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The Norwegian EPD Foundation



ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration:	INHUS Prefab AS
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-445-306-EN
ECO Platform reference number:	00000366
Issue date:	30.05.2016
Valid to:	30.05.2021

Precast concrete beams

INHUS Prefab AS



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General information

Product:

Precast concrete beams

Program operator:

The Norwegian EPD Foundation
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 Phone: +47 23 08 82 92
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Declaration number:

NEPD-445-306-EN

ECO Platform reference number:

00000366

This declaration is based on Product Category Rules:

CEN Standard EN 15804 serves as core PCR
 NPCR 020 Precast Concrete Products (28.03.2012).

Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Declared unit:

1 tonne precast concrete beams

Declared unit with option:
Functional unit:

1 tonne precast concrete beams with specific reference service life (RSL) of 60 years

Verification:

The CEN Norm EN 15804 serves as the core PCR. Independent verification of the declaration and data, according to ISO14025:2010

internal external

Third party verifier:



Christofer Skaar, PhD

(Independent verifier approved by EPD Norway)

Owner of the declaration:

UAB INHUS

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Manufacturer:

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Place of production:

Vilnius, Lithuania

Management system:

ISO 14001, ISO 9001

Organisation no:

LT 121559766

Issue date:

30.05.2016

Valid to:

30.05.2021

Year of study:

2015-2016

Comparability:

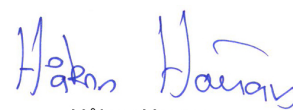
EPD of construction products may not be comparable if they do not comply with EN 15804 and are seen in a building context.

The EPD has been worked out by:

Marte Reenaas




Approved



Håkon Hauan
 Managing Director of EPD-Norway

Product

Product description:

Precast concrete beams are used in building constructions.

Product specification:

Product specification is given below.

Materials	kg	%
Sand	337,3	33,73 %
Stone	425,8	42,58 %
Cement	130,9	13,09 %
Reinforcement details	69,4	6,94 %
Steel details	0,8	0,08 %
Water	35,4	3,54 %
Additives	0,4	0,04 %
SUM	1000	100 %

Technical data:

Products are available in various sizes, shapes and lengths. Height: 300 mm - 1000 mm, width: 300 mm - 900 mm length: 3000 mm - 20000 mm, concrete: C30/37 - C60/75.

Beams are produced in accordance with EN 13225:2013.

Market:

Norway

Reference service life, product:

60 years

Reference service life, building:

60 years

LCA: Calculation rules

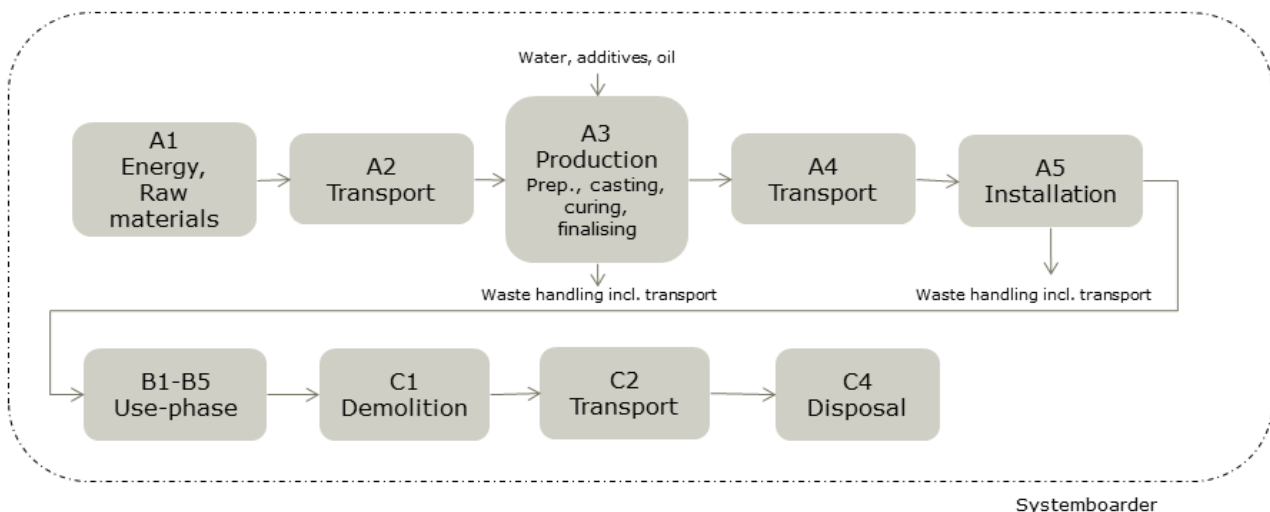
Declared unit:

1 tonne precast concrete beam

System boundary:

The system boundaries for the cradle-to-grave analysis are given in the flow diagram. All modules are included except module D. There are no environmental impact in B1-B5 and B6 and B7 are not relevant according to PCR. Waste processing is included in module A1-3 and in C1 and C4.

Figure 1 Flow diagram



Data quality:

Product specific data is based on the annual average of 2014. Generic data is from Simapro v.8.0.5.13 with Ecoinvent v 3.2 database from 2014.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Cut-off criteria:

All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances.

Variability:

The size of the product differs from project to project, but the results are given per tonne product and based on the production volume, this is assumed to be a representative estimate of the environmental burden of the products

LCA: Scenarios and additional technical information

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

The transport distance from the production site to consumer is an average distance based on factory location and typical customer location for this product.

Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	58 %	Freight lorry >32t, Euro 4	312	0,014 l/tkm	4,37
Boat	71 %	Transoceanic ship	2002,5	0,003 l/tkm	6,00

A5 includes energy use in building machines. It also includes transportation to- and incineration of wood used for material protection during transportation.

The product is demolished and separated at site. Steel is recycled. Concrete is either deposited (25,9 %) or used in roadfillings etc. (74,1 %).

Assembly (A5)

	Unit	Value
Auxiliary	kg	
Water consumption	m ³	
Electricity consumption	kWh	
Other energy carriers	MJ	42
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	
Reuse	kg	
Recycling	kg	759
Energy recovery	kg	
To landfill	kg	241

The transportation in C2 is from the site to recycling or landfill. It is assumed that waste processing happens at site.

Transport to recycling and disposal (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy	Value
Truck	37	Freight lorry, 16-32t, Euro 4	15	0,031 l/tkm	0,47

LCA: Results

The cradle to grave results for 1 tonne product.

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

Product stage		Assembly stage			Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Assembly	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	x	x	x	x	x	MNR	MNR	x	x	x	x	MND

Environmental impact

Parameter	Unit	A1-A3	A4	A5	B1-B5	C1	C2	C3	C4
GWP	kg CO ₂ -eqv	1,97E+02	4,92E+01	4,48E+00	0,00E+00	6,03E-03	2,52E+00	0,00E+00	9,92E-01
ODP	kg CFC11-eqv	9,88E-06	8,68E-06	7,98E-07	0,00E+00	1,08E-09	4,63E-07	0,00E+00	1,79E-07
POCP	kg C ₂ H ₄ -eqv	4,46E-02	2,04E-02	3,08E-03	0,00E+00	1,22E-06	4,34E-04	0,00E+00	2,00E-04
AP	kg SO ₂ -eqv	6,51E-01	5,93E-01	3,44E-02	0,00E+00	4,54E-05	1,02E-02	0,00E+00	7,48E-03
EP	kg PO ₄ ³⁻ -eqv	2,86E-01	7,10E-02	8,50E-03	0,00E+00	1,03E-05	2,22E-03	0,00E+00	1,69E-03
ADPM	kg Sb-eqv	8,82E-04	6,41E-05	2,62E-06	0,00E+00	2,01E-09	8,21E-06	0,00E+00	3,23E-07
ADPE	MJ	1,40E+03	7,71E+02	6,74E+01	0,00E+00	9,20E-02	4,04E+01	0,00E+00	1,51E+01

