



ENVIRONMENTAL PRODUCT DECLARATION OF MULTILAYER PANELS OF **POPLAR PLYWOOD**



PANGUANETA

Plywood For Life

Approval date

28.08.2017

Valid until

27.08.2022

Registration number

S-P-01117

ECO EPD reference number

00000586



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 2.2 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.

EPD registration number	
Approval date	28.08.2017
Valid until	27.08.2022
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 Analysis (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; and the actual manufacturing stage, all the way up to the expedition stage.</p> <p>The declared unit under consideration is 1 m³ of poplar-based plywood panel for different gluing classes (UNI EN 314 Standard):</p> <ul style="list-style-type: none"> • Class 1 (UNI EN 636 – 1) • Class 2 (UNI EN 636 – 2) • Class 3 (UNI EN 636 – 3)

2. COMPANY PROFILE

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



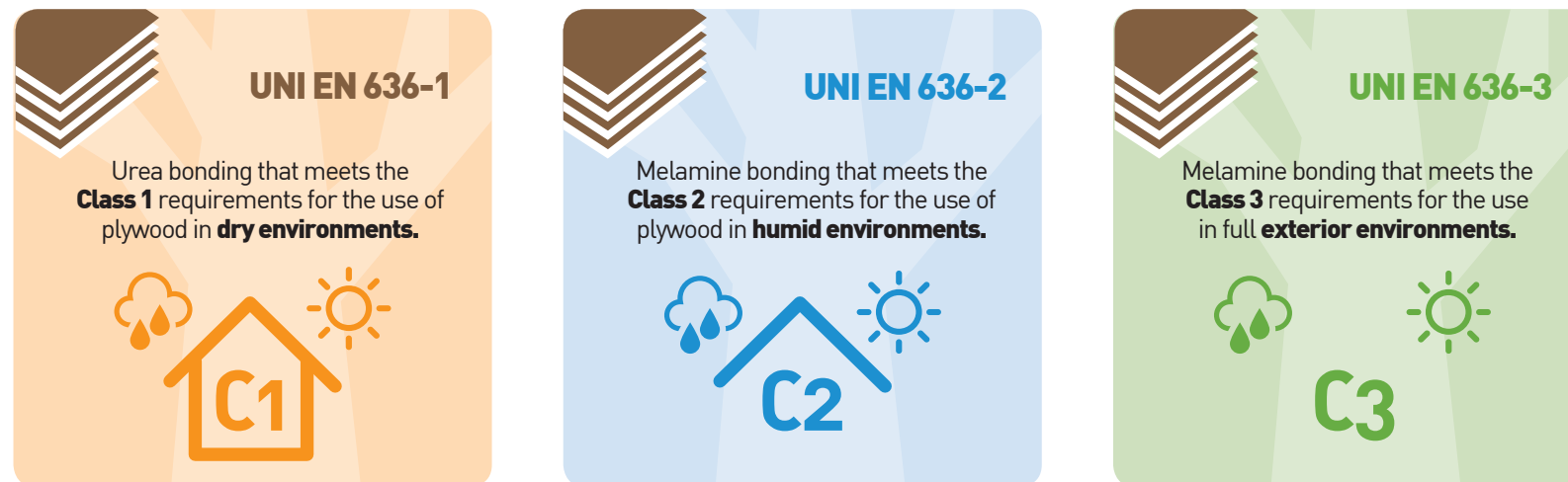
Panguaneta today looks to the future, with the certainty that it has developed strategic partnerships and equipped itself with the most advanced technologies. Continuous technical updating, global presence, deep knowledge of production processes and strong market skills are the defining elements behind 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.

TYPES OF BONDING

The quality of Panguaneta glues complies with the provisions of **UNI EN 314 Standard**, after suitable treatment in view of resistance to humidity.

Products are divided in **3 gluing classes**.



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	C1 and C2		C3	
		Glue	Poplar Wood	Glue	Poplar Wood
15	7	16%	84%	18%	82%
15,5	9	20%	80%	22%	78%
15,2	11	24%	76%	27%	73%



*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).

TABLE - GLUE COMPOSITION

Gluing class	Gluing mix	Resorcin	Water	Wheat flour	Resin (Urea Formaldehyde)	Resin (Melamine Urea Formaldehyde)
CLASS1	C1	0%	17.5%	17.5%	65.0%	0%
CLASS2	C2	0%	17.0%	17.0%	33.0%	33.0%
CLASS3	C3	5.0%	0.0%	10.0%	0%	85.0%



In Italy it is forbidden to allow the use of panels, semi-finished or finished products with formaldehyde emissions higher than those established for Class E1. Panguaneta products are all accompanied by a conformity declaration by the producer conformity declaration. The emission class is assigned in conformity with 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	All products
EU 995/2010	All products
REACH	All products
NAF Bonding – No Added Formaldehyde	On demand
CARB2 Bonding - (California Air Resource Board, Phase 2)	On demand
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-16-191


PANGUANETA SPA
California 93120 Compliant for Formaldehyde Phase 2 No. 001 – TPC 016


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 and bonding. According to PCR’s guidelines results are presented using the impacts of representative products.


