

Environmental Product Declaration (EPD) of LUMIN® Standard Pine and Eucalyptus Plywood

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Environmental Product Declaration



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

LUMIN® Standard Pine and Eucalyptus Plywood

from

Uruply S.A. (LUMIN®)



Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	EPD-IES-0019581
Publication date:	2025-02-07
Revision date:	2025-03-13
Valid until:	2030-02-07


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
E-mail:	info@environdec.com

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): <i>Construction Products, PCR 2019:14 (v1.3.4), c-PCR-006 (to PCR 2019:14) Wood and wood-based products for use in construction (EN 16485:2014).</i>
PCR review was conducted by: <i>Claudia A. Peña</i> , info@environdec.com
Life Cycle Assessment (LCA)
LCA accountability: George Roberts, Campbell Skinner - BioComposites Centre, Bangor University
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: <input type="checkbox"/> EPD verification by individual verifier Third-party verifier: <i>Jane Anderson, ConstructionLCA Ltd,</i>  Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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

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.

Company information

Owner of the EPD: Uruply S.A. (LUMIN®)

Contact: Jorge Rivero Castrillon

Email: Jorge.RiveroCastrillon@lumin.com

Description of the organisation: With more than 25 years of experience in Uruguay, LUMIN manages 120,000 hectares of land with 65,000 hectares of forests in Rivera, Tacuarembó, Cerro Largo and Treinta y Tres. The forests are managed intensively with pruning and thinning. LUMIN also has a clonal eucalyptus nursery, a bio-fuel cogeneration plant and a plywood manufacturing plant.

Product-related or management system-related certifications: FSC® (FSC-C162602, FSC-C002169, and FSC-C163659). LUMIN standard plywood products are certified by the United States' TPI Agency (Timber Products Inspection, INC.) in compliance with the standards required by the PS1 standard. They are also certified by the BM Trada agency to EN 13986 (CE2+), for use in construction and structural applications in Europe, certified by Element BV (Netherlands), and BS EN 13986:2004 + A1:2015 (UKCA) certified by BM TRADA (UK) for the UK. LUMIN panels also comply with the E1 standard for European pollutant emissions and adheres to the air quality standards required by the California Air Resource Board (CARB) and with the formaldehyde emission required by the USA EPA TSCA Title VI.

Name and location of production site(s):

Uruply S.A. (LUMIN), Ruta 5, Km 400,5 Tacuarembó, 45000 – Uruguay.

Product information

Product name: LUMIN® Standard Pine and Eucalyptus Plywood.

Product identification: LUMIN® Plywood Pine and/or Eucalyptus Plywood (Mill 1).

Product description: LUMIN® Standard plywood (Mill 1) is produced from 100% plantation grown pruned Pine and Eucalyptus Grandis.

Wood approximate density: average 474.6 kg / m³

Wood average moisture content: 4 – 9 %

UN CPC code: 314 Boards and panels.

Geographical scope: Regarding raw materials in A1 the pine and eucalyptus are from Uruguay.

A2 represents freight lorry from Uruguay.

A3 represents production in Uruguay.

A4 represents transport to Europe and the US.

A5 has been included to balance out the emission of carbon from the packaging.

C1-C4 represents waste processing globally.

D represents energy recovery globally.

LCA information

Functional unit / declared unit: Results are reported for 1 m³ of LUMIN Standard Pine and Eucalyptus plywood. Material density is 474.6 kg/m³ with an average wet moisture content of 6.5%. Weight of 1m³ of finished product is 521 kg/m³.

Following the recommendation of EN 15804 in point 6.3.3.

Reference service life: Not applicable for this EPD.

Time representativeness: All data refers to the years 2021 - 2022.

Database(s) and LCA software used: Databases: Ecoinvent version 3.10.
LCA software: SimaPro version 9.6.0.1.

Description of system boundaries: Type of EPD: Cradle to gate with modules C1-C4 and module D.

The underlying LCA is based upon the following information and assumptions:

Modules A1-A3: The product stage of the LCA constitute of modules A1 – A3. Module A1 involves the extraction and refinement of raw materials (timber from LUMIN plantation). Transports of the main components are included in module A2. A3 involves the processes of producing the panels. The primary energy grid mix used by LUMIN is the Uruguay grid mix, energy generated from the onsite biomass boiler is also included. Infrastructure and capital goods of LUMIN have been excluded from this study.

