ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025 ISO 21930 EN 15804

Owner of the declaration	Contiga AS
Program holder	The Norwegian EPD Foundation
Publisher	The Norwegian EPD Foundation
Declaration number	00078E rev1
Issue date	25.11.2013
Valid to	25.11.2018

Hot finished structural hollow sections (HFSHS)

Product

Contiga AS

Manufacturer

General information

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Program holder
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Contiga AS
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Declaration number:
00078E rev1

Place of production:
EENVEGEN 31, 2216 ROVERUD

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serve as core PCR
NPCR 01-Revision 1 (08 2013) on steel as construction material

Management system:
ISO 14001

Declared unit:
per kg steel

Org. No:
971507837

Declared unit with option:

Issue date
25.11.2013

Functional unit:
per kg building steel structure with an expected service life of 100 years.

Valid to
25.11.2018

The environmental product declaration has been worked out by:
Adriana C. GuerraCalle, NTNU
Michael Myrvold Jensen, NTNU

Comparability:
EPD of construction products may not be comparable if they not comply with EN 15804

Year of study:
2013

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

externally ☑ internally ☐

Prof. Dr. ing. Annik Magerholm Fet
(Independent verifier approved by EPD Norway)

Approved according to ISO14025, 8.1.4

Dr. ing Sverre Fossdal
(Chairman of the Verification Group of EPD-Norway)

Declared unit:
per kg steel

Key environmental indicators	Unit	Cradle to gate A1 - A3	Transport $A4_1$	Module D
Global warming	kg CO_2 -eqv	2,74	0	-1,36
Energy use	MJ	43,80	0	-13,97
Dangerous substances	*	*	-	-
Recycled material in**	%	13	-	-
Recycled material out***	%	99		86

* The product contains no substances from the REACH Candidate list or the Norwegian priority list
$A4_1$ Transport from production site to central warehouse in Norway
** The fraction of recycled steel from the mill is 13%
*** The recovery rate of steel is 99% including recoverd and reused products
Net new recycled material output presented in Module D.

Product

Product description:
Circular, square and rectangular sections used in building frame structures.

Technical data:
Dimensions: Square HS: 40x3 - 400x20. Rectangular HS: 50x25x2-400x200x12,5 and Circular HS: 21,3x2 - 711x60. Steel grade ≤ S355. EN 10210 and EN 1090-2 standards are applied.

Product specification
Steelsections are made by European manufacturers. Sections are prefabricated and erected on-site by Norwegian steel contractors.

Materials	kg	%
Steel	>0,99	>99
Primer	>0,01	<1

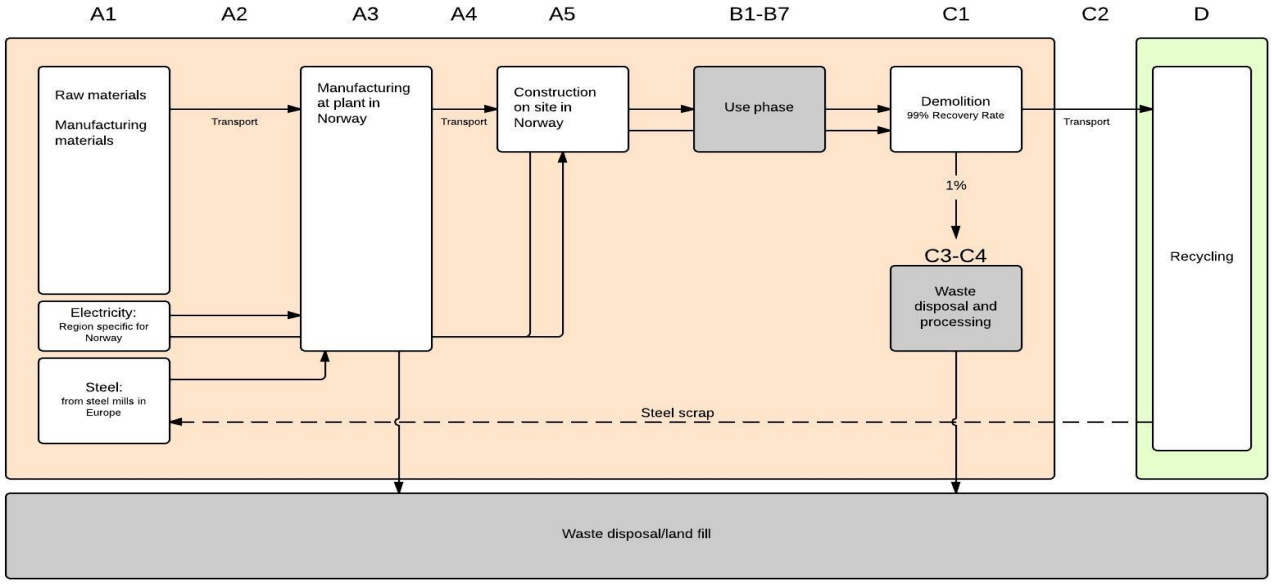
Market:
Norway

Reference service life:
100 years

LCA: Calculation rules

Functional unit:
per kg building steel structure with an expected service life of 100 years.

