

ENVIRONMENTAL PRODUCT DECLARATION (EPD)

POPLAR PLYWOOD EFFICIENCY

In accordance with ISO 14025 and EN 15804.

PCR 2012:01 FOR CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES (V 2. 33),
CPC 314 BOARDS AND PANELS from:

garnica

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1. GENERAL INFORMATION

<u>EPD Program</u>	THE INTERNATIONAL EPD®SYSTEM www.environdec.com
<u>EPD Program Operator</u>	EPD International AB
<u>EPD Based on Product Category Rule (PCR)</u>	EN 15804:2012+A1:2014 Sustainability of construction works – Environmental product declaration - core rules for the product category of construction product and PCR: Products and construction services 2012:01 Version 2.33.
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<u>Validity data</u>	<u>5 years. Until 2026-12-26</u>
Comparison of EPD within this PCR	To be able to compare EPDs within this product category they have to be based on the same product category rules of the International EPD® System. EPDs from different programmes may not be comparable.

2. DESCRIPTION OF THE MANUFACTURING COMPANY.

2.1. About Garnica

Since it was set up in 1941 as a sawmill in Baños de Río Tobía (La Rioja, Spain), Garnica has been a pioneer in exploring new ways to manage and use natural resources intelligently and to manufacture outstanding plywood solutions that meet the needs of its over 600 clients in 50 countries around the world. Garnica has come a long way in that time, always in search of excellence, steadily progressing without losing sight of the future.

At present, Garnica is a global benchmark for production in the plywood panel industry and offers a wide range of products. With an estimated production capacity of 360,000 m³ of plywood panels, 93% of the company's sales are exports. It has six factories and employs 1,100 people. Its production model is based on sustainability, and it promotes sustainable plantations as a source of raw materials for its products.



Garnica uses local timber from sustainable forests and plantations.



Garnica innovates in products and services and fosters ongoing improvement throughout the organization.



Garnica offers tailored solutions for each client based on an extensive product range.



Garnica grows alongside its clients and has been posting double-digit growth figures for over 20 years.

Garnica sources its raw materials primarily from its production plants located in Spain and France. It trades on every continent and exports its products to over 45 countries. Garnica has a central headquarters and six production centres (five in Spain and one in France), soon to be seven with a new facility in Troyes.

Logroño: The group's headquarters, where the Shared services centre is located.

Baños de Río Tobía I: The first and most versatile factory, making all types of products.

Baños de Río Tobía II: Specializing in large panels.

Fuenmayor: Specializing in value-added products.

Valencia de Don Juan: The group's most efficient factory with the largest capacity and the largest press in Europe.

Maderas de Llodio: Recent Garnica acquisition, specializing in Radiata Pine plywood.

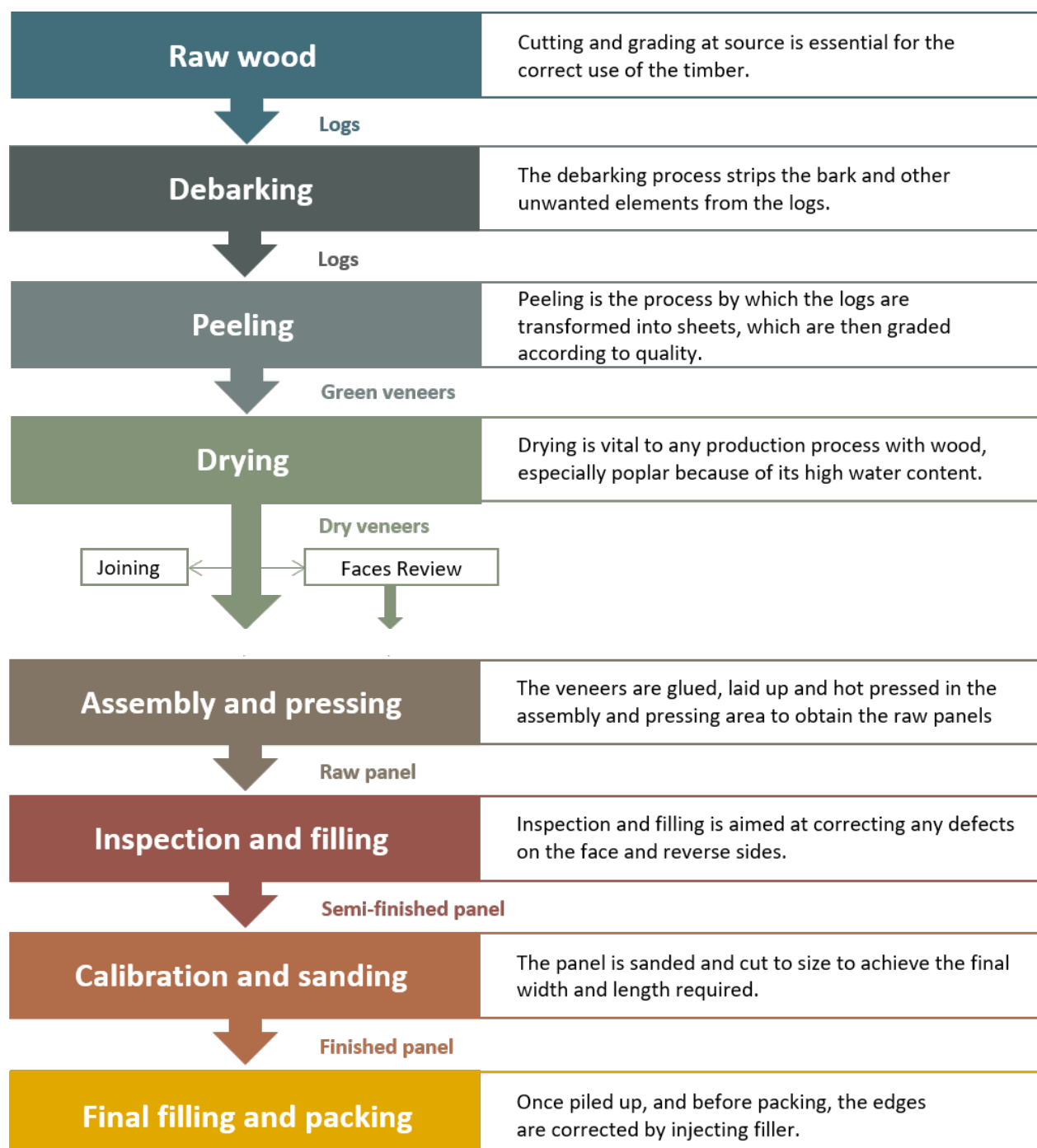
Samazan: Specializing in the manufacture of poplar veneer sheets to supply the other factories.

