Environmental Product Declaration

Particle Board

In accordance with ISO 14025 and EN 15804:2012+A2:2019

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TURKEY EPD®
ENVIRONMENTAL PRODUCT DECLARATIONS

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ECO PLATFORM

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.

Owner of the EPD

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ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)

Product Category Rules (PCR):
2019:14 Version 1.11, 2021-02-05, UN CPC code of 31431, EN 15804:2012 + A2:2019
Sustainability of Construction Works, c-PCR-006 Wood and wood-based products for use in construction (EN 16485)

PCR review was conducted by:
The Technical Committee of the International EPD® System. See www.environdec.com/about-us/the-international-epd-system-about-the-system 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.

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification X EPD verification

Third party verifier: Prof. Vladimír Kocí

Approved by: The International EPD® System Technical Committee, supported by the Secretariat

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes X No

“The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.”

About The Company

Orma is one of the most important and reliable companies in the sector with its long years of knowledge and corporate identity. In 1970, Orma was established on a land of 50 thousand square meters, 5 km from the city center. In Şevket Demirel's words, "An industy is being established in Isparta to utilize forest products,other wood products and their wastes fully".

Following the establishment of Orma, high-quality chipboard product has continuously developed with designs and surfaces that determine the market and has become the pioneer of the sector and has reached today with its sustainable production approach. The Orma brand is commemorated with quality and success and continues its production without making concession on it.

It started its first integration with a particle board unit with a capacity of 150 m^3 / day, a natural veneering unit of 5000 m^2 / day and closed sheet units of 400 sheets/day. It has renewed itself in line with the needs of furniture sector and still continues to produce particle board and melamin faced particle board in an area of 500 thousand square meters, 70 thousand square meters of which is closed, three particleboard plants, one of which is integrated , with a total capacity of 2,220 m^3/day and three impregnation lines with a total capacity of 90 million m^2/year and four coating lines with a total capacity of 4.500.000 units/year.

Product Information

Particle Board (PB) is a plate made of raw wood materials (wood chips, chips, sawdust, etc.) obtained by mixing and hot pressing of glue and hardeners and has a wide usage area. Particle Boards are produced in various thicknesses and qualities within certain standards.

Material Composition in 1 m^3 of ORMA Particle Board :

Raw Material	Weight, %
Wood	85-95
Resin	8-10
Other	1-5

The type of sawdust can be varied in particleboard production, but mainly pine and its species, as well as poplar and beech wood, are used.

Technical Specifications

1. General Requirements:				
Tolerances On Nominal Dimensions				
Property		Unit	Min.	Max.
Thickness(sanded) within and between boards		mm	-0.3	0.3
Thickness (unsanded) Within and Between Boards		mm	-0.3	1.7
Length and Width		mm	-5	5
Edge Straightness Tolerance		mm		1.5
Squareness Tolerance		mm		2
Moisture Content		%	5	13
Tolerance On The Mean Density Within a Board		%	-10	10
Formaldehyde Release	CARB P2	ppm	0	0.09
	TSCA Title VI		0	0.09
	E0	mg/100g	0	3.5
	E1		3.5	8
	E2		8	30

2. Mechanical properties TS EN 312:								
a) Requirements for boards for interior fitments (including furniture) for use in dry conditions (Type P2)								
Property	Test Method	Unit	Requirement					
			Thickness range (mm, nominal)					
			6 < to ≤ 13	13 < to ≤ 20	20 < to ≤ 25	25 < to ≤ 32	32 < to ≤ 40	> 40
Bending strength	EN 310	N/mm^2	11	11	10.5	9.5	8.5	7
Modulus of elasticity in bending	EN 310	N/mm^2	1800	1600	1500	1350	1200	1050
Internal bond	EN 319	N/mm^2	0.40	0.35	0.30	0.25	0.20	0.20
Surface soundness	EN 311	N/mm^2	0.8	0.8	0.8	0.8	0.8	0.8

Note: *This document may be modified at any time by the company without any express obligation to send any updated edition to all original recipients. To verify that you have the latest edition available, you are advised to contact the relevant sales executive.*

LCA Information

Declared Unit	1 m^3 of Particle Board with an average weight 603 kg/m^3
Time Representativeness	2021
Database(s) and LCA Software Used	Ecoinvent 3.6, SimaPro 9.1

> The inventory for the LCA study is based on the 2021 production figures for Particle Board products by ORMA production plant in Isparta/Turkey.
> This EPD's system boundary is cradle to gate. The system boundary covers A1 - A3 product stages, C1 - C4 end of life and D stages.

