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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:	Södra Skogsägarna ekonomisk förening
Program operator:	The Norwegian EPD Foundation
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CLT (Cross Laminated Timber)

Södra Skogsägarna ekonomisk förening

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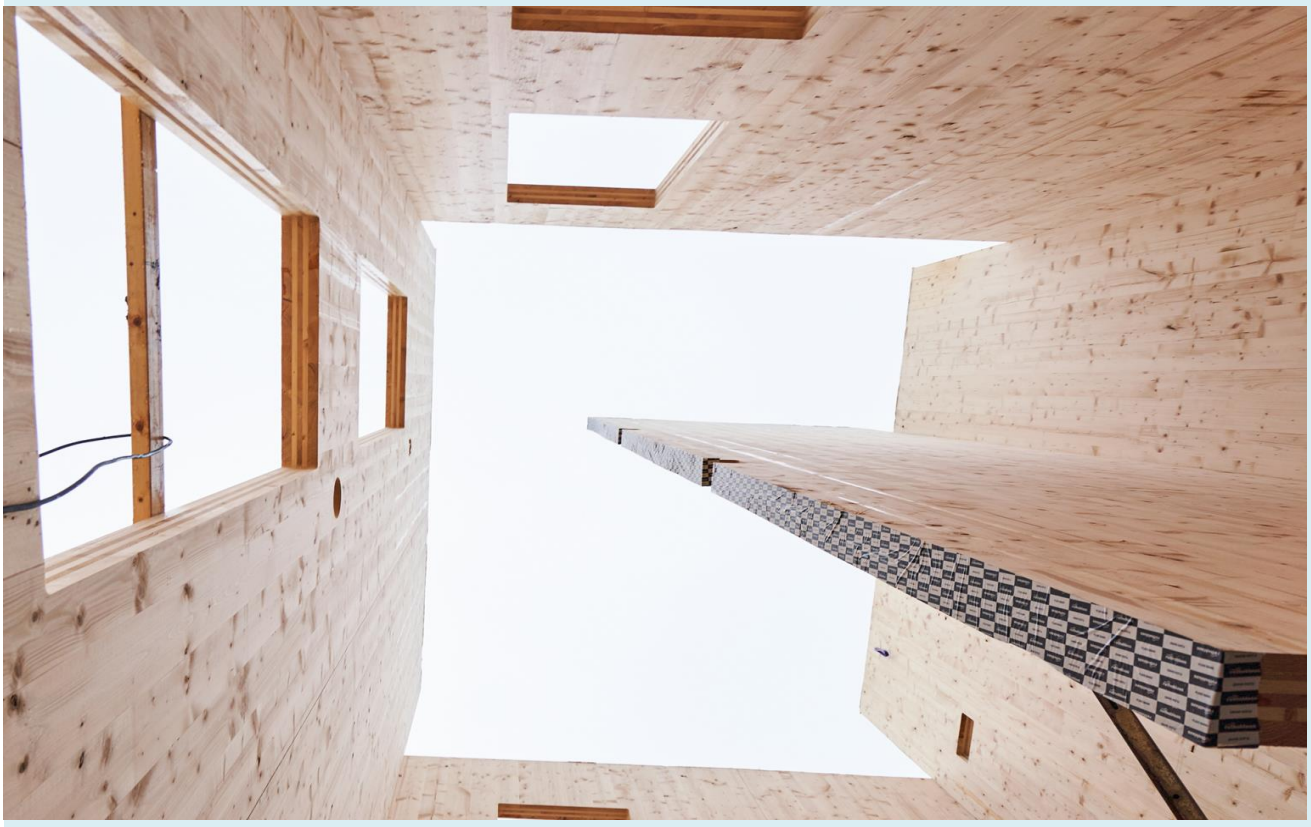

General information

Product:
CLT, Cross Laminated Timber

Owner of the declaration:
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Declaration number:
NEPD-2587-1314-EN

Place of production:
Väröbacka, Sverige

ECO Platform reference number:
NA

Management system:
ISO 14001

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serves as core PCR and PCR Part B for wood and wood-based products for use in construction (NPCR 015 version 3.0, 10.04.2019).

Organisation no:
729500-3789

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.

Issue date:
14.12.2020

Valid to:
14.12.2025

Declared unit:
m^3

Year of study:
2020

Declared unit with option:
A1-3, A4, A5, C1, C2 and D

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

Functional unit:
—

The EPD has been worked out by:
Martin Erlandsson, IVL Swedish Env. Res. Inst.

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

internal	external
	X

Third party verifier:

Linda Høibye, COWI
(Independent verifier approved by EPD Norway)

Approved

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Construction material for walls, joists and roof.

Technical data:

The CLT panels have a density of approx. 430 kg/m^3 and a moisture content of 12%.

Product specification:

Spruce. Individually finger jointed boards with 20, 30 or 40 mm. thickness, C24. 3, 5, 7-layer.

Materials	kg	%
Spruce, wood (dry matter)	384	89%
Water	46	11%
Adhesive	3,49	0,8%
sum	433,5	100

Market:

Sweden, but also export to Nordic countries/Europe

Reference service life:

The reference service life is the same as the building element that the CLT is part of.

