

EPD

Environmental Product Declaration



CLT by Stora Enso

Product: Cross Laminated Timber (CLT) is a solid wood construction product consisting of at least three bonded single-layer panels arranged at right angles to each other.

Manufacturer: Stora Enso Wood Products Oy Ltd, P.O.Box 309, FI-00101 Helsinki, Finland

Manufacturing sites: Ybbs an der Donau and Bad St. Leonhard (Austria)

Declared unit: 1 m³ of CLT

Approval date: 2017-06-01

Valid until: 2022-05-31

Reference year: 2014

The declaration is calculated on the basis of standards ISO 14025, EN 15804+A1 and EN 16485. EPDs of construction products may not be comparable if they do not comply with these standards.

Verification: CEN standard EN 15804 serves as the core product category rules. Independent verification of the declaration and data, according to EN ISO 14025.

internal external

Third party verifier:

VAHANEN

Hannu Karppi
Vahanen Environment Oy

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Stora Enso

Stora Enso is a leading provider of renewable solutions in packaging, biomaterials, wood and paper to global markets. Our customers include the packaging, joinery and construction industries as well as publishers, printing houses and paper merchants. Our aim is to replace non-renewable materials by innovating and developing new products and services based on wood and other renewable materials. Our focus is on fibre-based packaging, plantation-based pulp, innovations in biomaterials, and sustainable building solutions.

Stora Enso's Wood Products division is a market-leading provider of innovative wood-based products for construction and interior usages. Our product range covers all areas of urban construction including massive wood elements, wood components and pellets. We offer a variety of sawn timber goods. All the division's mills are certified in accordance with chain-of-custody (FSC® and/or PEFC™), quality management (ISO 9001), energy management (ISO 50001), environmental management (ISO 14001), and health and safety (OHSAS 18001).

Sustainability at Stora Enso

For Stora Enso, sustainability means realising concrete actions that will help us fulfil our Purpose, which is to 'Do good for the people and the planet', and to create shared value. Our values, Lead and Do what's right, guide our sustainability agenda. Our values are about setting high ethical standards in all of the work we do. As a global company we consistently act in accordance with our values, policies and guidelines everywhere we operate.

We comply with and when necessary go beyond the requirements of national legislation and regulations. We also expect our business partners and suppliers to comply with Stora Enso's policies and guidelines on Sustainability and Business Ethics. Social, environmental, and economic sustainability form the triple bottom line. Sustainability at Stora Enso is about maximising positive impacts on humans, the planet, and the economy, and minimising negative ones.

Product

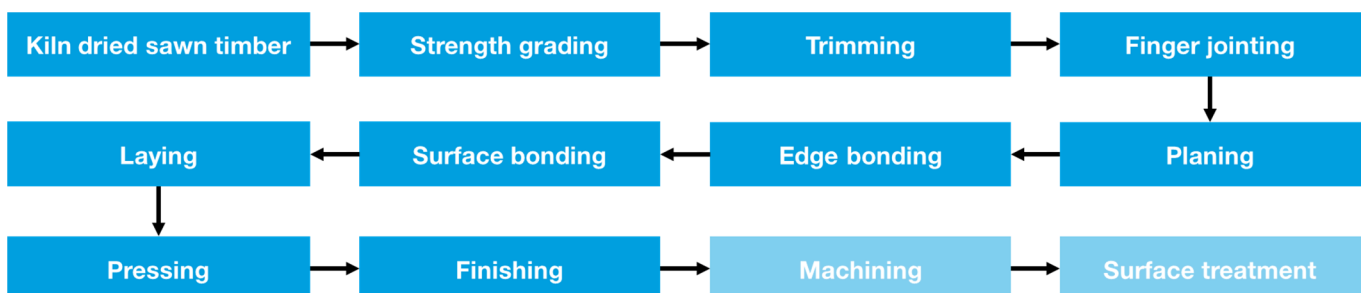
Cross Laminated Timber by Stora Enso is a solid wood construction product consisting of bonded single-layer panels arranged at right angles (90°) to each other. It can measure up to 2.95 m × 16.00 m. CLT solid wood panels are made up of several layers (3, 5, 7, or 8 layers) and are available in different panel thicknesses (maximum thickness 0.4 m). The layers are bonded using formaldehyde-free adhesives. Panels of CLT are used for the construction of houses and apartment buildings, as well as for industrial and commercial buildings. Panels can be used in wall, ceiling and roof constructions.

