

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

CROSSLAM KUHMO CLT
OY CROSSLAM KUHMO LTD



GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Oy CrossLam Kuhmo Ltd
Address	Kivikatu 4 88900 Kuhmo, Finland
Contact details	info@crosslam.fi
Website	https://www.crosslam.fi/

PRODUCT IDENTIFICATION

Product name	Crosslam Kuhmo CLT
Additional label(s)	
Product number / reference	
Place(s) of production	Finland



Kai Renholm

RTS EPD Committee secretary



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Managing Director

EPD INFORMATION

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

EPD program operator	Rakennustietosäätiö RTS sr / Rakennustieto Oy Malminkatu 16 A, PL 1004, 00101 Helsinki cer.rts.fi
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the 15804 +A1 PCR is used.
EPD author	Luca Petruccelli
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☒ External verification
Verification date	28.1.2021
EPD verifier	Silvia Vilčeková
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PRODUCT INFORMATION

PRODUCT DESCRIPTION

CLT means Cross Laminated Timber. It is massive wood board that has three, five or seven layers of lamel cross-glued together. It is an industrial wood product that is always made to the specific measurements for each customer. As the boards are cross-laminated, they make a strong and stable product that can be used in both vertical and horizontal structures. The CLT-board manufactured by Crosslam is a strong, natural and environmentally friendly building product.

PRODUCT APPLICATION

CLT-boards manufactured by Crosslam have been used as the building material for public buildings, blocks of flats, nursing homes, detached houses, holiday homes, noise barriers, non-settling logs and many other constructions and construction components. The simple manufacturing process of the CLT-element enables tailored products, customised for each project.

TECHNICAL SPECIFICATIONS

Crosslam = CLT = Cross Laminated Timber means solid wood board that is made by cross-gluing together three, five or seven layers of lamel, i.e. regularized timber. It is an engineered wood product that is always made to the specific measurements for each customer.

PRODUCT STANDARDS

The maximum dimensions of our CLT-board are 3.2 m x 12 m. The thickness of the board varies from 60 mm to 300 mm, depending on the end-use. The cross-glued massive wood boards are strong, and the measurements are stable. Therefore, CLT-elements can be used in both the vertical and horizontal structures of buildings.

PHYSICAL PROPERTIES OF THE PRODUCT

Thicknesses: 60 - 300 mm

Width: 3.2 m

Length: 12 m

Number of layers: 3, 5 or 7

Moisture content: EN 13183 6-15%

Strength class of boards: EN 337, C24

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at <https://www.crosslam.fi/>.

PRODUCT RAW MATERIAL COMPOSITION

Material	Amount %
Spruce and pine	99
Isocyanate pre-polymer	<1
Packaging	<1

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Fossil materials	1	Resins glues and packaging
Bio-based materials	99	Spruce and pine

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

The raw material for Crosslam-boards is mainly spruce or pine from Kainuu, Finland. First in the board manufacturing process, the sawn timber is finger-jointed into required length lamels. The lamels are then planed. Board-sized number of crossed layers are laid out. Each layer is glued before the next layer is laid on top. Then all the glued lamel layers are pressed together to form a ready-made, cross-laminated CLT-board. The CLT-boards produced by Crosslam have the minimum dimensions of 2.5 m x 4 m and maximum dimensions of 3.2 m x 12 m. The glue used in the cross-glued boards is an environmentally friendly, formaldehyde-free polyurethane glue.

From the compressed board, the desired pieces are carefully machined with the CNC-machine. Thus, many elements can be made out of one compressed CLT-board. The CNC-machine processes wood elements according to the element plans. Good planning can reduce the generated waste and thereby reduce the costs of wood construction.

After CNC-machining, the quality of the finished CLT-elements is checked and then delivered to the customer.

TRANSPORT AND INSTALLATION (A4-A5)

The packaging losses at the installation phase are taken into account as well as the transport to the average customer.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover use phase. Air, soil and water impacts during the use phase have not been studied.