System boundary:
Grey areas are not relevant for this study. Green reperesents the system receiving the scrap steel at the EOL, from which and environmental credit is returned to the system. Waste disposal is <1%.



Data quality:
General requirements and guidelines concerning use of generic and specific data and the quality of those are as described in EN 15804: 2012, clause 6.3.6 and 6.3.7. The data is representative according to temporal, geographical and technological requirements.

Temporal: Data for use in module A3 is supplied by the manufacturer and consists of the 2012 annual total material and energy consumption. Specific data has been collected through 2013. Generic data has been created or updated within the last 10 years.

Geographical: The geographic region of the production sites included in the calculation is Europe.

Technological: Data represents technology in use.

Cut-off criteria:
Processes that do not contribute to more than 2% of the total mass and 1 % of the energy use are excluded from the study. Omitted products shall not have relevant to the selected impact categories.contribution

Allocation:
Impacts due to production are allocated by mass. Welding processes are allocated to the fraction of 1/8. The consumption of primer paint is allocated to the fraction of 3/10.

To account for the impacts generated in the construction and demolition phases, electricity has been allocated to the phases by the fractions of 1/3 and 1/6 respectively.

LCA: Scenarios and additional technical information

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

Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	85*	Lorry truck>16t	400	l/tkm	**

* Utilisation ratio stated in background process "RER: Lorry transport PE" used in GaBi 6
** Fuel consumption data not available through GaBi 6 from which the modeling of transport was conducted.

Additional information: Transport from production site to central warehouse in Norway 0 km

To account for the impacts generated in the construction phase, electricity has been allocated to the phase by a fraction of 1/3 of the manufacturing phase (A3).

Installation in the building (A5)

	Unit	Value
Auxiliary	kg	-
Water consumption	m^3	-
Electricity consumption	kWh	0,35
Other energy carriers	MJ	-
Material loss	kg	-
Output materials from waste treatment	kg	-
Dust in the air	kg	-

End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	kg	-
Collected as mixed construction waste	kg	0,01
Reuse	kg	0,06
Recycling	kg	0,93
Energy recovery	kg	-
To landfill	kg	-

Life cycle stages B2-B7 are due to the description of the product not accounted for, since there is no repairs, service or maintenance performed on the product over its life cycle.

To account for the impacts generated in the demolition phase, electricity has been allocated to the phase by a fraction of 1/6 of the manufacturing phase (A3).

Transport from building site to waste processing site is estimated to an average of 50 kilometers, using an average derived from the manufacturer.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	85*	Lorry >16t	50	l/tkm	**

* Utilisation ratio stated in background process "RER: Lorry transport PE" used in GaBi 6
** Fuel consumption data not available through GaBi 6 from which the modeling of transport was conducted.

Benefits and loads beyond the system boundaries (D)

	Unit	Value
GWP	kg CO_2-eqv	-1,36E+00
ODP	kg CFC11-eqv	-6,42E-09
AP	kg SO_2-eqv	-2,50E-03
EP	kg PO_4^{-3}-eqv	-4,33E-07
POCP	kg NMVOC	-2,51E-03
ADPM	kg Sb -eqv	-2,46E-08
ADPE	MJ	-1,38E+01

Module D is calculated as a scenario in which the net new steel scrap received in Module D is given an environmental burden. This burden is subtracted from this system as a credit, representing the environmental benefit from recycling the steel structure at its end of life. Including Module D will therefore show the total environmental performance of the product for the whole life cycle.

Additional technical information
No additional information is required

LCA: Results

The impacts generated due to the life cycle stages described in the system boundaries below are calculated using the GaBi 6 Professional LCA-software. The impact assessment methodology used is ReCiPe. Exceptions are for the ADP-elements and ADP-fossil categories, which according to NPCR 013 are to be derived from the CML 2001 impact assessment methodology.

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	MNR	MNR	MNR	MNR	MNR	MNR	X	X	MNR	MNR	X

* Life cycle modules are not declared due to non-existant data for these particular life cycle stages.

