Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

XLAM/CLT (Cross Laminated Timber)

From

X-LAM DOLOMITI S.p.A.

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): • *PCR 2019:14 Construction products (EN 15804:2012+A2:2019),* • *version 1.3.3 of 01-03-2024* • *PCR 2019:14-c-PCR-006 Wood and wood-based products for use in construction* • *(EN 16485), version of 20/12/2019 – Being updated: UN CPC 314*
PCR review was conducted by: *The Technical Committee of the International EPD System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com*
Life Cycle Assessment (LCA)
LCA accountability: Eng. Matteo Buffa, SEA Consulenze e Servizi Srl
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☐ EPD verification by individual verifier Third-party verifier: < > Approved by: The International EPD® System
OR
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by accredited certification body Third-party verification: *Bureau Veritas Italia S.p.A.* is an approved certification body accountable for the third-party verification The certification body is accredited by: *Accredia*

OR
Independent third-party verification of the declaration and data, according to ISO 14025:2006 via: ☐ EPD verification by EPD Process Certification* Internal auditor: < > Third-party verification: < > is an approved certification body accountable for third-party verification Third-party verifier is accredited by: < > *For EPD Process Certification, an accredited certification body certifies and reviews the management process and verifies EPDs published on a regular basis. For details about third-party verification procedure of the EPDs, see GPI.
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

***Please note**: EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.*

***Please note**: The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.*

Company information

Owner of the EPD:

XLAM Dolomiti S.p.A.
viale Venezia 35, 3805 Castelnuovo (TN), Italy
https://www.xlamdolomiti.it/
info@xlamdolomiti.it

Contact:

Technical Department

Description of the company:

X-LAM Dolomiti is a company based in Castelnuovo, Trentino-Alto Adige, specializing in the production of X-Lam panels. Founded in 2012 by the Paterno Group, it quickly gained a prominent position in the world of wooden constructions and today represents one of the most authoritative and cutting-edge entities in the sector at an international level.

One of the distinctive features of X-Lam Dolomiti is its integrated approach to the building cycle; the company offers clients a complete service: from the production of panels to the design and construction of buildings, ensuring perfect integration of the various phases up to the final realization. Over the years, X-Lam Dolomiti has grown intelligently and steadily, investing in research and development and becoming a point of reference for architects, builders, and designers looking for high-performance, versatile, and ecological materials for high-profile projects, from the construction of private homes to large residential and industrial complexes.

Product-related or management system-related certifications:

ISO 9001:2015 Quality Management System
European Technical Assessment ETA-12/0347
S.A.L.E. certification
CSTB certification

Name and location of production site:

X-LAM Dolomiti S.p.A., viale Venezia 35, Castelnuovo (TN).

Product information

Product name:

XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Product identification:

Wood-based structural panel, obtained from cross laminated layers glued together.

Product description:

The XLAM/CLT (Cross Laminated Timber) panel by X-Lam Dolomiti is a structural element made of solid wood, consisting of cross-laminated layers of spruce boards glued together. This configuration gives the panel high dimensional stability and mechanical strength, making it suitable for use in load-bearing walls, floors, and roofs.
The panels are made with a minimum of three layers of spruce boards, each with a thickness varying between 17 and 40 mm, arranged orthogonally and glued with formaldehyde-free adhesives. The available thicknesses range from 51 mm to 320 mm, with maximum dimensions of 3.5 meters in width and 13.5 meters in length. The wood used belongs to the minimum strength class C24 and comes from sustainably managed forests, certified according to PEFC standards, prioritizing local sources to reduce environmental impact.
Thanks to the cross-laminated arrangement of the layers, CLT panels offer excellent stability in the two main directions, ensuring excellent structural performance against both vertical and horizontal actions, such as wind and earthquakes. These characteristics make them particularly suitable for multi-story buildings and structures with high-performance requirements.

Production takes place entirely at the X-LAM Dolomiti plant in Castelnuovo (TN), ensuring rigorous quality control at every stage of the process, from material selection to final processing.

UN CPC code:

Section 3, division 31, group 314 – Boards and panels

Geographical scope:

Europe region – timber and glue production and transport (modules A1-A2)
Italy – CLT production (module A3)
Italy – construction process stage (modules A4-A5)
Italy – end of life (modules C-D)

LCA information

Declared unit:

1 m^3 of XLAM/CLT by X-Lam Dolomiti with an average moisture content between 6 and 15 % and a density of 454 kg/m3.