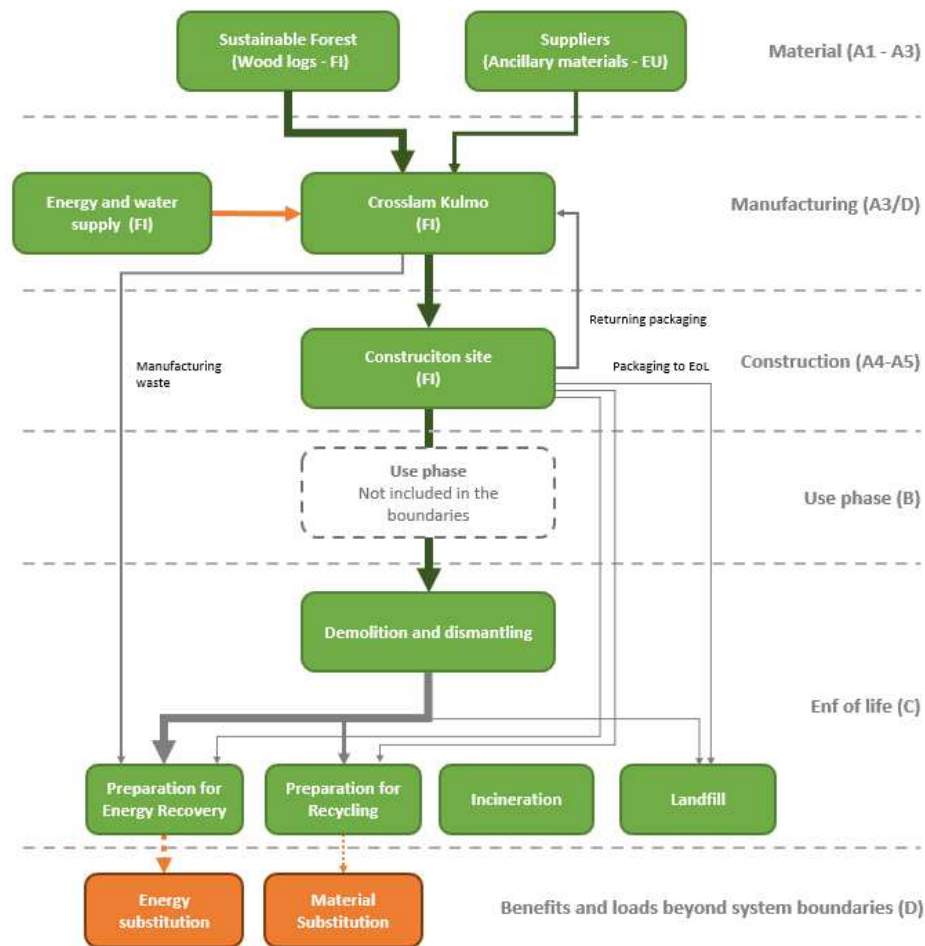
PRODUCT END OF LIFE (C1-C4, D)

Wood materials, according to <http://www.stat.fi> is sent 99% to Incineration while the waste packaging (plastic Tarpaulin) is 71% incinerated and 35% recovered

MANUFACTURING PROCESS

The manufacturing process is based on the following steps:

Lumber or layers cutting to length, Adhesive application, CLT panel lay-up, Assembly pressing, Quality control, machining and cutting, and finally Product marking, packaging and shipping.



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2019
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DECLARED AND FUNCTIONAL UNIT

Declared unit	1 m3
Mass per declared unit	485
Functional unit	1 m3

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	218.25
Biogenic carbon content in packaging, kg C	

SYSTEM BOUNDARY

This EPD covers cradle to gate with options scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A4 (Transport), A5 (Assembly) as well as C1 (Deconstruction), C2 (Transport at end-of-life), C3 (Waste

processing) and C4 (Disposal). In addition, module D - benefits and loads beyond the system boundary is included.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	x	x	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

CUT-OFF CRITERIA

all inputs of the production phase is considered in the model

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Wood waste during the manufacturing process is sent to incineration for heat production. This is considered in the model to substitute heat from heat district.