Technical information

- Wood species: spruce (*Picea abies*), pine (*Pinus sylvestris*)
- Wood moisture: 12% ± 2%
- Glue/adhesive: polyurethane adhesive (PUR), emulsion-polymer-isocyanate adhesive (EPI)
- Composition: wood (99%), resin (1%)
- Visual quality: non-visible, industrial visible and visible quality; the surface are sanded on both faces
- Weight: approx. 470 kg/m³
- Water vapour transmission resistance: 20–50 μ (EN 12524)
- Thermal conductivity λ: 0.11 W/(mK) (EN 12524)
- Specific heat capacity c_p: 1,600 J/(kgK) (EN 12524)
- Usage classes: 1 and 2 (EN 1995-1-1)
- Strength class: C24 (EN 338)

Production steps

Cross Laminated Timber is produced from the sawn timber by gluing lamellas together. Lamellas are trimmed and finger jointed before production. Product is finalised and customised after pressing on demand.



Life cycle assessment rules and scenarios

This environmental product declaration covers life cycle information from the product stage (modules A1–A3) and from a scenario based end of life stage (modules C1–C4). Supplementary information beyond the building life cycle is also provided (module D). Other life cycle phases (A4–B7) are excluded. Type of EPD is cradle to gate with options.

Assessment rules

Life cycle assessment is done according ISO 14044 standard. Functional unit of calculation is 1 m³ of CLT. The EPD is representative of 100% of CLT manufactured by Stora Enso. Product is manufactured in two different production sites, Bad St Leonhard and Ybbs units, therefore results are shown in production capacity weighted average results.

Standards EN 15804 and EN 16485 serves as the core product category rules for the assessment. Standard EN 15942 serves communication format for the EPD. Biogenic carbon content of wood is calculated by EN 16449 standard.

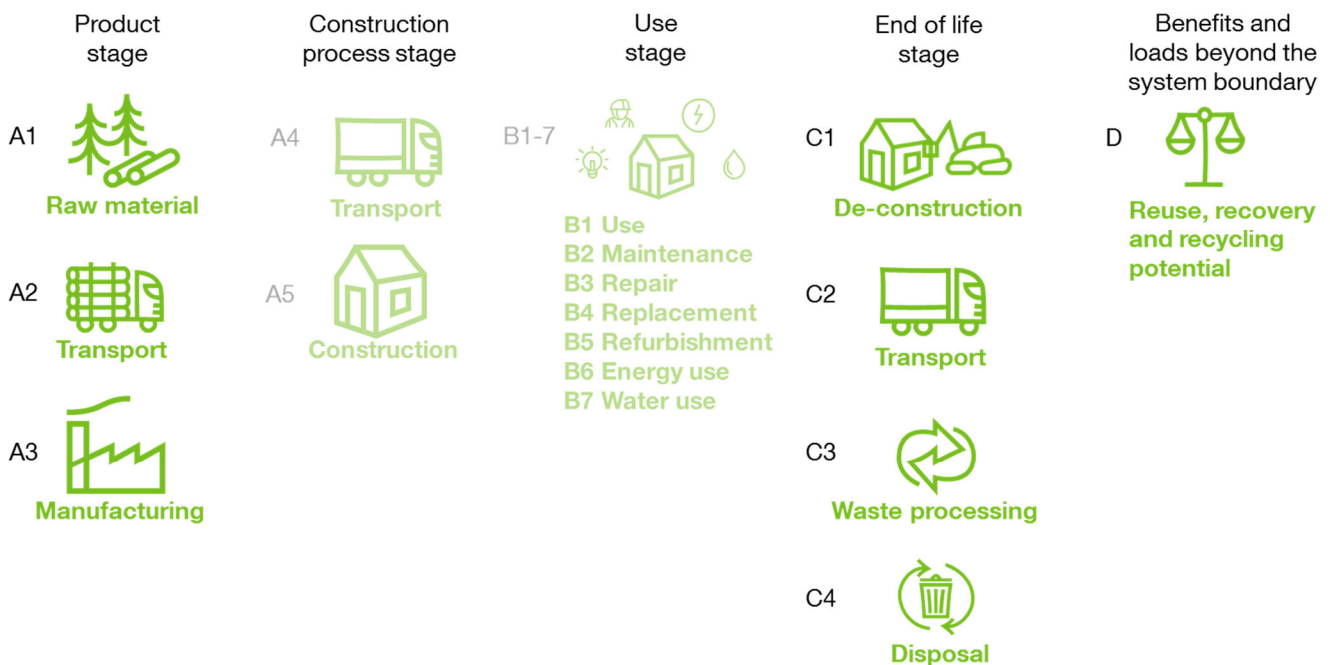
Data inventory have been done from Stora Enso CLT production units covering production data (12 months) of year 2014. All inputs and outputs of units are recorded and included in the calculations. Some assumption are made for reduction factors of by-products and energy use in different process steps. Raw material (sawn timber) for CLT is mainly coming from the same production sites, additionally some raw material can come from other saw mills. Three data sources were used for the assessment: Ecoinvent datasets were used for material/energy processes, Lipasto datasets were used for transportation processes and Metsätieto data for wood supply (data produced from Stora Enso own forest operations).