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	B1-B5	C1	C2	C3	C4
RPEE	MJ	2,56E+02	1,30E+01	5,37E+01	0,00E+00	4,82E-04	4,81E-01	0,00E+00	7,81E-02
RPEM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	2,56E+02	1,30E+01	5,37E+01	0,00E+00	4,82E-04	4,81E-01	0,00E+00	7,81E-02
NRPE	MJ	1,54E+03	7,94E+02	6,91E+01	0,00E+00	9,29E-02	4,11E+01	0,00E+00	1,53E+01
NRPM	MJ	6,81E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	1,55E+03	7,94E+02	6,91E+01	0,00E+00	9,29E-02	4,11E+01	0,00E+00	1,53E+01
SM	kg	1,28E+02	INA	INA	0,00E+00	INA	INA	0,00E+00	INA
RSF	MJ	INA	INA	INA	0,00E+00	INA	INA	0,00E+00	INA
NRSF	MJ	INA	INA	INA	0,00E+00	INA	INA	0,00E+00	INA
W	m ³	3,37E+00	1,55E-01	1,11E-02	0,00E+00	1,33E-05	7,38E-03	0,00E+00	2,17E-03

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; INA indicator not assessed. INA is used for indicators we assume is zero or close to zero. The indicators are zero in the foreground system, but as there could be small contributions in the background system the indicators are set as INA instead of zero.

End of life - Waste

Parameter	Unit	A1-A3	A4	A5	B1-B5	C1	C2	C3	C4
HW	kg	2,29E-03	4,07E-04	3,37E-05	0,00E+00	3,71E-08	2,29E-05	0,00E+00	6,02E-06
NHW	kg	3,69E+01	3,84E+01	1,63E-01	0,00E+00	9,97E-05	1,79E+00	0,00E+00	1,60E-02
RW	kg	5,96E-03	5,01E-03	4,60E-04	0,00E+00	6,10E-07	2,63E-04	0,00E+00	1,01E-04

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

End of life - Output flow

Parameter	Unit	A1-A3	A4	A5	B1-B5	C1	C2	C3	C4
CR	kg	INA	INA	INA	INA	INA	INA	INA	INA
MR	kg	2,00E+01	INA	INA	INA	INA	7,59E+02	INA	INA
MER	kg	1,00E-03	INA	4,00E-03	INA	INA	0,00E+00	INA	INA
EEE	MJ	INA	INA	INA	INA	INA	INA	INA	INA
ETE	MJ	INA	INA	INA	INA	INA	INA	INA	INA

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy; INA indicator not assessed. INA is used for indicators we assume is zero or close to zero. The indicators are zero in the foreground system, but as there could be small contributions in the background system the indicators are set as INA instead of zero.

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

Additional Norwegian requirements

Greenhouse gas emission from the use of electricity in the manufacturing phase

Markuciai holds a green certificate for power supplied by Green Lithuanian Energy, Energijos Tiekimas. This certificate certifies that Markuciai consumes electricity from 100 % renewable energy sources. Energijos Tiekimas purchases electricity from Kaunas Hydroelectric Power Plant and the electricity used in the manufacturing phase is 100 % run-of-river production.

Data source	Amount	Unit
Econinvent v3 (june 2014)	10,2	g CO ₂ -eqv/kWh

Dangerous substances

- The product contains no substances given by the REACH Candidate list or the Norwegian priority list
- The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforkiften, Annex III), see table.

Indoor environment





The product has not been tested for emissions to indoor environment.

Carbon footprint

Carbon footprint has not been worked out for the product.

Bibliography

ISO 14025:2010	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
Reenaas, M, 2016	LCA report Markuciai, Precast concrete products, Rambøll, Report No 1-2016.
NPCR 0200, 2012	Precast Concrete products, EPD, Norway
Ecoinvent v.3.2	Swiss Centre of Life Cycle Inventories, www.ecoinvent.ch
Litgrid, 2015	http://www.litgrid.eu/index.php/energetikos-sistema/elektros-energetikos-sistemas-informacija/elektros-gamybos-ir-vartojimo-balanso-duomenys/2287 (accessed 27.11.2015)

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