Modules A4-A5: As the market for LUMIN is global, representative transport figures has been accounted for in module A4 to represent the US and Europe. The mode of transport from the mill to the port (leg 1) is by freight lorry with a determined distance of 423 km. Then the product is shipped via sea container (leg 2) with a determined distance of 11,337 km. Finally, the product is transported via freight lorry from the destined port to a central warehouse depot or customer (leg 3) with a determined distance of 300 km.

No installation materials and energy consumption were considered in A5. However, as the packaging contains more than 5% biobased materials, module A5 has been included to balance out the emission of this carbon.

Modules C1-C4: All EoL stages (modules C – D) are based on global scenarios and datasets. Manual deconstruction of the cladding is assumed for C1. Transport by lorry with a distance of 100km to the waste facility is assumed for C2. At end-of-life it is assumed the timber is incinerated and used for energy recovery, so oxidisation is assumed in C3 with the stored biogenic carbon released back into the atmosphere. No activity in C4 as the timber is used for energy recovery.

Module D: Incineration of waste wood avoids electricity and heat production.

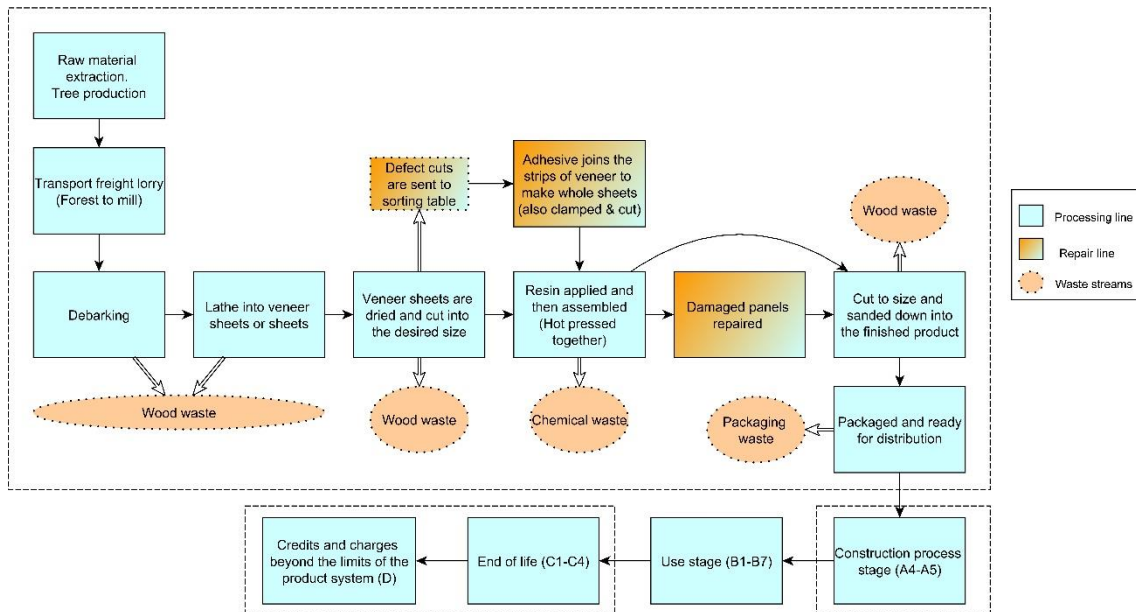
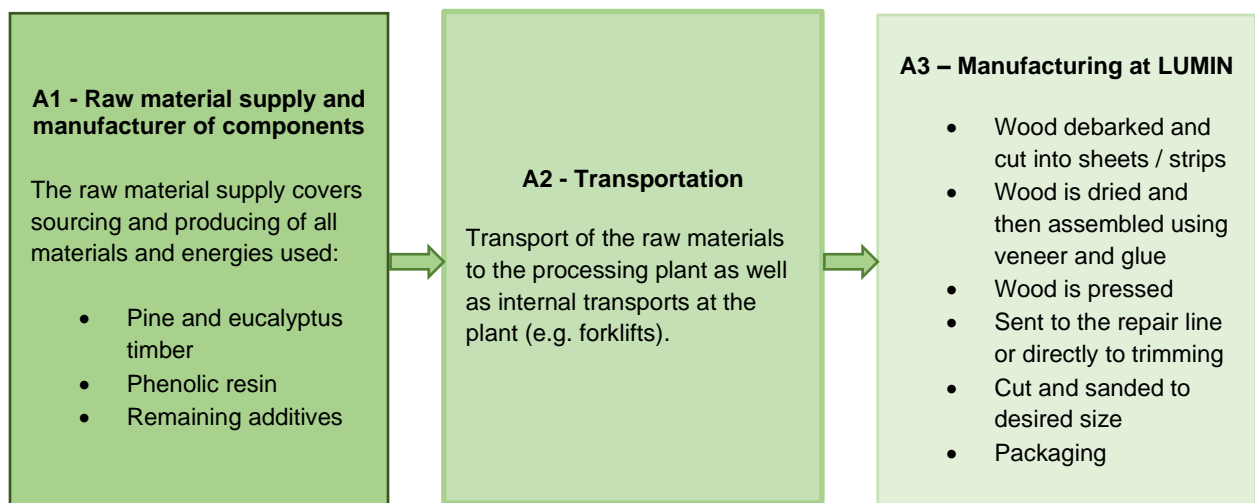


