



ENVIRONMENTAL PRODUCT DECLARATION OF MULTILAYER PANELS FOR **NO ADDED FORMALDEHYDE POPLAR PLYWOOD**



Approval date
24.09.2019

Valid until
16.05.2024



Registration number
S-P-01711

ECO EPD reference number
00000983



GENERAL INFORMATION

General Information	The International EPD® System www.environdec.com
EPD Programme Operator	EPD International AB Box 210 60, SE-100 31 Stockholm, Sweden.
Product Category Rules (PCR)	International EPD System - PCR 2012:01 - "Construction products and construction services" - Version 2.3 UNI EN 15804:2014 - "Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
EPD Prepared by	Eng. Carlo Grassi, Dr. Jonatha Trabucco
Owner of the declaration	Panguaneta S.p.a. Via Gino Solazzi 19, 46018 Sabbioneta (MN) Italy
Website	www.panguanetaplywood.com
Verified by	DNV GL Business Assurance Italia S.r.l.
UN CPC Code	31410 - Plywood consisting solely of sheets of wood, except of bamboo.

Geographical scope	International (except for the End of Life phase, which has Italian scope).
EPD registration number	S-P-01711
Approval date	24.09.2019
Valid until	16.05.2024
Product description	Poplar plywood totally made of poplar veneers. Outer faces in long grain. Cross grain or unidirectional grain available on request. Suitable for those entire application fields that enhance all its main features: lightweight, stability, ease of cutting and machining.
Applications	Construction, automotive, boatbuilding, furniture and design, parquet, retailer, packaging.
Scope of application of the LCA	<p>The Life Cycle Assessment (LCA) was carried out according to standards ISO 14025, ISO 14040, ISO 14044 and EN 15804. Both specific data from the production of the product under analysis as well as the following data bases were used: Ecoinvent 3.3.</p> <p>The method used for calculating the categories of impact was CML –IA version 4.1 as implemented in OpenLCA. The life cycle analysis covers the production of raw materials and energy; the transportation of raw materials; the manufacturing stage; the expedition stage; the end of life stage.</p> <p>The declared unit under consideration is 1 m³ of poplar-based plywood panel without added formaldehyde (NAF).</p>

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Panguaneta turns a valuable raw material, poplar wood, into plywood with innovative performance features. Playing a leading role on international markets, Panguaneta gives impetus to concrete environmental sustainability, involving all aspects of the industrial cycle in a virtuous and dynamic process. Thorough knowledge of the sector, total traceability at all stages, consistent management of complexity, coupled with the use of advanced technologies: the industrial experience of Panguaneta is a solid asset we are proud to share with our customers.

STRONG ROOTS



Originally, Panguaneta was the name of a village settlement beside the river Po. The fields, often invaded by the river waters, still give life to poplar plantations. Thanks to the tenacity of a group of young local people, led by Giuliano Azzi and Antonio Tenca, Panguaneta was reborn as a factory in Sabbioneta, in the spring of 1960. Those young people, often relatives, were to create a formidable industrial experience. In over half a century of history many events were to happen, but the success of Panguaneta will always see that same “big” family playing a leading role, now in its third generation.

REAL VALUES



The value of family, business ethics and loyalty to our origins. We at Panguaneta strongly believe in consistency and respect of our values. We prove this with commitment, planning the future in the name of sustainable development, respect and appreciation of work and with a strong propensity to product innovation. These are the core values of the Brand, the light that shines over the entire company. With loyal observance, Panguaneta also expresses deep gratitude to its roots, the territory, the founders, the women and men who have experienced all this, bringing the company to its current level of excellence.

MISSION ENVIRONMENT



Panguaneta aims to offer a product of industrial value, able to efficiently and advantageously replace other raw materials whose use has greater critical impact on the environment. The company lives its mission with passion, it often plays a leading role in international events and technical meetings, intervening on forest issues and firmly believing in good industrial practices. Panguaneta also has the ambition to grow while improving its environmental performance and impact on the Planet. The company thus contributes in a particular way to the sustainable development of the local economy, to global ecological balance, conservation of the landscape and the economic sustainability of many industrial products.

RESPONSIBLY



The continuity in the governance and ownership of the Company, the careful management of every aspect of the supply chain, the certifications acquired and complete self-sufficiency in energy testify to the strong and mature personality of the Panguaneta industrial model. In any relationship context, with the community which hosts it, customers and suppliers, workers and all stakeholders, Panguaneta acts responsibly, with awareness and a sharing approach. This provides substantial strength, projecting the company with synergy into the future.

