Environmental Product Declaration

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

SUDPLY Pine Plywood

EPD of multiple products, based on the average results of the product group (9 to 24 mm, p.4)

from

Indústria de Compensados Sudati Ltda.

Programme:	The International EPD® System, registered through the fully aligned regional programme: Hub EPD Brasil. www.environdec.com
Programme operator:	EPD International AB, Regional Hub: EPD Brasil.
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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): PCR 2019:14 CONSTRUCTION PRODUCTS, v1.3.4 and C-PCR-006 (TO PCR 2019:14) WOOD AND WOOD-BASED PRODUCTS FOR USE IN CONSTRUCTION (EN 16485:2014), VERSION: 2019-12-20.
PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Life Cycle Assessment (LCA)
ACV Brasil Sustentabilidade Prest. Serv., Consult. e Asses. Ltda https://acvbrasil.com.br/ LCA accountability: Ana Cristina G. Donke Martins and Tiago Barreto Rocha
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: Edivan Cherubini Edivan Cherubini, EnCiclo Soluções Sustentáveis Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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

Indústria de Compensados Sudati Ltda.
Av. Pres. Getulio Vargas, 1638
Palmas, PR 85555-000, Brazil
Tel. +55 46-3263-8400
CNPJ: 02.314.153/0001-39
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Contact:
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Description of the organisation:

A reference in the forestry sector in Brazil, the Sudati Group was founded in 1998 and has four industrial sites in the state of Paraná. The company is responsible for 20% of Brazil's plywood exports to the global markets. Sudati's is highly recognized as a reference in terms of quality and certification standards globally, as well as actively participating in actions to encourage the preservation of the environment. We are a FSC® certified industry. All our products come from responsibly managed forests, following strict environmental policies and carrying the sustainability reflected in every production innovation and market decision performed.

Product-related or management system-related certifications:

- FSC-C013874 SCS-COC-000925 (FSC Chain of Custody)
- EPA/CARB ULEF (Ultra-low emitting formaldehyde)
- CE Marking
- UKCA

Name and location of production site(s):

SUDATI - PALMAS
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CNPJ: 02.314.153/0002-10

SUDATI - VENTANIA
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CNPJ: 02.314.153/0003-09

Product information

Product name: This EPD covers the SUDPLY Pine Plywood line.

Product identification: EN 636-2, EN 13986:2004+A1:2015.

Product description: The SUDPLY Pine Plywood line includes plywood panels made with sustainably sourced wood, produced in thicknesses 9 mm, 12 mm, 15 mm, 18 mm, 20 mm, 21 mm, 22 mm and 24 mm. Pine wood is used in the face and back and pine or pine and eucalyptus wood as inner plies, glued with moisture-resistant phenolic resins. The quantity of applied resin is the only variation between the products. They present great mechanical resistance and dimensional stability, being suitable for use in dry and humid environments.
SUDPLY Pine Plywood panels are used for structural use in wooden constructions, manufacturing of packaging, siding, concrete forms, truck bodies, etc.

UN CPC code: 314 Boards and panels.

Geographical scope:
Raw materials production (A1), transport (A2) and the manufacturing process (A3) take place in Brazil. Product distribution (A4) and installation (A5) are modelled to represent the United States and European consumer markets. The end-of-life stages (C1-C4) consider the same consumer markets (USA and Europe).

LCA information

Declared unit: The declared unit is 1 m³ of SUDPLY Pine Plywood panels. The product's apparent density is 570 kg/m³ (6% moisture content), which is the conversion factor to mass.

Declared indicator results: The results presented refer to the average production of pine plywood produced in different thicknesses (9 to 24mm) in each plant, weighted by the production volumes of the plants (located in Ibaiti-PR, Ventania-PR and Palmas-PR).

Reference service life: Not applicable for this EPD.

Time representativeness: SUDPLY Pine plywood manufacturing data (A3) refers to 2022 production.

Database(s) and LCA software used: The ecoinvent 3.9.1 database was used as the main source of generic data and the SimaPro 9.5 software was used for modelling and obtaining LCA results.

Description of system boundaries:
The system boundary of this EPD follows option b) Cradle to gate with options, modules C1–C4, module D and with optional modules A4-A5 (A1–A3 + C + D and A4-A5 as additional modules).
The module B is not part of this EPD. The System diagram (Figure 1) and further description present the stages considered in each module.