Thickness (n° of layers)	Bonding		
	 C1	 C2	 C3
15 (7) 	C1L	C2L	C3L
15.5 (9) 	C1M	C2M	C3M
15.2 (11) 	C1H	C2H	C3H
			


In the table below are shown the representative products (first column) and the related represented products divided for the type of bonding:

Representative Products	C1		C2		C3	
	Thickness	N° of layers	Thickness	N° of layers	Thickness	N° of layers
 15 (7)	6	3	6	3		
	28	11	28	11		
	5.5	3	5.5	3	5.5	3
	11	5	11	5	11	5
	36	15	36	15	36	15
	25.4	11	25.4	11	25.4	11
	15.2	7	15.2	7	15.2	7
	35	15	35	15	35	15
	5	3	5	3	5	3
	10	5	10	5	10	5
	15	7	15	7	15	7
	20	9	20	9	20	9
	25	11	25	11	25	11
	30	13	30	13	30	13
	40	17	40	17	40	17

Representative Products	C1		C2		C3	
	Thickness	N° of layers	Thickness	N° of layers	Thickness	N° of layers
 15 (7)	24.8	11	24.8	11	24.8	11
	44	19	44	19	44	19
	14.5	7	14.5	7	14.5	7
	29	13	29	13	29	13
	4.8	3	4.8	3	4.8	3
	24	11	24	11	24	11
	23.8	11	23.8	11	23.8	11
	28.5	13	28.5	13	28.5	13
	19	9	19	9	19	9
	38	17	38	17	38	17
	33	15	33	15	33	15
	23.5	11	23.5	11	23.5	11
	14	7	14	7	14	7
	28	13	28	13	28	13
	18.5	9	18.5	9	18.5	9
	27.6	13	27.6	13	27.6	13
	23	11	23	11	23	11
	9	5	9	5	9	5

Representative Products	C1		C2		C3	
	Thickness	N° of layers	Thickness	N° of layers	Thickness	N° of layers
 15 (7)	13.5	7	13.5	7	13.5	7
	27	13	27	13	27	13
	18	9	18	9	18	9
	22	11	22	11		
	17.5	9	17.5	9		
	13	7	13	7		
 15.5 (9)					22	11
					17.5	9
					13	7
	30	15	30	15	30	15
	8.5	5	8.5	5	8.5	5
	17	9	17	9	17	9
	38	19	38	19	38	19
	21	11	21	11	21	11
	16.5	9	16.5	9	16.5	9
	8.2	5	8.2	5	8.2	5
	16.4	9	16.4	9	16.4	9

Representative Products	C1		C2		C3	
	Thickness	N° of layers	Thickness	N° of layers	Thickness	N° of layers
 15.5 (9)	4	3	4	3	4	3
	8	5	8	5	8	5
	12	7	12	7	12	7
	16	9	16	9	16	9
	20	11	20	11	20	11
	15.5	9	15.5	9	15.5	9
	11.4	7	11.4	7	11.4	7
	38	21	38	21	38	21
	15	9	15	9	15	9
	11.1	7	11.1	7	11.1	7
	11	7	11	7	11	7
	14.5	9	14.5	9	14.5	9
	7	5	7	5	7	5

Representative Products	C1		C2		C3	
	Thickness	N° of layers	Thickness	N° of layers	Thickness	N° of layers
 15.2 (11)	10	7	10	7	10	7
	16.4	11	16.4	11	16.4	11
	6.5	5	6.5	5	6.5	5
	15.2	11	15.2	11	15.2	11
	18.2	13	18.2	13	18.2	13
	3	3	3	3	3	3
	6	5	6	5	6	5
	12	9	12	9	12	9
	15	11	15	11	15	11
	18	13	18	13	18	13

CUT OFF & ALLOCATION

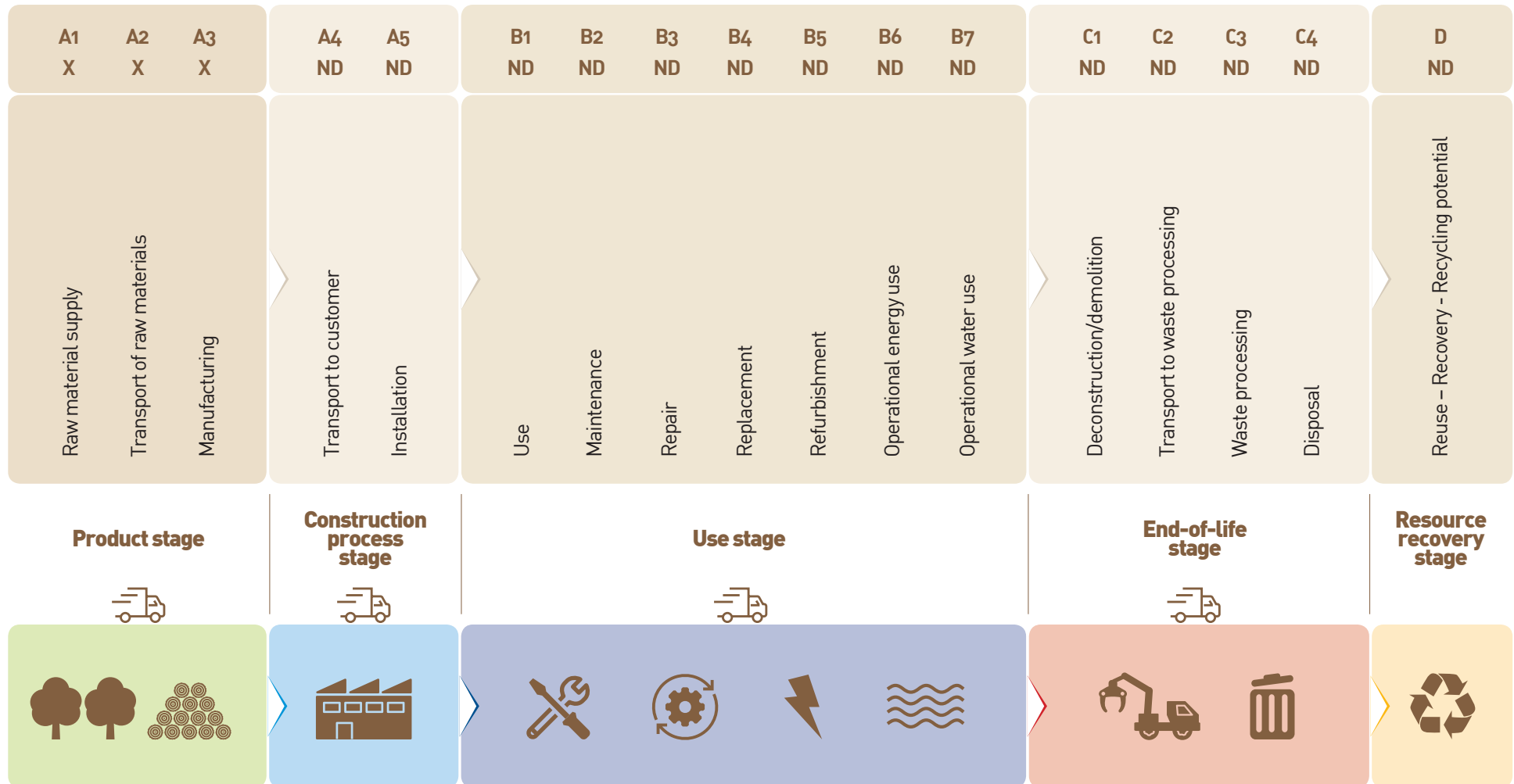
Environmental impacts relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary. All inputs and outputs to a unit process for which data are available are included in the calculation.