Troyes: Upcoming Garnica project in France



2.2. Poplar plywood production process

The manufacturing process of poplar plywood can be divided into:




2.3. Scope of application of the Declaration

This document applies to interior use lightweight panels made entirely from sustainably planted European poplar panels manufactured by GARNICA.

3. PRODUCT RELATED INFORMATION

3.1. Product definition

Lightweight panel composed entirely of European poplar sustainably grown. Also available with a  primed finish with 80 microns of water-based acrylic paint, designed to reduce time and cost for end users who finish the panel with a final coat of paint. Available in white or Gray. Maximum sustainability thanks to its composition based on fast-growing plantation wood.

Available in two formats.

- Raw plywood panels - [Efficiency](#)



- Poplar plywood panel for interior use with a primed finish – [primed Efficiency poplar](#)



Glue: Class 1 (interior) according to EN 636

Emissions: Class E1 according to EN 13986

There is a wide range of styles and sizes:

Efficiency poplar and primed Efficiency poplar:

Dimensions (mm)	Thickness (mm)												
2500 x 1220	6	7	8	9	10	12	15	18	20	22	25	30	40
No. of piles	3	5	5	5	5	7	7	9	9	9	11	13	15
Packaging	100	85	75	70	60	50	40	33	30	27	24	20	15
3100 x 1530													
No. of piles	-	-	5	5	5	7	7	9	-	9	11	13	15
Packaging	-	-	62	55	50	41	33	27	-	22	20	16	12

Technical features

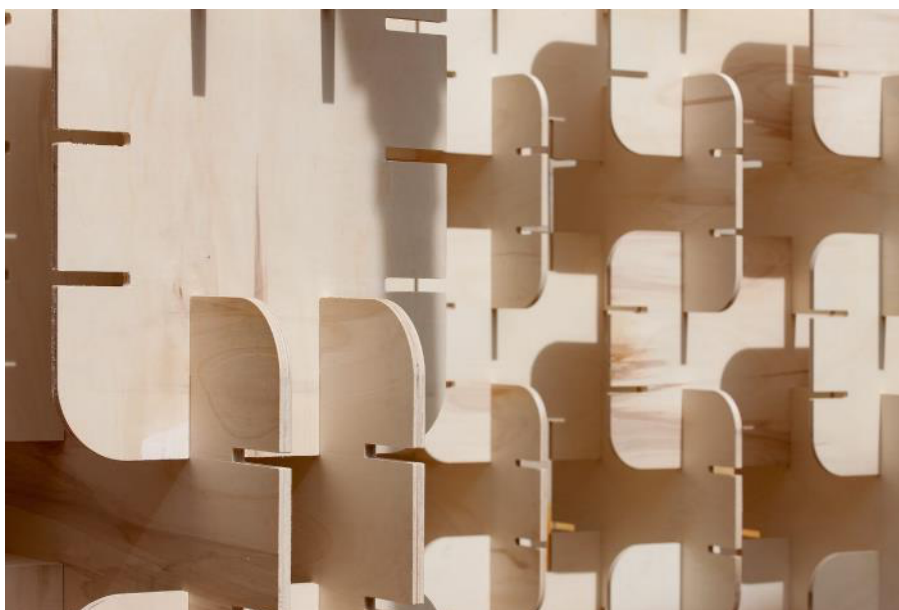
Technical features	Values	Standard
Density (kg/m ³)	420-480	EN 323
MOE – Modulus of elasticity (N/mm ²)	3500-4800	EN310
Face Screw Holding (kgf)	135	EN 320
Moisture content (%)	6-14	EN 322

3.2. Planned applications

It is an extremely versatile line that translates to a multitude of applications:

- Interior construction: walls, doors, and frames, kitchen cabinets.
- Furniture manufacturing for caravans, motorhomes, and vans.
- Public and private establishments.

- DIY projects.



3.2.1. Recommendations for product use

GARNICA recommends using of this product in its corresponding planned applications. This product is considered to have a long-life span and therefore requires little maintenance. Consult good practice documents available at www.garnica.one.

4. LCA CALCULATION INFORMATION

FUNCTIONAL UNIT	The functional unit is 1 m ³ of wood panels, including packaging.
SYSTEM BOUNDARIES	Cradle to gate with options. Modules A1 to A3.
TIME REPRESENTATIVENESS	The inventory of the LCA study is based on the 2019 production for wood panels.
ALLOCATIONS	Allocation criteria are based on volume.
DATABASE AND LCA SOFTWARE USED	The LCA was modelled with SimaPro 8.0.5 LCA software using the impact factors and the Ecoinvent database (V3.01).

4.1. Definition of declared unit

For this EPD, “declared unit” applies rather than “functional unit”, following the guidelines established in the reference PCR, since the use phase and end of life are not included within the scope of this environmental product declaration.

The composition of the declared unit is showed in the following table:

Table 1. Declared Unit Composition

Components of declared unit	Description	Weight (kg/m ³)
Product	1 m ³ of wood panels	450
Packaging	Packaging	3.78
TOTAL		453.78

This declared unit was adopted to cover the variety of products that are produced at GARNICA.