Reference service life:

In according to ETA – 12/0347 the service life is set in 50 years[1]

Time representativeness:

The data collected and used in the analysis refer to year 2024. This data includes raw material supply, transport distances, fuels, energy consumption, produced XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti, by-products and waste.
The sales volumes used in stage A4 are modelled on the 2023 data.

Database(s) and LCA software used:

Database Ecoinvent 3.10, elaborated with the software SimaPro Analyst, version 9.6.0.1.

Description of system boundaries:

Cradle to gate with options, modules C1–C4, module D and with optional modules (A1–A3 + C + D and additional modules A4-A5):

- **A1** production of raw materials, fuels, energy carriers
- **A2** transport of raw materials to the production site
- **A3** manufacture of product and ancillary materials
- **A4** transport of XLAM/CLT panels
- **A5** Construction
- **C1** deconstruction, demolition
- **C2** transport
- **C3** waste processing
- **C4** disposal
- **D** reuse, recovery, recycling potential

Exclusion:

In this work is excluded the Use stage: modules from B1 to B7

Target group:

Business to business and business to consumers

[1] The actual useful life can be, under normal usage conditions, significantly longer, without significant degradation affecting the essential requirements of the works. The indications on the useful life of the solid wood panel cannot be interpreted as a guarantee from the manufacturer or the assessment body. They should only be considered as a means to enable designers to choose the appropriate criteria for solid wood panels in relation to the economically reasonable expected lifespan of the works.

Allocation:

It was decided to use primary data on the energy consumption of the plant where the panels are produced and purchasing data. The total was then divided by the amount of XLAM/CLT (Cross Laminated Timber) produced.
While literature data and operational practice were used for modelling construction process and end-of-life stages.
It was decided to use the assumption of physical allocation based on mass.

Cut off:

In accordance with PCR 2019:14 v 1.3.4 and the cut-off rule, flows of less than 1% of the total inventory were excluded, namely:

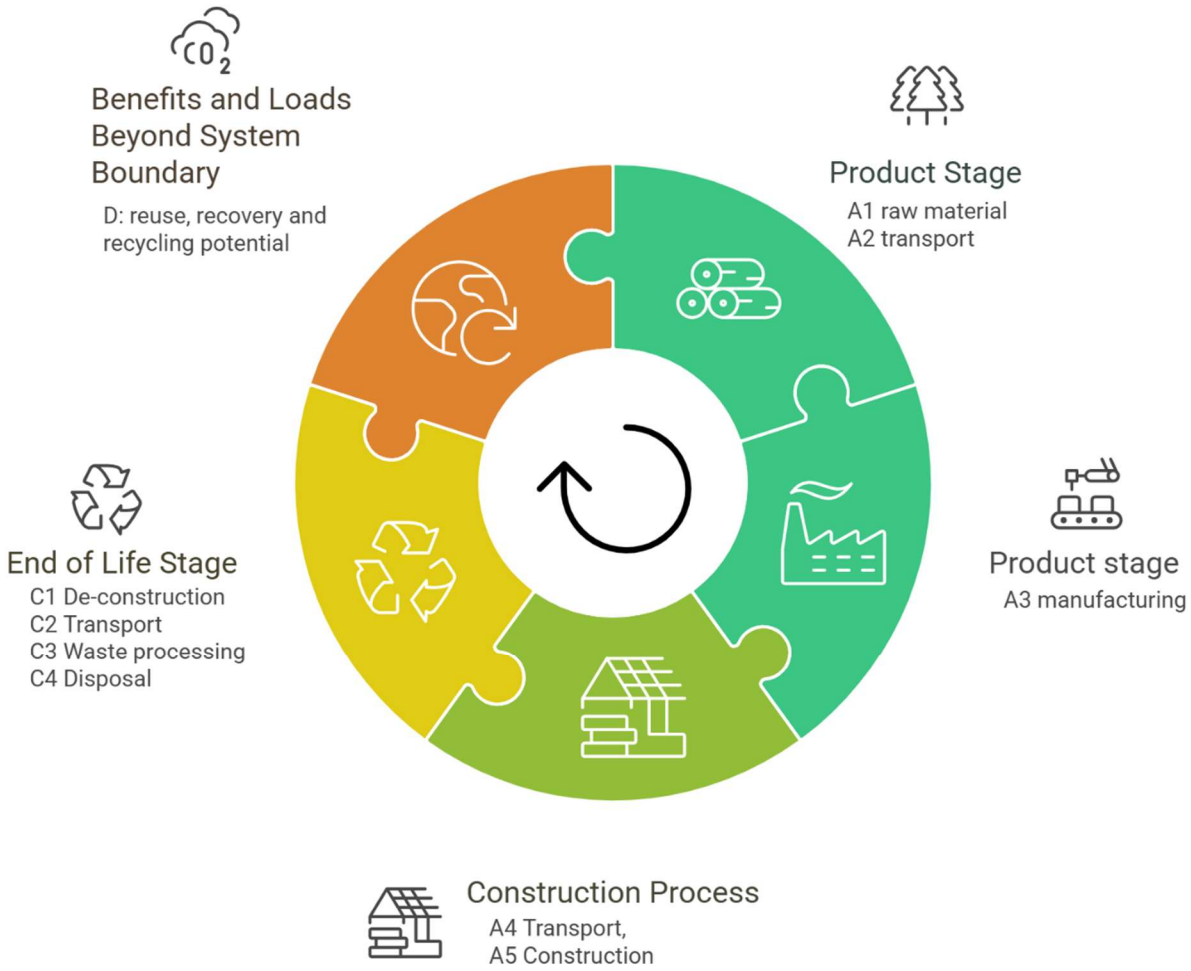
- the infrastructure and maintenance auxiliaries of machinery;
- the travel of workers to and from the workplace and the construction of machinery and plants, as they are not directly related to the product;
- packaging production;
- electricity consumed by offices.