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.

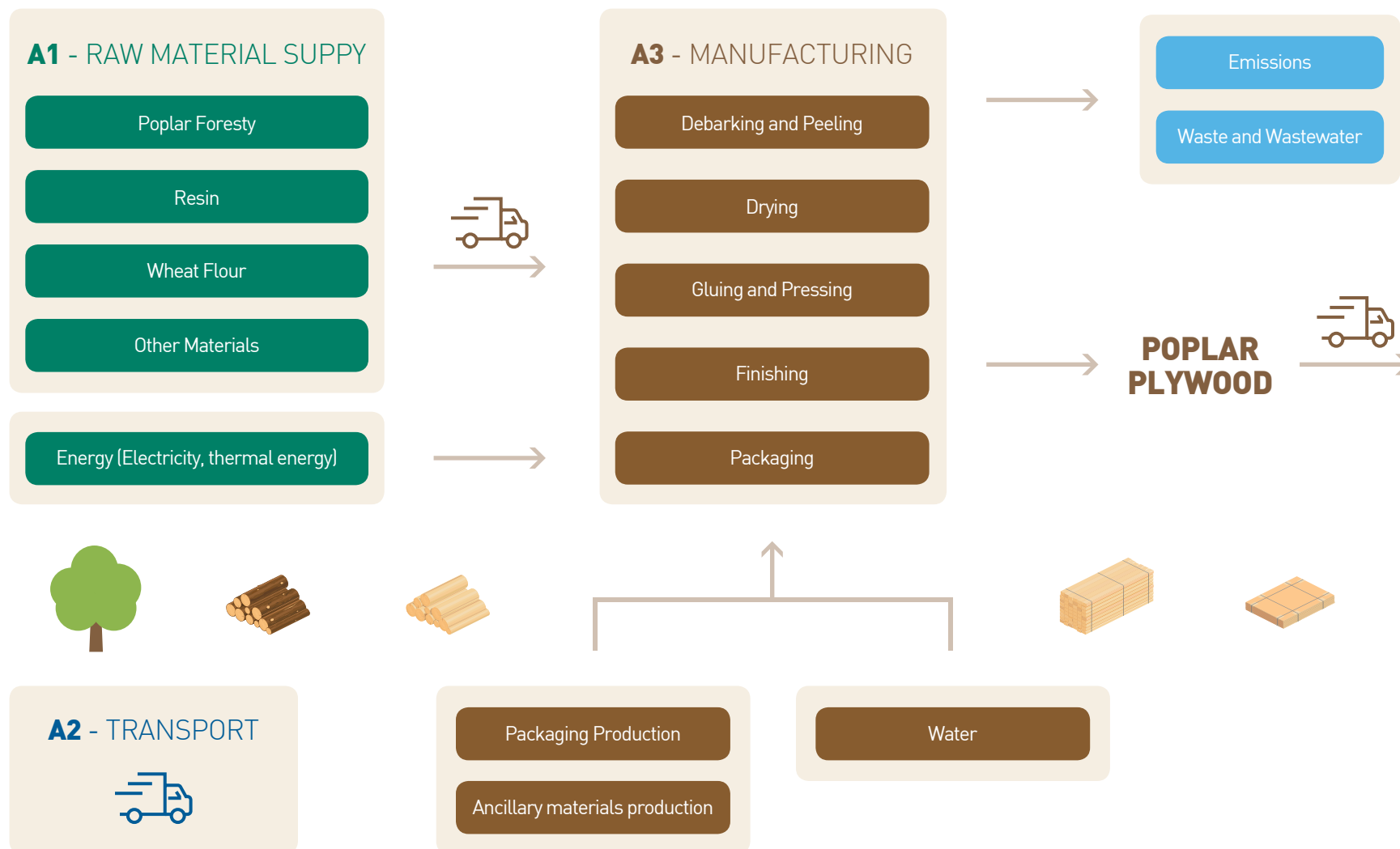
6. SYSTEM BOUNDARY

This EPD is of the “**cradle to gate**” type and includes the mandatory modules A1 (Raw materials), A2 (Transport) and A3 (Manufacturing).