System diagram:

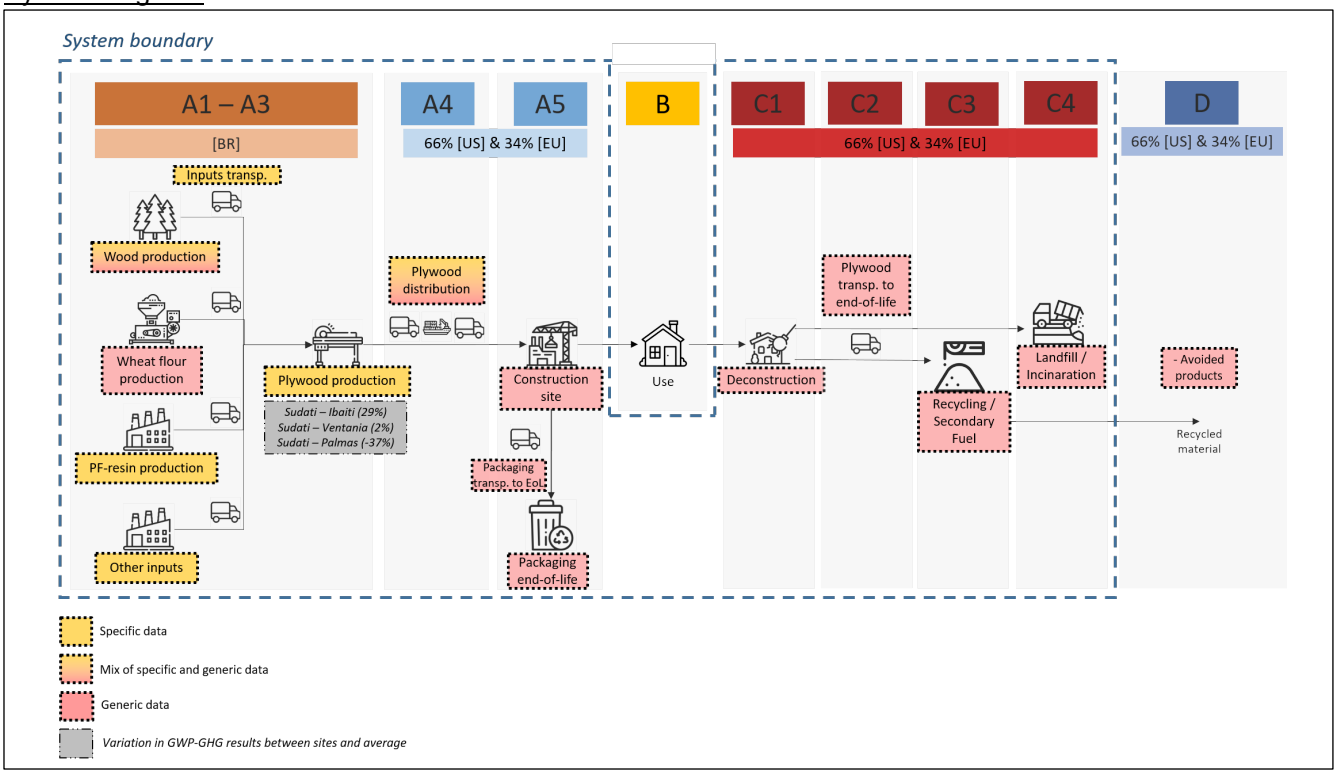

Figure 1. System diagram.

Module A1 covers the production of raw materials used in SUDPLY Pine plywood production. Pine and eucalyptus wood are cultivated in Brazil (the state of Paraná) in the same regions where the industrial plants are located. Phenol-Formol resin is used as glue, in which wheat flour is added as a thickener.

Module A2 includes the transportation of raw materials and other inputs from the suppliers to Sudati industrial plants by road.

Module A3 considers the plywood panel manufacturing (Figure 2). The production process begins with receiving pine and eucalyptus logs at the industrial plant. The heat source used throughout the process is the steam obtained by burning residual woodchips from wood processing and the electricity is from the regional grid. The logs are sent to the cooking stage, followed by the cutting for laminating the wood and then drying the veneers. The dried veneers go through machinery to classify their quality. Next, the veneers are positioned in alternating orientations and with applications of phenol-formaldehyde resin and thickener between them, followed by pressing in a steam press. The number of veneers determines the thickness of the plywood, varying between 9 and 24 mm. Finally, the plywood boards go to the sawing and sanding stages for finishing. The trimmings from cutting are used to produce pallets used as product packaging. Recycled plastic corners and steel wires are also used as packaging. This module also takes into account waste sent to landfill and recycling.