ESSENTIAL KNOWLEDGE



The making of Panguaneta rests on a solid link with the cultivation of poplar: this is what gives life to the raw material, the fine heritage of the landscape. Panguaneta constantly implements field tests. Know-how gained in planting density, quality assurance represented by the Italian clone I214, the agricultural practices observed and forest management all follow the principles of biodiversity, ensuring the respect and protection of the natural environment. Knowledge sharing and cultivation techniques take place mainly with traditional suppliers, which represent the most fruitful and accredited partnership of the company. The direct ownership of several major estates, devoted to cultivation and experimentation confirm the “green” soul of Panguaneta.

ENERGY FOR THE FUTURE



As the poplar tree demonstrates its ecological value as it grows, improving various environmental parameters, so does Panguaneta, witnessing with the growth of the factory how it believes and also heavily invests in sustainable development. The energy system that powers the production facilities consists of a steam generator of a futuristic concept, designed specifically to exploit the best available technology (BAT) for the Panguaneta processing cycle. The biomass produced directly from in-house processing is a source of energy right on our doorstep, as well as being completely renewable. Sophisticated management of combustion processes ensures maximum energy efficiency and quality of emissions into the atmosphere. With a state-of-the-art thermal power plant reserving further, virtuous potential, plus the ability to recover other clean energy from residual steam, we have thus chosen to invest by looking ahead, to a world that is able to grow in a sustainable way.

QUALITY AND EXPERTISE



Panguaneta today looks to the future, with the certainty that it has developed strategic partnerships and equipped itself with the most advanced technologies. Continuous technical updating, global presence, deep knowledge of production processes and strong market skills are the defining elements behind a comprehensive range of products and services. Our plywood today reaches all latitudes and methods of design, construction and assembly, ensuring substantial competitive advantages, even for new applications. Our offer thus allows our customers to improve their business efficiency, timing, reliability and productivity.

Plywood is a panel product made of thin veneers of wood peeled from poplar wood logs and bonded by resin.

Pure Glue Plywood is constructed using an innovative new bonding system as the result of a collaboration between Panguaneta SPA and Solensis LLC.

The product is manufactured using **Soyad™ technology**; an environmentally-friendly adhesive that is formulated using a proprietary cross-linking resin and natural soy flour. This provides a strong and moisture resistant bond with no added Formaldehyde. The product is light in weight and made from fully certified Poplar plantations giving a surface appearance that is light-coloured with high homogeneity and a barely perceptible grain.

Formaldehyde emissions from the finished product meet numerous highly reputable and globally recognized standards for low emission rates and are in accordance with the California Air Resources Board's No Added Formaldehyde (NAF) regulation.

Plywood is used in many application areas, such as structural bracing, concrete formwork, cladding, flooring, webbed beams, boats, aircraft, door skins, furniture, wall panels and architectural joinery in exterior and interior environments.

The ratio between thickness and number of layers (veneers) affect the glue quantity per m3 necessary for bonding.



4. CONTENT DECLARATION

MAIN COMPONENTS OF THE PANGUANETA POPLAR PLYWOOD PANEL

Thickness	N. layers	Glue	Poplar Wood*
15.2	7	18%	82%
8.5	5	20%	80%
14.5	9	23%	77%
15.2	11	26%	74%



*Poplar wood with humidity content of about 5%

The formulation contains no hazardous substances and no substances of very high concern (SVHC) on the REACH Candidate List/ published by the European Chemicals Agency in a concentration more than 0,1% (by unit weight).

In Italy it is forbidden to allow the use of panels, half-finished or finished products with formaldehyde emissions higher than those established for Class E1. All Panguaneta's products are accompanied by a conformity declaration by the producer.

The emission class is assigned in conformity with the UNI EN 636 standard.

The low emission class E1 panels do not cause a concentration of equilibrium in the air of the test chamber (defined in the UNI EN 717-1 standard) greater than 0.1 ppm, the limit established by the World Health Organisation for living and residential environments.

