



Environmental Product Declaration of Medium Density Fiberboard (MDF)



Environmental Product Declaration (EPD)
In accordance with ISO 14025 and EN
15804:2012+A2:2021 for

Medium Density Fiberboard (MDF)
Manufactured by KRONOSPAN ORMAN
ÜRÜNLERİ SAN. VE TİC. A.Ş.

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www.environdec.com

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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.

Programme Information

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR) Product Category Rules (PCR): 2019:14 Version 1.2.5, 2024-12-20, Construction Products and CPC 54 Construction Services, 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. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

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Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: EPD verification by individual verifier

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Approved by: The International EPD® System Procedure for follow-up of data during EPD validity involves third party verifier:



Life Cycle Assessment (LCA)

LCA accountability: Metsims Sustainability Consulting

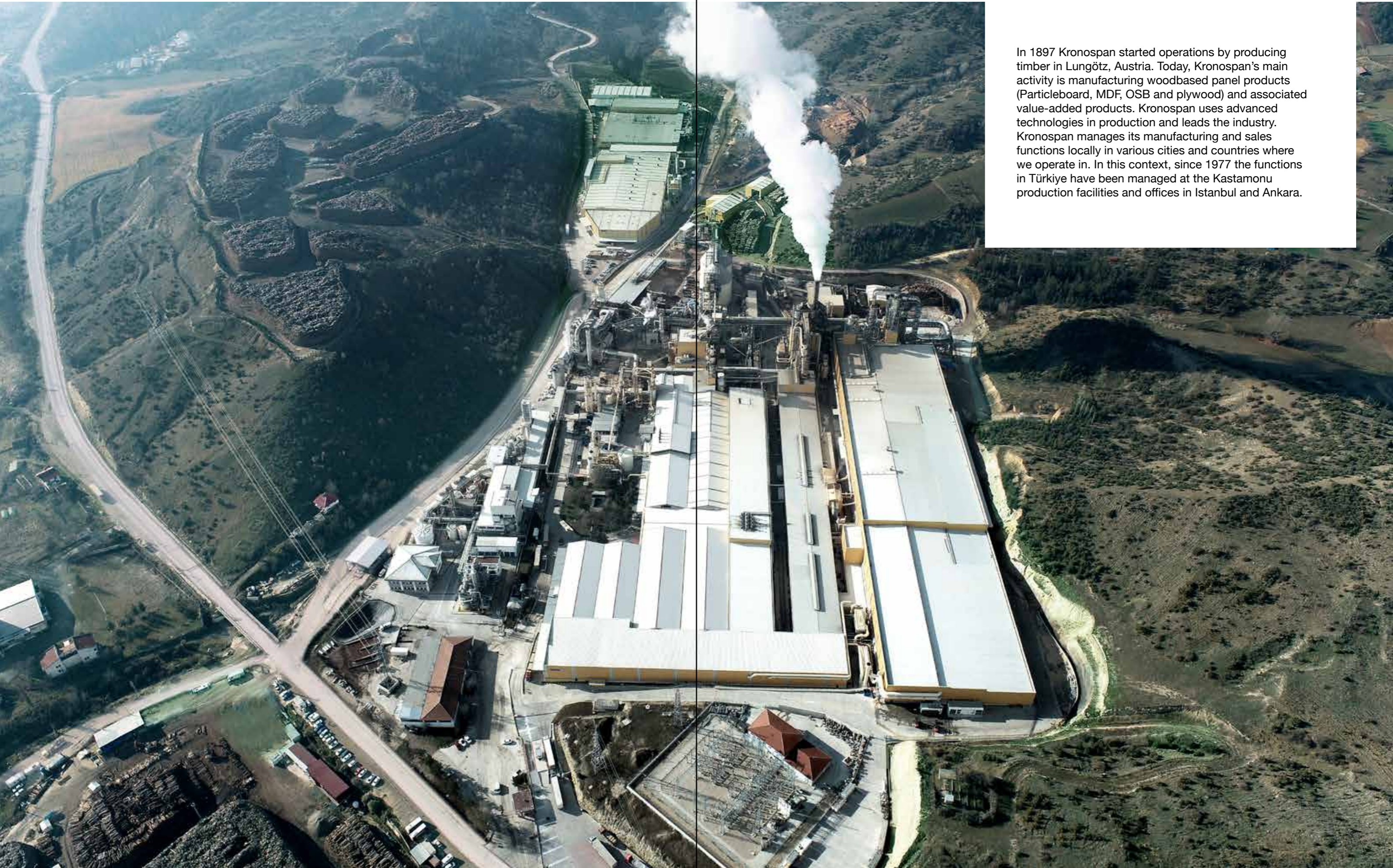
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About the Kronospan



In 1897 Kronospan started operations by producing timber in Lungötz, Austria. Today, Kronospan's main activity is manufacturing woodbased panel products (Particleboard, MDF, OSB and plywood) and associated value-added products. Kronospan uses advanced technologies in production and leads the industry. Kronospan manages its manufacturing and sales functions locally in various cities and countries where we operate in. In this context, since 1977 the functions in Türkiye have been managed at the Kastamonu production facilities and offices in Istanbul and Ankara.