The electricity consumed in the manufacturing stage comes from the regional electricity mix (*Electricity, medium voltage, BR-Southern grid*), whose GWP-GHG indicator is 0,165 kg CO_2 eq./kWh.

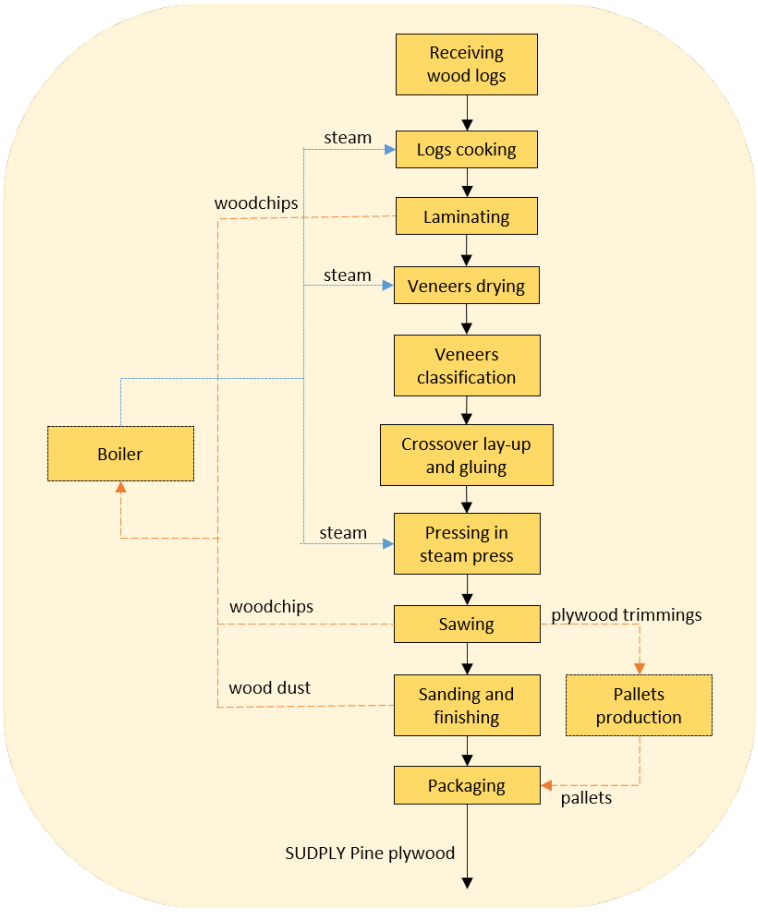

Figure 2. Plywood manufacturing diagram.

Module A4 covers the plywood distribution to end users, considering that 66% of Sudati's consumer market is located in the United States and 34% in Europe. In this way, transport occurs by road between Sudati plants and the Brazilian export port; by sea from Brazilian port and import ports; and by road for internal distribution in the United States and Europe (see Scenarios and additional technical info).

Module A5 considers the installation of the product in construction sites, including complementary materials. However, due to low representation, by the cut-off exclusion rule, this EPD does not consider inputs in the installation phase. Packaging transport to end-of-life and end-of-life processes are also considered in this module. The end-of-life scenarios of packaging followed specific statistical data by type of material for the United States and Europe (including recycling, incineration and landfill disposal, see Scenarios and additional technical info).

Module C1 covers the dismantling and deconstruction process. However, due to low representation, by the cut-off exclusion rule, this EPD does not consider inputs in the deconstruction phase.

Module C2 includes the transportation of post-consumer plywood to end-of-life, by road.

Module C3 considers the plywood recovery processes for recycling or use as secondary fuel. The end-of-life scenarios were defined based on regional statistical data for the United States and Europe (see Scenarios and additional technical info).

Module C4 covers the plywood's final destination for incineration or landfill. The end-of-life scenarios were defined based on regional statistical data for the United States and Europe (see Scenarios and additional technical info).

Module D includes the potential benefits generated by material recovery by avoiding future use of primary resources. The plywood that goes for recycling or use as secondary fuel reaches the "end-of-waste" point in the form of wood chips. Therefore, the product chosen to be avoided by recovery is virgin wood chips.