4.2. System limits

The limits that have been selected for the system cover the manufacture of wood panels, including the production of raw materials up to the point of the final packed product at the factory gate (life cycle designated from Cradle to Gate), following the guidelines of PCR 2012: 01 for construction products and services:

Table 2. System limits and scope of the study

Product stage			Construction process stage		Use Stage							End of life stage				Resource recovery stage
Raw materials	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
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

The table illustrates the different life cycle stages according to the PCR. X = module is declared in EPD. MND = module not declared (does not indicate zero impact result).

PRODUCT STAGE

A1) Raw material supply

This module considers the extraction and processing of all raw materials and energy:

- Extraction and processing of poplar wood.
- Extraction and processing of auxiliary materials.
- Extraction and processing of packaging (wood, corrugated board, plastic).

A2) Transport to the manufacturer

The A2 module includes external transportation to the core processes and internal transportation. The module considers roads.

A3) Manufacturing

The manufacturing module includes the manufacturing of the product and packaging. In particular, the production processes are shown in Figure 2.

A3 includes the manufacturing of packaged products, the production of electricity, natural gas, and fuels that feed these processes, and water supply, wastewater treatment and waste management at GARNICA. This process starts when components and materials enter the manufacturer's facilities and finishes when wood panels leave the plant.

The Ecoinvent database was consulted throughout the entire life cycle analysis.

The processes observed in detail were as follows:

- The forest stage, for wood procurement and transportation
- The transportation of all relevant raw materials for the process.
- The manufacturing process of Efficiency Poplar and primed Efficiency Poplar panels.
- The packing process and thermal use as the end of the life cycle.
- Infrastructure processes fall outside the scope of the system.
- Waste processing: recycling (this scenario considers downcycling into wood chips)
- Reuse-Recovery-Recycling-potential: assuming energy recovery in a biomass combustion plant with the following efficiencies, established in the PCR in Annex A, for a waste wood fuel

type: heat 90% and electricity 35%. Energy substitutes are heat from natural gas and Spain's electricity mix.

The stage related to the use of Efficiency Poplar and primed Efficiency Poplar panels has not been researched in the present declaration.

Note on the stage of use: the conditions of use, as well as any possible uncommon effects associated with it, were not studied when valuing the life cycle analysis.

4.2.1. Inclusion of transportation and logistics

The transportation of raw materials and secondary materials that were used, as well as transportation of generated waste, were also included in the study.

The calculation and result of this EPD includes internal transportation of primed Efficiency Poplar panels to the painting site, which is also an intermediate space before the final customer.

4.3. Period of reference for life cycle analysis

The data used refers to actual production processes during the fiscal year from 01/01/2019 to 31/12/2019. The life cycle evaluation was prepared with Spain as the area of reference.

4.4. Background

The global analysis software, "SimaPro" was used to model the life cycle. All data related to manufacturing and waste disposal were taken from the Ecoinvent 3.1. software database.

4.4.1. Criteria for calculating the life cycle analysis

The results of the life cycle analysis are based on the following assumptions:

- Transportation of all raw materials and or secondary materials is calculated according to the means of transportation that were used, using data from the Ecoinvent 3.1 database.

- The power supply companies and fuel sources that were used at the production site were considered for energy supply.
- All waste generated during production that could not be re-circulated into the process (cutting and wood panel formation waste) was directed to another manufacturer who uses them as the raw material or their product.

4.4.2. Data quality

The data used are less than 5 years old.

All data were obtained directly through the person responsible for the project at GARNICA, from their facilities and from suppliers. In order to assess in detail, the quality of the data in use, a dual exercise was carried out:

- Identification of the primary/secondary nature of each data.
- Maximum percentage in mass/energy for any category of impact per stage of the most relevant data.
- After analysing the data, it was concluded that they are very representative and comply with 90% of the primary data required by applicable standards and regulations.
- Viability of all delivered data has been confirmed. All information comes from operational data and from measurements, so data quality can be described as very good.

Table 3. Data quality in each stage of the study

Parameters	Product stage		
	A1: Raw materials	A2: Transport	A3: Manufacturing
Processes			
Data quality	1º	1º	1º
Scope	X	X	X

Data Quality can be primary or specific data (1º) or secondary data (2º).

Scope: X= module is declared in EPD. MND = module not declared (does not indicate zero impact result). According to PCR 2012 v2.33.

4.5. Allocation and interpretation criteria

Allocation refers to the allocation of input and output flows to and from a product life cycle module that is being researched according to the criteria set forth under standard ISO 14040. The assignment of the different factors of the impact categories studied for the case of electricity consumption is calculated from the average of Spain's electricity sources.

The calculation of emissions (e.g., CO₂, HCl, SO₂ or particulates) dependant on the inputs is carried out based on of feed material composition.

Table 4. Main inputs and outputs

PROCESS	MAIN PRODUCT AND CO-PRODUCT	ALLOCATION INSTRUCTION
Cultivation of poplars	Main wood and wood residues unsuitable for the process	Product volume
Manufacturing of poplar wood panels	Wood residues	Product volume

4.6. Cut-off rules

ISO 14025 and specifically PCR 2012: 01 for construction products and services v 2.33., indicate the possibility of applying a cut-off criteria to the inventoried data. Although PCR 2012: 01 v 2.33. indicates that Life Cycle Inventory data for a minimum of 95% of total inflows (mass and energy) to the upstream and core module shall be included, in the present study it has not been taken into account omitting criteria of this type.