End of life scenarios

Reuse: CLT is reused in coherent form. C1: demolition of the building, C2: transportation to the sorting 50 km, C3: preparing for reuse, C4: product for reuse, D: reuse of product

Recycling: CLT chipping cover virgin wood chips. C1: demolition of the building, C2: transportation to the sorting 50 km, C3: preparing for recycling, C4: chips to recycling, D: recovery of virgin material

Incineration: CLT incineration substitute natural gas. C1: demolition of the building, C2: transportation to the sorting 50 km, C3: preparing for incineration, C4: chips to incineration (80% efficiency), D: substitution of natural gas in heat production



Environmental performance

The Cross Laminated Timber EPD includes information on the use of resources, potential environmental impacts, and waste production. The declared unit is one cubic meter of CLT. The results per declared unit are presented by life cycle modules (A1–A3, C1–C4 and D). Energy values (MJ) are presented in results as net calorific values.

ENVIRONMENTAL IMPACTS

Parameters describing environmental impacts		Global warming potential	Depletion potential of stratospheric ozone layer	Acidification potential of soil and water	Eutrophication potential	Formation potential of tropospheric ozone	Abiotic depletion potential (elements)	Abiotic depletion potential (fossil)
		GWP	ODP	AP	EP	POCP	ADPE	ADPF
		kg CO ₂ -eq	kg CFC 11-eq	kg SO ₂ -eq	kg PO ₄ ³⁻ -eq	kg Ethene-eq	kg Sb-eq	MJ
Product stage	A1–A3	-671 *	8.14E-06	0.240	0.347	6.82E-03	3.70E-05	959
Reuse 100%								
De-construction	C1	0.551	5.86E-07	5.30E-03	8.27E-04	1.36E-04	2.49E-07	44.89
Transport	C2	2.37	0	7.41E-03	1.92E-03	3.59E-05	0	3.34E+01
Waste processing	C3	731	4.74E-08	8.46E-04	5.54E-03	2.73E-05	9.28E-08	5.91
Disposal	C4	0	0	0	0	0	0	0
Re-use potential	D	-787.8	-7.51E-06	-0.227	-0.339	-6.62E-03	-3.67E-05	-875
Recycling 100%								
De-construction	C1	0.551	5.86E-07	5.30E-03	8.27E-04	1.36E-04	2.49E-07	44.9
Transport	C2	2.37	0	7.41E-03	1.92E-03	3.59E-05	0	33.4
Waste processing	C3	735	4.54E-07	3.32E-02	1.60E-02	3.71E-04	5.63E-06	59.2
Disposal	C4	0	0	0	0	0	0	0
Recycling potential	D	-744	-4.63E-06	-5.53E-02	-8.05E-02	-4.20E-03	-3.79E-07	-150
Incineration 100%								
De-construction	C1	0.551	5.86E-07	5.30E-03	8.27E-04	1.36E-04	2.49E-07	44.9
Transport	C2	2.37	0	7.41E-03	1.92E-03	3.59E-05	0	33.4
Waste processing	C3	735	4.54E-07	3.32E-02	1.60E-02	3.71E-04	5.63E-06	59.2
Disposal	C4	16.3	3.95E-06	1.12	0.459	6.57E-02	7.11E-05	130
Recovery potential	D	-413	-6.07E-05	0.597	0.344	4.24E-02	4.08E-05	-7444