AVERAGES AND VARIABILITY

Data represent the averaged production of 2019 for all thicknesses and number of layers produced.

ENVIRONMENTAL IMPACT DATA

Note : ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930 are presented in annex.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change – total	kg CO2e	-7,69E+02	2,04E+00	6,15E+01	-7,05E+02	2,41E+01	0,00E+00	0,00E+00	5,24E+00	7,19E+02	8,90E+01	-2,11E+02
Climate change – fossil	kg CO2e	2,78E+01	2,04E+00	5,91E+01	8,89E+01	2,43E+01	3,87E-01	0,00E+00	5,24E+00	1,33E+01	0,00E+00	-2,80E+01
Climate change – biogenic	kg CO2e	-7,97E+02	0,00E+00	1,90E+00	-7,95E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,06E+02	8,90E+01	-1,83E+02
Climate change – LULUC	kg CO2e	2,40E-01	7,64E-04	5,17E-01	7,58E-01	8,64E-03	0,00E+00	0,00E+00	2,27E-03	1,40E-03	0,00E+00	-9,13E-02
Ozone depletion	kg CFC11e	2,10E-06	4,60E-07	8,15E-06	1,07E-05	5,57E-06	0,00E+00	0,00E+00	1,17E-06	5,86E-07	0,00E+00	-2,51E-06
Acidification	mol H+e	1,29E-01	6,38E-03	2,61E-01	3,96E-01	5,64E-02	0,00E+00	0,00E+00	1,25E-02	7,85E-02	0,00E+00	-2,96E-01
Eutrophication, aquatic freshwater	kg PO4e	4,32E-03	1,60E-04	1,93E-02	2,38E-02	1,80E-03	0,00E+00	0,00E+00	4,50E-04	3,26E-03	0,00E+00	-1,92E-02
Eutrophication, aquatic marine	kg Ne	4,31E-02	1,49E-03	5,69E-02	1,01E-01	7,72E-03	0,00E+00	0,00E+00	1,71E-03	4,15E-02	0,00E+00	-9,94E-02
Eutrophication, terrestrial	mol Ne	3,00E-01	1,61E-02	6,88E-01	1,00E+00	8,20E-02	0,00E+00	0,00E+00	1,81E-02	3,96E-01	0,00E+00	-1,13E+00
Photochemical ozone formation	kg NMVOCe	1,22E-01	5,97E-03	1,67E-01	2,95E-01	4,58E-02	0,00E+00	0,00E+00	9,63E-03	9,66E-02	0,00E+00	-3,30E-01
Abiotic depletion, minerals & metals	kg Sbe	2,43E-04	5,79E-05	2,58E-04	5,59E-04	6,58E-04	0,00E+00	0,00E+00	1,87E-04	9,45E-05	0,00E+00	-4,27E-04
Abiotic depletion of fossil resources	MJ	4,29E+02	3,05E+01	7,16E+02	1,18E+03	3,65E+02	0,00E+00	0,00E+00	7,78E+01	7,16E+01	0,00E+00	-3,88E+02
Water use	m3e depr.	2,31E+02	0,00E+00	7,57E+04	7,59E+04	3,50E+02	0,00E+00	0,00E+00	9,30E+01	0,00E+00	0,00E+00	-5,33E+03