5. CONTENT DECLARATION

5.1. Primary and secondary materials, and additives

Wood panels with a thickness of 15 mm and an average density of 450 kg/m³, have the following composition:

- Wood (poplar wood used): 80-88%
- Recycled material is identified in accordance with EN 14021
- Resin: 2%
- Water: 1%
- Painting substances: 10% (painting primed Efficiency Poplar)
- Wood: The production of Efficiency panels uses only green timber, 100% poplar.
- UF Glue consists of a resin composed of a multitude of substances.
- Special painting in primed Efficiency Poplar

During the panel's pressing process resin fully hardens and produces a smooth, hard and resistant surface, upon which the next treatment can be applied, in the case of coated panels.

The following table shows the composition of packaging material that goes into the declared unit of GARNICA poplar wood panels.

Table 5. Composition of packaging

Packaging Materials	Weight (kg/m ³)	Contribution (%)
Cardboard	1.54E+00	40.64
PET	3.01E-02	0.80
Wood	2.21E+00	58.57
TOTAL	3.78+00	100

5.2. Extraction and origin of raw materials:

Wood comes predominantly from regional forest areas. This wood comes from forests situated within a radius of approx. 100 km from the production site. Transportation distances tend to be small in order to keep logistical costs as low as possible with the acquisition of raw materials.

5.3. Local and general availability of raw materials

The wood used in the production of Efficiency Poplar panels is obtained from local plantations. The forest areas where wood is harvested are both public and private areas near to GARNICA production facilities. GARNICA carries out the forestry operation for the majority of its supplies.

Forest and industrial by-products, such as non-peeling logs, branches, wood chips, etc. are then used for other industries as raw materials.

The adhesive used for the panels is mixed and prepared at GARNICA facilities.

6. Results from the LCA

6.1. Life cycle inventory

The life cycle model that was chosen is “Cradle to Gate”, covering all operations required for manufacturing the panels, from felling the timber and cutting the wood until the fully finished product is obtained.

The data that feed the calculation process represent the manufacturing process of wooden panels for the production period which is indicated in subheading 4.2. This is primary data for the most part, collected directly from reliable sources that can be divided into the following categories:

- Delivery notes from delivered or supplied material
- Map distances
- Invoices
- Direct measurements
- Counters
- Product data sheets

6.2. Environmental performance

The Environmental performance considered for the evaluation of impact associated with the production under 2012 v 2.33 PCR are as follows:

- Global warming potential (kg CO₂ eq.)
- Ozone layer depletion (kg CFC-11 eq.)
- Acidification potential (kg SO₂ eq.)
- Eutrophication potential (kg PO₄³⁻ eq.)
- Photochemical oxidant formation potential (kg C₂H₄ eq.)
- Abiotic depletion potential – Elements (kg Sb eq.)
- Abiotic depletion potential – Fossil fuels (MJ)
- Water Scarcity Footprint (m³ H₂O eq)
- Human toxicity (kg 1,4- DB eq.)

6.3. Use of resources & Waste production and output flows

The indicators for resource use based on the life cycle inventory (LCI) are listed as follows:

- Primary energy resources – Renewable (MJ)
- Primary energy resources – Non-renewable (MJ)
- Secondary material (kg)
- Renewable secondary fuels (MJ)
- Non-renewable secondary fuels (MJ)
- Net use of fresh water (m³)
- Hazardous waste disposed (kg)
- Non-hazardous waste disposed (kg)
- Radioactive waste disposed (kg)
- Components for reuse (kg)
- Material for recycling (kg)
- Materials for energy recovery (kg)
- Exported energy, electricity (MJ)
- Exported energy, thermal (MJ)

Table 6. EFFICIENCY Poplar. Impact assessment per functional unit (1m³)

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
GWP-Fossil	kg CO ₂ eq	2,06E+02	3,38E+00	1,11E+01	1,92E+02
GWP-Biogenic	kg CO ₂ eq	7,66E+00	3,50E-02	8,95E-02	7,54E+00
GWP-land use	kg CO ₂ eq	2,53E-01	1,55E-03	3,92E-03	2,47E-01
GWP-TOTAL	kg CO ₂ eq	2,14E+02	3,41E+00	1,12E+01	2,00E+02
<i>GWP; Global Warming Potential</i>					

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
ODP	kg CFC-11 eq	3,12E-05	4,05E-06	2,03E-06	2,51E-05
AP	kg SO ₂ eq	1,17E+00	3,11E-02	4,16E-02	1,10E+00
EP	kg PO ₄ ³⁻ eq	4,70E-01	4,93E-03	8,73E-03	4,56E-01
POCP	kg C ₂ H ₄ eq.	6,37E-01	2,13E-02	4,53E-02	5,70E-01
ADPE	kg Sb eq	3,13E-04	1,74E-06	3,05E-05	2,81E-04
ADPF	MJ	3,10E+03	3,35E+02	1,76E+02	2,59E+03
<i>Ozone Depletion Potential; AP: Acidification Potential; EP: Eutrophication Potential; POCP: Photochemical Ozone Creation Potential; ADPE: Depletion of Abiotic resources (elements); ADPF: Depletion of Abiotic Resources (fossil).</i>					

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
WDP	m ³	5,15E+00	5,37E-03	1,91E-02	5,13E+00
HT	kg 1,4-DB eq	2,60E+01	4,85E-01	1,74E+00	2,38E+01
ByP	kg	2,86E+02	2,76E+02	9,94E+00	0,00E+00
<i>WDP: Water Depletion Potential; HT: Human Toxicity; ByP: By-Products</i>					

Table 6 (cont.). EFFICIENCY Poplar. Impact assessment per functional unit (1m³)

