Environmental Product Declaration

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

WISA® spruce plywood, treated

EPD of multiple products, based on a representative product: **WISA-SpruceBT**, WISA-Roof, WISA-SpruceWR, WISA-SpruceFR

UPM Plywood Oy

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	EPD-IES-0018171:001
Publication date:	2024-12-19
Valid until:	2029-12-19

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

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, version 1.3.4; c-PCR-006 (to PCR 2019:14) Wood and wood-based products for use in construction (EN 16485:2014) UN CPC 031, 311, 312, 313, 314, 315, 316, 319, version 2024-04-30.
PCR review was conducted by: The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com.
Life Cycle Assessment (LCA)
Etteplan Finland Oy Laserkatu 6, 53850 Lappeenranta, Finland www.etteplan.com LCA by: Kaisa Kuusela
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: Hannu Karppi, Ramboll Finland Oy 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:
UPM Plywood Oy

Contact:
Sanna Kontinen,
Manager, Environmental Affairs
e-mail: sanna.kontinen@upm.com

More information: www.wisaplywood.com

Description of the organisation:
UPM Plywood offers high quality WISA® plywood and veneer products for construction, vehicle flooring, LNG shipbuilding, parquet manufacturing and other industrial applications. In 2023 UPM Plywood sales was EUR 422 million and it had 1,634 employees. UPM has three plywood mills and one veneer mill in Finland and one plywood mill in Estonia.

Product-related or management system-related certifications:

- ✓ FSC and PEFC CoC
- ✓ ISO 9001, ISO 14001 & ISO 45001
- ✓ CE marking according to EN 13986:2004+A1:2015 with AVCP 2+ & 4 (depending on the product)
- ✓ M1 emission classification (depending on the product)

Names and locations of production sites:

- ✓ UPM Pellos Plywood Mills
  Karsikkoniementie 10
  52420 Pellosniemi
  Finland

Product information

Product name:

WISA® treated spruce plywood. This is a name for a range of four plywood products, see Table 1. This EPD represents the representative composition and production of treated plywood products manufactured at Pellos mill in Finland. WISA®-SpruceBT is chosen as the representative product, as its production volume (along with compositionally identical WISA®-Roof) represents a majority 50 % of treated spruce plywood production at Pellos mill.

Table 1. Products included in the results of this average EPD.

Product group	Product	Features
WISA® treated spruce plywood	WISA®-SpruceBT	Spruce plywood board surface treated with wood protection agent. Representative product.
	WISA®-Roof	Spruce plywood board surface treated with wood protection agent.
	WISA®-SpruceWR	Spruce plywood board surface treated with water repelling agent.
	WISA®-SpruceFR	Spruce plywood board surface treated with fire retarding agent.

Up-to-date information on products is available at www.wisaplywood.com

Product identification:

WISA-Plywood products are marked with CE-marking containing unambiguous code of Declaration of Performance, i.e. UPM001CPR, UPM002CPR and UPM024CPR.

Product description:

WISA® Plywood products are sustainable material for permanent constructions and infrastructure. Surface treated panels are strong, stiff and lightweight and hence suitable for multiple different uses in building and construction applications, such as structural uses requiring enhanced resistance against moisture, coloring, fungi or fire.

As permanent component of building or infrastructure, plywood boards are primarily used in dry indoor or moderately humid conditions (reference in-use conditions). According to research results and experience, glued timber products, such as plywood, will have around the same service life expectations than solid wood in dry and moderately humid conditions. If installed properly and moisture exposure is low or moderate, the service life of the plywood board is 100 years at minimum.

UN CPC code: 31410

Geographical scope:

WISA® treated spruce plywood products are manufactured in Finland, which modules A1–A3 mostly represent. Plywood products are used across Europe and therefore modules A4–A5, B, C (end-of-life stage) and D (avoided burdens) represent a combination of specific destination countries in Europe.

LCA information

Declared unit:

1 m^3 of representative WISA® treated spruce plywood board from cradle to grave. The product density is 460 kg/m^3, which acts as a conversion factor for the declared indicator results.

Reference service life:

100 years. As permanent component of building or infrastructure, plywood boards are primarily used in dry indoor or moderately humid conditions (reference in-use conditions), such as in roofing, flooring and wall sheeting. According to research results and experience, glued timber products, such as plywood, will have around the same service life expectations than solid wood in dry and moderately humid conditions. If installed properly and moisture exposure is low or moderate, the service life of the plywood board is 100 years at minimum.