In insufficient data cases conservative “worst case” assumptions have been used when filling the data gaps.

Technical support for LCA:

Sea Consulenze e Servizi Srl - www.seaconsulenze.it

System diagram:



Product stage:

A1: This stage includes the extraction and processing of raw materials, such as forestry operations and glue production. All wood raw materials used by X-Lam Dolomiti come from a third party certified wood traceability system according to PEFC™ standards.
The wood used by Essepi comes from European forests: Austria, Germania, Nord Italia, Slovacchia, Slovenia, Svezia, Finlandia, Francia e Repubblica Ceca.

A2: This stage concerns the transportation of raw materials from the sawmills and the glue production plant to the X-Lam Dolomiti production site.
Purchased board are spruce logs transported with trucks.

A3: This stage covers the production of XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti and by-products. In this phase are consider:

- generation of electricity and heat,
- natural gas production and consumption,
- waste and by-product production, transport and treatment.

X-Lam Dolomiti uses electricity from renewable sources. Approximately 30% of the total energy used is produced by the photovoltaic panel installed on the factory roof, the remainder is purchased from Eviso who guarantees that the purchased energy comes from a renewable source thanks to the use of energy certified by Guaranted Origin (GO).
For this purpose, the Italian renewable energy mix for the year 2022, available on Terna's portal was used:

- Hydroelectric: 28%
- Wind: 20%
- Photovoltaic: 28%
- Geothermal: 6%
- Bioenergy: 18%

This mix has an impact of 0.1891 kg_{CO2eq}/kWh.

Construction process stage:

A4: This stage shows additional information such as average figures from the transportation to the construction sites. The figures show the impact of 1 m^3 XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti delivered to italian customer. Furthermore, the impact of some boards used for the construction site was considered in this stage.
Transportation distance is a weighted average based on 80% of sales volumes.

Scenario information	Values and units
Vehicle used for transport	Transport, freight, lorry >32 metric ton, EURO6 {RER}
Mean distance	250 km
Weight XLAM/CLT	454 kg
Weight of boards	12.73 kg

A5: The only impact that is considered in this stage is the use of construction equipment (*Machine operation, diesel, >= 74.57 kW, high load factor*). On an average construction site, a team of three workers installs approximately 500 m^2 of X-Lam panels per week. Therefore, it's consider a time of approximately 30 minutes per cubic metre of XLAM/CLT, but of this only part is considered to be using construction equipment.
The use of other materials on the site in addition to the X-Lam panel was not considered: the amount and type of materials depends on the specific design of the site, and it is not possible to identify a standard model. Nor was waste production considered: panels leaving the factory are not packaged and are designed to minimise waste production during installation.

End of life scenarios and benefits and loads beyond system boundary:

C1-C4 and module D: Three alternative average scenarios have been presented for the evaluation of impacts related to the end-of-life phase (demolition, transport, waste management, disposal), and the benefits beyond system boundary.
Incineration with subsequent thermal energy recovery is considered the most representative end-of-life scenario in Europe and is therefore included in the environmental information declared in the EPD. while recycling with wood chips production and reuse in a coherent form are considered less likely scenarios and reported in the additional environmental information.