More information:

Data quality: Specific data were used for the plywood manufacturing process; the production of pine wood and PF-resin; the regional electricity grid; the distances for transporting inputs to Sudati plants; and the distribution of plywood to the main import ports. These data were collected from the manufacturing plants, according to 2022 year production. Generic data were used for producing eucalyptus wood and wheat flour; transport distances for internal distribution in the consumer market in the United States and Europe; and background processes. The ecoinvent 3.9.1 database was the main source of generic data, adapting the electrical grid to the reference country whenever possible and relevant.

Cut-off rules: Flows excluded from the analysis do not exceed 5% of the system's material or energetic inputs. The excluded flows are listed below:

- Infrastructure, equipment and employee consumption (all modules);
- LPG consumption in forklifts for transporting materials within factories (A3);
- Material losses in the installation stage (A5);
- Nails and or screws, energy and equipment consumption in installation (A5);
- Separation of material or demolition for deconstruction (C1).

Allocation: The surplus woodchips generated in the manufacture of plywood are sold to third parties and, therefore, considered as a co-product of the process. Due to the large difference in revenue generated between product and co-product, 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 this EPD, surplus woodchips contribute only 4% of revenue and, conservatively, do not receive any charges from the plywood manufacturing process, 100% of the impacts are allocated to the plywood and 0% to the surplus woodchips.
The same occurs about the waste generated in the manufacturing process that is sent for recycling, 100% of the impacts are allocated to plywood and 0% to scrap.

Scenarios and additional technical information:
Module A4: The plywood distribution scenarios were defined based on Sudati's consumer markets (66% goes to the USA and 34% to Europe). Transport occurs by road from the manufacturing units to the Port of Paranaguá (PR) and by sea to the import ports (Port of Baltimore, Newark, Everglades and Charleston, in the USA, and Port of Antwerp, in Europe). Internal distribution to final consumers occurs by road, covering distances estimated at 1200 km (according to PEF – Category Rules Guidance recommendation), to the United States and Europe. The distances considered in transports and the ecoinvent 3.9.1 datasets selected to represent them are presented in the following table.

Parameter	Value
Average distance from Sudati plants to Brazilian Port	391 km, by road *(Transport, freight, lorry 16-32 metric ton, EURO5 {BR})*
Average distance from Brazilian Port to the United States main ports	9208 km, by sea *(Transport, freight, sea, container ship {GLO})*
Distance from Brazilian Port to the European main port	10355 km, by sea *(Transport, freight, sea, container ship {GLO})*
Estimated distance from ports to internal distribution (US)	1200 km, by road *(Transport, freight, lorry 16-32 metric ton, EURO5 {RoW})*
Estimated distance from ports to internal distribution (EU)	1200 km, by road *(Transport, freight, lorry 16-32 metric ton, EURO5 {RER})*
Bulk density of transported productions	576 kg/m³

Module A5: No installation materials and energy consumption were considered due to the cut-off rule applied. Packaging end-of-life scenarios followed specific statistical data by type of material, as presented in the following table. US and EU data refer to the year 2018. Transports to the packaging end-of-life stage were estimated at 50 km.

Parameter		Value		
		Recycling	Incineration	Landfill
US[1]	Wood pallets EoL	27%	14%	59%
	Plastic corners EoL	3%	19%	78%
	Steel wires EoL	81%	3%	16%
EU[2]	Wood pallets EoL	30%	32%	39%
	Plastic corners EoL	23%	35%	43%
	Steel wires EoL	74%	12%	14%
Estimated distance from construction site to packaging recovery and final destination (US/EU)		50 km, by road (*Transport, freight, lorry 16-32 metric ton, EURO5 {RoW}/{RER})*		
Bulk density of transported packaging		5,7 kg/m³		

Source: [1][EPA, 2018]; [2][EC, 2018].

Module C1: No deconstruction materials and energy consumption were considered due to the cut-off rule applied.

Module C2: Transports to the end-of-life stage were estimated at 50 km.

Parameter	Value
Estimated distance from construction site to product recovery and final destination (US/EU)	50 km, by road *(Transport, freight, lorry 16-32 metric ton, EURO5 {RoW}/{RER})*
Bulk density of transported productions	570 kg/m³

Modules C3 and C4: The plywood end-of-life scenarios were established based on regional statistical data for the US and Europe. US data refer to the year 2015 and EU data refer to 2018. To reach the point of “end-of-waste”, it was considered that the plywood goes through a wood chipping process, as recommended by c-PCR-006. In this EPD, following a conservative approach, wood collected for energy recovery was considered as secondary fuel. Recycling, secondary fuel recovery, incineration and landfill rates are presented in the following table.