Standard/Certification	Conformity
Class E1	✓
EU 995/2010	✓
REACH	✓
NAF Bonding – No Added Formaldehyde	✓
CARB2 Bonding - (California Air Resource Board, Phase 2)	✓
FSC® (Forest Stewardship Council®)	On demand
PEFC™ (Programme for Endorsement of Forest Certification schemes)	On demand
CE2+	On demand



The mark of responsible forestry
Richiedi prodotti certificati FSC®











PANGUANETA SPA
California 93120 NAF No-Added Formaldehyde
N-18-191

5. DECLARED UNIT


For this EPD, the concept of “unit declared” applies instead of “functional unit”, following the guidelines established in the reference PCR. The present declaration refers to the manufacture of 1 m³ of poplar plywood panel of different thickness, number of layers. According to PCR’s guidelines results are presented using the impacts of representative products.

Thickness (n° of layers)		Bonding
5.2 (7)		PURE GLUE PG - A
8.5 (5)		PG - B
14.5 (9)		PG - C
15.2 (11)		PG - D


In the table below are shown the representative products (first column) and the related represented products ordered by glued surface per m3:







Representative Products						
	Thickness (mm)	N° of layers	Glued Surface per m ³ (m ²)	Thickness (mm)	N° of layers	Glued Surface per m ³ (m ²)
 15.2 (7) 	5.5	3	364	14.5	7	414
	11	5	364	29	13	414
	36	15	388	4.8	3	416
	25.4	11	394	24	11	416
	15.2	7	394	23.8	11	420
	35	15	400	28.5	13	422
	5	3	400	19	9	422
	10	5	400	38	17	422
	15	7	400	33	15	424
	20	9	400	23.5	11	426
	25	11	400	14	7	428
	30	13	400	28	13	428
	40	17	400			
	24.8	11	404			
	44	19	410			

Representative Products



8.5 (5)



 Thickness (mm)	 N° of layers	 Glued Surface per m ³ (m ²)	 Thickness (mm)	 N° of layers	 Glued Surface per m ³ (m ²)
18.5	9	432	16.5	9	484
27.6	13	434	8.2	5	488
23	11	434	16.4	9	488
9	5	444	4	3	500
18	9	444	8	5	500
27	13	444	12	7	500
13.5	7	444	16	9	500
22	11	454	20	11	500
17.5	9	458			
13	7	462			
30	15	466			
8.5	5	470			
17	9	470			
38	19	474			
21	11	476			

Representative Products



14.5 (9)




 Thickness (mm)	 N° of layers	 Glued Surface per m ³ (m ²)
15.5	9	516
11.4	7	526
38	21	526
15	9	534
11.1	7	540
11	7	546
14.5	9	552
7	5	572
10	7	600