Please note: *The end-of-life options are scenario based and the choice of the most appropriate one can vary from situation, country and their legislation, energy and raw material availability. The options should indicate the potential environmental impact.*

See chapter	*Environmental information*	*Additional environmental information*	
Scenario	**Incineration with energy recovery**	**Recycling to wood chips**	**Re-Use in coherent form**
Stage C1	Deconstruction / Demolition of the building. 454 kg of CLT is collected.	Deconstruction / Demolition of the building. 454 kg of CLT is collected.	Deconstruction / Demolition of the building. 454 kg of CLT is collected.
Stage C2	Transport to incineration site, distance assumed 100 km	Transport to treatment platform site, distance assumed 100 km	Transport to selection site, distance assumed 100 km
Stage C3	Crushing operation and wood combustion	Sorting and crushing at the platform, wood chips are produced.	Sorting and preparing of the CLT at the site. Consider only 80% of XLAM/CLT will be recover in coherent form, 20% will be burned.
Stage C4	-	-	-
Stage D	Avoided impact of electricity production and thermal energy recovery.	Avoided impact of forestry, harvesting, wood chips preparation and drying.	80%: Avoided impact of producing CLT from virgin wood. 20%: Avoided impact of electricity production and thermal energy recovery.

Please note: *Module D declares potential benefits and loads of secondary material, secondary fuel or recovered energy leaving the product system. The information given in Module D lies beyond the system boundary.*

Description of system boundaries

The methodological framework defined for carrying out the environmental study leading to the drafting of the EPD **XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti,** as described above, covers the scenario from **cradle to gate, with module A4-A5, C1-C4 and D**.

	Product stage			Construction process stage		Use stage							End of life stage					Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal		Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**		**D**
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X		X
Geography	EU	EU	IT	IT	IT	-	-	-	-	-	-	-	IT	IT	IT	IT		IT
Specific data used	>90 %			-	-	-	-	-	-	-	-	-	-	-	-	-		-

X = module declared
ND = module Not Declared

Technical information

Properties	Definition/value
Application	structural or non-structural element in timber buildings and structures: walls, floors and beams.
ETA number	n. 12/0347
Thickness	$51 \div 360\ mm$
Width	$\leq 3.60\ m$
Length	$\leq 13.60\ m$
Number of layers	$3 \leq n \leq 9$
Materials	spruce certified PEFC
Wood resistance class (EN 33813)	C24 according to EN 338, maximum 40 % C18 permitted in inner layers
Adhesive	Polyurethane adhesive (PUR) both for gluing solid wood slabs and for finger joints compliant with EN 15425. Melamine-Urea- Formaldehyde for finger joints
Weight	454 kg
Moisture	between 6 and 15 %
Thermal conductivity	$\lambda = 0.12\ W/(m\ K)$
Service class	1 and 2 (EN 1995-1-1)
Specific Heat capacity	$C_P = 1600\ J/(kg\ K)$

Product composition

Materials	kg	%	Notes
Wood	448.3 kg	99.8 %	Moisture content between 6 and 15 %
PUR glue	4,3	0,9%	both for gluing solid wood slabs and for finger joints
MUF glue	0,6	0,1%	for gluing finger joints
Hot melt glue	0,4	0,1%	Lateral bonding
Packaging	0	0,0%	the product is distributed without packaging
Hazardous substances			the product does not contain any substances or products listed in the" Candidate List of Substances of Very High Concern for Authorisation"
Totale	**454 kg**		

Biogenic carbon content at the factory gate

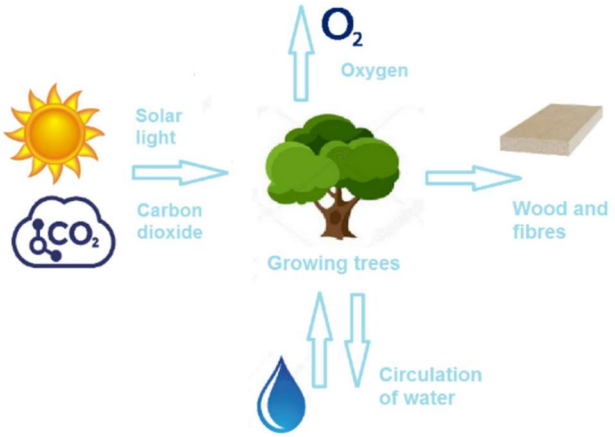
Biogenica carbon content	Unit (express for declared unit)
Biogenic carbon content in product	$855\ kg\ CO_{2_{eq}}/m^3 = 233\ kg\ C/m^3$
Biogenic carbon content in accompanying packaging	$0\ kg\ CO_{2_{eq}}/m^3 = 0\ kg\ C/m^3$
Please note: *1 kg biogenic carbon is equivalent to 44/12 kg of CO_2*	

Carbon sequestration and storage:

Wooden materials have the unique capability of storing CO_2 absorbed by plants during their growth and removing it from the carbon cycle for as long as the structure lasts. The longer the structure lasts, the greater the environmental benefit.