	Product Stage			Constrcution Process Stage		Use Stage							End of Life Stage				Benefits and Loads
	Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction. demolition	Transport	Waste Processing	Disposal	Future reuse. recycling or energy recovery potentials
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	TR	TR	TR	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO
Specific Data Used	> 90%	> 90%	> 90%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	NR					-	-	-	-	-	-	-	-	-	-	-	-
Variation - Sites	NR					-	-	-	-	-	-	-	-	-	-	-	-

X = Included in LCA, ND = Not Declared

System Boundary

A1: Raw Material Supply

Productions start from wood. ORMA supplies its raw materials from suitable forests. Raw material supply includes extraction/ preparation and pretreatment processes before production.

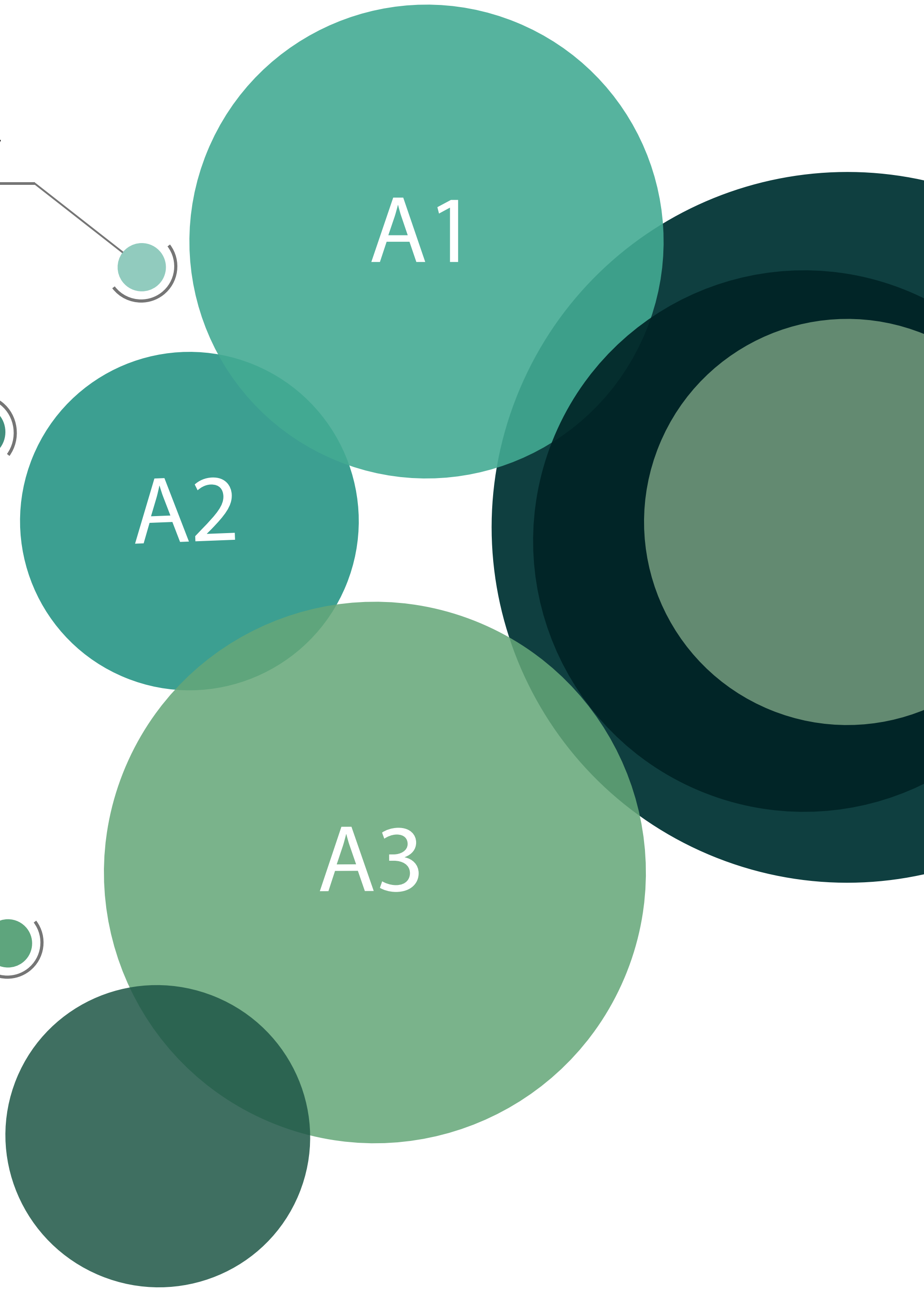
A2: Transportation

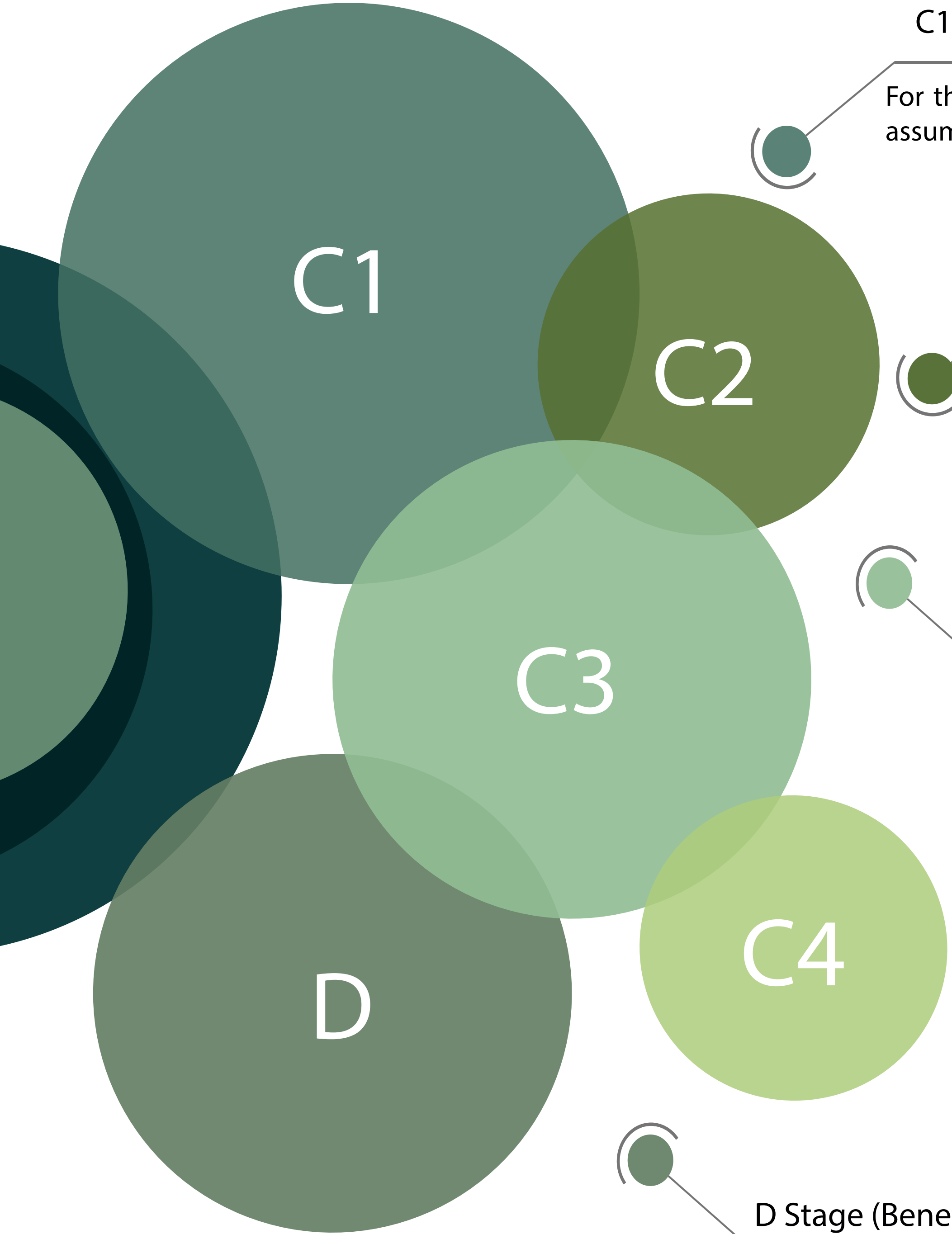
Transportation is relevant for delivering raw materials and other materials to the plant and transporting materials within the plant. Transport within the factory is included in the LCA model. Transport of raw materials to production sites is taken as the weight average values for transport from raw materials suppliers in 2021.

