

# ENVIRONMENTAL DECLARATION ISO 14025 and ISO 21930



## Steel structures of cold formed welded structural hollow sections (CFSHS)

**EPD**  
Foundation for Environmental  
Declarations in Industry

*Bjørn Green*



**NEPD no.:** 079  
Issued, date: 01.07.2007  
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### Independent verification of conformity

We confirm that this environmental declaration has been carried out according to ISO 14044, ISO 14025 and ISO 21930, and Product category rules (PCR) of Steel as construction materials. The documentation has been carried out with the EcoDec-tool.

The declaration has been prepared by:

SINTEF Byggtorsk SINTEF

*Sven Fosstøl*  
Oslo: 01.07.2007

*Åsn Kjøivold*  
Independent verifier

### Manufacturer

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ISO 14001/EMAS etc. : ISO 14001: 2003-OSL-SYMI-8195  
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### Background information

Scope	Cradle to grave
Year of study	2005
Expected service life of building	60 years
Service life of product	100 years

Functional unit (FU)

kg building frame structure with a service life of 60 years

### Product description

Cold finished structural hollow sections (CFSHS): Circular, square and rectangular sections are used in building frame structures, made of hot-rolled steel strip by cold-rolling and welding by European manufacturers. Prefabricated and erected on-site by Norwegian steel entrepreneurs. Dimensions: Square HS: 25x2 - 300x12,5. Rectangular HS: 50x25x2 - 400x200x12,5 and Circular HS: 21,3x2 - 711x60. The requirements of the EN 10219 standard are applied. The standard steel grade is S355. Density of steel: 7850 kg/m<sup>3</sup>.

### Product specification

	Part %	Quantity (kg/FU)
Steel frame	99,3 %	1,00
Paint (Alkyde)	0,7 %	0,01
SUM	100,0 %	1,01

### Environmental Indicators

Global warming	0,9	kg CO2 equiv.
Energy use	21,2	MJ
Recycled materials	94	%
Recovery Rate steel	96	%
Indoor air classification (Classification according to CR 1752:1999)	No information	

## Use of resources

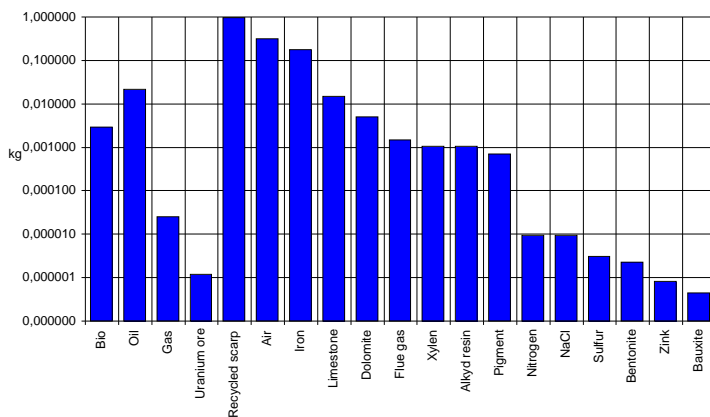
### Material resources

R = Recycled materials  
\* = Feedstock

All figures refer to functional unit (FU)

	Type	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
<b>No renewable materials are used</b>									
Bio	*	kg		2,9E-03					2,9E-03
<b>Non-renewable materials</b>									
Oil	*	kg	2,2E-02	4,0E-05					2,2E-02
Gas	*	kg		2,6E-05					2,6E-05
Uranium ore		kg	1,0E-06	1,3E-07					1,2E-06
Recycled scarp	R	kg	9,6E-01						9,6E-01
Air		kg	3,2E-01						3,2E-01
Iron		kg	1,8E-01						1,8E-01
Limestone		kg	1,5E-02						1,5E-02
Dolomite		kg	5,1E-03						5,1E-03
Flue gas		kg	1,5E-03						1,5E-03
Xylen		kg	1,1E-03						1,1E-03
Alkyd resin		kg	1,1E-03						1,1E-03
Pigment		kg	7,1E-04						7,1E-04
Nitrogen		kg	9,3E-06						9,3E-06
NaCl		kg	9,3E-06						9,3E-06
Sulfur		kg	3,1E-06						3,1E-06
Bentonite		kg	2,3E-06						2,3E-06
Zink		kg	8,2E-07						8,2E-07
Bauxite		kg	4,4E-07						4,4E-07

Material resources total



Renewable materials 0 %, Non-renewable materials 100 %, Recycled materials 94 %

The product does not contain tropical wood.