Representative Products



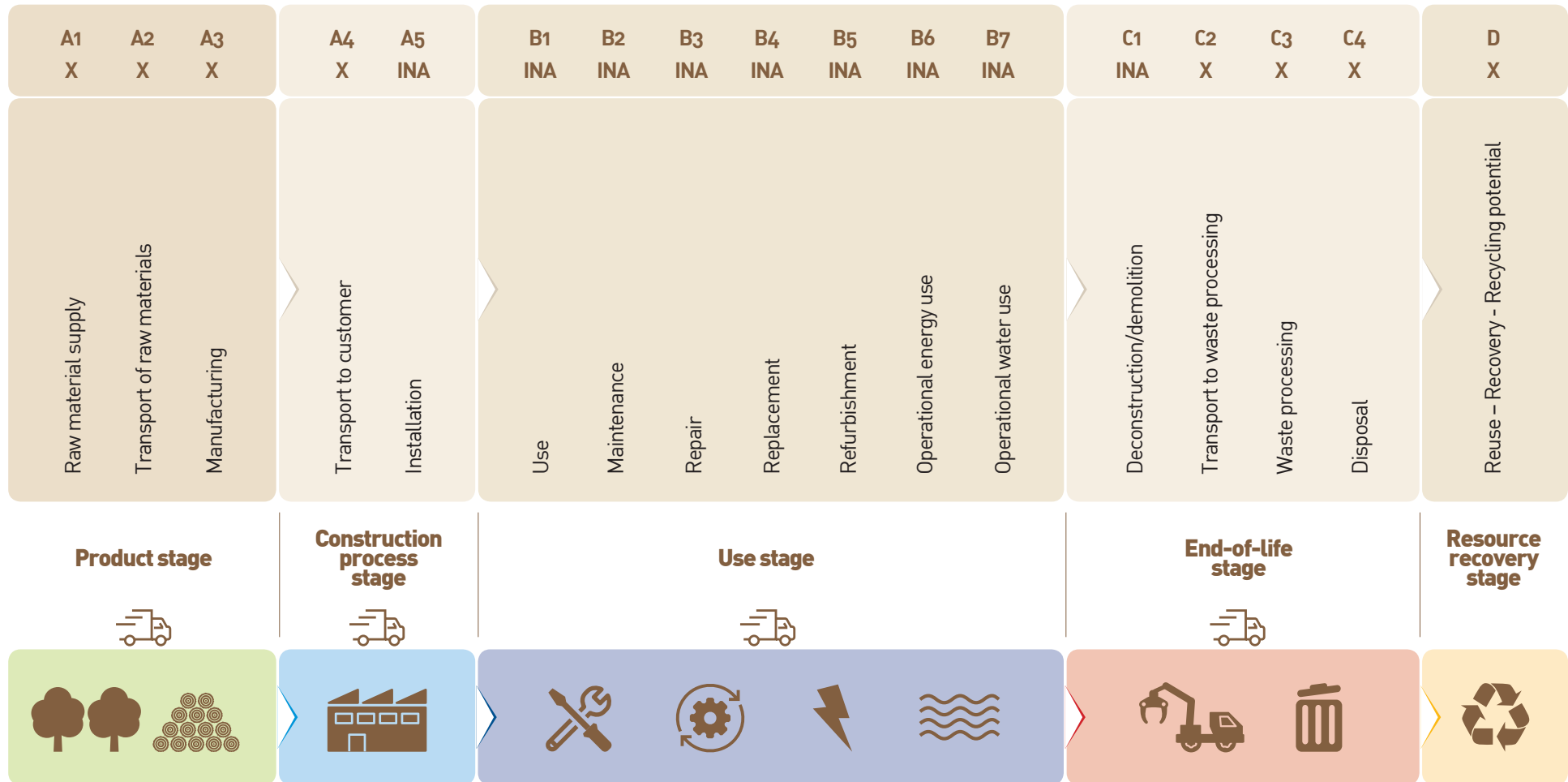
15.2 (11)



 Thickness (mm)	 N° of layers	 Glued Surface per m ³ (m ²)
16.4	11	610
6.5	5	616
15.2	11	658
18.2	13	660
3	3	666
6	5	666
12	9	666
15	11	666
18	13	666