EN 15804+A2 disclaimer for Abiotic depletion and Water use indicators and all optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter	Incidence	2,14E-06	1,85E-07	3,14E-06	5,47E-06	2,24E-06	0,00E+00	0,00E+00	4,08E-07	8,30E-07	0,00E+00	-2,58E-05
Ionizing radiation, human health	kBq U235e	9,16E-01	1,55E-01	7,10E+01	7,21E+01	1,90E+00	0,00E+00	0,00E+00	4,17E-01	1,56E-01	0,00E+00	-7,67E+00
Eco-toxicity (freshwater)	CTUe	5,24E+00	9,94E-01	8,34E+00	1,46E+01	1,23E+01	0,00E+00	0,00E+00	2,24E+00	1,16E+00	0,00E+00	-2,39E+01
Human toxicity, cancer effects	CTUh	1,01E-08	1,11E-09	3,54E-08	4,66E-08	1,34E-08	0,00E+00	0,00E+00	2,94E-09	1,65E-08	0,00E+00	-5,04E-08
Human toxicity, non-cancer effects	CTUh	3,33E-07	4,60E-08	2,53E-06	2,91E-06	5,35E-07	6,55E-09	0,00E+00	1,23E-07	4,74E-06	0,00E+00	-1,69E-06
Land use related impacts/soil quality	-	3,22E+01	2,45E+01	7,90E+01	1,36E+02	3,01E+02	0,00E+00	0,00E+00	5,25E+01	1,61E+01	0,00E+00	-8,77E+01

EN 15804+A2 disclaimer for Ionizing radiation, human health, This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle, It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities, Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator

ENVIRONMENTAL IMPACTS - TRACI 2,1, / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global warming potential	kg CO2e	2,65E+01	2,02E+00	5,83E+01	8,68E+01	2,41E+01	3,88E-01	0,00E+00	5,18E+00	1,31E+01	0,00E+00	-2,80E+01
Ozone depletion	kg CFC11e	2,24E-06	4,88E-07	1,23E-05	1,50E-05	5,91E-06	0,00E+00	0,00E+00	1,24E-06	6,24E-07	0,00E+00	-3,16E-06
Acidification	kg SO2e	1,08E-01	5,42E-03	2,14E-01	3,27E-01	4,59E-02	0,00E+00	0,00E+00	1,02E-02	7,27E-02	0,00E+00	-2,56E-01
Eutrophication	kg Ne	6,10E-02	2,04E-03	1,53E-01	2,16E-01	2,24E-02	0,00E+00	0,00E+00	5,29E-03	1,55E-01	0,00E+00	-1,43E-01
Photochemical Smog Formation	kg O3e	1,70E+00	9,28E-02	3,03E+00	4,82E+00	4,68E-01	0,00E+00	0,00E+00	1,03E-01	2,28E+00	0,00E+00	-5,85E+00
Depletion of non-renewable energy	MJ	5,80E+01	4,37E+00	5,75E+01	1,20E+02	5,29E+01	0,00E+00	0,00E+00	1,11E+01	8,35E+00	0,00E+00	-2,87E+01

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Renewable PER used as energy	MJ	5,51E+02	0,00E+00	9,23E+02	1,47E+03	5,19E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,20E+03
Renewable PER used as materials	MJ	8,45E+03	0,00E+00	0,00E+00	8,45E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable PER	MJ	9,00E+03	0,00E+00	9,23E+02	9,92E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,20E+03
Non-renew. PER used as energy	MJ	3,70E+02	3,11E+01	1,64E+03	2,04E+03	3,73E+02	0,00E+00	0,00E+00	7,97E+01	7,29E+01	0,00E+00	-5,13E+02
Non-renew. PER used as materials	MJ	1,08E+02	0,00E+00	2,86E+01	1,37E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable PER	MJ	4,78E+02	3,11E+01	1,67E+03	2,18E+03	3,73E+02	0,00E+00	0,00E+00	7,97E+01	7,29E+01	0,00E+00	-5,13E+02
Use of secondary materials	kg	1,51E-01	0,00E+00	4,09E-01	5,60E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,14E-01
Use of renewable secondary fuels	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	0,00E+00	0,00E+00	0,00E+00
Use of non-renew. secondary fuels	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	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m3	4,30E-01	5,28E-03	4,88E-01	9,23E-01	6,29E-02	0,00E+00	0,00E+00	1,36E-02	1,34E-01	0,00E+00	-1,55E-01