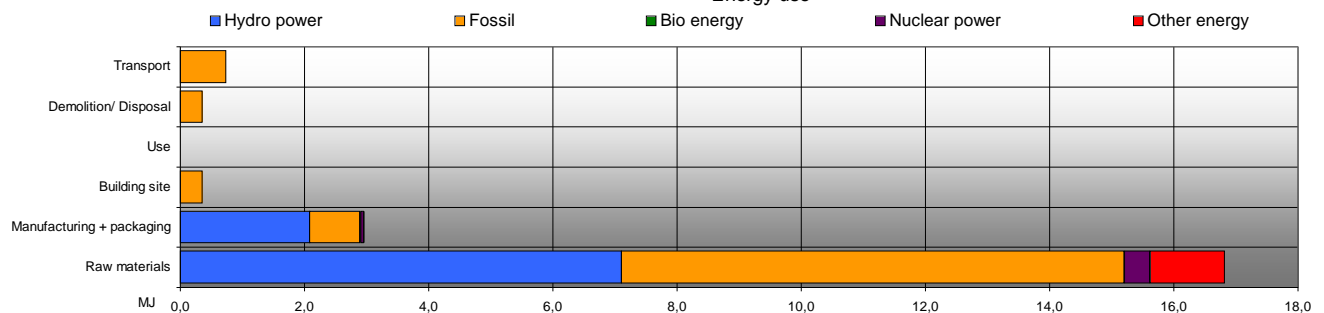
### Consumption of chemicals on the Norwegian observation list

CAS-number	Risk phrases	Quantity	Unit
64742-95-6	10, 37, 51/53	2,1E-01	g
			g
			g
			g
			g
			g
<b>Total</b>		<b>2,1E-01</b>	<b>g</b>

### Energy resources

	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
<b>Renewable energy</b>								
Hydro power	MJ	7,1E+00	2,1E+00					9,2E+00
Bio energy	MJ		6,8E-03					6,8E-03
<b>Non-renewable energy</b>								
Oil	MJ	8,8E-01	5,9E-01	3,6E-01		3,6E-01	7,4E-01	2,9E+00
Gas	MJ	3,3E+00	2,1E-01					3,5E+00
Coal	MJ	3,9E+00	2,4E-02					4,0E+00
Nuclear power	MJ	4,2E-01	5,1E-02					4,7E-01
Other energy	MJ	1,2E+00	1,2E-02					1,2E+00
<b>Total</b>								<b>2,1E+01</b>

Energy use



### Water

Potable water 6,9E-03 m<sup>3</sup>

### Land

Land used 0,00 m<sup>2</sup>

## Emissions and environmental impacts

### Environmental impacts

All figures refer to functional unit (FU)