6. SYSTEM BOUNDARY

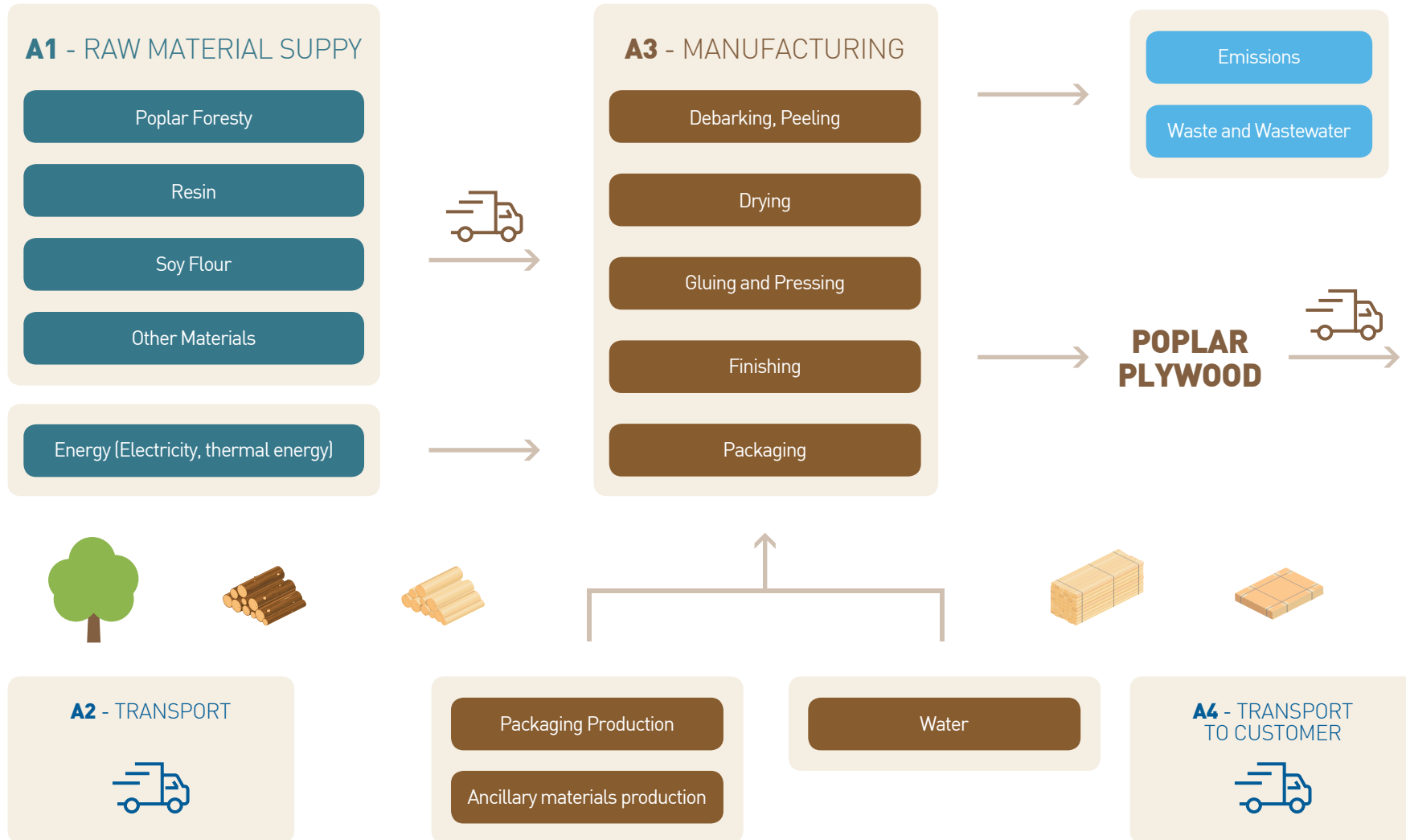
This EPD is of the “cradle to gate with options” type and includes the mandatory modules A1 (Raw materials), A2 (Transport), A3 (Manufacturing) and the optional modules A4 (Transport to consumer), C2 (Transport to waste processing), C3 (Waste processing), C4 (Disposal) and D (Reuse - Recovery - Recycling potential).



7. PRODUCTION (A1-A3)



- 1_ Panguaneta plywood can be produced from **poplar or exotic wood**, with **poplar plywood** being the most common. This EPD represents poplar plywood panels, which includes 50% of total production by volume.
- 2_ The manufacturing process starts by **debarking log**, then poplar log undergoes a **peeling process** which is the first transformation cycle for plywood. This is done through the **tangential cutting** of the log which is transformed into a thin, continuous strip of wood cellulose of various thicknesses.
- 3_ The precision of the layers is ensured by digitally controlled, **cutting-edge** production lines that ensure uniformity and quality of the cuts. The layer obtained is then converted into veneers of the desired size before they are **dried** to achieve an optimal degree of moisture.
- 4_ Finished veneers are resin-bonded with the grain direction of each layer perpendicular to that of the previous layer and then hot pressed into a panel.
- 5_ Panguaneta plywood is subjected to a **suitable finishing**, with four processing phases: squaring and trimming of the edges; balancing and smoothing to **optimize the surfaces**, and lastly, testing.
- 6_ The final board is **packaged and stored**. Steel straps and cardboard are the main packaging materials used.



8. TRANSPORT TO CUSTOMER (A4)

The transportation of the product to customer is included in this declaration.

This module is divided in 3 scenarios:



Local Transportation
Italy



Continental transportation
Europe



Intercontinental transportation
mainly U.S.A. and Australia

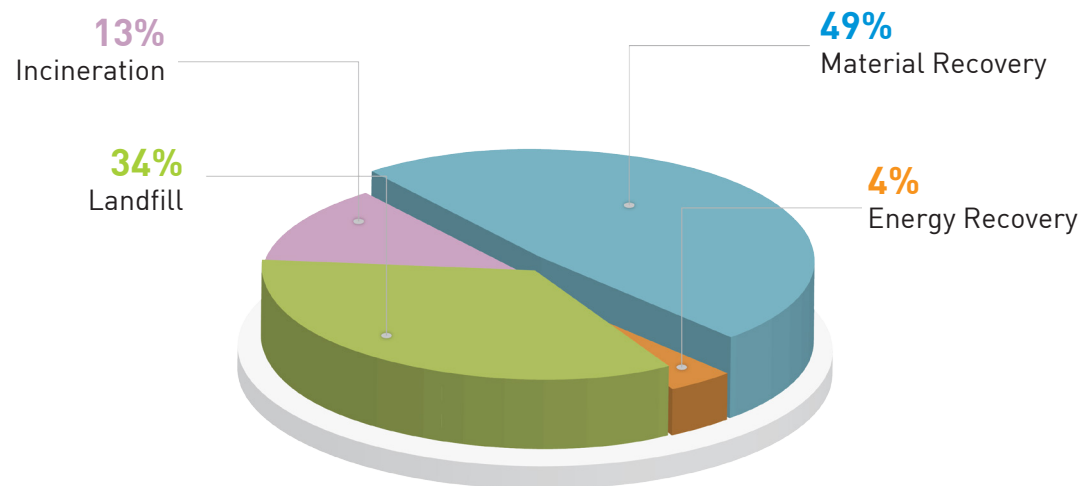


Parameter	Unit	Land Transportation	Water Transportation
Vehicle type used for transport	n.a.	Heavy-duty vehicles	Transoceanic ship
Fuel type	n.a.	Diesel	Heavy fuel oil
Fuel consumption	Kg/tkm	0.0196	0.0025
Gross vehicle weight	Ton	29.96	n.d.
Average load factor	Ton/vehicle	15.96*	50000
Bulk density of transported products	Kg/m3	410	410
Volume capacity utilisation factor (factor: = 1 or < 1 or ≥ 1 for compressed or nested packaged products)	n.a.	<1	<1
Database process utilized (Ecoinvent)	n.a.	Transport, freight, lorry >32 metric ton, EURO3	Transport, freight, sea, transoceanic ship

* Includes empty return

9. END OF LIFE (C2-C4) AND RECOVERY (D)

When a wood product reaches the end of its useful life, it may either be reused, recycled, landfilled or combusted to produce energy. The End-of-Life scenario is based on data from Italian national waste management reports and assumes that about 52.5% of the panels is sent to some recycling process (mainly recovery of primary material, while a smaller fraction is sent to energy recovery). The remaining fraction (47.5%) is landfilled or incinerated.



10. CUT-OFF & ALLOCATION

Environmental impacts relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary.

All inputs and outputs to a unit process for which data are available are included in the calculation. Less than 1% of the total mass inputs / outputs of the unit process are cut off.

Allocation of co-products: As the difference in economic value of the co-products is high (>25% as per EN 15804, Section 6.4.3.2), allocation has been done by economic value.

11. ENVIRONMENTAL PERFORMANCE

Environmental Impacts: 1 m3 poplar plywood, Pure Glue bonding class for Modules A1-A3.