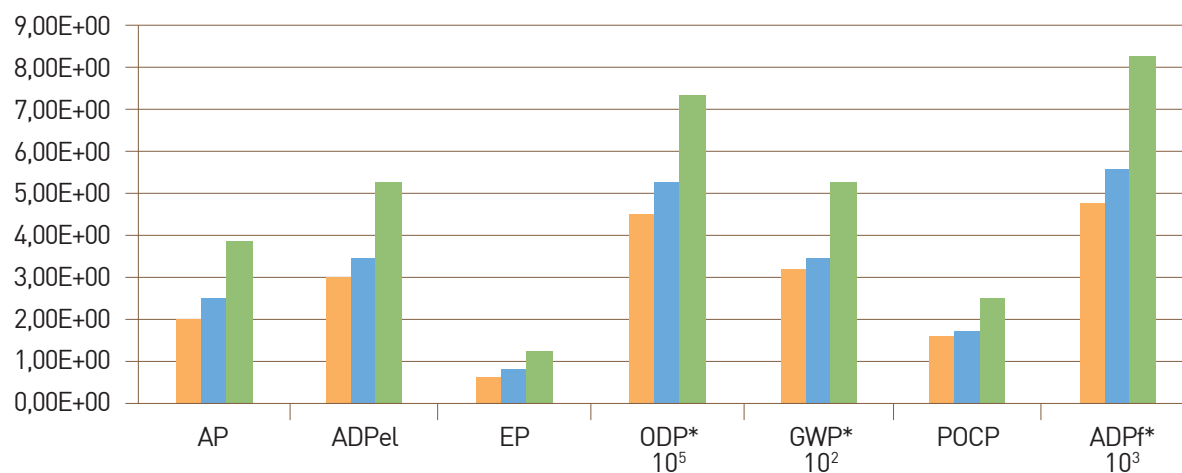
- 1_ Panguaneta plywood can be produced from **poplar or exotic wood**, with **poplar plywood** being the most common. This EPD represents poplar plywood panels, which includes 50% of total production by volume.
- 2_ The manufacturing process starts by **debarking log**, then poplar log undergoes a **peeling 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**. **C1-bond** (urea formaldehyde) resin is most common, while **C2** and **C3-bond** (melamine urea formaldehyde) resin represent a minor production.
- 5_ Panguaneta plywood is subjected to a **suitable finishing**, with four processing phases: squaring and trimming of the edges; calibrating and smoothing to **optimize the surfaces**, and lastly, testing.
- 6_ The final board is **packaged and stored**.
Steel str aps and cardboard are the main packaging materials used.



7. ENVIRONMENTAL IMPACTS

Environmental Impacts: 1 m³ poplar plywood, **15 mm, 7 layers**. Different bonding classes [C1, C2, C3].

Impact category	Reference unit	C1L	Variability Range (%)	C2L	Variability Range (%)	C3L	Variability Range (%)
AP	kg SO2-Eq	1.77E+00	+8.5; -7.1	2.09E+00	+9.6; -8.6	3.19E+00	+8.4; -5.5
ADPeI	kg antimony-Eq	2.61E+00	+8.0; -6.6	2.94E+00	+8.9; -7.7	4.43E+00	+8.0; -5.0
EP	kg PO4-Eq	7.46E-01	+5.3; -4.4	8.16E-01	+6.2; -5.5	1.04E+00	+5.9; -3.7
ODP	kg CFC-11-Eq	4.62E-05	+6.7; -5.0	5.18E-05	+7.7; -6.2	7.22E-05	+7.2; -4.1
GWP	kg CO2-Eq	3.04E+02	+6.9; -4.9	3.48E+02	+8.0; -6.4	5.09E+02	+7.5; -4.3
POCP	kg ethylene-Eq	1.71E-01	+6.0; -5.4	1.82E-01	+6.6; -6.1	2.50E-01	+6.5; -4.5
ADPf	MJ	4.83E+03	+8.0; -6.7	5.44E+03	+8.9; -7.9	8.21E+03	+8.0; -5.2