The biogenic carbon of wood is calculated according to EN 16485 and 16449. Half of the dry mass of wood is carbon. Each kg of stored biogenic carbon is equal to $\sim 3.67\ kg_{CO2}$, which is removed from the atmosphere.

In the case of X-Lam Dolomiti, the biogenic carbon dioxide content is $855\ kg_{CO_{2eq}}/m^3$.



The timber used by X-Lam Dolomiti comes from sustainably managed forests (PEFC). Biogenic carbon enters the product system in the forest (module A1) and leaves the system in the end-of-life phase when the building is demolished (module C). Any subsequent combustion of the wood (phase D) generates heat and electricity.

The product under study is not packaged, so there is no biogenic carbon in the packaging and no correction of the balance obtained from calculations is necessary.

Results of the environmental performance indicators

Below tables are describing the Mandatory impact category indicators according to EN 15804 results of 1 m^3 XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti along its life cycle. Incineration and thermal recover, as the most representative end-of-life scenario is applied in this chapter. Other end-of-life scenarios have been made available in the chapter "*Additional environmental information*".

Mandatory impact category indicators according to EN 15804 – 1 m^3 XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	A1	A2	A3	Total A1-A3	A4	A5	C1	C2	C3	C4	D
GWP - Total	**kg CO_2 eq.**	**-7,71E+02**	**1,94E+01**	**7,65E+01**	**-6,75E+02**	**1,30E+01**	**1,36E+01**	**8,85E+00**	**1,18E+01**	**6,75E+02**	**0,00E+00**	**-3,08E+02**
GWP -Biogenic	kg CO_2 eq.	-8,62E+02	1,00E-02	5,91E+01	**-8,03E+02**	6,95E-03	1,47E-03	9,57E-04	6,87E-03	8,03E+02	0,00E+00	-4,80E-02
GWP - Fossil	kg CO_2 eq.	9,02E+01	1,94E+01	1,74E+01	**1,27E+02**	1,30E+01	1,36E+01	8,85E+00	1,18E+01	-1,27E+02	0,00E+00	-3,08E+02
GWP - Land use & land transformation	kg CO_2 eq.	9,34E-01	6,64E-03	1,09E-03	**9,41E-01**	4,61E-03	1,17E-03	7,61E-04	3,70E-03	-9,41E-01	0,00E+00	-1,82E-02
ODP	kg CFC 11 eq.	6,03E-01	6,27E-02	5,14E-02	**7,17E-01**	3,07E-02	4,58E-02	2,99E-02	3,52E-02	-7,17E-01	0,00E+00	-2,26E-01
AP	mol H^+ eq.	3,98E-02	1,32E-03	2,81E-03	**4,40E-02**	9,15E-04	3,92E-04	2,56E-04	7,69E-04	-4,40E-02	0,00E+00	-3,61E-03
EP - freshwater	kg P eq.	2,03E-01	2,13E-02	9,50E-03	**2,33E-01**	8,05E-03	1,87E-02	1,22E-02	1,18E-02	-2,33E-01	0,00E+00	-8,56E-02
EP - marine	kg N eq.	2,17E+00	2,32E-01	1,07E-01	**2,51E+00**	8,71E-02	2,05E-01	1,33E-01	1,28E-01	-2,51E+00	0,00E+00	-9,16E-01
EP - terrestrial	mol N eq.	8,73E-01	1,02E-01	5,75E-02	**1,03E+00**	5,33E-02	7,26E-02	4,73E-02	5,55E-02	-1,03E+00	0,00E+00	-6,75E-01
POCP	kg NMVOC eq.	2,16E-06	3,90E-07	7,90E-07	**3,34E-06**	2,71E-07	2,06E-07	1,34E-07	2,35E-07	-3,34E-06	0,00E+00	-8,25E-06
ADP - Minerals & metals*	kg Sb eq.	5,41E-04	5,24E-05	2,29E-04	**8,22E-04**	3,63E-05	4,79E-06	3,13E-06	3,74E-05	-8,22E-04	0,00E+00	-7,88E-05
ADP - fossil*	MJ	4,96E+02	2,31E+01	3,42E+01	**5,53E+02**	1,60E+01	7,12E+00	4,64E+00	1,31E+01	-5,53E+02	0,00E+00	-5,44E+01
WDP*	m^3	2,23E+01	1,34E+00	2,58E+01	**4,95E+01**	9,30E-01	3,81E-01	2,48E-01	6,24E-01	-4,95E+01	0,00E+00	-2,01E+01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption											