Figure 1: System boundary of the LUMIN® Standard Pine and Eucalyptus Plywood (Mill 1) process. The dotted line shows the processes included in the boundary up to EoL

System diagram (A1 – A3):



The plantation grown timber is used as the primary material which are grown from seedlings in their nursery and planted in their sustainably managed forests. Once the logs arrive at the mill, they are stored in the log yard before being debarked. During storage, the logs are sprayed with water to prevent damage. Subsequently, they are debarked and sent to the log conditioning vats, where they remain for 4 to 10 hours under hot water showers, depending on the species and diameter. Once the conditioning is complete, the logs are fed into the green end line (lathe) to peel them to the proper thickness and cut the continuous veneer ribbon into sheets or strips. The sheets and strips are then dried which are then joined to form a sheet. After drying, the veneer sheets and the composed veneer are sent to the layup area to assemble the panels by layering veneer and glue until the desired number of plies for the product is reached. This "sandwich" of veneer and glue is first cold pressed to consolidate the panels, then hot-pressed to cure the glue. After pressing, the panels are sent either to the repair area or directly to

trimming, depending on the grade. In the repair area, face defects are corrected using putty or synthetic repairs as needed. After repairs, the panels are sent to the trimming line, where they are cut to the desired size. Finally, the trimmed panels are sent to the sanding line for finishing, then to the packaging area (each mill has different packaging materials) along with the unsanded panels.

Background of data

The LCA software, “SimaPro” was used to model the life cycle and all datasets used in this study after A1 were taken from Ecoinvent 3 software database.

Cut-off rules

Following section 6.3.6. of EN15804:2012+A2:2019 the cut-off criteria has been followed, 99% of the total energy and materials are included and the total neglected input flows for the modules reported on in the LCA are less than 5% of the energy use.

Data quality

The data used is less than 5 years old.

All data obtained for modules A1-A3 was done so through communications with LUMIN. All manufacturing information comes from operational data and from measurements, so the quality of data can be described as good. Assumptions have been made around waste processing in modules C1-C4 and energy recovery for module D.

Parameters	Product stage									
	A1: Raw materials	A2: Transportation	A3: Manufacturing	A4: Transport	A5: Construction installation	C1: De-construction demolition	C2: Transport	C3: Waste processing	C4: Disposal	D: recovery stage
Data quality	1	1	1	1	1	2	2	2	2	2
Scope	X	X	X	X	X	X	X	X	X	X

Data quality can be primary (1) or secondary (2).

Scope: X = module is declared in EPD. MND = module not declared (does not indicate zero impact result).

Modules C – D are stated as using secondary data, meaning these scenarios are based on assumptions and generic data.

Allocation

The surplus energy and wood waste generated in the manufacture of plywood are sold to third parties and, therefore, considered as a co-product of the process. As the difference in revenue generated between product and co-product is large, allocation must be based on economic criteria. However, according to PCR 2019:14, products that contribute very little to the overall revenue of the process can be disregarded. In Mill 2 (TRP) surplus energy contributes only 0.01% of revenue, and wood waste contributes only 0.001% of revenue. Therefore 100% of the impacts are allocated to the plywood, this is the same about waste generated in the manufacturing process.