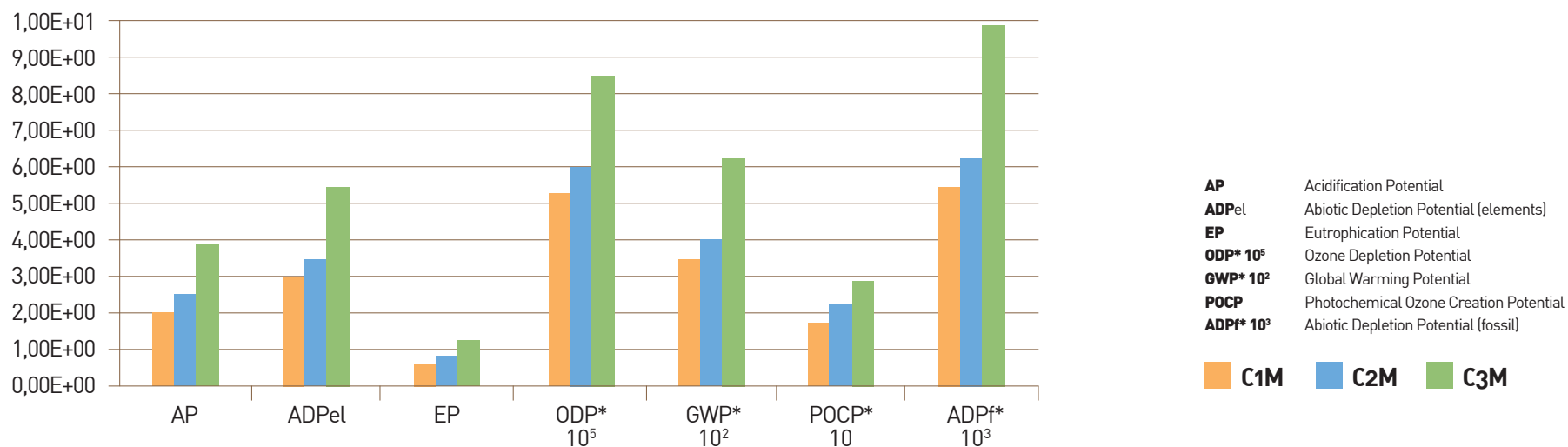


AP Acidification Potential
ADPeI Abiotic Depletion Potential (elements)
EP Eutrophication Potential
ODP* 10⁵ Ozone Depletion Potential
GWP* 10² Global Warming Potential
POCP Photochemical Ozone Creation Potential
ADPf* 10³ Abiotic Depletion Potential (fossil)

■ C1L ■ C2L ■ C3L

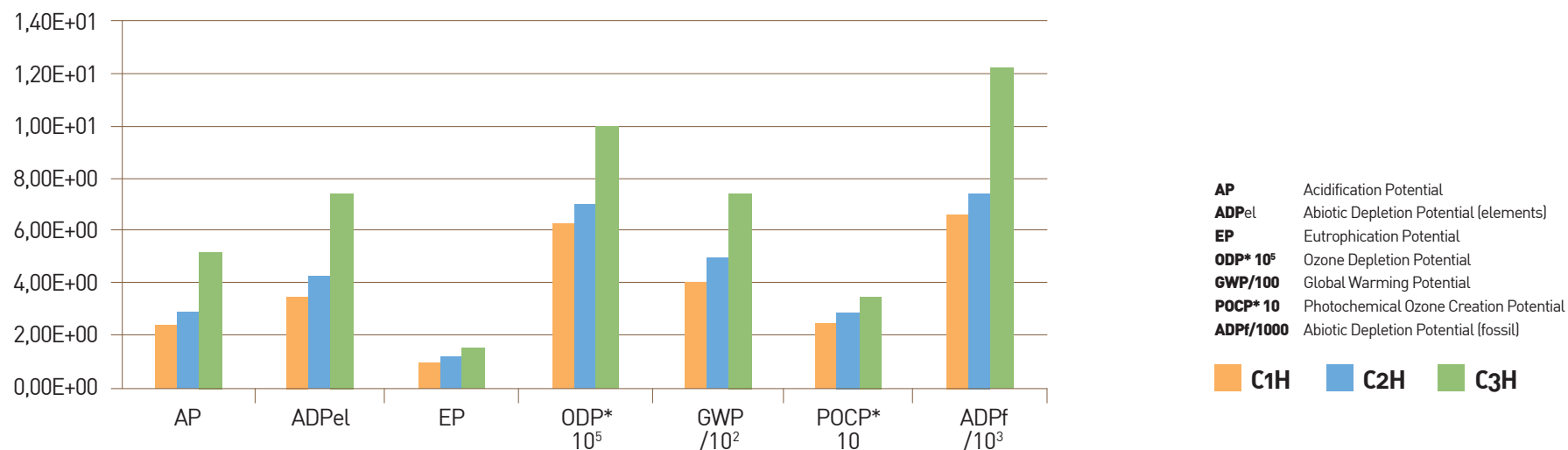
Environmental Impacts: 1 m³ poplar plywood, **15.5 mm, 9 layers**. Different bonding classes (C1, C2, C3).

Impact category	Reference unit	C1M	Variability Range (%)	C2M	Variability Range (%)	C3M	Variability Range (%)
AP	kg SO ₂ -Eq	2.05E+00	+9.3; -6.4	2.47E+00	+9.6; -7.0	3.89E+00	+10.0; -9.5
ADPeI	kg antimony-Eq	3.00E+00	+9.1; -6.2	3.43E+00	+9.3; -6.6	5.35E+00	+9.8; -9.1
EP	kg PO ₄ -Eq	8.20E-01	+6.1; -4.2	9.10E-01	+6.6; -4.8	1.20E+00	+7.6; -7.0
ODP	kg CFC-11-Eq	5.20E-05	+8.4; -5.4	5.92E-05	+8.7; -5.9	8.56E-05	+9.3; -8.3
GWP	kg CO ₂ -Eq	3.44E+02	+8.9; -5.6	4.00E+02	+9.1; -6.1	6.07E+02	+9.7; -8.6
POCP	kg ethylene-Eq	1.90E-01	+6.3; -4.6	2.04E-01	+6.6; -5.0	2.92E-01	+7.8; -7.7
ADPf	MJ	5.55E+03	+8.9; -6.1	6.35E+03	+9.1; -6.5	9.91E+03	+9.7; -9.1



Environmental Impacts: 1 m³ poplar plywood, **15.2 mm, 11 layers**. Different bonding classes (C1, C2, C3).