* *Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators – 1 m³ XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	A1	A2	A3	Total A1-A3	A4	A5	C1	C2	C3	C4	D
GWP - GHG	kg CO_2 eq.	9,12E+01	1,94E+01	1,74E+01	**1,28E+02**	1,30E+01	1,36E+01	8,85E+00	1,18E+01	-1,28E+02	0,00E+00	-3,08E+02

Resource use indicators – 1 m³ XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	A1	A2	A3	Total A1-A3	A4	A5	C1	C2	C3	C4	D
PERT	**MJ**	**2,70E+04**	**4,48E+00**	**1,90E+02**	**2,72E+04**	**3,11E+00**	**1,08E+00**	**7,05E-01**	**3,17E+00**	**8,29E-01**	**0,00E+00**	**-9,01E+00**
PERE	MJ	1,69E+04	4,48E+00	1,90E+02	**1,71E+04**	3,11E+00	1,08E+00	7,05E-01	3,17E+00	8,29E-01	0,00E+00	-9,01E+00
PERM	MJ	1,00E+04	0,00E+00	0,00E+00	**1,00E+04**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	**MJ**	**5,51E+02**	**2,31E+01**	**3,42E+01**	**6,01E+02**	**1,60E+01**	**7,12E+00**	**4,64E+00**	**1,31E+01**	**5,28E+00**	**0,00E+00**	**-5,44E+01**
PENRE	MJ	4,96E+02	2,31E+01	3,42E+01	**5,45E+02**	1,60E+01	7,12E+00	4,64E+00	1,31E+01	5,28E+00	0,00E+00	-5,44E+01
PENRM	MJ	5,56E+01	0,00E+00	0,00E+00	**5,56E+01**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SM	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
RSF	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
NRSF	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
FW	m3	8,10E-01	4,21E-02	6,08E-01	**1,46E+00**	2,92E-02	1,26E-02	8,19E-03	2,28E-02	1,05E-02	0,00E+00	-5,16E-01
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water											

Waste indicator – 1 m³ XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	A1	A2	A3	Total A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	**kg**	1,67E-01	6,03E-03	2,87E-02	**2,01E-01**	4,18E-03	3,87E-04	2,52E-04	2,67E-03	3,22E-01	0,00E+00	-3,92E-03
Non-hazardous waste disposed	kg	2,06E+01	2,40E+01	2,29E+00	**4,69E+01**	1,67E+01	1,07E-01	7,01E-02	6,58E+00	1,05E+00	0,00E+00	-4,99E+00
Radioactive waste disposed	kg	3,30E-03	8,45E-05	8,53E-05	**3,47E-03**	5,86E-05	1,93E-05	1,26E-05	6,28E-05	8,39E-06	0,00E+00	-1,63E-04

Output flow indicators - 1 m³ XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	A1	A2	A3	Total A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	**kg**	0,00E+00	0,00E+00	3,60E+00	**3,60E+00**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	0,00E+00	0,00E+00	5,36E+01	**5,36E+01**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	4,54E+02	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	6,02E+01	**6,02E+01**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,59E+03
Exported energy, thermal	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	7,90E+02