PER abbreviation stands for primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	8,08E-01	3,40E-02	4,05E+00	4,89E+00	3,73E-01	6,15E-03	0,00E+00	9,18E-02	2,78E+00	0,00E+00	-2,14E+00
Non-hazardous waste	kg	9,09E+00	2,14E+00	9,26E+01	1,04E+02	2,56E+01	1,81E-01	0,00E+00	5,08E+00	1,00E+01	0,00E+00	-8,18E+01
Radioactive waste	kg	9,72E-04	2,09E-04	1,50E-02	1,62E-02	2,54E-03	0,00E+00	0,00E+00	5,34E-04	1,42E-04	0,00E+00	-2,33E-03

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	2,30E-01	2,30E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,31E-01	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,85E+02	0,00E+00	0,00E+00
Exported energy	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	0,00E+00	0,00E+00	0,00E+00

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change – total	kg CO2e	-1,64E+00	4,34E-03	1,31E-01	-1,50E+00	5,17E-02	0,00E+00	0,00E+00	1,11E-02	1,53E+00	1,89E-01	-4,50E-01
Abiotic depletion, minerals & metals	kg Sbe	5,16E-07	1,23E-07	5,49E-07	1,19E-06	1,40E-06	0,00E+00	0,00E+00	3,99E-07	2,01E-07	0,00E+00	-9,08E-07
Abiotic depletion of fossil resources	MJ	9,13E-01	6,50E-02	1,52E+00	2,50E+00	7,77E-01	0,00E+00	0,00E+00	1,66E-01	1,52E-01	0,00E+00	-8,26E-01
Water use	m3e depr.	9,16E-04	1,12E-05	1,04E-03	1,97E-03	1,34E-04	0,00E+00	0,00E+00	2,89E-05	2,84E-04	0,00E+00	-3,30E-04
Use of secondary materials	kg	3,22E-04	0,00E+00	8,70E-04	1,19E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,31E-03
Biogenic carbon content in product	kg C	0,00E+00	0,00E+00	2,18E+02	2,18E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Biogenic carbon content in packaging	kg C	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Ecoinvent 3.6 good quality
Electricity CO ₂ e / kWh	0,24 kg CO ₂ e / kWh
District heating data source and quality	Ecoinvent 3.6 good quality
District heating CO ₂ e / kWh	0,0031 kg CO ₂ e / MJ

Transport scenario documentation

Scenario parameter	Value
A4 specific transport CO ₂ e emissions, kg CO ₂ e / tkm	0,17 kg CO ₂ e / ton*km
A4 average transport distance, km	300
A4 Capacity utilization (including empty return)	100%
A4 Bulk density of transported products	485 kg/m ³
A4 Volume capacity ¹ utilization factor	44%

¹ 24 ton lorry can carry up to 33 EUR pallet (1200*800 mm) and a volume of about 112 m³

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	0
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	0.631
Recovery process – kg for energy recovery	485
Disposal (total) – kg for final deposition	0