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
Use of Resources					
PERE	MJ	8,27E+01	3,37E-01	1,02E+00	8,13E+01
PERM	MJ	4,67E+02	6,79E-01	1,10E+00	4,65E+02
PENRE	MJ	3,10E+03	3,35E+02	1,76E+02	2,59E+03
PENRM	MJ	7,07E+02	2,30E+00	2,73E+00	7,02E+02
SM	kg	1,53E+00	0,00E+00	0,00E+00	1,53E+00
RSF	MJ	3,06E+03	0,00E+00	0,00E+00	3,06E+03
NRSF	MJ	2,26E+02	0,00E+00	0,00E+00	2,26E+02
FW	m3 eq.	6,92E-02	0,00E+00	6,92E-02	0,00E+00
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; 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; 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 production and output flows					
Hazardous waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-Hazardous waste disposed	kg	1,56E+00	0,00E+00	0,00E+00	1,56E+00
Radioactive waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse	kg	2,21E+00	0,00E+00	0,00E+00	2,21E+00
Material for recycling	kg	1,33E+01	0,00E+00	0,00E+00	1,33E+01
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 7. EFFICIENCY Poplar. Impact assessment per unit of board panel

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
GWP-Fossil	kg CO ₂ eq	9,44E+00	1,55E-01	5,09E-01	8,78E+00
GWP-Biogenic	kg CO ₂ eq	3,50E-01	1,60E-03	4,10E-03	3,45E-01
GWP-land use	kg CO ₂ eq	1,16E-02	7,10E-05	1,79E-04	1,13E-02
GWP-TOTAL	kg CO ₂ eq	9,80E+00	1,56E-01	5,13E-01	9,13E+00
<i>GWP; Global Warming Potential</i>					

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
ODP	kg CFC-11 eq	1,43E-06	1,85E-07	9,27E-08	1,15E-06
AP	kg SO ₂ eq	5,37E-02	1,43E-03	1,90E-03	5,03E-02
EP	kg PO ₄ ³⁻ eq	2,15E-02	2,26E-04	3,99E-04	2,09E-02
POCP	kg C ₂ H ₄ eq.	2,91E-02	9,73E-04	2,07E-03	2,61E-02
ADPE	kg Sb eq	1,43E-05	7,94E-08	1,39E-06	1,28E-05
ADPF	MJ	1,42E+02	1,53E+01	8,04E+00	1,18E+02
<i>ODP: Ozone Depletion Potential; AP: Acidification Potential; EP: Eutrophication Potential; POCP: Photochemical Ozone Creation Potential; ADPE: Depletion of Abiotic resources (elements); ADPF: Depletion of Abiotic Resources (fossil).</i>					

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
WDP	m ³	2,36E-01	2,46E-04	8,75E-04	2,35E-01
HT	kg 1,4-DB eq	1,19E+00	2,22E-02	7,95E-02	1,09E+00
ByP	kg	2,86E+02	2,76E+02	9,94E+00	0,00E+00
<i>WSP: Water Depletion Potential; HT: Human Toxicity; ByP: By-Products</i>					

Table 7 (cont.). EFFICIENCY Poplar. Impact assessment functional unit of board panel

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
Use of Resources					
PERE	MJ	3,78E+00	1,54E-02	4,65E-02	3,72E+00
PERM	MJ	2,14E+01	3,11E-02	5,05E-02	2,13E+01
PENRE	MJ	1,42E+02	1,53E+01	8,04E+00	1,18E+02
PENRM	MJ	3,24E+01	1,05E-01	1,25E-01	3,21E+01
SM	kg	7,00E-02	0,00E+00	0,00E+00	7,00E-02
RSF	MJ	1,40E+02	0,00E+00	0,00E+00	1,40E+02
NRSF	MJ	1,03E+01	0,00E+00	0,00E+00	1,03E+01
FW	m3 eq.	3,16E-03	0,00E+00	3,16E-03	0,00E+00
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; 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; 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 production and output flows					
Hazardous waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-Hazardous waste disposed	kg	7,14E-02	0,00E+00	0,00E+00	7,14E-02
Radioactive waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse	kg	1,01E-01	0,00E+00	0,00E+00	1,01E-01
Material for recycling	kg	6,10E-01	0,00E+00	0,00E+00	6,10E-01
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, termal	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 8. EFFICIENCY Poplar primed. Impact assessment per functional unit (1m³) of coated panels.

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
GWP-Fossil	kg CO ₂ eq	4,23E+02	3,38E+00	7,01E+01	3,49E+02
GWP-Biogenic	kg CO ₂ eq	1,50E+01	3,50E-02	5,66E-01	1,44E+01
GWP-land use	kg CO ₂ eq	1,70E+01	1,55E-03	2,50E-02	1,69E+01
GWP-TOTAL	kg CO ₂ eq	4,55E+02	3,41E+00	7,07E+01	3,81E+02
<i>GWP; Global Warming Potential</i>					

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
ODP	kg CFC-11 eq	6,26E-05	4,05E-06	1,28E-05	4,58E-05
AP	kg SO ₂ eq	2,77E+00	3,11E-02	2,63E-01	2,48E+00
EP	kg PO ₄ ³⁻ eq	1,03E+00	4,93E-03	5,46E-02	9,75E-01
POCP	kg C ₂ H ₄ eq.	1,52E+00	2,13E-02	2,85E-01	1,21E+00
ADPE	kg Sb eq	1,18E-03	1,74E-06	1,92E-04	9,83E-04
ADPF	MJ	6,25E+03	3,35E+02	1,11E+03	4,81E+03
<i>ODP: Ozone Depletion Potential; AP: Acidification Potential; EP: Eutrophication Potential; POCP: Photochemical Ozone Creation Potential; ADPE: Depletion of Abiotic resources (elements); ADPF: Depletion of Abiotic Resources (fossil).</i>					

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
WDP	m ³	7,17E+00	1,48E-03	5,34E-02	7,11E+00
HT	kg 1,4-DB eq	6,96E+01	4,85E-01	1,09E+01	5,82E+01
ByP	kg	2,86E+02	2,76E+02	9,94E+00	0,00E+00
<i>WSP: Water Depletion Potential; HT: Human Toxicity; ByP: By-Products</i>					

Table 8 (cont.). EFFICIENCY Poplar primed. Impact assessment per functional unit (1m³) of coated panels.