Parameter		Value			
		Recycling	Secondary fuel	Landfill	Incineration
US[1]	Plywood panel recovery rates	10%	20,5%	69,5%	-
EU[2]	Plywood panel recovery rates	46,3%	48,8%	0,4%	4,4%

Source: [1][EPA, 2020]; [2][EUROSTAT, 2023].

Name and contact information of LCA practitioner:

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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	BR	BR	BR	US/EU	US/EU	ND	ND	ND	ND	ND	ND	ND	US/ EU	US/ EU	US/ EU	US/ EU	US/EU
Specific data used	51%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Ibaiti: 29%; Ventania: 2%; Palmas: -37%					-	-	-	-	-	-	-	-	-	-	-	-

BR: Brazil; US: United States; EU: Europe.

Content information

The content declaration represents the average content of the product group (9 to 24 mm).

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/m³
Wood (pinus and eucalyptus)	517	0%	100% and 258,6 kg C/m³
Phenol-Formol resin	38	0%	0%
Wheat flour	15	0%	100% and 6,11 kg C/m³
TOTAL	570	0%	93% and 264,7 kg C/m³
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/m³**
Wood pallets	5,0	0,87%	2,31 kg C/m³
Plastic corners	0,02	0,004%	0
Steel wires	0,7	0,12%	0
TOTAL	5,7	1%	2,31 kg C/m³

The product does not contain dangerous substances from the candidate list of SVHC that exceed the registration limits.

Results of the environmental performance indicators

The impact category indicators results are presented per 1m³ SUDPLY Pine plywood, according to the characterisation factors (CFs) of EN 15804 reference package based on EF 3.1.
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 without considering the results of module C is discouraged.
No variations above 10% were observed between the results of the products and the average result presented in any impact category (modules A-C).

Mandatory impact category indicators according to EN 15804

Results per 1 m³ SUDPLY Pine plywood									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	$2{,}0*10^{2}$	$1{,}8*10^{2}$	$9{,}6*10^{-2}$	$0{,}0*10^{0}$	$4{,}4*10^{0}$	$2{,}3*10^{0}$	$1{,}6*10^{0}$	$-4{,}2*10^{1}$
GWP-biogenic	kg CO_2 eq.	$-9{,}7*10^{2}$	$1{,}7*10^{-2}$	$8{,}7*10^{0}$	$0{,}0*10^{0}$	$2{,}7*10^{-4}$	$5{,}1*10^{2}$	$4{,}8*10^{2}$	$-1{,}8*10^{-1}$
GWP-luluc	kg CO_2 eq.	$5{,}5*10^{0}$	$1{,}2*10^{0}$	$2{,}1*10^{-5}$	$0{,}0*10^{0}$	$1{,}3*10^{-4}$	$3{,}6*10^{-3}$	$8{,}6*10^{-4}$	$-2{,}1*10^{-1}$
GWP-total	kg CO_2 eq.	$-7{,}7*10^{2}$	$1{,}8*10^{2}$	$8{,}8*10^{0}$	$0{,}0*10^{0}$	$4{,}4*10^{0}$	$5{,}1*10^{2}$	$4{,}8*10^{2}$	$-4{,}2*10^{1}$
ODP	kg CFC 11 eq.	$5{,}7*10^{-6}$	$3{,}5*10^{-6}$	$1{,}3*10^{-9}$	$0{,}0*10^{0}$	$7{,}2*10^{-8}$	$2{,}3*10^{-8}$	$2{,}4*10^{-8}$	$-8{,}7*10^{-7}$
AP	mol H^+ eq.	$1{,}2*10^{0}$	$2{,}0*10^{0}$	$5{,}1*10^{-4}$	$0{,}0*10^{0}$	$1{,}2*10^{-2}$	$8{,}8*10^{-3}$	$1{,}6*10^{-2}$	$-3{,}7*10^{-1}$
EP-freshwater	kg P eq.	$1{,}6*10^{-2}$	$3{,}2*10^{-4}$	$1{,}3*10^{-6}$	$0{,}0*10^{0}$	$8{,}1*10^{-6}$	$2{,}0*10^{-4}$	$3{,}3*10^{-5}$	$-4{,}5*10^{-3}$
EP-marine	kg N eq.	$6{,}2*10^{-1}$	$5{,}6*10^{-1}$	$2{,}9*10^{-4}$	$0{,}0*10^{0}$	$4{,}6*10^{-3}$	$1{,}2*10^{-3}$	$1{,}4*10^{-2}$	$-1{,}4*10^{-1}$
EP-terrestrial	mol N eq.	$5{,}6*10^{0}$	$6{,}0*10^{0}$	$2{,}4*10^{-3}$	$0{,}0*10^{0}$	$4{,}9*10^{-2}$	$1{,}4*10^{-2}$	$7{,}4*10^{-2}$	$-1{,}6*10^{0}$
POCP	kg NMVOC eq.	$1{,}2*10^{0}$	$1{,}7*10^{0}$	$7{,}6*10^{-4}$	$0{,}0*10^{0}$	$1{,}8*10^{-2}$	$5{,}0*10^{-3}$	$2{,}7*10^{-2}$	$-4{,}8*10^{-1}$
ADP-minerals&metals*	kg Sb eq.	$3{,}7*10^{-4}$	$9{,}3*10^{-6}$	$6{,}1*10^{-9}$	$0{,}0*10^{0}$	$2{,}2*10^{-7}$	$1{,}4*10^{-7}$	$6{,}9*10^{-8}$	$-9{,}8*10^{-6}$
ADP-fossil*	MJ	$1{,}2*10^{3}$	$2{,}4*10^{3}$	$1{,}1*10^{0}$	$0{,}0*10^{0}$	$5{,}8*10^{1}$	$4{,}9*10^{1}$	$2{,}1*10^{1}$	$-8{,}5*10^{2}$
WDP*	m^3	$9{,}6*10^{1}$	$6{,}5*10^{0}$	$-2{,}0*10^{-3}$	$0{,}0*10^{0}$	$7{,}3*10^{-2}$	$5{,}1*10^{-1}$	$1{,}0*10^{-1}$	$-7{,}3*10^{1}$
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