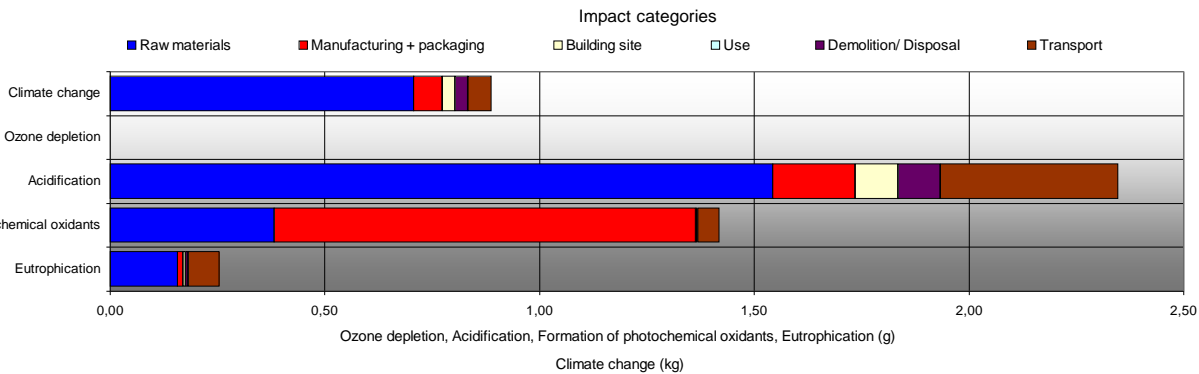
	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
Climate change	kg CO <sub>2</sub> - equiv.	7,1E-01	6,8E-02	2,9E-02		2,9E-02	5,5E-02	8,8821E-01
Ozone depletion	kg ODP - equiv.	1,2E-12	6,5E-12	4,0E-12		4,0E-12		1,6E-11
Acidification	kg SO <sub>2</sub> - equiv.	1,5E-03	1,9E-04	9,9E-05		9,9E-05	4,1E-04	2,3E-03
Formation of photochemical oxidants	kg POCP- equiv.	3,8E-04	9,8E-04	2,3E-06		2,3E-06	5,0E-05	1,4E-03
Eutrophication	kg PO <sub>4</sub> - equiv.	1,6E-04	1,4E-05	5,8E-06		5,8E-06	7,3E-05	2,6E-04

### Emissions to air

	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
CO <sub>2</sub>	g	6,5E+02	6,7E+01	2,9E+01		2,94E+01	5,4E+01	8,3E+02
CO	g	8,5E+00	3,0E-02	6,3E-03		6,35E-03	2,4E-01	8,8E+00
SO <sub>2</sub>	g	7,7E-01	1,2E-01	6,8E-02		6,81E-02	2,0E-02	1,0E+00
NO <sub>x</sub>	g	1,1E+00	1,0E-01	4,4E-02		4,41E-02	5,6E-01	1,8E+00
NMVOG	g	1,4E-01	2,4E+00	5,5E-03		5,45E-03	6,4E-02	2,6E+00
Particles	g	2,3E-02	4,2E-03	5,4E-04		5,38E-04	4,2E-02	7,0E-02
CH <sub>4</sub>	g	1,1E+00	3,3E-02	1,4E-03		1,40E-03	2,5E-03	1,1E+00
N <sub>2</sub> O	g	3,6E-02	7,9E-04	2,0E-04		1,95E-04	6,4E-04	3,8E-02
NH <sub>3</sub>	g	8,0E-04	4,3E-04	2,2E-04		2,15E-04		1,7E-03
Pb	g	2,8E-03	1,4E-07				1,9E-06	2,8E-03
Hg	g	9,0E-05	1,4E-07					9,0E-05
HF	g	6,0E-07	2,9E-06	1,8E-06		1,79E-06		7,1E-06
HCl	g	3,3E-02	7,2E-06	2,0E-06		2,04E-06		3,3E-02
Benzene	g	3,2E-07	3,4E-08				1,3E-03	1,3E-03
KCFC-22	g	3,7E-08	1,9E-07	1,2E-07		1,18E-07		4,7E-07
Zn	g	1,2E-02						1,2E-02
H <sub>2</sub> S	g	2,4E-03						2,4E-03
Cr	g	2,2E-03						2,2E-03
Cd	g	6,4E-05						6,4E-05
Dioxins	g	1,2E-08						1,2E-08

### Emissions to water

Substance/fibre	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Transport	Total
Substance/fibre	g	2,0E-01						2,0E-01
COD	g	1,8E-01	1,8E-04					1,8E-01
BOD	g	6,8E-07	4,3E-05					4,3E-05
Phosphorus P	g	3,0E-03	1,4E-07					3,0E-03
Nitrogen N	g	1,1E-03	2,5E-07					1,1E-03
Fe	g	9,4E-02						9,4E-02
Zn	g	8,0E-04						8,0E-04
Ni	g	1,6E-04						1,6E-04