* A1–A3 GWP: emissions from the production stage 60 kg CO₂-eq and biogenic carbon storage in wood -731 kg CO₂-eq

USE OF RESOURCES

Parameters describing resource use		Use of renewable primary energy resources as energy	Use of renewable primary energy resources as raw material	Total use of renewable primary energy resources	Use of non-renewable primary energy resources as energy	Use of non-renewable primary energy resources as raw material	Total use of non-renewable primary energy resources
		MJ	MJ	MJ	MJ	MJ	MJ
Product stage	A1–A3	1630	7470	9100	626	338	964
Reuse 100%							
De-construction	C1	0.170	0	0.170	44.9	0	44.9
Transport	C2	0	0	0	33.1	0	33.1
Waste processing	C3	2.95	-7470	-7467	5.95	0	5.95
Disposal	C4	0	0	0	0	0	0
Re-use potential	D	-1627	0	-1627	-542	-338	-880
Recycling 100%							
De-construction	C1	0.170	0	0.170	44.9	0	44.9
Transport	C2	0	0	0	33.1	0	33.1
Waste processing	C3	10.0	-7470	-7460	60.2	0	60.2
Disposal	C4	0	0	0	0	0	0
Recycling potential	D	-678	0	-678	-150	0	-150
Incineration 100%							
De-construction	C1	0.170	0	0.170	44.9	0	44.9
Transport	C2	0	0	0	33.1	0	33.1
Waste processing	C3	10.0	-7470	-7460	60.2	0	60.2
Disposal	C4	76.7	0	76.7	142	0	142
Recovery potential	D	29.0	0	29.0	-6936	0	-6936

Parameters describing resource use, secondary materials and fuels, and use of water		Use of secondary material	Use of renewable secondary fuels	Use of non-renewable secondary fuels	Net use of fresh water
		kg	MJ	MJ	m ³
Product stage	A1–A3	0	0	0	0.799
Reuse 100%					
De-construction	C1	0	0	0	3.43E-03
Transport	C2	0	0	0	0
Waste processing	C3	0	0	0	2.34E-03
Disposal	C4	0	0	0	0
Re-use potential	D	470	0	0	-0.394
Recycling 100%					
De-construction	C1	0	0	0	3.43E-03
Transport	C2	0	0	0	0
Waste processing	C3	0	0	0	0.0290
Disposal	C4	0	0	0	0
Recycling potential	D	470	0	0	-0.137
Incineration 100%					
De-construction	C1	0	0	0	3.43E-03
Transport	C2	0	0	0	0
Waste processing	C3	0	0	0	0.0290
Disposal	C4	0	7470	0	0
Recovery potential	D	0	0	0	-0.137

OTHER ENVIRONMENTAL INFORMATION

Waste information		Hazardous waste disposal	Non-hazardous waste disposal	Radioactive waste disposal
		kg	kg	kg
Product stage	A1–A3	0.0592	0.0295	0
Reuse 100%				
De-construction	C1	0	0	0
Transport	C2	0	0	0
Waste processing	C3	0	0	0
Disposal	C4	0	0	0
Re-use potential	D	-0.0592	-0.0295	0
Recycling 100%				
De-construction	C1	0	0	0
Transport	C2	0	0	0
Waste processing	C3	0	0	0
Disposal	C4	0	0	0
Recycling potential	D	-0.0585	-0.0191	0
Incineration 100%				
De-construction	C1	0	0	0
Transport	C2	0	0	0
Waste processing	C3	0	0	0
Disposal	C4	0	0	0
Recovery potential	D	0	0	0

