ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025, ISO 21930 and EN 15804

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The Norwegian EPD Foundation

Owner of the declaration	Skonto Prefab SIA
Publisher	The Norwegian EPD Foundation
Declaration number	NEPD00287E
Issue date	01.12.2014
Valid to	01.12.2019

Steel structure

Product

Skonto Prefab SIA

Owner of the declaration

General information

Product
Steel structure

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Manufacturer
Skonto Prefab SIA
33/4 Granita street, Acone, Salaspils area
LV-2119 Latvia

Declaration number:
NEPD00287E

Place of production:
Acone, Salaspils area, Latvia

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A1:2013 serves as core PCR, and NPCR 013Rev1 (08 2013): Steel as Construction Material.

Management system:
ISO 14001 and ISO 9001

Declared unit (A1-A3):
1 kg of manufactured product.

Org. No:
LV40003610650

Declared unit with option:
-

Issue date
01.12.2014

Functional unit (A1-C4):
1 kg with a specified reference service life (RSL) of 100 years.

Valid to
01.12.2019

The EPD has been worked out by:

Christofer Skaar, PhD

asplan viak

Comparability:
EPD of construction products may not be comparable if they do not comply with EN 15804 and are seen in a building context.

Year of study:
2014

Verification:
Independent verification of data, other environmental information and EPD has been carried out in accordance with ISO14025, 8.1.3 and 8.1.4

externally ☑ internally ☐

Helene Sedal, PhD
(Independent verifier approved by EPD-Norway)

Approved

Dagfinn Malnes
Managing Director of EPD-Norway

Declared unit (A1-A3):
1 kg of manufactured product.

Key environmental indicators	Unit	Cradle to gate A1 - A3	Transport *****
Global warming	kg CO_2 -eqv	1,36E+00	0,0491
Energy use	MJ	2,80E+01	7,67E-01
Dangerous substances	*	-	-

* The product contains no substances from the REACH Candidate list or the Norwegian priority list

***** Estimate of transport from production site to central warehouse in Oslo, Norway. Calculation of this distance is required by the PCR. Note that the product is normally transported directly to construction site (as described in A4).

Product

Product description:
Production of steel columns, beams, trusses, HSQ beams, embedded details and other unstandardized steel details, sections made of welded hot-rolled steel plates used in building frame structures. Profiles and plates are made by European manufacturers. Sections are prefabricated and assembled on-site by Norwegian steel contractors. The requirements of the EN 1090-1 and EN 1090-2 standards are applied, with execution class EXC2, EXC3 and EXC4. The standard steel grade from S235 up to S500.

Market:
Norway.

Reference service life:
Expected reference service life (RSL) is 100 years.

Technical data:
The product is certified in accordance with the EN13225:2004/AC:2006 standard. Properties (min/max):
Compressive strength: C25/30 - C50/60.
Length: 2000 - 11500 mm.

Product specification
The composition of the product is described in the table below:

Materials	kg	%
Steel	> 0,99	> 99
Surface treatment	< 0,01	< 1

LCA: Calculation rules

Functional unit (A1-C4):
1 kg with a specified reference service life (RSL) of 100 years.

System boundary:
Cradle to grave. Included modules production and construction are A1-A5, included modules for end of life are C1, C2 and C4. The use stage (B1-B7) is not relevant. The waste processing stage (C3) is not relevant, as waste processing takes place in C1. Module D is declared. Production process at Skonto includes welding, painting and finalising. The product is then loaded on trucks for transportation to building site.