About the Product



MDF & HDF TEKNİK DEĞERLERİ MDF&HDF TECHNICAL PROPERTIES

Genel amaçlı levhalar için gerekler Requirements for Dry Process Fiber Boards											
TS 64-1 EN 622-5 / Nisan 2011 MDF Genel özellikler TS 64-1 EN 622-5 / April 2011 General Properties of MDF											
Mekanik Özellikler Mechanical Properties	Test Metodu Method	Birim Unit	Kalınlık Grupları (mm) Nominal Thickness Group (mm)								
			> 1,8mm ≤ 2,5mm	> 2,5mm ≤ 4mm	> 4mm ≤ 6mm	> 6mm ≤ 9mm	> 9mm ≤ 12mm	> 12mm ≤ 19mm	> 19mm ≤ 30mm	> 30mm ≤ 45mm	> 45mm
Kalınlık Toleransı Thickness Tolerances	TS EN 324-1 TS EN 622-1	mm	± 0,2						± 0,3		
Uzunluk ve Genişlik Toleransı Length and Width Tolerances	TS EN 324-1 TS EN 622-1	mm/m	± 2 mm/m, max ± 5 mm								
Köşeyeden sapma Toleransı Squareness Tolerances	TS EN 324-2 TS EN 622-1	mm/m	2								
Kenar düzgünlüğü Toleransı Edge straightness Tolerances	TS EN 324-2 TS EN 622-1	mm/m	1,5								
Rütubet Değeri Moisture Content	TS EN 322 TS EN 622-1	%	4 - 11								
Levha ortalama yoğunluk Toleransı Average Density of Board Tolerances	TS EN 323	%	± 7								
TS 64-1 EN 622-5 / Nisan 2011 MDF Mekanik Değerleri TS 64-1 EN 622-5 / April 2011 Mechanical Properties of MDF											
Levha Yoğunluğu Board density		kg/m ³	800-900		700 - 800			650 - 750			
Kalınlık şişme 24 saat Thickness Swelling 24h	TS EN 317 TS EN 622-5	%	≤ 45	≤ 35	≤ 30	≤ 17	≤ 15	≤ 12	≤ 10	≤ 8	≤ 6
Çekme Direnci Internalbond Strength I.B	TS EN 319 TS EN 622-5	N/mm ²	≥ 0,65			≥ 0,60	≥ 0,55	≥ 0,50			
Eğilme Direnci Bending Strength MR	TS EN 310 TS EN 622-5	N/mm ²	≥ 23			≥ 22	≥ 20	≥ 18	≥ 17	≥ 15	
Elastikiyet Modülü Elasticity Modulus MOE	TS EN 310 TS EN 622-5	N/mm ²	≥ 2700		≥ 2500	≥ 2200	≥ 2100	≥ 1900	≥ 1700		
Formaldehit Değeri Sınıf E1 Formaldehyde content class E1	TS EN ISO 12460-5 TS EN 717-1	mg/100g ppm	E1 ≤ 8,0 mg/100g E1 ≤ 0,1 ppm								

The products are manufactured by Kronospan at Company's Kastamonu plant.

Medium Density Fiberboard (MDF) is engineered board produced from resin bonded wood fibers under high pressure and heat. MDF is a non-load-bearing product for interior use in dry conditions sanded to give a very fine surface, MDF is suitable for different coatings – veneering, laminating, painting and varnishing. Kronospan MDF can be used as a building material as a substitute for timber in non-load-bearing walls, ceilings, partitions etc..

System Boundaries & Description

A1 - Raw Material Supply

Initial raw material for Kronospan is wood. The company supplies sawdust, hard and soft roundwood from local suppliers. Raw material supply includes raw material extraction/ preparation and pre-treatment processes before production.

A2 - Transport

Transport for raw materials and other materials to the plant and the transport of materials within the plant. Transport of raw materials to production sites is taken as the weight average values for transport from raw materials supplier in 2022 FY.