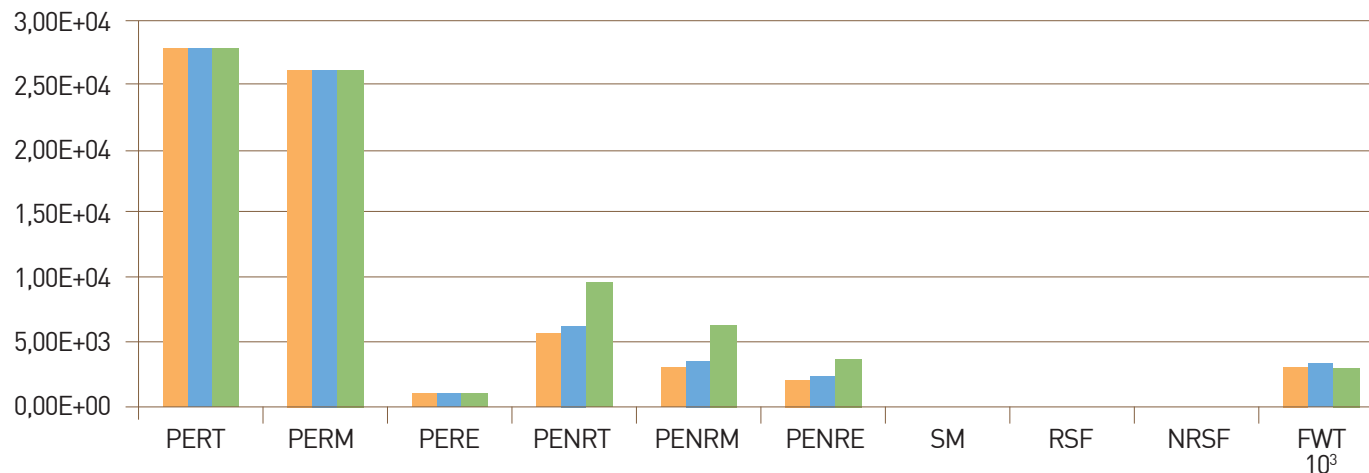
Impact category	Reference unit	C1H	Variability Range (%)	C2H	Variability Range (%)	C3H	Variability Range (%)
AP	kg SO ₂ -Eq	2.44E+00	+3.8; -5.6	2.97E+00	+3.4; -6.2	4,78E+00	+2.6; -7.2
ADPeI	kg antimony-Eq	3.55E+00	+3.9; -5.4	4.09E+00	+3.5; -5.8	6,54E+00	+2.7; -6.9
EP	kg PO ₄ -Eq	9.21E-01	+2.7; -3.9	1.04E+00	+2.5; -4.4	1,40E+00	+2.2; -5.6
ODP	kg CFC-11-Eq	6.03E-05	+4.2; -4.6	6.95E-05	+3.8; -5.2	1,00E-04	+10.0; -3.5
GWP	kg CO ₂ -Eq	4.00E+02	+4.4; -4.7	4.73E+02	+4.0; -5.3	7,37E+02	+3.0; -6.6
POCP	kg ethylene-Eq	2.15E-01	+2.3; -4.4	2.33E-01	+2.3; -4.7	3,46E-01	+2.0; -6.0
ADPf	MJ	6.55E+03	+3.6; -5.4	7.56E+03	+3.3; -5.8	1,21E+04	+2.6; -7.0



8. RESOURCE USE

Resource Use: 1 m³ poplar plywood, **15 mm, 7 layers**. Different bonding classes (C1, C2, C3).

Impact category	Reference unit	C1L	Variability Range (%)	C2L	Variability Range (%)	C3L	Variability Range (%)
PERT	MJ	2.72E+04	+0.2; -0.1	2.72E+04	+0.2; -0.1	2.72E+04	+0.2; -0.1
PERM	MJ	2.61E+04	+0.2; -0.1	2.61E+04	+0.2; -0.1	2.61E+04	+0.2; -0.1
PERE	MJ	1.09E+03	+0.2; -0.1	1.09E+03	+0.2; -0.1	1.09E+03	+0.2; -0.1
PENRT	MJ	5.59E+03	+7.8; -6.3	6.29E+03	+8.6; -7.4	9.40E+03	+7.9; -4.9
PENRM	MJ	3.52E+03	+7.8; -6.3	3.96E+03	+8.6; -7.4	5.92E+03	+7.9; -4.9
PENRE	MJ	2.07E+03	+7.8; -6.3	2.33E+03	+8.6; -7.4	3.48E+03	+7.9; -4.9
SM	kg	0.00E+00	±0.0	0.00E+00	±0.0	0.00E+00	±0.0
RSF	MJ	0.00E+00	±0.0	0.00E+00	±0.0	0.00E+00	±0.0
NRSF	MJ	0.00E+00	±0.0	0.00E+00	±0.0	0.00E+00	±0.0
FWT	m3	3.58E+00	+4.8; -4.6	3.60E+00	+4.9; -4.6	3.51E+00	+3.3; -2.0