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
Use of Resources					
PERE	MJ	5,05E+02	3,37E-01	6,38E+00	4,99E+02
PERM	MJ	5,72E+02	6,79E-01	6,94E+00	5,65E+02
PENRE	MJ	6,25E+03	3,35E+02	1,11E+03	4,81E+03
PENRM	MJ	1,04E+03	2,30E+00	1,67E+01	1,03E+03
SM	kg	1,53E+00	0,00E+00	0,00E+00	1,53E+00
RSF	MJ	3,06E+03	0,00E+00	0,00E+00	3,06E+03
NRSF	MJ	2,26E+02	0,00E+00	0,00E+00	2,26E+02
FW	m3 eq.	6,92E-02	0,00E+00	6,92E-02	0,00E+00
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; 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; 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 production and output flows					
Hazardous waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-Hazardous waste disposed	kg	1,56E+00	0,00E+00	0,00E+00	1,56E+00
Radioactive waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse	kg	2,21E+00	0,00E+00	0,00E+00	2,21E+00
Material for recycling	kg	1,33E+01	0,00E+00	0,00E+00	1,33E+01
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, termal	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 9. EFFICIENCY Poplar primed. Impact assessment per unit of coated boards with painting

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
GWP-Fossil	kg CO ₂ eq	1,93E+01	1,55E-01	3,21E+00	1,60E+01
GWP-Biogenic	kg CO ₂ eq	6,88E-01	1,60E-03	2,59E-02	6,61E-01
GWP-land use	kg CO ₂ eq	7,76E-01	7,10E-05	1,14E-03	7,74E-01
GWP-TOTAL	kg CO ₂ eq	2,08E+01	1,56E-01	3,23E+00	1,74E+01
<i>GWP; Global Warming Potential</i>					

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
ODP	kg CFC-11 eq	2,86E-06	1,85E-07	5,84E-07	2,09E-06
AP	kg SO ₂ eq	1,27E-01	1,43E-03	1,20E-02	1,13E-01
EP	kg PO ₄ ³⁻ eq	4,73E-02	2,26E-04	2,50E-03	4,46E-02
POCP	kg C ₂ H ₄ eq.	6,96E-02	9,73E-04	1,31E-02	5,55E-02
ADPE	kg Sb eq	5,38E-05	7,94E-08	8,76E-06	4,50E-05
ADPF	MJ	2,86E+02	1,53E+01	5,06E+01	2,20E+02
<i>ODP: Ozone Depletion Potential; AP: Acidification Potential; EP: Eutrophication Potential; POCP: Photochemical Ozone Creation Potential; ADPE: Depletion of Abiotic resources (elements); ADPF: Depletion of Abiotic Resources (fossil).</i>					

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
WDP	m ³	3,28E-01	6,76E-05	2,44E-03	3,25E-01
HT	kg 1,4-DB eq	3,18E+00	2,22E-02	5,00E-01	2,66E+00
ByP	kg	1,31E+01	1,26E+01	4,55E-01	0,00E+00
<i>WDP: Water Depletion Potential; HT: Human Toxicity; ByP: By-Products</i>					

Table 9 (cont.). EFFICIENCY Poplar primed. Impact assessment per unit of coated boards with painting

Impact Category	Unit	Total	Product stage		
			A1	A2	A3
Use of Resources					
PERE	MJ	2,31E+01	1,54E-02	2,92E-01	2,28E+01
PERM	MJ	2,62E+01	3,11E-02	3,18E-01	2,58E+01
PENRE	MJ	2,86E+02	1,53E+01	5,06E+01	2,20E+02
PENRM	MJ	4,78E+01	1,05E-01	7,65E-01	4,69E+01
SM	kg	7,00E-02	0,00E+00	0,00E+00	7,00E-02
RSF	MJ	1,40E+02	0,00E+00	0,00E+00	1,40E+02
NRSF	MJ	1,03E+01	0,00E+00	0,00E+00	1,03E+01
FW	m3 eq.	3,16E-03	0,00E+00	3,16E-03	0,00E+00
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; 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; 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 production and output flows					
Hazardous waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-Hazardous waste disposed	kg	7,14E-02	0,00E+00	0,00E+00	7,14E-02
Radioactive waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for reuse	kg	1,01E-01	0,00E+00	0,00E+00	1,01E-01
Material for recycling	kg	6,10E-01	0,00E+00	0,00E+00	6,10E-01
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, termal	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00

7. ADDITIONAL INFORMATION

Construction practices can play an important role in atmospheric CO₂ emissions and fixation.

The company's vision tries to implement year by year production best practices at all stages of the poplar wood panels supply chain to ensure the sustainability of their business.

Thus, GARNICA shows the benefit of these practices, through is data.

The amount of CO₂ stored in the product was considered for achieving this balance, according to EN 16449.