Time representativeness:

Manufacturer-specific data (module A3) represents year 2023. Time representativeness of secondary data used was mainly very good, and good overall.

Database(s) and LCA software used:

LCA for Experts software version 10.9 is used for modeling and calculation of results. Used databases include Sphera Professional 2024.2 and Ecoinvent 3.10 (cut-off system model).

Description of system boundaries:

The system boundaries of this EPD are cradle to grave and module D *(A + B + C + D)*. Therefore, all life cycle stages are included. See Table 2 and Figure 1 below for information on declared modules and descriptions further below.

Table 2. Modules declared, geographical scope, share of specific data 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	X	X	X	X	X	X	X	X	X	X	X	X
Geography	FI			EU													EU
Specific data used	< 35 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-4 %/+36 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-

EU = Europe; FI = Finland.

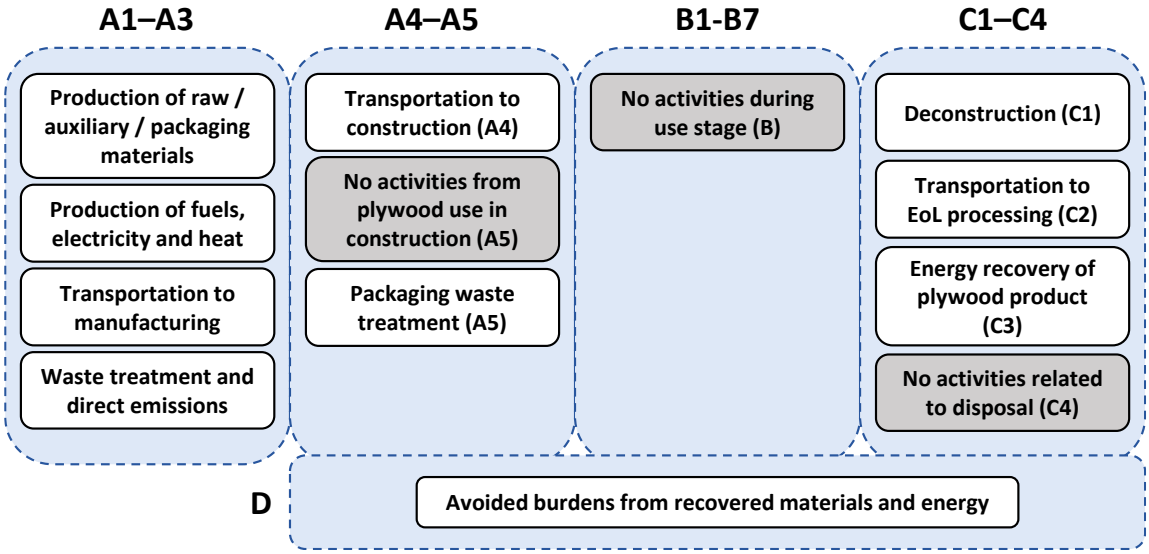


Figure 1. System diagram.

Module A1 includes the production of raw materials and energy used in the manufacturing of the plywood products. Spruce logs are sourced from sustainably grown forests in Finland. The plywood mill has an onsite energy plant that uses wood residues from plywood manufacturing as primary fuel. Electricity used in manufacturing is produced mostly with natural gas, nuclear power and coal and its emission factor is 0.015 kg CO_2 eq./kWh (GWP-GHG).

Module A2 includes transportation processes up to the plywood mill gates. Wood is transported by road, rails and water. Other materials are shipped by road and few materials are also by sea.

Module A3 includes the direct emissions of the manufacturing processes at the plywood mills, production of auxiliary and packaging materials, treatment of solid wastes and pre-treatment of wastewater. Plywood manufacturing process is depicted in Figure 2 below.