Additional environmental Information – alternative end-of-life scenarios

Mandatory impact category indicators according to EN 15804 – 1 m³ XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	C1	C2	C3	C4	D	C1	C2	C3	C4	D
		Recycling to wood chips					Re-Use in coherent form				
GWP - Total	**kg CO_2 eq.**	**8,85E+00**	**1,18E+01**	**3,79E+01**	**0,00E+00**	**8,27E+02**	**1,99E+01**	**1,18E+01**	**0,00E+00**	**0,00E+00**	**4,19E+02**
GWP -Biogenic	kg CO_2 eq.	9,57E-04	6,87E-03	8,55E+02	0,00E+00	8,92E+02	2,15E-03	6,87E-03	0,00E+00	0,00E+00	6,07E+02
GWP - Fossil	kg CO_2 eq.	8,85E+00	1,18E+01	4,28E+01	0,00E+00	-6,47E+01	1,99E+01	1,18E+01	0,00E+00	0,00E+00	-1,87E+02
GWP - Land use & land transformation	kg CO_2 eq.	7,61E-04	3,70E-03	4,70E-01	0,00E+00	-6,11E-01	1,71E-03	3,70E-03	0,00E+00	0,00E+00	-9,77E-01
ODP	kg CFC 11 eq.	1,34E-07	2,99E-02	3,52E-02	3,97E-01	0,00E+00	3,02E-07	2,35E-07	0,00E+00	0,00E+00	-4,16E-06
AP	mol H^+ eq.	2,99E-02	2,56E-04	7,69E-04	2,54E-02	0,00E+00	6,73E-02	3,52E-02	0,00E+00	0,00E+00	-8,87E-01
EP - freshwater	kg P eq.	2,56E-04	1,22E-02	1,18E-02	1,33E-01	0,00E+00	5,76E-04	7,69E-04	0,00E+00	0,00E+00	-5,95E-02
EP - marine	kg N eq.	1,22E-02	1,33E-01	1,28E-01	1,42E+00	0,00E+00	2,74E-02	1,18E-02	0,00E+00	0,00E+00	-2,98E-01
EP - terrestrial	mol N eq.	1,33E-01	4,73E-02	5,55E-02	3,82E-01	0,00E+00	3,00E-01	1,28E-01	0,00E+00	0,00E+00	-3,21E+00
POCP	kg NMVOC eq.	4,73E-02	1,34E-07	2,35E-07	7,37E-07	0,00E+00	1,07E-01	5,55E-02	0,00E+00	0,00E+00	-1,28E+00
ADP - Minerals & metals*	kg Sb eq.	3,13E-06	3,13E-06	3,74E-05	3,42E-04	0,00E+00	7,04E-06	3,74E-05	0,00E+00	0,00E+00	-5,87E-04
ADP - fossil*	MJ	4,64E+00	4,64E+00	1,31E+01	4,69E+02	0,00E+00	1,04E+01	1,31E+01	0,00E+00	0,00E+00	-8,83E+02
WDP*	m^3	2,48E-01	2,48E-01	6,23E-01	2,33E+01	0,00E+00	5,58E-01	6,23E-01	0,00E+00	0,00E+00	-4,00E+01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption										

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators – 1 m³ XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	C1	C2	C3	C4	D	C1	C2	C3	C4	D
		Recycling to wood chips					Re-Use in coherent form				
GWP - GHG	**kg CO_2 eq.**	8,85E+00	1,18E+01	3,79E+01	0,00E+00	8,27E+02	1,99E+01	1,18E+01	0,00E+00	0,00E+00	4,19E+02

Resource use indicators – 1 m³ XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	C1	C2	C3	C4	D	C1	C2	C3	C4	D
		Recycling to wood chips					Re-Use in coherent form				
PERT	**MJ**	7,05E-01	3,17E+00	1,14E+03	0,00E+00	1,59E+00	3,17E+00	0,00E+00	0,00E+00	-1,63E+04	1,59E+00
PERE	MJ	7,05E-01	3,17E+00	1,14E+03	0,00E+00	1,59E+00	3,17E+00	0,00E+00	0,00E+00	-1,63E+04	1,59E+00
PERM	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
PENRT	**MJ**	4,64E+00	1,31E+01	4,69E+02	0,00E+00	1,04E+01	1,31E+01	0,00E+00	0,00E+00	-8,83E+02	1,04E+01
PENRE	MJ	4,64E+00	1,31E+01	4,69E+02	0,00E+00	1,04E+01	1,31E+01	0,00E+00	0,00E+00	-8,83E+02	1,04E+01
PENRM	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
SM	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
RSF	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
NRSF	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
FW	m3	8,18E-03	2,28E-02	9,95E-01	0,00E+00	1,84E-02	2,28E-02	0,00E+00	0,00E+00	-1,54E+00	1,84E-02
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water										

Waste indicator – 1 m³ XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	C1	C2	C3	C4	D	C1	C2	C3	C4	D
		Recycling to wood chips					Re-Use in coherent form				
Hazardous waste disposed	kg	2,52E-04	2,67E-03	3,07E-01	0,00E+00	-3,30E-01	5,68E-04	2,67E-03	0,00E+00	0,00E+00	-2,86E-01
Non-hazardous waste disposed	kg	7,01E-02	6,58E+00	1,04E+01	0,00E+00	-1,77E+01	1,58E-01	6,58E+00	0,00E+00	0,00E+00	-3,24E+01
Radioactive waste disposed	kg	1,26E-05	6,28E-05	4,31E-03	0,00E+00	-5,42E-03	2,83E-05	6,28E-05	0,00E+00	0,00E+00	-6,90E-03

Output flow indicators - 1 m³ XLAM/CLT (Cross Laminated Timber) by X-Lam Dolomiti

Indicator	Unit	C1	C2	C3	C4	D	C1	C2	C3	C4	D
		Recycling to wood chips					Re-Use in coherent form				
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,91E+02	0,00E+00	0,00E+00
Material for recycling	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
Materials for energy recovery	kg	0,00E+00	0,00E+00	4,54E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,79E+01	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,59E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,43E+02
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,90E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,70E+02

Other environmental performance indicators

Information on additional environmental impact indicators for each module is stated in the LCA study report "*Life Cycle Assessment and Environmental Product declaration XLAM/CLT by X-Lam Dolomiti - ANNEX A*" and is available on request.