LCA: Calculation rules

Declared unit with options:

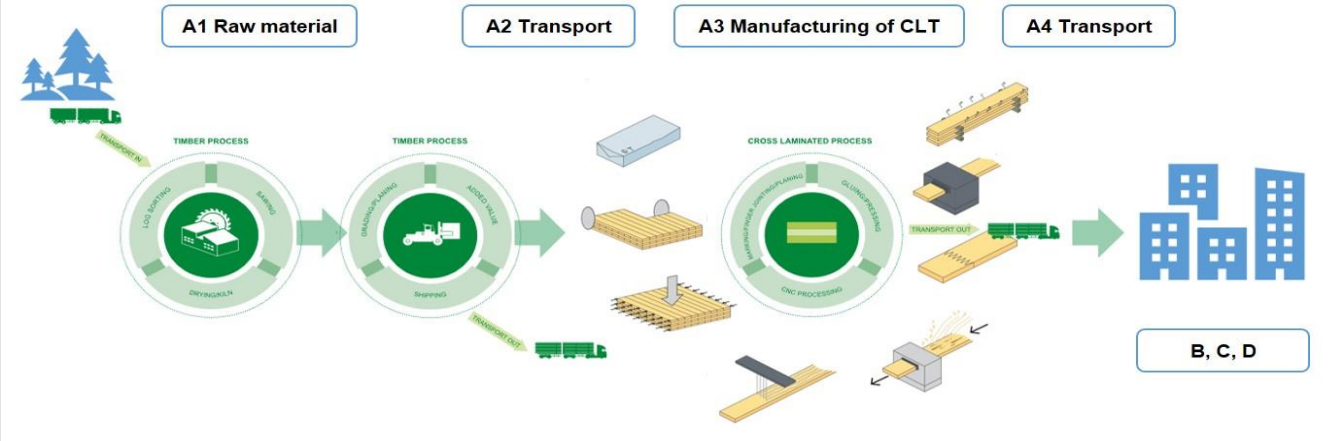
1 m³ CLT installed in a building and waste treatment at end of life according to the PCR NPCR 015 version 3.0, 10.04.2019.

System boundary:

The figure below describes the manufacturing of the CLT and the transport to a customer. In addition, the modules A5 Installation, C1-C4 End-of-life and D are accounted for.

In module D discarded wood is assumed to replace average fuel in district heating in Sweden.

Figure *CLT manufacturing and transport to a customer*



Data quality:

Specific LCA data from 2020 is used for the CLT manufacturing, and from 2019 for the sawmill and forestry. CLT data is from the first half-year of 2020 and scaled up to one year. The manufacturing of CLT has been running more than one year and the figures from the last 6 months are stable. The adhesive is based on a sector EPD and other upstream data is from Gabi 2019 or Ecoinvent 3.3, where no data is older than 10 years.

Cut-off criteria:

All major raw materials and all the essential energy is included. The impact from temporary roads are assumed to be negligible (<1%) and are not included. This cut-off rule does not apply for hazardous materials and substances.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. A conservative approach is used for allocation of by-products in the CLT manufacturing and sawmill, meaning that all impact is attributed to the main products CLT and sawn timber respectively. In forestry a conservative approach is also used for the economical allocation valid for the joint co-product allocation, which means that no impact is allocated to the tops and branches (GROT).

Other comments:

The environmental impact and specially the contribution to GWP is relatively low for the declared CLT product. This is a result of significant amounts of HVO100 at the sawmill (almost 100%) and in the transportation from the forestry to sawmill, combined with large amounts of timber that arrive with electric trains to the mill. The diesel mix used in the forestry is based on national statistics and gives about the same amount of HVO100 as in the reduction diesel, where the supplier is forced by law to add biocomponents, with at least 25% HVO or FAME in the diesel used. The transport from the sawmill to the CLT manufacturing is an internal transport made by electric trucks.

LCA: Scenarios and additional technical information

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

A4: The transportation to end user is based on statistics from 2019.

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	EURO6, >34t	269	0,020 l/tkm	

A5: At the construction site, 4 minutes of work with front loader is assumed (Erlandsson 2013) and an average lift with a crane (Lundström 2016).

Assembly (A5)

	Unit	Value
Crane, electricity consumption	kWh	6,9
Front loader, diesel	kWh	10
Material loss	kg	0

Use (B1)

	Unit	Value
MND		

Maintenance (B2)/Repair (B3)

	Unit	Value
MND		

Replacement (B4)/Refurbishment (B5)

	Unit	Value
MND		

Wood chipped accourding to Erlandsson (2013).

Operational energy (B6) and water consumption (B7)

	Unit	Value
MND		

End of Life (C1, C3, C4)

	Unit	Value
C1: Crane and front loader (as in A5)	—	—
C1: Reused	kg	0
C2: Recycling	kg	0
C2: Energy recovery	kg	433
C3: Chipping of wood	kWh	2,6
C4: To landfill	kg	0

C2: Assumed value for transportationfrom demolition site to local collection site, from where it is then sold.
Energy recovery is the currently the dominant end-of-life alternative and also the most likely scenario alternative.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	50	EURO6, >34t	100	0,046 l/tkm	

D: The chipped CLT wood is assumed to be used as a fuel in district heating and then replaces the average district heating energy mix in year 2019 (Svensk Energi 2020).