A3: Manufacturing

Workflow of ORMA is as follows (Some process can be vary according to production plant):

1 - Chipping
2 - Chips Classification
3 - Flaking
4 - Drying
5 - Gluing
6 - Mat formation
7 - Pressing
8 - Cutting & trimming
9 - Cooling
10 - Sanding
11 - Quality control
12 - Storage





C1: Demolition/Deconstruction

For this stage, 0.323 MJ electricity use per kg of material was assumed (Gervasio et al., 2018).

C2: Waste Transport

A distance of 200 km is assumed to transport the construction waste to the disposal site.

C3: Waste Processing

Due to waste going directly to landfill, incineration or recycling, there is no need for any waste process.

C4: Disposal

ORMA's products may be disposed with any disposal scenario after construction and demolition as their final fate and modelled as such for this EPD. It is assumed that 58% of the wastes are sent to the landfill site, 23% are sent to recycling plants, 13% are reused and the rest of the wastes are used as raw material for incineration.

D Stage (Benefits and Load)

For benefits and loads beyond, a calorific value of 18.6 MJ per kg of flooring products was assumed (Günther et al., 2012) to calculate the amount of avoided electricity production from heat. In this stage, the production efficiency of the facility, where electricity is produced by incineration method, is assumed as 20%.

More Information

Production Plants and Allocations
Water consumption, energy consumption and raw material transportation were weighted according to 2021 production figures.

In addition, hazardous and non-hazardous waste amounts were also allocated from the 2021 total waste generation.

Packaging
Products by ORMA are delivered to end-users in film plastic packaging or corrugated board. The packaging of the final product is included in the LCA.

Cut-Off Criteria
1% cut-off applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

Assumptions
For benefits and loads beyond, a calorific value of 18.6 MJ per kg of MDF was assumed (Günther et al., 2012) to calculate the amount of avoided natural gas used for heating. For the deconstruction stage, 0.323 MJ electricity use per kg of material was assumed (Gervasio et al., 2018).

LCA Modelling, Calculation and Data Quality
The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. According to the PCR, all energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while freshwater use is calculated with selected inventory flows in SimaPro.

There are no co-product allocations within the LCA study underlying this EPD.

The SimaPro 9.1 LCA software and the Ecoinvent 3.6 LCA database were used to calculate the environmental impacts. The regional energy datasets were used for all energy calculations.

Raw materials, energy and water consumption, waste and material and product transport data are collected from Orma. All primary data collected from ORMA is for the period year of 2021.

Geographical Scope
The geographical scope of this EPD is global. The assumptions of the end of life (C modules) and benefit (D module) stages can be referred to as the global.

REACH
The product contains formaldehyde, a substance of very high concern (SVHC) and is subject to authorization under the REACH Regulation.