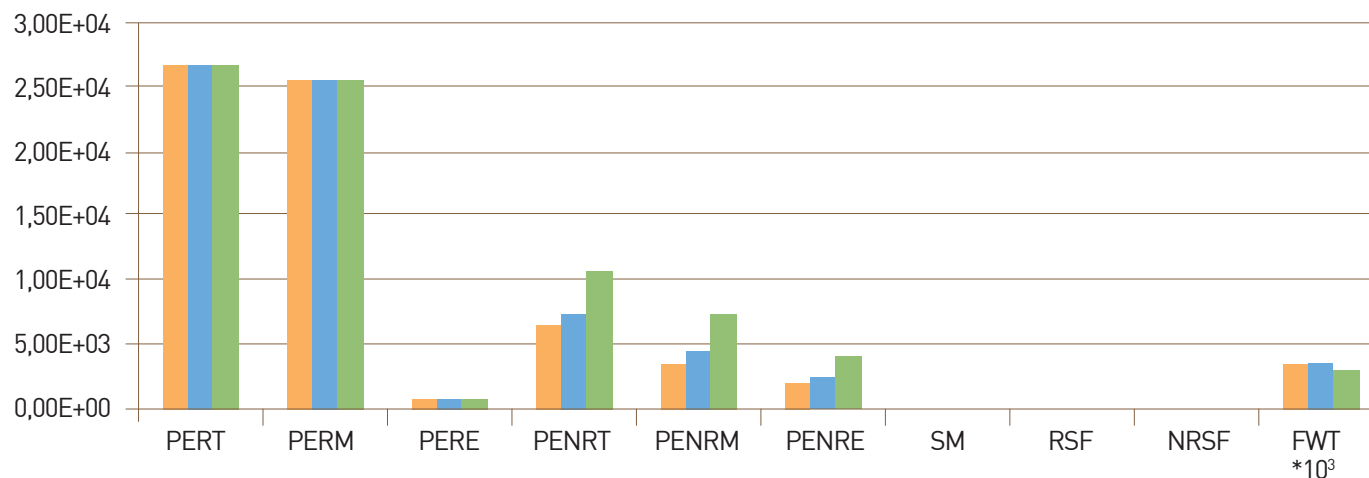


PERT Total use of renewable primary energy resources;
PERM Use of renewable primary energy resources used as raw materials;
PERE Use of renewable primary energy excluding renewable primary energy resources used as raw materials;
PENRT Total use of non-renewable primary energy resources;
PENRM Use of 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 10³ Total use of net fresh water.

C1L C2L C3L

Resource Use: 1 m³ poplar plywood, **15.5 mm, 9 layers**. Different bonding classes (C1, C2, C3).

Impact category	Reference unit	C1M	Variability Range (%)	C2M	Variability Range (%)	C3M	Variability Range (%)
PERT	MJ	2.73E+04	+0.4; -0.3	2.73E+04	+0.4; -0.3	2.73E+04	+0.4; -0.2
PERM	MJ	2.62E+04	+0.4; -0.3	2.62E+04	+0.4; -0.3	2.62E+04	+0.4; -0.2
PERE	MJ	1.09E+03	+0.4; -0.3	1.09E+03	+0.4; -0.3	1.09E+03	+0.4; -0.2
PENRT	MJ	6.41E+03	+9.0; -6.0	7.31E+03	+9.3; -6.5	1.13E+04	+9.8; -9.0
PENRM	MJ	4.04E+03	+9.0; -6.0	4.60E+03	+9.3; -6.5	7.14E+03	+9.8; -9.0
PENRE	MJ	2.37E+03	+9.0; -6.0	2.70E+03	+9.3; -6.5	4.19E+03	+9.8; -9.0
SM	kg	0.00E+00	±0.0	0.00E+00	±0.0	0.00E+00	±0.0
RSF	MJ	0.00E+00	±0.0	0.00E+00	±0.0	0.00E+00	±0.0
NRSF	MJ	0.00E+00	±0.0	0.00E+00	±0.0	0.00E+00	±0.0
FWT	m3	3.90E+00	+4.8; -3.7	3.93E+00	+4.9; -3.7	3.81E+00	+4.7; -4.2

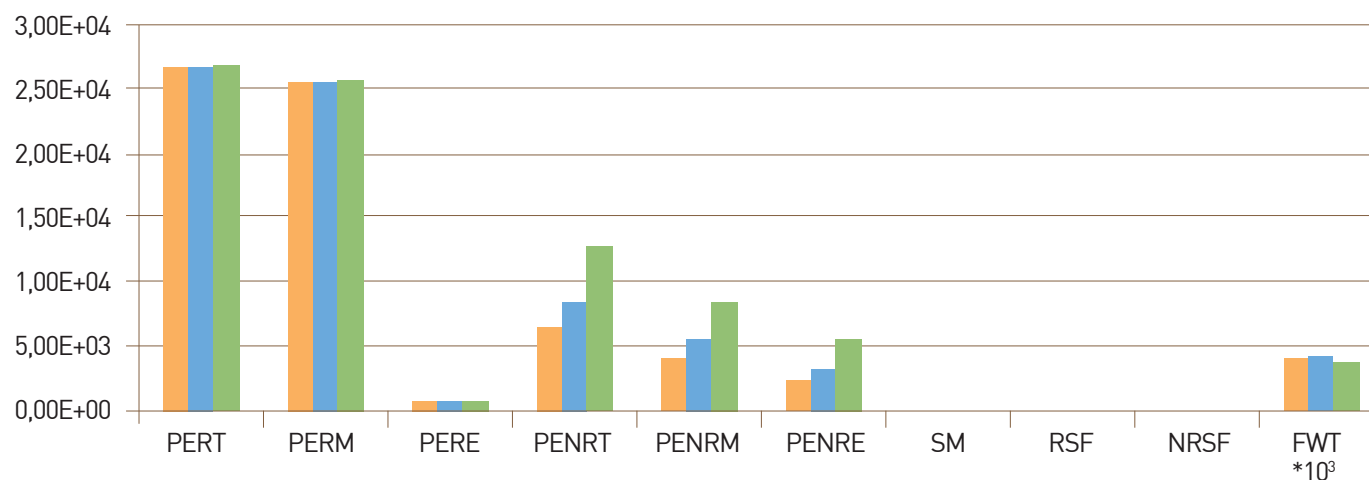


PERT Total use of renewable primary energy resources;
PERM Use of renewable primary energy resources used as raw materials;
PERE Use of renewable primary energy excluding renewable primary energy resources used as raw materials;
PENRT Total use of non-renewable primary energy resources;
PENRM Use of 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* 10³ Total use of net fresh water.