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Chipped CLT that substitute fuel in a district heating plant	kg	433,5

Additional technical information
No additional information given.

LCA: Results

System boundaries (X=included, MNA= module not assessed, MNR=module not relevant)

Product stage			Assemby stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	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	X	MNA	MNA	MNA	MNA	MNA	MNA	MNA	X	X	X	MNA	X

Environmental impact per m^3

Parameter	Unit	A1- A3	A4	A5	C1	C2	C3	D	
GWP-TOT	kg CO_2 -eqv	-670	6,2	0,8	0,8	4,9	704	97	
GWP-GHG	kg CO2 -eqv	34	6,2	0,8	0,8	4,9	0,1	-152	
GWP-BIO	kg CO2 -eqv	-704	0	0	0	0	704	0	
ODP	kg CFC11-eqv	5,4E-07	8,6E-08	3,51E-08	3,51E-08	6,76E-08	9,12E-09	-9,64E-07	
POCP*	kg C_2H_4 -eqv	2,6E-02	-1,1E-02	4,48E-04	4,48E-04	-9,16E-03	8,09E-05	9,06E-03	
AP	kg SO_2 -eqv	3,1E-01	3,9E-02	6,29E-03	6,29E-03	3,13E-02	1,35E-03	-3,67E-01	
EP	kg PO_4^{3-}-eqv	8,9E-02	1,4E-02	3,09E-03	3,09E-03	1,11E-02	7,51E-04	-2,91E-03	
ADPM	kg Sb-eqv	7,1E-05	2,5E-06	1,73E-06	1,73E-06	1,93E-06	2,60E-07	-2,33E-05	
ADPE	MJ	5,9E+02	9,0E+01	3,8,E+01	3,8,E+01	7,04E+01	9,50E+00	-1,18E+03	

GWP-GHG is also referred to as "GWP-IOBC" and accounts for all greenhouse gases (GHG) according to IPCC AR 4 and exclude emission and uptake of biogenic carbon. GWP-BIO report uptake and emissions of biogenic carbon stored in the product and packing materials.
*Negative impact occur due to negative characterization factors.

GWP-TOT=GWP-GHG+GWP-BIO, 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 per m^3

Parameter	Unit	A1- A3	A4	A5	C1	C2	C3	D	
RPEE	MJ	2999	23	31	31	18	2,5	6472	
RPEM	MJ	7373	0	0	0	0	0	0	
TPE	MJ	10372	23	31	31	18	2,5	6472	
NRPE	MJ	508	92	70	70	72	9,7	-1142	
NRPM	MJ	135	0	0	0	0	0	0	
TRPE	MJ	643	92	70	70	72	9,7	-1142	
SM	kg	0	0	0	0	0	0	0	
RSF	MJ	0	0	0	0	0	0	-4204	
NRSF	MJ	0	0	0	0	0	0	-901	
W	m^3	13	2	0,8	0,8	1,5	0,8	-80	

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	C1	C2	C3	D	
HW	kg	6,12E-06	4,40E-06	1,80E-06	1,80E-06	3,45E-06	2,92E-02	-2,47E-07	
NHW	kg	1,57E+00	2,69E-02	1,98E-01	1,98E-01	2,11E-02	2,84E-03	#VALUE!	
RW	kg	6,71E-04	3,34E-06	5,28E-04	5,28E-04	2,62E-06	3,53E-07	-9,40E-03	

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

End of life - Output flow

Parameter	Unit	A1- A3	A4	A5	C1	C2	C3	D	
CR	kg	0	0	0	0	0	0	0	
MR	kg	0	0	0	0	0	433,5	0	
MER	kg	0	0	0	0	0	0	0	
EEE	MJ	0	0	0	0	0	0	0	
ETE	MJ	0	0	0	0	0	0	0	

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-03 = $9,0*10^{-3}$ = 0,009

Additional Norwegian requirements

Greenhous gas emission from the use of electricity in the manufacturing phase
National production mix and from low voltage include import, production of transmission lines, in addition to direct emissions and losses in grid). 40 kg CO_2e/kWh is used for national grid electriciy and specifica data (see below) is used for CLT manufacturing and the sawmill based on a fuel mix of 99.5% bioresidues and 0.5% fossil oil.

Data source	Amount	Unit
Site specific value for electricity produced on site	36	CO_2e/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 than 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 (Avfallsforskiften, Annex III), see table.

Indoor environment

The adhesive used is solvent free. A VOC measuring is performed for the CLT. The product meets the requirements for low emissions for; M1/TRS (according to EN15251: 2007 Appendix E), Emicode EC1, Emicode EC1^{PLUS}, Blue Angel, M1 (RTS) and GUT (Johansson 2020).

Carbon footprint
Carbon footprint has not been worked out according to ISO 14067:2018 for the product.

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