The formula used for calculating this CO₂ content is indicated in point 5 of *EN 16449:2014 Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide*:

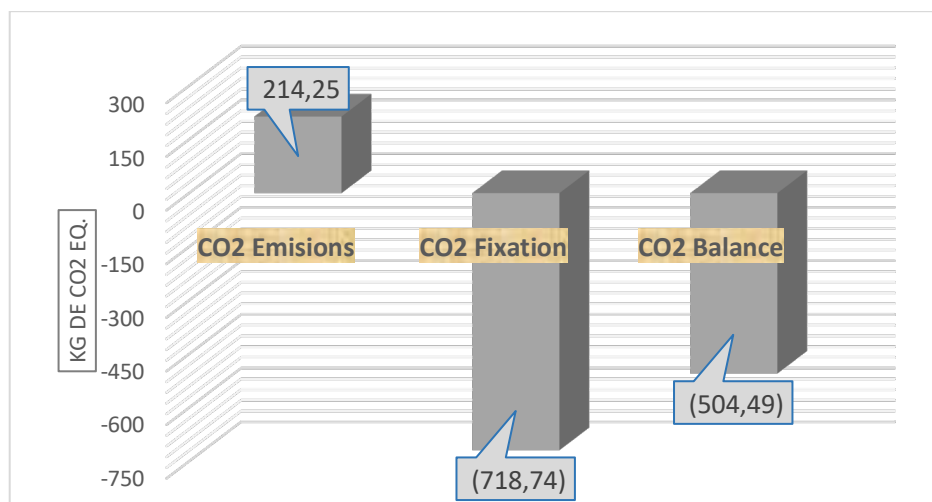
$$P_{CO_2} = \frac{44}{12} \times cf \times \frac{\rho_{\omega} \times V_{\omega}}{1 + \frac{\omega}{100}}$$

Where:

- ✓ P_{CO_2} is the biogenic carbon oxidized as carbon dioxide emission from the product system into the atmosphere (kg)
- ✓ cf is the carbon fraction of woody biomass (oven dry mass), 0,5 as the default value
- ✓ ω is the moisture content of the product (10%)
- ✓ ρ_{ω} is the density of woody biomass of the product at that moisture content (450 kg/m³)
- ✓ V_{ω} is the volume of the solid wood product at that moisture content (m³)

The CO₂ balance in figure 1, shows that manufacturing 1 m³ of Efficiency Poplar [A1+A2+A3] generates 214.25 kg of CO₂ per m³. A total of 718.74 kg of CO₂ per m³ is the biogenic carbon content (according to EN 16449) in Efficiency Poplar, and the overall balance is -504.49 kg CO₂ eq.

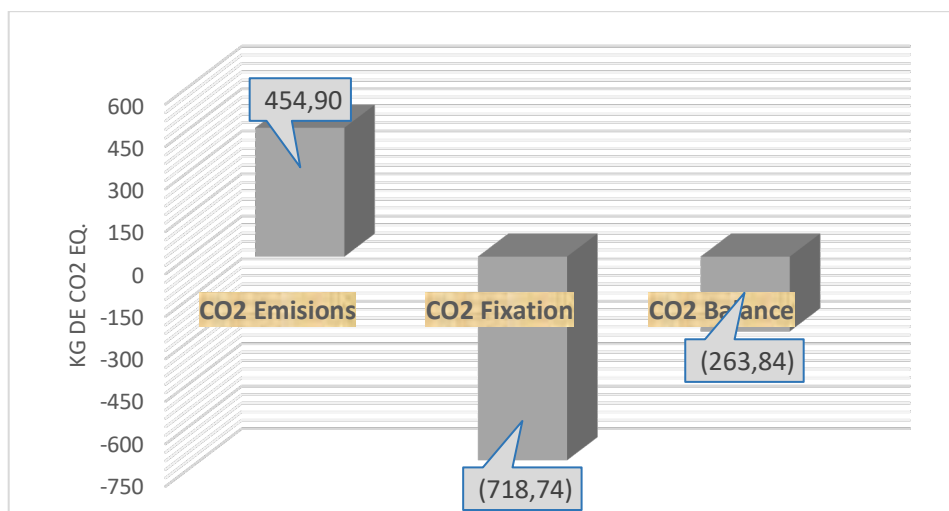
Figure 1. CO₂ Balance in GARNICA Efficiency poplar raw panel



This calculation can also be performed based on a standard panel in order to know its environmental performance values in this impact category, as shown in table 7 above. The company's standard panel is understood as the panel with dimensions of 2500x1220x15 mm, and we calculate that 1 unit of raw Efficiency panel [A1+A2+A3] generates 9.80 kg of CO₂ per unit. A total of 32.88 kg of CO₂ per unit is the biogenic carbon content (according to EN 16449) in raw Efficiency panel and the overall balance is -23.08 kg CO₂ eq.

The CO₂ balance in figure 2, shows that manufacturing 1 m³ of primed Efficiency Poplar panels [A1+A2+A3] generates 454.90 kg of CO₂ per m³. A total of 718.74 kg of CO₂ per m³ is the biogenic carbon content (according to EN 16449) in a primed Efficiency Poplar panel and the overall balance is -263,84 kg CO₂ eq.

Figure 2. CO₂ Balance in GARNICA primed Efficiency poplar panel



This calculation can also be performed based on a standard panel in order to know its environmental performance values in this impact category, as shown in table 8 above. The company's standard panel is understood as panel with dimensions of 2500x1220x15 mm, and we calculate that 1 unit of primed Efficiency Poplar panel [A1+A2+A3] generates 20.81 kg of CO₂ per unit. A total of 32.88 kg of CO₂ per unit is the biogenic carbon content (according to EN 16449) in a primed Efficiency Poplar panel and the overall balance is -12,07 kg CO₂ eq.

8. DIFFERENCE WITH PREVIOUS VERSIONS

This EPD is the first version of the product.

9. REFERENCES

- ✓ PCR 2012:01 Construction products and Construction services v2.33.
- ✓ General Programme Instructions for the International EPD System. Version 3.01, <https://www.environdec.com/home>

The international standards of reference are as follows:

- ✓ ISO 14040:2006, Environmental management. Life cycle analysis. Principles and reference framework
- ✓ ISO 14025:2006 Labels and environmental declarations. Environmental declarations type III. Principles and procedures
- ✓ ISO 14044:2006, Environmental management. Life cycle analysis. Requirements and guidelines
- ✓ EN 15804:2012-04+A2:2020. Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.
- ✓ EN 16449:2014 Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide.