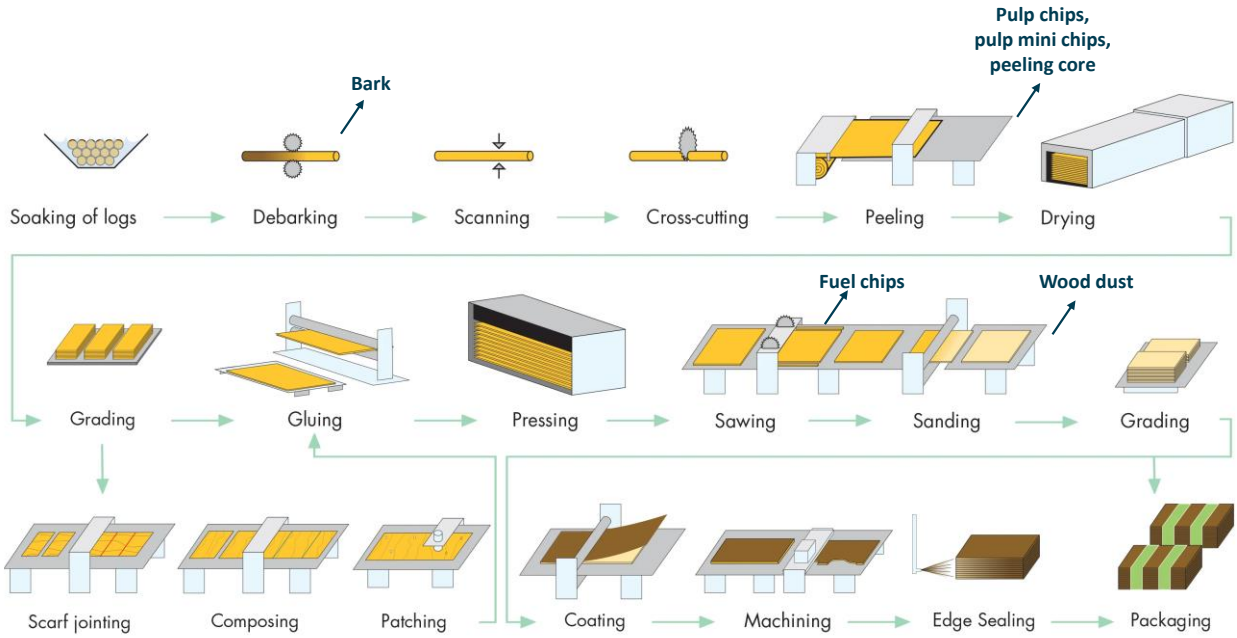


Figure 2. Manufacturing process flow diagram.

Module A4 describes the transportation of plywood products to end users in multiple European countries. In module A5 the plywood products are installed/used in construction (no significant inputs are identified to be used in construction). Plywood wastage and product packaging are directed to waste treatment in module A5.

Modules B1–B7 describe the use stage of plywood board installed in a building; the plywood does not require maintenance or create additional material or energy consumption, and therefore the environmental impacts in module B are estimated to be insignificant and presented as zero. Modules C1–C4 describe the deconstruction of the plywood (C1), transportation to waste processing (C2), waste processing (C3) and disposal (C4). Plywood is assumed to be recovered as energy, of which burdens belong to module C3, and no activities are included in module C4. Module D describes the material and energy resource recovery across the life cycle.

Table 3. Modeling data pertaining to modules A4-C4.

Module	Module information
A4	141 km by road (Truck-trailer, Euro VI, 27t payload capacity; 61 % utilization rate) 1035 km by sea (Container ship, 52 134 dead weight tonnage; 70 % utilization rate)
A5	Use of materials, energy and water and emissions to air: zero (assumed minor). Wastes formed: 0.192 kg polyester banding (material recovery) 6.474 kg bed timber (energy recovery) 25.693 kg plywood (including 5 % product wastage - energy recovery) 0.267 kg polyethylene wrap (material recovery)
B1–B7	No activities (estimated to be insignificant and presented as 0).
C1	Deconstruction (Excavator, 100 kW, construction)
C2	100 km assumed (Truck, Euro VI, 9.3t payload capacity; 51 % utilization rate)
C3	100 % energy recovery assumed.
C4	No activities (presented as 0).
D	Quality ratios of recovered materials are accounted for. Default efficiency of energy recovery are 25-27 % for heat, 13-15 % for electricity (Sphera). Average district heat (A5/C3) and country-specific market grid mix (A5/C3) are assumed to be avoided.

Cut-off criteria:

The sum of excluded flows do not exceed 1% of the total inputs or outputs (by mass or by energy). The flows knowingly excluded are as follows:

- Capital equipment, infrastructure, and employee commute.
- A1: Production of few minor auxiliary materials (<0.002 % of material input mass to mill site).
- A5: Production of screws and use of screwdriver in construction stage.
- B1: Emissions to air during use stage are very minor and assumed to be zero.

Allocation:

Allocation is avoided in the calculation of product-specific raw material inputs and outputs (as waste). Economic allocation is used to allocate other annual inventory data between plywood products and valuable co-products. In this way, plywood products carry at least 92 % of burdens from manufacturing.