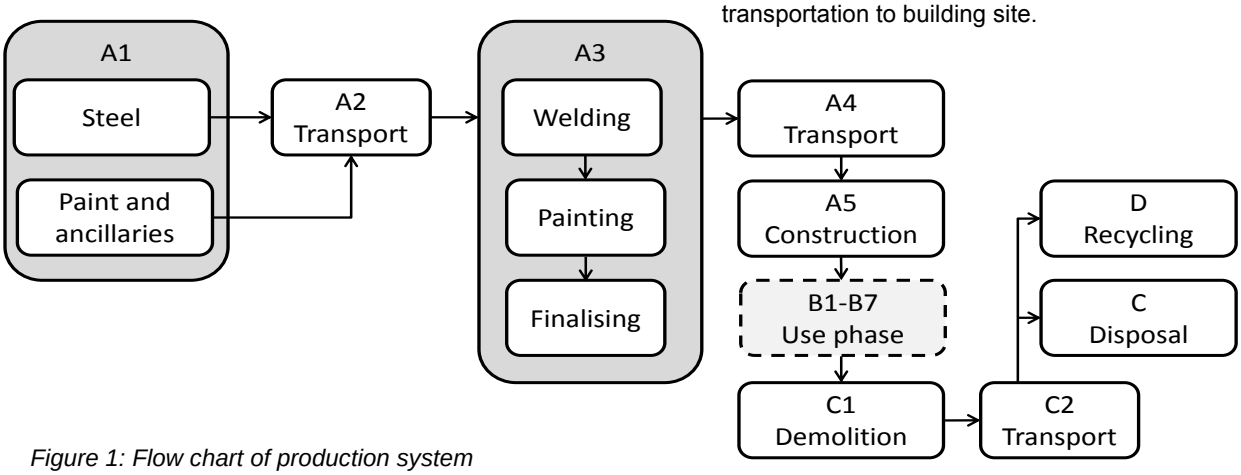

Figure 1: Flow chart of production system

Data quality:
Data for Skonto Prefab production facilities is for 2013. Transport data is for 2014, but valid for 2013. Material and energy use per declared unit has been calculated using expert judgment and validated against annual consumption. Generic data is from the ecoinvent 2.2 database (2003-2007).

Allocation:
The allocation is made in accordance with the provisions of EN 15804. Energy, water and produced waste is allocated on expert judgment to each product group produced by Skonto Prefab to reflect differences between products. The basis for allocation has been information in Building Product Declarations (BPDs) for Skonto Prefab products.

Cut-off criteria:
All important raw materials and energy use are included. In the production process, raw materials and energy of low amounts are not included (<1%). These cut-off rules do not apply to dangerous substances.

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

The scenario for transportation from production place to user is defined as transport from Salaspils (Latvia) to Stavanger (Norway). This is a typical transportation distance for Skonto Prefab products.

Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	75	Lorry, >32t, EURO4	975	0,019 l/tkm	18,62
Boat	65	Ferry	469	0,003 l/tkm	1,31

Installation in the building (A5)

	Unit	Value
Auxiliary	kg	-
Water consumption	m^3	-
Electricity consumption	kWh	-
Other energy carriers	MJ	0,027
Material loss	kg	-
Output materials from waste treatment	kg	-
Dust in the air	kg	0,012

Description, A5:
Scenario is modelled as installation of a typical steel product in a building. Only fossil fuel use during installation is included. Product waste and other inputs are negligible.

End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	kg	0
Collected as mixed construction waste	kg	0
Reuse	kg	0
Recycling	kg	0,99
Energy recovery	kg	0
To landfill	kg	0,01

Description, C1, C3 and C4:
End of Life scenario is based on materials being separated on site. 99 % of steel is recycled. The remaining fraction is sent to landfill (module C4). Energy for deconstruction is included in C1, therefore is no activity in C3.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return)	Type of vehicle	Distance km	Fuel/Energy	Value
Truck	Lorry, 16-32t		15	0,0356 l/tkm	0,53

Description, C2:
Transport to material recycling of steel.

Use stage (B1-B7)
B1 is defined as not relevant (MNR) in NPCR13Rev1. In B2, B3, B4 and B5 there is no significant interaction with the environment, as there is no need for maintenance, repair or refurbishment in the use stage. B6 and B7 are specified as not relevant (MNR) in NPCR020, and are therefore not included. This must not be regarded as an indicator result of zero for B1, B6 and B7.

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Net new steel to recycling	kg	0,29

Module D is calculated as the net new steel that is recycled. This amount is considered to replace primary steel production. The average recycled content is approximately 70 %. With a recycling rate of 99 % for steel, the net new recycled steel is 29 %.

LCA: Results

System boundaries (X=included, MND=module not declared, MNR=module not relevant)

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	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	X	MNR	X	X	X	X	MNR	MNR	X	X	X	X	X

Environmental impact

Parameter	Unit	A1-A3	A4	A5	B2	B3	B4	B5	C1	C2	C3	C4	D
GWP	kg CO_2-eqv	1,36E+0	8,76E-2	2,47E-3	0	0	0	0	9,16E-3	2,48E-3	0	6,68E-4	-5,88E-1
ODP	kg CFC11-eqv	9,98E-8	1,45E-8	3,08E-10	0	0	0	0	1,14E-9	3,92E-10	0	9,67E-11	-1,66E-8
POCP	kg C_2H_4-eqv	5,74E-4	1,54E-5	4,87E-7	0	0	0	0	1,80E-6	3,02E-7	0	1,33E-7	-3,41E-4
AP	kg SO_2-eqv	5,28E-3	4,41E-4	1,90E-5	0	0	0	0	7,03E-5	9,50E-6	0	4,95E-6	-2,38E-3
EP	kg PO_4^{3-}-eqv	2,99E-3	1,05E-4	4,09E-6	0	0	0	0	1,64E-5	2,53E-6	0	1,16E-6	-1,41E-3
ADPM	kg Sb-eqv	1,07E-5	3,09E-7	3,92E-10	0	0	0	0	1,45E-9	6,84E-9	0	2,34E-10	-9,22E-6
ADPE	MJ	2,37E+1	1,39E+0	3,42E-2	0	0	0	0	1,27E-1	3,66E-2	0	1,01E-2	-1,04E+1