Indicator	Particulate matter (PM)	Ionising radiation[2]	Ecotoxicity (freshwater)[3]	Human toxicity, cancer effects [2]	Human toxicity, non-cancer effects [2]	Land use
Unit	disease inc.	kBq U-235 eq	CTUe	CTUh	CTUh	Pt

[2] This impact category mainly concerns the potential impact of low-dose ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects of possible nuclear accidents, occupational exposure, or the disposal of radioactive waste in underground facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.

[3] The results of this environmental impact indicator should be used with caution, as the uncertainties of these results are high or experience with the indicator is limited.

Additional environmental information

Within the additional environmental information, X-Lam Dolomiti has decided to introduce some information not strictly related to the LCA analysis, but which provides useful information to define the sustainability of XLAM/CLT panels, as defined by UNI EN 15804 in section 5.4.4.

The main tool defined by the European Union within the European strategy on "*Sustainable production and consumption action plan*" (COM 2008/397 of 2008) is **Green Public Procurement (GPP)**.

This policy has been incorporated into Italian legislation in *Criteri Ambientali Minimi* (CAM). The XLAM/CLT panels fall within the CAM for the construction sector (DM 23/06/2022) and ensure compliance with the following aspects:

- **criterion 2.5.6: Wood products**:
  all the wood purchased by X-Lam Dolomiti is PEFC certified, and any specific documents related to the certification of the material will be made available upon request.
- **criterion 2.5.1: Emissions in confined environments:**
  analyses were carried out according to the EN 717-1 protocol following various standards: French VOC (class A), French CMR components, Italian CAM Edilizia, AGB/AgBB, Belgian Regulation, Indoor Air Comfort. Any specific documents related to the certification of the material will be made available upon request;
- **criterion 2.4.14: Disassembly and end of life**:
  The process of disassembly CLT panels, although complex, requires a structured approach to ensure proper management of the various phases and efficient material recovery. First, windows, systems, and all complementary building elements are removed, freeing the panels and facilitating subsequent operations.
  Next, the structural integrity of the building is checked to ensure safety during the disassembly of the panels and other main components. Another key step is to verify the possibility of removing adhesive sheets and/or membranes applied in full adherence to the panels, thus preserving the wooden material and ensuring the correct disposal of these elements. Once these preliminary phases are completed, the materials destined for disposal, such as rock wool insulation, are carefully separated. Finally, the CLT panels are dismantled using operations similar to those adopted during the assembly phase, but with the use of specific disassembly equipment to preserve the integrity of the wood and allow for its possible reuse.

Differences versus previous versions

This EPD represents an update of the two previous EPDs held by X-Lam Dolomiti:

- S-P-05298 Panel X-Lam 3 layers thickness 57 mm
- S-P-05299 Panel X-Lam 8 layers thickness 300 mm

It was decided to create a single EPD representative of the XLAM/CLT panel produced by X-Lam Dolomiti, including all stratifications.

Between 2021 and 2024, the following modifications were made to the plants:

- Introduction of a photovoltaic system on the roof of the plant;
- Purchase of wood only with PEFC certification;
- Efficiency improvement of the planer and finger joint;
- Introduction of a second cutting center.

Another aspect that may explain the differences in the results obtained can be found in the updating of the model and the changes made between 2021 and today in the datasets used.

References

General Programme Instructions of the International EPD® System. Version 4.0 del 19/06/2024

PCR 2019:14 Construction products (EN 15804+A2), version 1.3.4 valid until 20/06/2025

PCR 2019:14-c-PCR-006 Being updated - c-PCR-006 Wood and wood-based products for use in construction (EN 16485), version 30/04/2024.

Standards

EN 15804:2012 + A2:2019 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 14040:2021 Environmental management – Life cycle assessment – Principles and framework

ISO 14044:2021 Environmental management. Life Cycle Assessment. Requirements and guidelines.

Tools and database

SimaPro 9.6.0.1 – LCA software by PRé Sustainability http://simapro.com/
Ecoinvent 3.10 database. http://www.ecoinvent.org/

EPD owner

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