Energy source – From the grid – Electricity, medium voltage, consumption mix, Uruguay. Reference year: 2020. GWP-GHG = 0.101 kg CO₂ eq./kWh.

From the biomass boiler – Wood waste, unspecified, combusted in industrial boiler, US. GWP-GHG = 0.007 kg CO₂ eq./kWh.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	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	UY	UY	UY	EU/US	EU/US	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Specific data used:

The majority share of the GWP-GHG impacts in A1 – A3 are associated to upstream inputs that are manufacturer specific LCA data. Transport processes are based on specific data for distance, vehicle type and loading, and grid electricity is specific to Uruguay along with product specific energy quantities.

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Wood	474.61	0%	91.1%, 222.82 kg C/kg
Phenol formaldehyde resin	45	0%	0%
Polyurethane varnish	0.69	0%	0%
Putty	0.63	0%	0%
Catalyst (hardener)	0.08	0%	0%
TOTAL	521	0%	91.1%
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Plastic sheet	0.80	0.15%	0
Corner protectors (cardboard)	0.38	0.07%	0
Plastic strapping	0.17	0.03%	0
Pallet	0.167	0.03%	0
TOTAL	1.517	0.29%	0

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
N/A	N/A	N/A	N/A

There are no SVHC substances in the product or their amount is negligible.

Wood waste materials arising from the core production is used as biofuel, sold, or disposed of appropriately.

Results of the environmental performance indicators

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.

The use of the results of modules A1-A3 (A1-A5 for services) should not be used without considering the results of module C.

The EN 15804 reference package has been based on version EF 3.1.

Mandatory impact category indicators according to EN 15804

		Results per functional or declared unit							
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	3.37E+02	1.01E+02	0.00E+00	0.00E+00	7.27E+01	7.38E+00	0.00E+00	-2.97E+02
GWP-biogenic	kg CO ₂ eq.	-8.17E+02	-1.77E-02	5.08E-01	0.00E+00	7.90E-03	8.17E+02	0.00E+00	-2.05E-01
GWP-luluc	kg CO ₂ eq.	5.17E-01	4.80E-02	0.00E+00	0.00E+00	7.18E-03	1.80E-03	0.00E+00	-2.37E-01
GWP-total	kg CO ₂ eq.	-4.79E+02	1.01E+02	5.08E-01	0.00E+00	7.28E+01	8.25E+02	0.00E+00	-2.98E+02
ODP	kg CFC 11 eq.	3.42E-05	1.47E-06	0.00E+00	0.00E+00	1.12E-06	8.29E-08	0.00E+00	-3.09E-06
AP	mol H ⁺ eq.	1.54E+00	1.92E+00	0.00E+00	0.00E+00	3.83E-01	7.66E-02	0.00E+00	-9.17E-01
EP-freshwater	kg P eq.	6.78E-02	5.11E-03	0.00E+00	0.00E+00	1.36E-03	3.20E-03	0.00E+00	-7.53E-02
EP-marine	kg N eq.	4.20E-01	4.88E-01	0.00E+00	0.00E+00	1.66E-01	4.06E-02	0.00E+00	-1.96E-01
EP-terrestrial	mol N eq.	4.41E+00	5.41E+00	0.00E+00	0.00E+00	1.82E+00	3.90E-01	0.00E+00	-1.99E+00
POCP	kg NMVOC eq.	1.97E+00	1.54E+00	0.00E+00	0.00E+00	7.26E-01	9.82E-02	0.00E+00	-7.56E-01
ADP-minerals&metals*	kg Sb eq.	2.24E-03	1.69E-04	0.00E+00	0.00E+00	4.72E-05	1.28E-05	0.00E+00	-1.92E-04
ADP-fossil*	MJ	6.47E+03	1.33E+03	0.00E+00	0.00E+00	9.43E+02	6.54E+01	0.00E+00	-4.19E+03
WDP*	m ³	4.77E+01	4.72E+00	0.00E+00	0.00E+00	1.50E+00	3.11E+00	0.00E+00	-2.92E+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

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG ¹	kg CO ₂ eq.	3.38E+02	1.01E+02	0.00E+00	0.00E+00	7.28E+01	7.39E+00	0.00E+00	-2.98E+02
<i>Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017</i>		ND	ND	ND	ND	ND	ND	ND	ND

