseline method.
Software	SimaPro 8.2

EPDs within the same product category but from different programmes may not be comparable.
EPDs of construction products may not be comparable if they do not comply with EN 15804.

Product contain no substances in the REACH Candidate list. Product contain no substances in the Norwegian priority list.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

Environmental performance

The tables below show the renewable and non-renewable resources, the quantities of waste generated, the amount of secondary material used and the consumption of net fresh water in the production of 1 FU i.e. 1000kg of steel core piles.

Non-renewable resources

		UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Non-Renewable primary resources: energy						
Total		MJ	12 342	1 883	1 808	16 033
Energy	Crude Oil	MJ	2 260	1 520	1 560	5 340
	Natural Gas	MJ	4 340	155	99,8	4 590
	Hard Coal	MJ	4 230	132	96,7	4 460
Non-Renewable primary resources: raw material						
Total		MJ	2 800	0	0	2 800
Total use of non-renewable primary energy						
		MJ	15 142	1 883	1 808	18 833

Renewable resources

		UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Renewable primary resources: energy						
Total		MJ	1 054	39	23	1 117
Renewable primary resources: raw material						
Total		MJ	0	0	0	0
Total use of renewable primary energy						
		MJ	1 054	39	23	1 117

Waste

	UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Hazardous Waste disposed					
Total	kg	0	0,1	0,01	0,11
Non-Hazardous Waste disposed					
Total	kg	36	11	25	72
Radioactive Waste disposed					
	kg	0,1	0,1	0,01	0,21

Secondary Material

	UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Secondary material used: Scrap metal					
Total	kg	1015	0	0	1015

Use of net fresh water

	UNIT	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM	TOTAL
Net fresh Water					
Total	m^3	41,4	1,03	0,393	42,9

Potential Environmental impact Cradle to Gate life cycle 1000kg of steel core piles

	UNIT	TOTAL	A1 UPSTREAM	A2, A3 CORE	A4 DOWNSTREAM
Global warming potential	kg CO2-e	1 130	895	121	114
Acidification potential	kg SO2-e	4,82	3,87	0,45	0,49
Eutrophication potential	kg PO43-e	2,05	1,85	0,10	0,10
Photochemical oxidant creation potential	kg C2H4-e	0,427	0,385	0,023	0,019
Ozone depletion,	kg CFC 11-e	0,000	0,000	0,000	0,000
depletion of abiotic resources (elements),	kg Sb-e	0,002	0,002	0,000	0,000
depletion of abiotic resources (fossil),	MJ	15 142	1 883	1 808	18 833

Contact information:

EPD owner	**UAB Scandia Steel Baltic** Upplandsgatan 7 111 23 Stockholm Sweden www.scandiasteel.se
LCA and EPD Author	**Miljögiraff AB** Pär Lindman Södra Larmgatan 6, 411 16, Göteborg, Sweden www.miljogiraff.se
Programme operator	**The International EPD System** EPD International AB 100 31 Stockholm Sweden www.environdec.se
Third Party Verifier	**Extracon AB** Göran Brohammer Hulanvägen 14 427 38 Billdal Sweden www.extracon.se

References

Ambrazaitis, N. (2016, 05). Production Manager, UAB Scandia Steel, Tel: +370 62 08 22 74, E-post: nerijus@scandiasteel.se. (P. Lindman, Interviewer)

Bauer, C., Althaus, H.-J., Weidema , B., & Hirschier, R. (2009). *Code of practice. Ecoinvent report No. 2.* St. Gallen: Swiss Centre for Life Cycle Inventories.

Baumann, H., & Tillman, A. (2004). *Liftarens guide till LCA.* Lund, Sweden: Studentlitteratur ISBN: 91-44-02364-2.

Carlsson, R., & Pålsson, A.-C. (2011). *Livscykelanalys – ringar på vattnet. .* SIS Förlag 978-91-7162-652-3.

ecoinvent, Hirschier, R., Weidema , B., Althaus , H.-J., Bauer , C., Doka , G., . . . Wernet , G. (2009). *Code of practice. ecoinvent report No. 2.* St. Gallen: Swiss Centre for Life Cycle Inventories.

EPD®, T. I. (2016-03-09). *PCR 2012:01 v. 2.01 Construction products and construction services.* The International EPD® System.

Goedkoop, M., Heijungs, R., Huijbregts, M., Schryver, A., Struijs, J., & Zelm, R. v. (2009). *ReCiPe 2008-A life cycle impact assessment method which comprises harmonised category indicators at the midpoint and the endpoint level.* Holland.

Guinée, J., Gorrée, M., Heijungs, R., Huppes, G., Kleijn, R., Koning, A. d., . . . Sleeswijk, A. (2004). *Handbook on Life Cycle Assessment - Operational Guide to the ISO Standards.* Kluwer Academic Publications.

ISO 14040. (2006). *Environmental Management – Life cycle assessment – Principles and framework (SS-EN ISO 14040:2006).* Stockholm, Sweden.: Swedish Standards Institute (SIS förlag AB).

ISO 14044. (n.d.). *Environmental Management – Life cycle assessment – Requirements and guidelines (SS-EN ISO 14044:2006).* Stockholm, Sweden: Swedish Standards Institute (SIS förlag AB).

Lindman, P. (2016-06-08). *Life Cycle Assessment Steel pipe piles and Steel core piles Miljögiraff Report 78.* Kalmar: Miljögiraff AB.

Łyczak, Ł. (2016, May). Sales Department Stalprodukt AS.

Marcus Eriksson. (2016, 05 25). Miljö och kvalitéansvarig, Mob. +46 708 990 941 E-mail: marcus@scandiasteel.se. (P. Lindman, Interviewer)

Programme-related information and verification

This EPD follow the PCR 2012:01 v. 2.01 Construction products and construction services.
Product Category Rules review was conducted by: The Technical Committee of the International EPD® System. Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:2006: ☐ EPD Process Certification (internal) ☑ EPD Verification (external)
Third party verifier: Göran Brohammer, Extracon AB Approved by the International EPD System