C1M **C2M** **C3M**

Environmental Impacts: 1 m³ poplar plywood, **15.2 mm, 11 layers**. Different bonding classes (C1, C2, C3).

Impact category	Reference unit	C1H	Variability Range (%)	C2H	Variability Range (%)	C3H	Variability Range (%)
PERT	MJ	2.74E+04	+0.5; -0.2	2.74E+04	+0.5; -0.2	2.75E+04	+0.5; -0.2
PERM	MJ	2.63E+04	+0.5; -0.2	2.63E+04	+0.5; -0.2	2.64E+04	+0.5; -0.2
PERE	MJ	1.10E+03	+0.5; -0.2	1.10E+03	+0.5; -0.2	1.10E+03	+0.5; -0.2
PENRT	MJ	7.55E+03	+3.9; -5.2	8.69E+03	+3.6; -5.7	1.38E+04	+2.8; -6.8
PENRM	MJ	4.76E+03	+3.9; -5.2	5.48E+03	+3.6; -5.7	8.71E+03	+2.8; -6.8
PENRE	MJ	2.79E+03	+3.9; -5.2	3.22E+03	+3.6; -5.7	5.11E+03	+2.8; -6.8
SM	kg	0.00E+00	±0.0	0.00E+00	±0.0	0.00E+00	±0.0
RSF	MJ	0.00E+00	±0.0	0.00E+00	±0.0	0.00E+00	±0.0
NRSF	MJ	0.00E+00	±0.0	0.00E+00	±0.0	0.00E+00	±0.0
FWT	m3	4.32E+03	±0.0	4.36E+03	±0.0	4.21E+03	±0.0



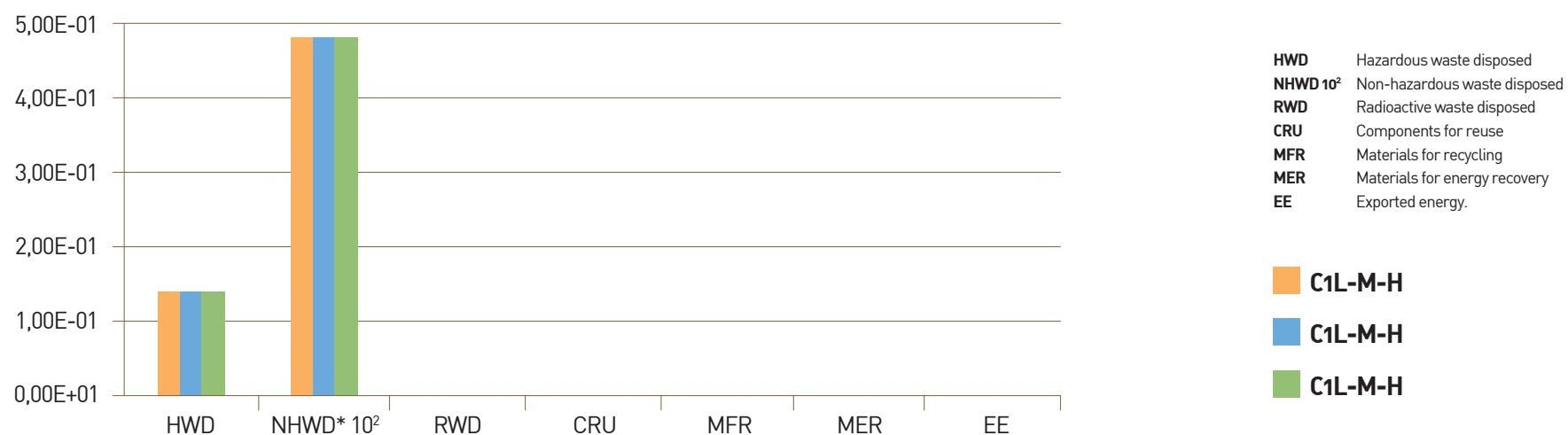
PERT Total use of renewable primary energy resources;
PERM Use of renewable primary energy resources used as raw materials;
PERE Use of renewable primary energy excluding renewable primary energy resources used as raw materials;
PENRT Total use of non-renewable primary energy resources;
PENRM Use of 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* 10³ Total use of net fresh water.

C1H C2H C3H

9. WASTE PRODUCTION

Waste category: 1 m³ poplar plywood, **15 mm, 7 layers (L)**, 1 m³ poplar plywood, **15.5 mm, 9 layers (M)** and 1 m³ poplar plywood, **15.2 mm, 11 layers (H)**. Different bonding classes (C1, C2, C3).

Impact category	Reference unit	C1L	C2L	C3L
HWD	kg	1.36E-01	1.36E-01	1.36E-01
NHWD	kg	4.89E+01	4.89E+01	4.89E+01
RWD	kg	0.00E+00	0.00E+00	0.00E+00
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



10. 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 2.2
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via: info@environdedec.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



11. 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:

$$\text{Mass of CO}_2 \text{ sequestered} = \text{mdry (timber)} \times \text{Cf} \times 44/12$$



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 wood content in the final product is about 410 kg*m⁻³, with a residual moisture of 10%.

The average amount of CO₂ sequestered per m³ of plywood is approximately 656 kg CO₂-Eq.

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