Resource use indicators

Results per functional or declared unit									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	4.76E+03	1.28E+01	0.00E+00	0.00E+00	3.94E+00	8.81E+03	0.00E+00	-2.67E+02
PERM	MJ	8.81E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-8.81E+03	0.00E+00	0.00E+00
PERT	MJ	1.36E+04	1.28E+01	0.00E+00	0.00E+00	3.94E+00	2.24E+00	0.00E+00	-2.67E+02
PENRE	MJ	4.92E+03	1.33E+03	0.00E+00	0.00E+00	9.43E+02	1.49E+03	0.00E+00	-4.19E+03
PENRM	MJ	1.44E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.42E+03	0.00E+00	0.00E+00
PENRT	MJ	6.34E+03	1.33E+03	0.00E+00	0.00E+00	9.43E+02	6.33E+01	0.00E+00	-4.19E+03
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
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E+03
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
FW	m ³	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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 indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.09E-01	7.76E-03	0.00E+00	0.00E+00	6.57E-03	4.74E-04	0.00E+00	-1.51E-02
Non-hazardous waste disposed	kg	1.02E+02	1.91E-02	0.00E+00	0.00E+00	3.42E-03	2.19E+00	0.00E+00	-6.71E-02
Radioactive waste disposed	kg	2.69E-03	5.12E+01	0.00E+00	0.00E+00	4.45E+00	2.14E+00	0.00E+00	-5.25E+00

¹ This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.

Output flow indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
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	0.00E+00
Material for recycling	kg	2.52E-02	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	4.75E+02	0.00E+00	0.00E+00
Exported energy, electricity	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
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

Other environmental performance indicators

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

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate Matter emissions	disease inc.	4.63E-05	5.85E-06	0.00E+00	0.00E+00	9.44E-06	8.58E-07	0.00E+00	-7.98E-06
Ionizing radiation, human health	kBq U-235 eq	1.09E+01	8.57E-01	0.00E+00	0.00E+00	2.94E-01	7.55E-02	0.00E+00	-2.35E+01
Eco-toxicity (freshwater)	CTUe	2.38E+03	1.96E+02	0.00E+00	0.00E+00	4.99E+01	8.22E+01	0.00E+00	-3.94E+02
Human toxicity, cancer effects	CTUh	5.43E-05	4.56E-07	0.00E+00	0.00E+00	1.09E-07	1.34E-07	0.00E+00	-4.10E-07
Human toxicity, non-cancer effects	CTUh	5.23E-06	5.58E-07	0.00E+00	0.00E+00	1.46E-07	9.24E-07	0.00E+00	-1.10E-06
Land use related impacts / Soil quality	Pt	6.02E+04	6.50E+02	0.00E+00	0.00E+00	1.08E+02	1.84E+01	0.00E+00	-3.68E+02

Additional environmental information

Biogenic carbon storage

Biogenic carbon storage during the lifetime of LUMIN plywood is calculated according to EN 16449: 2014.

Per 1m³ of LUMIN plywood = 222.82 kg C stored in the material, equivalent to 817.01 kg CO₂e.

Differences versus previous versions

2025-03-13 *Version 2*

Editorial changes: FSC certification license numbers have been corrected.

References

c-PCR-006 (to PCR 2019:14) Wood and wood-based products for use in construction (EN 16485:2014).

General Programme Instructions of the International EPD® System. Version 4.0.

ISO 9001 DIN EN ISO 9001:2015-11, Quality management systems– Requirements.

ISO 14001 DIN EN ISO 14001:2015-09, Environmental management systems - Requirements with guidance for use.

ISO 14025 DIN EN ISO 14025:2011-10, Environmental labels and declarations— Type III environmental declarations — Principles and procedures.

ISO 14040 ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework.

ISO 14044 ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines.

EN 350:2016 Durability of wood and wood-based products – Testing and classification of the durability to biological agents of wood and wood-based materials.

EN 15804+A2 EN 15804+A2: 2019: 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.

EN 16485:2014 Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction.

PCR 2019:14. Construction Products. Version 1.3.4.

Sub-PCR to PCR (v2.34), PCR 2012:01-SUB-PCR-E, Wood and Wood-Based Products For Use in Construction (EN 16485:2014).