GWP Global warming potential; **ODP** Depletion potential of the stratospheric ozone layer; **POCP** Formation potential of tropospheric photochemical oxidants; **AP** Acidification potential of land and water; **EP** Eutrophication potential; **ADPM** Abiotic depletion potential for non fossil resources; **ADPE** Abiotic depletion potential for fossil resources

Resource use

Parameter	Unit	A1-A3	A4	A5	B2	B3	B4	B5	C1	C2	C3	C4	D
RPEE	MJ	1,21E+0	2,24E-2	1,42E-4	0	0	0	0	5,26E-4	5,29E-4	0	5,28E-5	-5,32E-1
RPEM	MJ	6,32E-2											
TPE	MJ	1,28E+0	2,24E-2	1,42E-4	0	0	0	0	5,26E-4	5,29E-4	0	5,28E-5	-5,32E-1
NRPE	MJ	2,68E+1	1,49E+0	3,49E-2	0	0	0	0	1,29E-1	3,90E-2	0	1,03E-2	-1,10E+1
NRPM	MJ												
TRPE	MJ	2,68E+1	1,49E+0	3,49E-2	0	0	0	0	1,29E-1	3,90E-2	0	1,03E-2	-1,10E+1
SM	kg	6,95E-1											
RSF	MJ												
NRSF	MJ												
W	m^3	2,80E-2	8,43E-4	3,55E-5	0	0	0	0	3,55E-5	1,82E-5	0	4,44E-6	-7,70E-3

RPEE Renewable primary energy resources used as energy carrier; **RPEM** Renewable primary energy resources used as raw materials; **TPE** Total use of renewable primary energy resources; **NRPE** Non renewable primary energy resources used as energy carrier; **NRPM** Non renewable primary energy resources used as materials; **TRPE** Total use of non renewable primary energy resources; **SM** Use of secondary materials; **RSF** Use of renewable secondary fuels; **NRSF** Use of non renewable secondary fuels; **W** Use of net fresh water

End of life - Waste

Parameter	Unit	A1-A3	A4	A5	B2	B3	B4	B5	C1	C2	C3	C4		D
HW	kg	7,62E-5	1,81E-6	1,80E-8	0	0	0	0	6,65E-8	3,86E-8	0	5,27E-9		-5,08E-5
NHW	kg	5,00E-1	1,40E-2	2,30E-5	0	0	0	0	8,53E-5	2,42E-4	0	9,93E-3		-2,39E-1
RW	kg	4,41E-5	1,35E-6	1,03E-8	0	0	0	0	3,82E-8	3,25E-8	0	3,61E-9		-9,26E-6

HW Hazardous waste disposed; **NHW** Non hazardous waste disposed; **RW** Radioactive waste disposed

End of life - Output flow

Parameter	Unit	A1-A3	A4	A5	B2	B3	B4	B5	C1	C2	C3	C4		D
CR	kg													
MR	kg									0,99				
MER	kg													
EEE	MJ													
ETE	MJ													

CR Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energy

Reading example: 9,0 E-3 = $9,0*10^{-3}$ = 0,009

Additional Norwegian requirements

Electricity
Latvian electricity mix is used for production site. The main electricity sources are hydropower (39 %), natural gas (35 %) and electricity imported from Russia (18 %). Data are based on ENTSO-E for 2013.

Greenhouse gas emissions per MJ: 0.127 kg CO_2-eqv/MJ
Greenhouse gas emissions per kWh: 0.459 kg CO_2-eqv/kWh

Dangerous substances
None of the following substances have been added to the product: Substances on the REACH Candidate list (of 16.6.2014) of substances of very high concern or substances on the Norwegian Priority list (of 11.11.2013) or substances that lead to the product being classified as hazardous waste. The chemical content of the product complies with regulatory levels as given in the Norwegian Product Regulations. As the product contains no dangerous substances on the REACH Candidate list or the Norwegian priority list, it is assumed that there are no toxic effects occuring in the use stage.

Transport
Transport from production site to central warehouse in Norway is defined as transport to Oslo. The product is not normally transported to a central warehouse, but directly to construction site (see description of module A4).

Indoor environment
The product has not been tested for emissions to indoor environment. The product contains no dangerous substances on the REACH Candidate list or the Norwegian priority list. Based on this it is assumed that the product has a negligible impact on the indoor environment and therefore meets the requirements for low emissions (M1) according to EN15251:2007 Appendix E.

Carbon footprint
Carbon footprint has not been worked out for the product.

Bibliography

ISO 14025:2006	*Environmental labels and declarations - Type III environmental declarations - Principles and procedures*
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines
EN 15804:2012+A1:2013	*Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products*
ISO 21930:2007	*Sustainability in building construction - Environmental declaration of building products*
Skaar, C. (2014)	LCA report for Skonto Prefab SIA. MiSA EPD Report No. 1-2014.
NPCR013rev1 (2013)	*Steel as construction material*

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