Data quality:

Primary data of UPM Plywood represents year 2023 and annual production inventory data is used as the basis of calculation. Modeling data is obtained from Sphera Professional 2024.2 and Ecoinvent 3.10 databases. Time-related, geographical and technological representativeness are assessed before using secondary data and overall, the data quality is good.

Content information

Compositions of representative WISA® treated spruce plywood (WISA®-SpruceBT) and accompanying packaging are presented in Table 4 below.

Table 4. WISA® treated spruce plywood composition and packaging (representative product WISA®-SpruceBT).

Product components	**Weight, kg**	**Post-consumer material, weight-%**	**Weight biogenic carbon, kg C**
Wood, spruce	389.9	0 %	193
Moisture	41.8	0 %	0
Adhesive resin	19.9	0 %	3
Hardeners and fillers	7.3	0 %	0
Wood protection agent	0.6	0 %	0
Others (i.e. composing adhesives, fillers)	0.5	0 %	0
TOTAL	**460.0**	**0 %**	**196**
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Bed timber	6.5	1.4 %	2.6
Polyester band	0.2	0.0 %	0.0
TOTAL	**6.7**	**1.5 %**	**2.6**

** Contains biogenic carbon.*

There are no SVHC substances in the product.

Results of the environmental performance indicators

The declared indicators in this section are for the representative WISA® treated spruce plywood (WISA®-SpruceBT). 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.

Mandatory impact category indicators (EN 15804+A2)

Results per 1 m^3 of representative WISA® treated spruce plywood										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	-650	10.4	51.5	0	0.276	6.08	706	0	-177
GWP-fossil	kg CO_2 eq.	80.1	10.3	2.74	0	0.271	5.96	23.5	0	-176
GWP-biogenic	kg CO_2 eq.	-731	0.0207	48.8	0	0.000836	0.0186	683	0	-1.09
GWP-luluc	kg CO_2 eq.	0.752	0.0846	0.00899	0	0.00455	0.101	0.00683	0	-0.0358
ODP	kg CFC 11 eq.	1.01E-06	1.95E-12	6.41E-12	0	2.73E-14	6.06E-13	7.86E-11	0	-1.24E-09
AP	mol H^+ eq.	0.6	0.119	0.00948	0	0.00135	0.00721	0.118	0	-0.311
EP-freshwater	kg P eq.	0.0144	2.33E-05	1.21E-05	0	1.16E-06	2.57E-05	2.02E-05	0	-8.65E-04
EP-marine	kg N eq.	0.258	0.0423	0.00301	0	6.35E-04	0.00245	0.0345	0	-0.0964
EP-terrestrial	mol N eq.	2.54	0.466	0.0401	0	0.00704	0.0298	0.494	0	-0.982
POCP	kg NMVOC eq.	0.749	0.117	0.00772	0	0.0018	0.00677	0.095	0	-0.255
ADP-minerals&metals*	kg Sb eq.	1.42E-04	5.74E-07	3.83E-07	0	2.31E-08	5.12E-07	8.36E-07	0	-1.80E-05
ADP-fossil*	MJ	3650	134	22.7	0	3.54	78.6	173	0	-2620
WDP*	m^3	9.33	0.115	5.32	0	0.00404	0.0897	78.2	0	-17.8

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 (EN 15804+A2)

Results per 1 m^3 of representative WISA® treated spruce plywood										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	92.6	10.4	2.75	0	0.276	6.08	23.5	0	-177
PM	Disease incidences	7.39E-03	2.68E-06	6.53E-08	0	1.60E-08	6.88E-08	7.87E-07	0	-2.60E-06
IRP**	kBq U^{235} eq.	91.6	0.245	0.126	0	0.000638	0.0142	1.48	0	-27
ET-freshwater*	CTUe	922	93.1	10.4	0	2.6	57.8	74.7	0	-644
HTP-c*	CTUh	1.81E-07	1.91E-09	6.69E-10	0	5.22E-11	1.16E-09	7.48E-09	0	-4.10E-08
HTP-n*	CTUh	7.79E-07	7.04E-08	3.72E-08	0	2.33E-09	5.17E-08	3.96E-07	0	-1.21E-06
SQI*	Pt	136000	38.9	13.1	0	1.75	38.9	55.1	0	-3690

GWP-GHG = Global Warming Potential greenhouse gases; PM = Particulate Matter; IRP = Ionizing Radiation Potential; ET-freshwater = Ecotoxicity freshwater; HTP-c = Human Toxicity Potential cancer; HTP-c = Human Toxicity Potential non-cancer; SQI = 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.*

[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.