LCA Results

Environmental Impacts for 1 m^3 of Particle Board							
Impact Category	Unit	A1-A3	C1	C2	C3	C4	D
GWP - Fossil	kg CO_2 eq	168	40.4	10.9	0	7.53	-83.2
GWP - Biogenic	kg CO_2 eq	-995	0.064	5.40E-3	0	126	-41.6
GWP - Luluc	kg CO_2 eq	0.791	0.070	2.74E-03	0	1.20E-03	-0.119
GWP - Total	kg CO_2 eq	-826	40.6	10.9	0	133	-41.7
ODP	kg CFC-11 eq	27.5E-6	1.70E-06	2.61E-06	0	1.24E-06	-8.18E-06
AP	mol H+ eq	1.20	0.214	46.0E-3	0	0.045	-0.523
EP - Freshwater*	kg P eq	0.060	0.022	859E-6	0	0.002	-0.032
EP - Freshwater	kg PO_4 eq	0.184	0.067	2.63E-03	0	0.005	-0.098
EP - Marine	kg N eq	0.270	0.039	13.6E-3	0	0.193	-0.099
EP - Terrestrial	mol N eq	3.61	0.426	150E-3	0	0.186	-1.38
POCP	kg NMVOC	0.805	0.102	47.8E-3	0	0.066	-0.338
ADPE	kg Sb eq	491E-6	10.2E-6	20.3E-6	0	5.53E-06	-211E-6
ADPF	MJ	2810	526	173	0	95.4	-1239
WDP	m^3 depriv.	160	6.68	1.28	0	2.63	-56.5
PM	disease inc.	19.6E-6	1.51E-06	987E-9	0	696E-9	-6.92E-06
IR	kBq U-235 eq	9.68	6.05	0.856	0	0.660	-8.12
ETP - FW	CTUe	3096	701	120	0	273	-1709
HTTP - C	CTUh	90.6E-9	8.52E-9	3.15E-9	0	13.9E-9	-477E-9
HTTP - NC	CTUh	2.40E-6	349E-9	149E-9	0	209E-9	-1.16E-6
SQP	Pt	57180	71.8	192	0	211	-4310
Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.						
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.						
Disclaimer 1	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.						
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.						
*Disclaimer 3	EP-freshwater: This indicator is calculated both in kg PO_4 eq and kg P eq as required in the charactarization model. (EUTREND model. Struijs et al. 2009b. as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)						

Biogenic Carbon Content	Unit	A1-A3
Biogenic carbon content in product	kg C / m^3 product	272
Biogenic carbon content in packaging	kg C / m^3 product	536E-6
Note: 1 kg biogenic carbon is equivalent to 44/12 kg of CO_2.		

Resource Use for 1 m³ of Particle Board							
Impact Category	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	12214	54.4	1.83	0	3.06	-802
PERM	MJ	0	0	0	0	0	0
PERT	MJ	12214	54.4	1.83	0	3.06	-802
PENRE	MJ	2812	525	173	0	95.4	-1239
PENRM	MJ	0	0	0	0	0	0
PENRT	MJ	2812	525	173	0	95.4	-1239
SM	kg	0.159	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m^3	0.549	0.164	0.037	0	0.142	-0.335

Waste & Output Flows for 1 m³ of Particle Board							
Impact Category	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	0.476	0	0	0	0	0
NHWD	kg	8.29	0	0	0	0	0
RWD	kg	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0
MER	kg	80.9	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	671	0
EE (Thermal)	MJ	0	0	0	0	0	0

PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water, HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal.

Climate Impact for 1 m³ of Particle Board							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-CHG*	kg CO_2 eq	167	39.8	10.8	0	49.2	-81.9
Acronyms	GWP-GHG = Global Warming Potential total excl. Biogenic carbon following IPCC AR5 methodology						
*Disclaimer	The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013						

References

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

/ISO 9001/ Quality management systems – Requirements

/ISO 14001/ Enviroment Management System- Requirements

/EN 15804:2012+A2:2019/ Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

/ISO 14020:2000/ Environmental labels and declarations — General principles

/ISO 14025/ ISO 14025:2006 Preview Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures

/ISO 14040-44/ ISO 14040:2006-10, Environmental management - Life cycle assessment -Principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)

/ISO 45001/ Occupational Health & Safety Management System Certification - Requirements

/ Gervasio et al., 2018 /Model for Life Cycle Assessment of buildings LCA, JRC Technical Reports, 2018.

/ Günther et al. ,2012 /Calorific value of selected wood species and wood products, Springer.

/UN CPC code of 31431/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency,

SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2019:14 Version 2.0, DATE 2019-12-20

/Ecoinvent/ Ecoinvent Centre, www.ecoinvent.org

/SimaPro/ SimaPro LCA Package, Pré Consultants, the Netherlands, www.pre-sustainability.com

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