Impact category	Reference unit	PG-A	Variability Range (%)	PG-B	Variability Range (%)	PG-C	Variability Range (%)	PG-D	Variability Range (%)
ADPf	MJ	3.01E+03	1.36%; +2.36%	3.18E+03	-3.07%; +0.70%	3.33E+03	-3.83%; +6.63%	3.66E+03	-3.10%; +0.49%
ADPel	kg Sb eq	5.20E-04	0.00%; +1.92%	5.50E-04	-3.64%; +1.82%	5.80E-04	-3.45%; +6.90%	6.50E-04	-4.62%; +0.00%
AP	kg SO2 eq	1.13E+00	2.37%; +2.44%	1.19E+00	-2.70%; +0.11%	1.23E+00	-3.91%; +7.06%	1.36E+00	-2.95%; +0.45%
EP	kg PO4--- eq	7.02E-01	-1.03%; +3.25%	7.52E-01	-3.69%; +1.85%	8.03E-01	-4.55%; +5.64%	8.85E-01	-4.21%; +0.64%
GWP	kg CO2 eq	3.58E+02	-1.89%; +4.70%	3.97E+02	-5.48%; +2.88%	4.36E+02	-6.27%; +7.78%	4.98E+02	-5.66%; +0.87%
ODP	kg CFC-11 eq	3.20E-05	2.13%; +1.68%	3.33E-05	-2.29%; +0.07%	3.44E-05	-3.00%; +6.04%	3.73E-05	-2.23%; +0.35%
POCP	kg C2H4 eq	1.96E-01	-1.50%; +3.05%	2.09E-01	-3.47%; +1.94%	2.23E-01	-4.23%; +4.86%	2.43E-01	-4.05%; +0.61%
PERT	MJ	2.36E+04	-0.16%; +0.31%	2.38E+04	-0.38%; +0.21%	2.39E+04	-0.48%; +0.56%	2.42E+04	-0.50%; +0.08%
PERM	MJ	6.08E+03	0.00%; +0.00%	6.08E+03	0.00%; +0.00%	6.08E+03	0.00%; +0.00%	6.08E+03	0.00%; +0.00%
PERE	MJ	1.75E+04	-0.21%; +0.42%	1.77E+04	-0.51%; +0.29%	1.78E+04	-0.65%; +0.75%	1.81E+04	-2.23%; +4.77%
PENRT	MJ	2.85E+03	0.37%; +2.80%	3.04E+03	-3.52%; +1.26%	3.22E+03	-4.27%; +6.51%	3.56E+03	-0.67%; +0.10%
PENRM	MJ	2.43E+02	-7.88%; +8.57%	2.89E+02	-8.93%; +6.25%	3.39E+02	-9.37%; +8.75%	4.04E+02	-8.80%; +1.33%
PENRE	MJ	2.61E+03	1.14%; +2.27%	2.75E+03	-2.96%; +0.74%	2.88E+03	-3.67%; +6.24%	3.15E+03	-3.02%; +0.47%
SM	kg	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%
RSF	MJ	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%
NRSF	MJ	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%
FWT	m3	1.42E+0	3.92%; +2.47%	1.50E+01	-3.39%; -0.16%	1.57E+01	-4.40%; +9.43%	1.77E+01	-3.01%; +0.48%

Impact category	Reference unit	PG-A	Variability Range (%)	PG-B	Variability Range (%)	PG-C	Variability Range (%)	PGD	Variability Range (%)
HWD	kg	5.18E-03	6.56%; +1.16%	5.35E-03	-2.06%; -1.68%	5.43E-03	-3.13%; +9.76%	6.03E-03	-1.16%; +0.33%
NHWD	kg	1.78E+02	-0.06%; +1.91%	1.86E+02	-2.43%; +0.99%	1.94E+02	-2.97%; +4.29%	2.08E+02	-2.70%; +0.42%
RWD	kg	1.46E-02	1.71%; +1.37%	1.51E-02	-1.86%; +0.13%	1.55E-02	-2.46%; +4.98%	1.66E-02	-1.87%; +0.30%
CRU	kg	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%
MFR	kg	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%
MER	kg	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%
EE	kg	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%	0.00E+00	0.00%; +0.00%

ACRONYMS

ENVIRONMENTAL IMPACTS:

AP = Acidification Potential;
ADPeI = Abiotic Depletion Potential (elements);
EP = Eutrophication Potential;
ODP = Ozone Depletion Potential;
GWP = Global Warming Potential;
POCP = Photochemical Ozone Creation Potential;
ADP_f = Abiotic Depletion Potential (fossil).

RESOURCE CONSUMPTION:

PERT = Total use of renewable primary energy resources;
PERM = Use of renewable primary energy resources used as raw materials;
PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resources;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FWT = Total use of net fresh water.

WASTE PRODUCTION:

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed;
CRU = Components for reuse;
MFR = Materials for recycling;
MER = Materials for energy recovery;
EE = Exported energy.

12. DOWNSTREAM MODULES

Impacts refers to 1m³ of poplar plywood. Results depend on bulk density that is constant 410 kg /m³ for different representative products (A-B-C-D).