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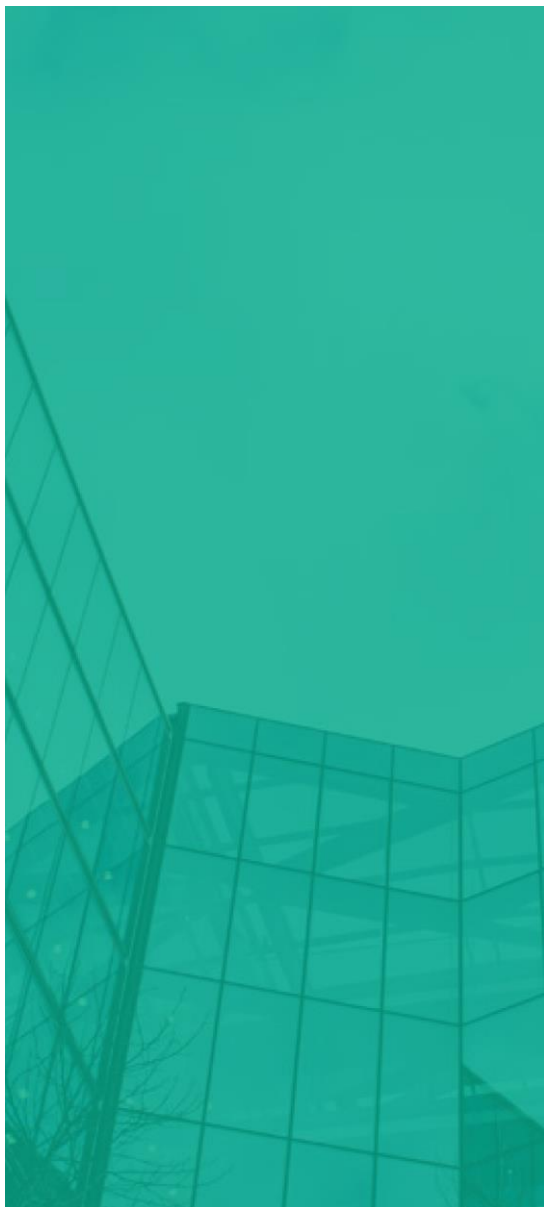
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ABOUT THE MANUFACTURER

In Kuhmo, life is based on wood and forest, Wood-based business has been the key to the region's development already in the days of tar burning, The forms of wood use have changed and evolved in many different ways over the centuries, Kuhmo forests have offered not only wood products for housing and living, but also game, berries and a healthy environment to live in, The company's operations have received a lot of attention and have been a significant pioneer for the Finnish wood construction, Without Crosslam's contribution, Finland's development would have been considerably left behind from the rest of Europe, Crosslam has created new possibilities for wood construction and strengthened the courage for the use of wood also in blocks of flats, At the same time, Crosslam has expanded its operations with new businesses that utilise wood,

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Oy CrossLam Kuhmo Ltd
EPD author	Luca Petruccelli
EPD verifier	Silvia Vilčeková
EPD program operator	Rakennustietosäätiö RTS sr / Rakennustieto Oy
Background data	This EPD is based on Ecoinvent 3,6 (cut-off) and One Click LCA databases,
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Wood and Plant Fiber Based Products

ANNEX : ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global warming potential	kg CO2e	2,65E+01	2,02E+00	5,82E+01	8,67E+01	2,41E+01	3,88E-01	0,00E+00	5,19E+00	1,31E+01	0,00E+00	-2,80E+01
Depletion of stratospheric ozone	kg CFC11e	1,71E-06	3,66E-07	1,00E-05	1,21E-05	4,44E-06	0,00E+00	0,00E+00	9,32E-07	4,96E-07	0,00E+00	-2,44E-06
Acidification	kg SO2e	1,06E-01	5,26E-03	2,10E-01	3,21E-01	4,91E-02	0,00E+00	0,00E+00	1,09E-02	5,59E-02	0,00E+00	-2,23E-01
Eutrophication	kg PO4 3e	3,27E-02	1,15E-03	8,51E-02	1,19E-01	1,01E-02	0,00E+00	0,00E+00	2,38E-03	6,22E-02	0,00E+00	-9,96E-02
Photochemical ozone formation	kg C2H4e	1,07E-02	3,11E-04	1,02E-02	2,12E-02	3,72E-03	0,00E+00	0,00E+00	8,03E-04	1,17E-03	0,00E+00	-1,04E-02
Abiotic depletion of non-fossil res.	kg Sbe	2,43E-04	5,79E-05	2,58E-04	5,59E-04	6,58E-04	0,00E+00	0,00E+00	1,87E-04	9,45E-05	0,00E+00	-4,27E-04
Abiotic depletion of fossil resources	MJ	4,29E+02	3,05E+01	7,16E+02	1,18E+03	3,65E+02	0,00E+00	0,00E+00	7,78E+01	7,16E+01	0,00E+00	-3,88E+02