Environmental impact

Parameter	A1-A3	A4	A5	B1-7	C1	C2	C3	C4	D
GWP	2,74E+00	2,39E-02	1,48E-02	-	7,42E-03	2,98E-03	-	-	-1,36E+00
ODP	1,17E-08	4,18E-13	3,19E-12	-	1,60E-12	5,22E-14	-	-	-6,42E-09
AP	4,90E-03	3,16E-05	1,51E-05	-	7,55E-06	3,95E-06	-	-	-2,50E-03
EP	9,46E-07	2,52E-08	5,90E-09	-	2,96E-09	3,14E-09	-	-	-4,33E-07
POCP	4,96E-03	3,39E-05	1,67E-05	-	8,37E-06	4,23E-06	-	-	-2,51E-03
ADPM	7,12E-07	8,92E-10	6,94E-08	-	3,47E-08	1,11E-10	-	-	-2,46E-08
ADPE	2,85E+01	3,31E-01	1,78E-01	-	8,86E-02	4,14E-02	-	-	-1,38E+01

GWP Global warming potential (kg CO_2-eqv.); **ODP** Depletion potential of the stratospheric ozone layer (kg CFC11-eqv.); **POCP** Formation potential of tropospheric photochemical oxidants (kg NMVOC*); **AP** Acidification potential of land and water (kg SO_2-eqv.); **EP** Eutrophication potential (kg PO_4^{3-}-eqv.); **ADPM** Abiotic depletion potential for non fossil resources (kg Sb -eqv.); **ADPE** Abiotic depletion potential for fossil resources (MJ). * According to the recommendations in the ReCiPe methodology, kg NMVOC is used in stead of kg C_2H_4-equivalents.

Resource use

Parameter	A1-A3	A4	A5	B1-7	C1	C2	C3	C4	D
RPEE	1,52E+01	1,30E-02	1,58E+00	-	7,86E-01	1,62E-03	-	-	-1,58E-01
FPEM	2,32E-05	4,11E-15	4,11E-14	-	2,06E-14	5,14E-16	-	-	-1,07E-05
TPE	1,52E+01	1,30E-02	1,58E+00	-	7,86E-01	1,62E-03	-	-	-1,58E-01
NRPE	-	3,31E-01	1,78E-01	-	8,86E-02	4,14E-02	-	-	-
NRPM	-	-	-	-	-	-	-	-	-
TRPE	2,86E+01	3,31E-01	1,78E-01	-	8,86E-02	4,14E-02	-	-	-1,38E+01
SM	-	-	-	-	-	-	-	-	-
RSF	-	-	-	-	-	-	-	-	-
NRSF	-	-	-	-	-	-	-	-	-
W	2,95E+01	1,29E-03	3,13E+00	-	1,56E+00	1,62E-04	-	-	-1,00E-02

RPEE Renewable primary energy resources used as energy carrier (MJ); **RPEM** Renewable primary energy resources used as raw materials (MJ); **TPE** Total use of renewable primary energy resources (MJ); **NRPE** Non renewable primary energy resources used as energy carrier (MJ); **NRPM** Non renewable primary energy resources used as materials (MJ); **TRPE** Total use of non renewable primary energy resources (MJ); **SM** Use of secondary materials (kg); **RSF** Use of renewable secondary fuels (MJ); **NRSF** Use of non renewable secondary fuels (MJ); **W** Use of net fresh water (m^3)

End of life - Waste

Parameter	A1-A3	A4	A5	B1-7	C1	C2	C3	C4	D
HW	9,97E-04	-	-	-	-	-	-	-	-
NHW	9,71E-02	-	-	-	<0,01	-	-	-	-
RW	-	-	-	-	-	-	-	-	-

HW Hazardous waste disposed (kg); **NHW** Non hazardous waste disposed (kg), **RW** Radioactive waste disposed (kg)

End of life - Output flow

Parameter	A1-A3	A4	A5	B1-7	C1	C2	C3	C4	D
CR	-	-	-	-	0,06	-	-	-	-
MR	8,05E-02	-	-	-	0,93	-	-	-	-
MER	-	-	-	-	-	-	-	-	-
EEE	-	-	-	-	-	-	-	-	-
ETE	-	-	-	-	-	-	-	-	-

* Approximately six percent is reused. This percentage togeter with the percentage for recycling constitues the Recovery Rate which is a basis for calculating recycling.

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

Reading example: 9,0 E-03 = $9,0*10^{-3}$ = 0,009

Specific Norwegian requirements

Electricity
Electricity used in the manufacturing processes has been accounted for using an electricity mix process specific to Norway.

Greenhouse gas emissions: 0,012 kg CO_2 - eqv/MJ

Dangerous substances
None of the following substances have been added to the product: Substances on the REACH Candidate list of substances of very high concern (of 25.11.2013) substances on the Norwegian Priority list (of.25.11.2013) and 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.

Transport
Transport from production site to central warehouse in Norway is 0 km

Indoor environment
The product has no impact on the indoor environment.

Carbon footprint
Carbon footprint has not been worked out.

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	*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*
NPCR 013-2013	Product Category Rules Steel as Construction Material
LCA-report Contiga AS	Life Cycle Assessment Report, Contiga AS, NTNU, Guerra and Jensen,Nov 2013, revised Feb 2014

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