Other output flows		Components for re-use	Materials for recycling	Materials for energy recovery	Exported energy, heat	Exported energy, electricity
		kg	kg	kg	MJ	kWh
Product stage	A1–A3	0	0.168	0	0	0
Reuse 100%						
De-construction	C1	0	0	0	0	0
Transport	C2	0	0	0	0	0
Waste processing	C3	470	0	0	0	0
Disposal	C4	0	0	0	0	0
Re-use potential	D	-470	-0.168	0	0	0
Recycling 100%						
De-construction	C1	0	0	0	0	0
Transport	C2	0	0	0	0	0
Waste processing	C3	0	470	0	0	0
Disposal	C4	0	0	0	0	0
Recycling potential	D	0	-470	-0.0112	0	0
Incineration 100%						
De-construction	C1	0	0	0	0	0
Transport	C2	0	0	0	0	0
Waste processing	C3	0	0	470	0	0
Disposal	C4	0	0	0	5993	0
Recovery potential	D	0	0	-470	0	0

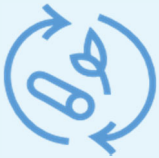
ADDITIONAL INFORMATION

Unit Parameter	Unit	Result
Product stage		
Origin of wood	Countries	Austria, Czech Republic, Germany, Hungary, Poland, Slovakia, Slovenia
Stored biogenic carbon in wood (EN 16449)	kg CO ₂	-731
Net calorific value of wood (MC 12%)	MJ/kg	15.9
Construction stage; A4 Transportation to the some countries *		
Transport to Austria	km	171
	kg CO ₂ -eq	3.21
Transport to Finland	km	1913
	kg CO ₂ -eq	35.96
Transport to France	km	1189
	kg CO ₂ -eq	22.35
Transport to Germany	km	350
	kg CO ₂ -eq	13.59
Transport to UK	km	1431
	kg CO ₂ -eq	26.90
Transport to Sweden	km	1890
	kg CO ₂ -eq	33.86


Construction stage; A5 Installation

Normally installation is done with a crane to lift up the CLT elements. CLT elements are fixed with screws, commonly also steel connectors and support structures are needed. Cellular rubber band is needed for sealing and vibration insulation.

* 1 m³ of CLT delivered to an average European customer which is assumed to be in different locations.



Stora Enso practises and promotes economically, socially, and environmentally sustainable forest management. The two most significant forest certification systems recognised by Stora Enso are run by the Forest Stewardship Council (FSC®) and the Programme for the Endorsement of Forest Certification (PEFC™).



Trees grow by absorbing carbon dioxide, and remove carbon from the atmosphere. They help to reverse the greenhouse effect. Net carbon sequestration in the forest for the average of all wood production in Europe amounts to -730 kg of biogenic carbon per 1 cubic metre of wood.



Wood is recyclable and is a good resource for new fibre based products or energy generation to substitute fossil energy. Collection schemes and actual recycling rates depend on national waste legislation, consumer behaviour, point of consumption, local collection system and infrastructure.

References

Standards

EN 15804:2012 + A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

EN 16485:2014 Round and sawn timber. Environmental product declarations. Product category rules for wood and wood-based products for use in construction

EN 16449:2014 Wood and wood-based products. Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

EN 15942:2012 Sustainability of construction works - Environmental product declarations - Communication format business-to-business

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.

Tools and databases

Sulca 4.2 - Sustainability tool for Ecodesign, Footprints & LCA. VTT Technical Research Centre of Finland Ltd

Ecoinvent 3 database. <http://www.ecoinvent.org/>

Lipasto - a calculation system for traffic exhaust emissions and energy use in Finland. VTT Technical Research Centre of Finland Ltd. <http://lipasto.vtt.fi/en/index.htm>

Product information and guidance on safe and effective installation, use and disposal of the product

<http://www.clt.info>
<http://www.storaenso.com>

Third party verifier

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