Results per 1 m³ SUDPLY Pine plywood									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	$2{,}1*10^{2}$	$1{,}8*10^{2}$	$2{,}8*10^{-1}$	$0{,}0*10^{0}$	$4{,}4*10^{0}$	$2{,}3*10^{0}$	$2{,}0*10^{1}$	$-4{,}2*10^{1}$
PM	disease inc.	$1{,}0*10^{-5}$	$1{,}0*10^{-5}$	$8{,}3*10^{-9}$	$0{,}0*10^{0}$	$2{,}9*10^{-7}$	$2{,}5*10^{-8}$	$3{,}5*10^{-7}$	$-9{,}0*10^{-6}$
IRP**	kBq U-235 eq	$1{,}0*10^{0}$	$2{,}6*10^{-1}$	$2{,}4*10^{-3}$	$0{,}0*10^{0}$	$7{,}0*10^{-3}$	$4{,}4*10^{-1}$	$3{,}2*10^{-2}$	$-4{,}3*10^{-0}$
ETP-fw*	CTUe	$2{,}9*10^{3}$	$2{,}2*10^{3}$	$6{,}3*10^{-1}$	$0{,}0*10^{0}$	$2{,}9*10^{1}$	$4{,}3*10^{0}$	$2{,}2*10^{1}$	$-1{,}5*10^{2}$
HTP-c*	CTUh	$4{,}1*10^{-8}$	$1{,}9*10^{-8}$	$1{,}7*10^{-10}$	$0{,}0*10^{0}$	$3{,}2*10^{-10}$	$3{,}4*10^{-10}$	$2{,}6*10^{-9}$	$-4{,}5*10^{-7}$
HTP-nc*	CTUh	$-1{,}7*10^{-6}$	$1{,}2*10^{-6}$	$1{,}9*10^{-9}$	$0{,}0*10^{0}$	$3{,}1*10^{-8}$	$1{,}3*10^{-8}$	$4{,}3*10^{-8}$	$-5{,}9*10^{-7}$
SQP*	Pt	$3{,}9*10^{4}$	$3{,}0*10^{1}$	$5{,}0*10^{-1}$	$0{,}0*10^{0}$	$1{,}9*10^{-1}$	$6{,}0*10^{0}$	$4{,}6*10^{1}$	$-1{,}4*10^{4}$
Acronyms	GWP-GHG = Global Warming Potential greenhouse gases; PM = Particulate Matter; IRP = Ionizing Radiation Potential; ETP-fw = Ecotoxicity freshwater; HTP-c = Human Toxicity Potential cancer; HTP-nc = Human Toxicity Potential non-cancer; SQP = Potential Soil Quality Index								