Resource use indicators

Note: energy stored in the product is not balanced out over the life cycle A to C, but instead reported as primary energy used as material, even though it is lost from the product system under study, why this has to be considered in any further assessment or use of the reported result.

Results per 1 m³ of representative WISA® treated spruce plywood										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	15200	12.5	494	0	0.299	6.64	6720	0	-2160
PERM	MJ	7150	0	-478	0	0	0	-6670	0	0
PERT	MJ	22300	12.5	16	0	0.299	6.64	49.1	0	-2160
PENRE	MJ	3580	134	41.5	0	3.54	78.6	434	0	-2620
PENRM	MJ	280	0	-18.8	0	0	0	-261	0	0
PENRT	MJ	3860	134	22.7	0	3.54	78.6	173	0	-2620
SM	kg	0.0218	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m^3	2.13	0.014	0.129	0	0.000336	0.00746	1.84	0	-1.12

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 of representative WISA® treated spruce plywood										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	kg	1.51	1.39E-08	1.02E-07	0	1.14E-10	2.54E-09	1.02E-07	0	-2.19E-06
NHWD	kg	6.88	0.0236	0.961	0	5.50E-04	0.0122	14	0	-6.84
RWD	kg	0.913	0.00236	0.000789	0	4.57E-06	1.02E-04	0.00935	0	-0.228

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

Output flow indicators

Results per 1 m³ of representative WISA® treated spruce plywood										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	29.7	0	0.702	0	0	0	0	0	0
MER	kg	0.575	0	29.7	0	0	0	437	0	0
EEE	MJ	0	0	73.4	0	0	0	989	0	0
EET	MJ	0	0	132	0	0	0	1780	0	0

CRU = Components for re-use; MFR = Material for recycling; MER = Materials for energy recovery; EEE = Exported energy, electricity; EET = Exported energy, thermal

Other impact category indicators

Impact category indicators calculated according to EN 15804+A1.

Results per 1 m³ of representative WISA® treated spruce plywood										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP	kg CO_2 eq.	-663	10.2	51.5	0	0.269	5.9	706	0	-175
ODP	kg CFC-11 eq.	4.49E-07	2.29E-12	7.55E-12	0	3.21E-14	7.14E-13	9.26E-11	0	-1.46E-09
AP	kg SO_2 eq.	0.34	0.0893	0.00654	0	0.000936	0.00514	0.0813	0	-0.24
EP	kg Phosphate eq.	0.142	0.0145	0.00137	0	2.26E-04	0.00116	0.015	0	-0.0444
POCP	kg Ethene eq.	0.0825	0.0056	4.40E-04	0	1.08E-04	4.46E-05	0.00658	0	-0.0305
ADPE*	kg Sb eq.	7.16E-05	5.89E-07	3.87E-07	0	2.30E-08	5.10E-07	9.03E-07	0	-1.96E-05
ADPF*	MJ	692	125	20	0	3.48	77.3	144	0	-1890

GWP = Global Warming Potentia; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion for fossil resources potential

** 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 environmental information

There are no harmful substances released to air, water or ground during the use of the product. Regarding indoor air quality the plywood boards have (depending on the product) M1 emission classification granted by the Building Information Foundation RTS sr (Rakennustietosäätiö RTS sr). M1 stands for low emissions.

Conversion factors from declared results

Below, conversion factors for converting the declared results to the results for specific products within the group are presented. The conversion factors are limited to the mandatory and voluntary impact category indicators of EN 15804+A2. Results of WISA®-Roof are identical to those of representative product.

Conversion factors from the representative product to WISA®-SpruceWR										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	1.020	1.000	1.008	0	1.000	1.000	1.010	0	1.000
GWP-fossil	kg CO_2 eq.	0.946	1.000	0.949	0	1.000	1.000	0.885	0	1.000
GWP-biogenic	kg CO_2 eq.	1.014	1.000	1.010	0	1.000	1.000	1.013	0	1.000
GWP-luluc	kg CO_2 eq.	2.832	1.000	1.000	0	1.000	1.000	1.000	0	1.000
ODP	kg CFC 11 eq.	0.629	1.000	1.000	0	1.000	1.000	1.000	0	1.000
AP	mol H^+ eq.	0.927	1.000	1.000	0	1.000	1.000	1.000	0	1.000
EP-freshwater	kg P eq.	0.972	1.000	1.000	0	1.000	1.000	1.000	0	1.000
EP-marine	kg N eq.	0.926	1.000	1.000	0	1.000	1.000	1.000	0	1.000
EP-terrestrial	mol N eq.	0.953	1.000	1.000	0	1.000	1.000	1.000	0	1.000
POCP	kg NMVOC eq.	0.985	1.000	1.000	0	1.000	1.000	1.000	0	1.000
ADP-minerals&metals*	kg Sb eq.	0.693	1.000	1.000	0	1.000	1.000	1.000	0	1.000
ADP-fossil*	MJ	0.970	1.000	1.000	0	1.000	1.000	1.000	0	1.000
WDP*	m^3	1.211	1.000	1.000	0	1.000	1.000	1.000	0	1.000