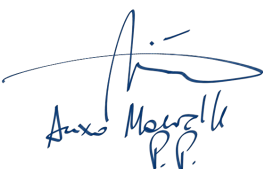
10. VERIFICATION

This verification has been made under PCR 2012:01 Construction products and Construction services v2.33 and the Environdec's Program General Instructions.

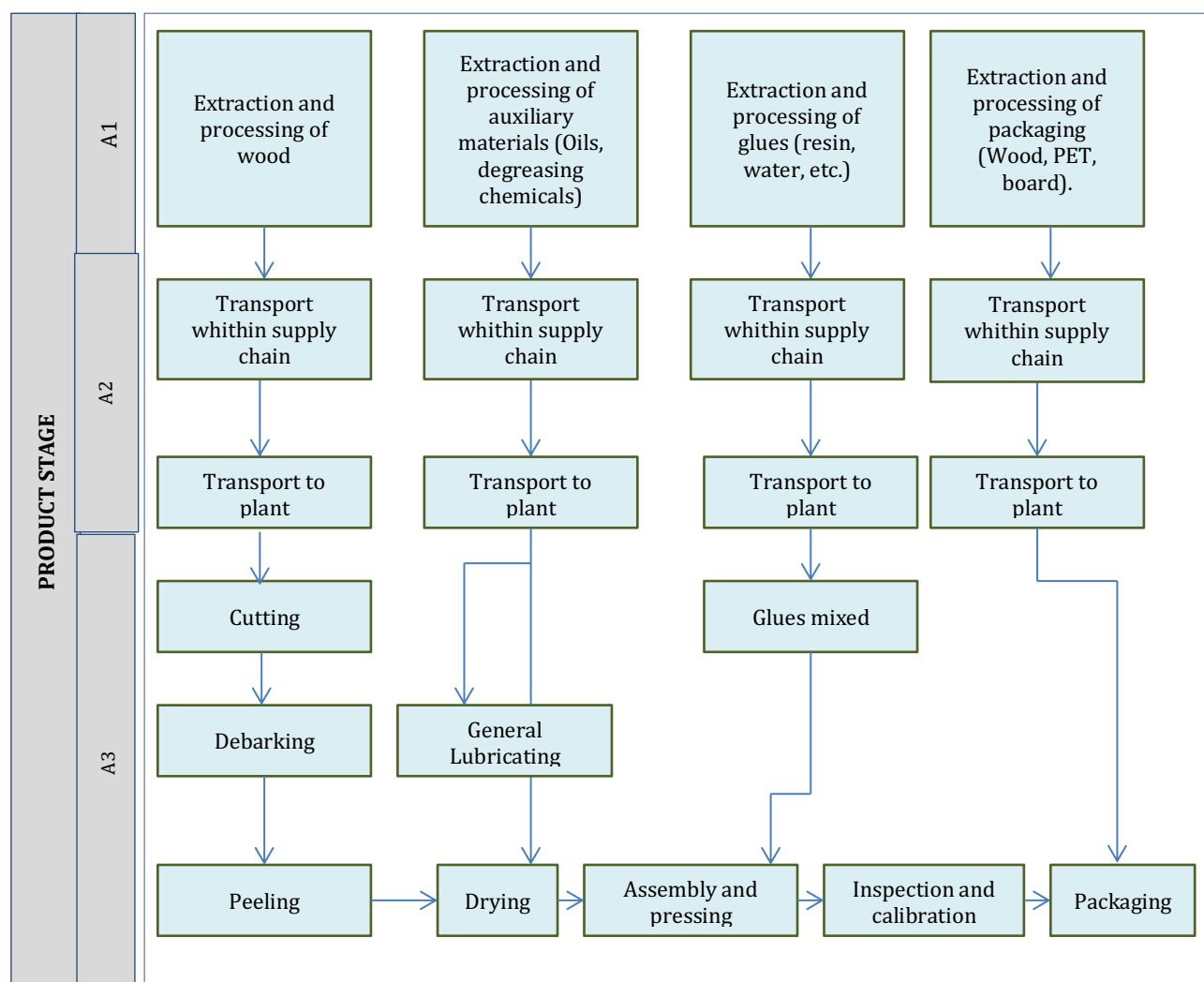
The declaration is complete and contains:

- Product definition and physical data related to manufacturing.
- Details of inputs and their origin.
- Description of how the product is manufactured.

- Data on the conditions of use, and the final phase of life.
- Results of the evaluation of the life cycle.
- Evidence, verification and testing.

Independent verification according to ISO 14025:2006	
<input type="checkbox"/> EPD process certification	<input checked="" type="checkbox"/> EPD verification
Procedure for follow-up of data during EPD validity involves third party verifier:	
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p>Third party verifier:</p> <p>Anxo Mourelle-Álvarez</p> <p>EPD International Verifier - Spain</p> <p>FIRMA</p> 	

ANNEX I. SYSTEM DIAGRAM



ANNEX II. SUSTAINABILITY

<p>1</p> <p>Wood from sustainable local plantations</p>	<p>Garnica is a leader and a driving force for change in the transition from importing tropical wood to using sustainable, local raw materials.</p>	
<p>2</p> <p>Poplar, an ally in the fight against climate change</p>	<p>Given its rapid growth, poplar is one of the species with the highest CO₂ absorption capacity on the planet - with an average of 22 tonnes per hectare per year.</p>	
<p>3</p> <p>Culture of circular economy and zero waste</p>	<p>We are committed to a “lean” production model based on sustainability and continuous improvement, taking advantage of all the resources in our processes and other industries.</p>	
<p>4</p> <p>Promoting the rural environment</p>	<p>By using local wood, we have a positive impact on rural areas and thereby help to improve the quality of the lives of the people who live there.</p>	
<p>5</p> <p>Responsibility towards society</p>	<p>Garnica is involved in several initiatives that promote quality training and improve health, well-being, diversity and equality inside and outside the organization.</p>	