** 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.*

*** Disclaimer: This impact category deals mainly with the eventual impact of low dose ionizing radiation of 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.*

Resource use indicators

The separation of primary energy use flows into energy used as raw material (PERM and PENRM) and energy used as an energy carrier (PERE and PENRE), was carried out according to the interpretation described in option A of PCR 2019:14 (v .1.3.4, Annex 3). The energy used as raw material that leaves the product system (i.e. module A5 for packaging content and module C3 and C4 for product content) is reported as an input in the indicator for energy used as energy carrier, in the modules that it occurs.

Results per 1 m³ SUDPLY Pine plywood									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	$7{,}6*10^{2}$	$1{,}5*10^{1}$	$1{,}4*10^{1}$	$0{,}0*10^{0}$	$1{,}1*10^{-1}$	$-1{,}6*10^{1}$	$7{,}9*10^{1}$	$-2{,}9*10^{3}$
PERM	MJ	$7{,}8*10^{3}$	$0{,}0*10^{0}$	$-6{,}8*10^{1}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$-4{,}1*10^{3}$	$-3{,}7*10^{3}$	$0{,}0*10^{0}$
PERT	MJ	$8{,}6*10^{3}$	$1{,}5*10^{1}$	$-6{,}7*10^{1}$	$0{,}0*10^{0}$	$1{,}1*10^{-1}$	$-4{,}1*10^{3}$	$-3{,}6*10^{3}$	$-2{,}9*10^{3}$
PENRE	MJ	$1{,}2*10^{3}$	$2{,}4*10^{3}$	$1{,}3*10^{0}$	$0{,}0*10^{0}$	$5{,}8*10^{1}$	$4{,}9*10^{1}$	$2{,}1*10^{1}$	$-8{,}5*10^{2}$
PENRM	MJ	$9{,}8*10^{-1}$	$0{,}0*10^{0}$	$-9{,}8*10^{-1}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$
PENRT	MJ	$1{,}2*10^{3}$	$2{,}4*10^{3}$	$9{,}2*10^{-2}$	$0{,}0*10^{0}$	$5{,}8*10^{1}$	$4{,}9*10^{1}$	$2{,}1*10^{1}$	$-8{,}5*10^{2}$
SM	kg	$1{,}3*10^{-2}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$
RSF	MJ	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$
NRSF	MJ	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$	$0{,}0*10^{0}$
FW	m^3	$6{,}7*10^{0}$	$6{,}1*10^{-1}$	$2{,}8*10^{-4}$	$0{,}0*10^{0}$	$2{,}8*10^{-3}$	$2{,}9*10^{-2}$	$7{,}8*10^{-3}$	$-1{,}9*10^{0}$

[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 CO_2 is set to zero.

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

Results per 1 m³ SUDPLY Pine plywood									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	$3,0*10^{-2}$	$1,7*10^{-2}$	$2,9*10^{-2}$	$0,0*10^{0}$	$4,5*10^{-4}$	$1,3*10^{-3}$	$3,6*10^{-2}$	$-1,6*10^{-1}$
Non-hazardous waste disposed	kg	$2,7*10^{1}$	$5,5*10^{-1}$	$2,7*10^{0}$	$0,0*10^{0}$	$1,1*10^{-2}$	$5,7*10^{-2}$	$2,6*10^{2}$	$-1,2*10^{0}$
Radioactive waste disposed	kg	$6,7*10^{-4}$	$1,1*10^{-4}$	$1,5*10^{-6}$	$0,0*10^{0}$	$3,1*10^{-6}$	$3,1*10^{-4}$	$2,2*10^{-5}$	$-3,0*10^{-3}$

Output flow indicators

Results per 1 m³ SUDPLY Pine plywood									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$
Material for recycling	kg	$3,1*10^{0}$	$0,0*10^{0}$	$2,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$1,3*10^{2}$	$0,0*10^{0}$	$0,0*10^{0}$
Materials for energy recovery	kg	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$1,7*10^{2}$	$0,0*10^{0}$	$0,0*10^{0}$
Exported energy, electricity	MJ	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$
Exported energy, thermal	MJ	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$	$0,0*10^{0}$

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