### Indoor environment

TVOC	No information	µg/m <sup>2</sup> h	Measured after 28 days
Formaldehyde	No information	µg/m <sup>2</sup> h	Measured after 28 days
Ammonia	No information	µg/m <sup>2</sup> h	Measured after 28 days
Carcinogenic compounds	No information	µg/m <sup>2</sup> h	Measured after 28 days
Classified as category	No information		Classification according to CR 1752:1999

Noise	No information	dB(A)
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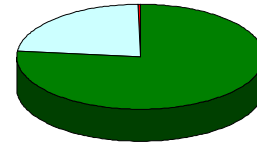
The paint used have not been classified, but according to the manufacturer it is expected there will be no impact on the indoor environment.

## Waste treatment

All figures refer to functional unit (FU)							
	Unit	Raw materials	Manufacturing + packaging	Building site	Use	Demolition/ Disposal	Total
Reuse/ recycling	kg		4,6E-02			9,7E-01	1,0E+00
Energy production	kg		3,0E-06				3,0E-06
Waste to land fill	kg	2,6E-01	1,1E-02			3,3E-02	3,1E-01
Hazardous waste	kg	1,5E-03	3,1E-04				1,8E-03
Radioactive waste	g	3,2E-03	6,0E-04				3,8E-03

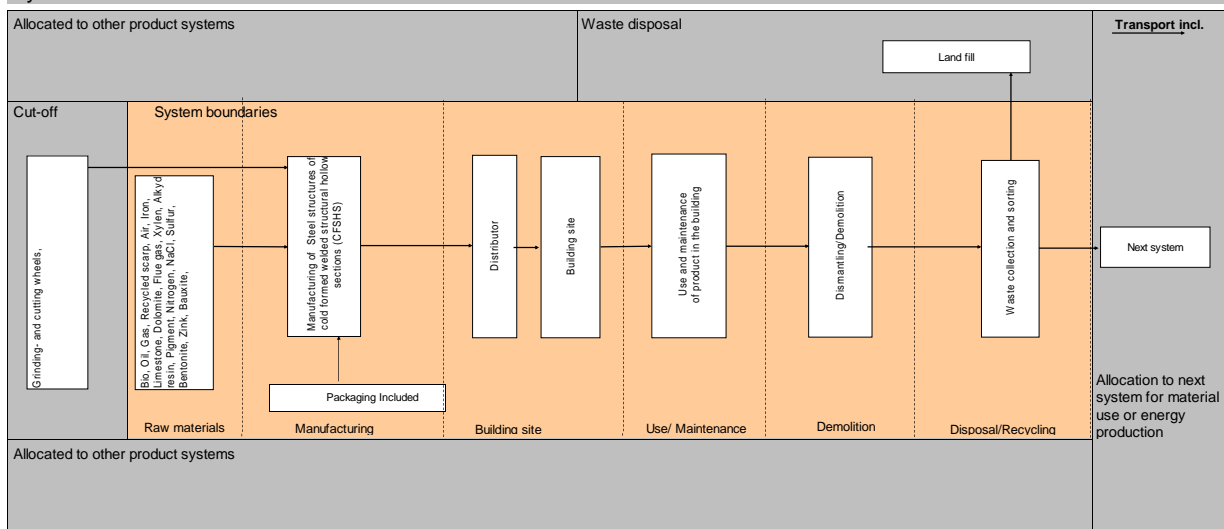
### Waste treatment

The whole building frame structure will be reused/recycled.



■ Reuse/ recycling  
■ Waste to land fill  
■ Energy production  
■ Hazardous waste

## System boundaries



Uncertainty	±	10 %
Scope of data (average)		100 %
Materials with product specific data		2 %
Cut-off		0,04 %

References: Sintef Byggforsk Report 20958

Contiga AS is manufacturing steel and concrete products in Oslo, Moss, Fredrikstad, Kongsvinger, Flisa and Stjørdal. This EPD is based on the manufacturing process in Kongsvinger. Contiga AS is certified according to ISO 9001, certificate no: 95-OSL-AQ-6299 and ISO 14001, certificate no: 2003-OSL-SYMI-8195 from Det Norske Veritas.