A4 – Transport to customer

Impact category	Reference unit	Local Transport	Continental Transport	Intercontinental Transport
ADPf	MJ	7.99E+01	5.56E+02	1.19E+03
ADPeI	kg Sb eq	9.71E-06	6.75E-05	9.29E-05
AP	kg SO ₂ eq	2.64E-02	1.84E-01	9.90E-01
EP	kg PO ₄ --- eq	6.07E-03	4.22E-02	1.32E-01
GWP	kg CO ₂ eq	5.06E+00	3.52E+01	8.08E+01
ODP	kg CFC-11 eq	1.02E-06	7.07E-06	1.47E-05
POCP	kg C ₂ H ₄ eq	9.10E-04	6.37E-03	3.27E-02
PERT	MJ	1.26E+00	8.77E+00	2.34E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00
PERE	MJ	1.26E+00	8.77E+00	2.34E+01
PENRT	MJ	7.85E+01	5.46E+02	1.17E+03
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00
PENRE	MJ ₃	7.85E+01	5.46E+02	1.17E+03
SM	kg	0.00E+00	0.00E+00	0.00E+00

Impact category	Reference unit	Local Transport	Continental Transport	Intercontinental Transport
RSF	MJ	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00
FWT	m ³	6.50E-02	4.53E-01	1.28E+00
HWD	kg	3.97E-05	2.80E-04	6.40E-04
NHWD	kg	1.06E+01	7.37E+01	1.16E+02
RWD	kg	5.90E-04	4.13E-03	8.60E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00

C2÷C4 – End of Life; D – Resource recovery

Impact category	Reference unit	Transport to Waste Processing	Waste Processing	Disposal	Resource recovery stage
		C2	C3	C4	D
ADP _f	MJ	5.03E+01	3.06E+01	3.00E+01	-1.62E+02
ADP _{el}	kg Sb eq	1.01E-05	2.04E-06	3.26E-06	-6.86E-06
AP	kg SO ₂ eq	1.30E-02	1.84E-01	3.83E-02	-4.68E-02
EP	kg PO ₄ --- eq	2.94E-03	6.96E-03	4.91E-02	-1.34E-02
GWP	kg CO ₂ eq	3.33E+00	3.56E+00	2.67E+00	-1.28E+01
ODP	kg CFC-11 eq	6.28E-07	2.30E-07	2.68E-07	-1.49E-06
POCP	kg C ₂ H ₄ eq	5.50E-04	9.00E-04	5.60E-04	-2.31E-03
PERT	MJ	6.88E-01	4.99E+00	6.09E-01	-1.67E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERE	MJ	6.88E-01	4.99E+00	6.09E-01	-1.67E+01
PENRT	MJ	4.88E+01	4.23E+01	2.01E+01	-1.05E+02
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRE	MJ ₃	4.88E+01	4.23E+01	2.01E+01	-1.05E+02
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Impact category	Reference unit	Transport to Waste Processing C2	Waste Processing C3	Disposal C4	Resource recovery stage D
RSF	MJ	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
FWT	m3	3.81E-02	4.29E+01	2.02E-01	-1.12E+00
HWD	kg	2.90E-05	6.12E-05	6.11E-05	-3.00E-04
NHWD	kg	4.70E+00	1.59E+00	5.19E+00	-1.45E+01
RWD	kg	3.60E-04	1.60E-04	4.16E-05	-5.30E-04
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

13. VERIFICATION AND REGISTRATION

EPD of construction products may not be comparable if they do not comply with **EN 15804**.
 Environmental product declarations within the same product category from different programs may not be comparable.

CEN standard EN15804 served as the core PCR

PCR:	PCR 2012:01 "Construction products and Construction services" - Version 2.3
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via: info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:	<input type="checkbox"/> EPD Process Certification (Internal) <input checked="" type="checkbox"/> EPD Verification (external)
Third party verifier:	DNV GL Business Assurance Italia S.r.l
Accredited or approved by:	Accredia



14. CARBON SEQUESTRATION

During growth, trees absorb carbon dioxide (CO₂) from the atmosphere through the process of photosynthesis and convert this into carbon-based compounds that constitute various components of a tree, including wood.

The CO₂ sequestered per m³ of wood was calculated according to the formula:

$$\text{Mass of CO}_2 \text{ sequestered} = m_{\text{dry (timber)}} \times C_f \times 44/12$$



Where:

- **Mass of CO₂ sequestered** is the biogenic carbon sequestered in the wood.
- **mdry (timber)** is the dry weight of the timber in the finished product.
- **Cf** is the percentage of carbon in dry matter, for Angiosperms timber = 48% ± 2 [IPCC, 2006]

The average density of the finished product is 410 kg * m⁻³, of which 330 kg * m⁻³ of poplar wood, with a residual moisture of 10%.

The average amount of CO₂ sequestered per m³ of plywood is approximately 522.7 kg CO₂-Eq.

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