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

Conversion factors from the representative product to WISA®-SpruceWR										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG	kg CO_2 eq.	0.962	1.000	0.953	0	1.000	1.000	0.889	0	1.000
PM	Disease incidences	0.737	1.000	1.000	0	1.000	1.000	1.000	0	1.000
IRP**	kBq U^{235} eq.	0.998	1.000	1.000	0	1.000	1.000	1.000	0	1.000
ET-freshwater*	CTUe	1.009	1.000	1.000	0	1.000	1.000	1.000	0	1.000
HTP-c*	CTUh	1.050	1.000	1.000	0	1.000	1.000	1.000	0	1.000
HTP-n*	CTUh	0.918	1.000	1.000	0	1.000	1.000	1.000	0	1.000
SQI*	Pt	1.015	1.000	1.000	0	1.000	1.000	1.000	0	1.000

GWP-GHG = Global Warming Potential greenhouse gases; PM = Particulate Matter; IRP = Ionizing Radiation Potential; ET-freshwater = Ecotoxicity freshwater; HTP-c = Human Toxicity Potential cancer; HTP-c = Human Toxicity Potential non-cancer; SQI = Soil Quality Index

Conversion factors from the representative product to WISA®-SpruceFR										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	0.952	1.000	1.130	0	1.000	1.000	0.992	0	1.006
GWP-fossil	kg CO_2 eq.	1.386	1.000	1.161	0	1.000	1.000	0.868	0	1.006
GWP-biogenic	kg CO_2 eq.	1.004	1.010	1.127	0	1.000	1.000	0.994	0	1.009
GWP-luluc	kg CO_2 eq.	4.774	1.008	1.179	0	1.000	1.000	1.000	0	1.020
ODP	kg CFC 11 eq.	2.129	1.005	1.175	0	1.000	1.000	1.000	0	1.008
AP	mol H^+ eq.	1.310	1.008	1.150	0	1.000	1.000	1.000	0	1.010
EP-freshwater	kg P eq.	1.604	1.009	1.405	0	1.000	1.000	1.000	0	1.010
EP-marine	kg N eq.	1.345	1.009	1.179	0	1.000	1.000	1.000	0	1.011
EP-terrestrial	mol N eq.	1.331	1.009	1.157	0	1.000	1.000	1.000	0	1.009
POCP	kg NMVOC eq.	1.362	1.009	1.153	0	1.000	1.000	1.000	0	1.012
ADP-minerals&metals*	kg Sb eq.	19.225	1.009	1.407	0	1.000	1.000	1.000	0	1.011

ADP-fossil*	MJ	1.416	1.007	1.207	0	1.000	1.000	1.000	0	1.008
WDP*	m^3	1.064	1.009	1.105	0	1.000	1.000	1.000	0	1.006

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

Conversion factors from the representative product to WISA®-SpruceFR

Indicator	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-GHG	kg CO_2 eq.	1.361	1.000	1.160	0	1.000	1.000	0.872	0	1.006
PM	Disease incidences	0.725	1.011	1.156	0	1.000	1.000	1.000	0	1.012
IRP**	kBq U^{235} eq.	1.507	1.008	1.183	0	1.000	1.000	1.000	0	1.007
ET-freshwater*	CTUe	2.722	1.009	1.163	0	1.000	1.000	1.000	0	1.011
HTP-c*	CTUh	1.481	1.010	1.160	0	1.000	1.000	1.000	0	1.007
HTP-n*	CTUh	2.118	1.009	1.183	0	1.000	1.000	1.000	0	1.008
SQI*	Pt	1.007	1.008	1.313	0	1.000	1.000	1.000	0	1.019

GWP-GHG = Global Warming Potential greenhouse gases; PM = Particulate Matter; IRP = Ionizing Radiation Potential; ET-freshwater = Ecotoxicity freshwater; HTP-c = Human Toxicity Potential cancer; HTP-c = Human Toxicity Potential non-cancer; SQI = Soil Quality Index

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