A3 - Manufacturing

Kronospan production starts from preparation of formaldehyde and resin. Then the wood is refined specific to the product. The wood is pressed to panels before they are cut and trimmed to be packaged.

A4 - Transport

Transport of final product to customers are considered and the routes and distances are calculated accordingly. Transport routes were provided by the manufacturer for 2022.

Transport Mode	Type
Road	Vehicle: Lorry Size Class: >32 metric ton Emission Standard: EURO5 Fuel Type: Diesel
Sea	Vehicle: Container Ship DWT (Load Capacity): 43000 tonnes Fuel Type: Heavy Fuel Oil

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Road	Vehicle: Lorry Size Class: >32 metric ton Emission Standard: EURO5 Fuel Type: Diesel
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C1 - Deconstruction / Demolition

0.323 MJ electricity use per kg of material was assumed for deconstruction (Gervasio et al., 2018).

C2 - Waste Transport

This step includes the transport of materials after they reach their end-of-life. The average distance was assumed 200 km by truck from demolition site to a waste or recycling area.

Parameter	Value
Vehicle Type	Vehicle: Lorry Size Class: 16-32 metric ton Emission Standard: EURO5 Fuel Type: Diesel
Distance	100 km (assumption)

C3 - Waste Processing

The product is considered to be recycling (50 % of product as input for chipboard production), incinerating with energy recovery (35 %) and partly landfilling (15%). The landfill and incineration does not require any additional process. However, recycling includes the sorting of the wood panels and wood chipping.

C4 - Disposal

Kronospan's products may dispose with any disposal scenario in their end-of-life phase and modelled accordingly for this EPD. It is assumed that 50% of the waste is used in recycling, 35% of the wastes used as raw material for incineration plants due to their high calorific value and 15% of the wastes send to the landfill site.

D - Benefits

Post-consumer recycling scenarios are considered, 50% of waste product is recycling to secondary wood and 35% is incinerating with energy recovery.



LCA Information

Functional Unit: 1 m³ of MDF with an average weight 770 kg/m³
Time Representativeness: 2022 Fiscal Year

Database(s) and LCA Software: Ecoinvent 3.9.1 and SimaPro 9.5
System Boundaries: Cradle to gate with options, modules C1 – C4, module D and with optional module (A4).

	Product stage			Construc- tion pro- cess stage	Use stage								End of life stage				Re- source 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	ND	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	GLO	GLO	TR	GLO	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	>90%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%				-	-	-	-	-	-	-	-	-	-	-	-	-

The inventory for the LCA study is based on the 2022 fiscal year production figures.

Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2022 fiscal year production figures. In addition, hazardous and non-hazardous waste amounts were also allocated from the 2022 fiscal year total waste generation. There is no co-product allocation.

Cut-Off Criteria

1% cut-off is 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.

REACH Regulation

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

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. EN15804 method is followed. All energy calculations were obtained using Cumulative Energy Demand, Low Heating Values (LHV) methodology, while fresh water use is calculated

within selected inventory flows in SimaPro according to the PCR. Corresponding regional energy datasets were used for all energy related activities. Data quality assessment scheme is given in the table below.

LCA Stages	Data Type
Raw Material Supply	Generic database, plant specific data
Raw Material Transport	Generic database, plant specific data
Manufacturing	Generic database, plant specific data
Product Transport	Generic database, generic data
Demolition	Generic database, scenario and generic data
Waste Transport	Generic database, scenario and generic data
Waste Processing	-
Disposal	Generic database, scenario and generic data
Benefits and Loads	Generic database, scenario and generic data

Content Declarations

Product Composition

Product composition of the investigated product is shown in the table below.

Product components	Weight, kg	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg
Wood	75-85	0%	100%
Resin	13-23	0%	0%
Additives	1-3	0%	

Packing

Products by Kronospan is delivered to end users in film plastic packaging, corrugated board, or composite packaging. The packaging of the final product is included in the LCA.

LCA Results

Indicators According to EN 15804

Medium Density Fiberboard (MDF)								
Environmental Impacts for 1 m ³ of MDF								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP - Fossil	kg CO ₂ eq	2.29E+02	1.32E+02	3.99E+01	2.90E+01	6.02E+00	2.03E+00	-1.67E+02
GWP - Biogenic	kg CO ₂ eq	-1.35E+03	8.94E-02	5.45E-01	2.62E-02	1.91E-02	1.92E+01	-6.10E+02
GWP - LULUC	kg CO ₂ eq	9.82E-01	7.20E-02	4.75E-01	1.41E-02	1.19E-02	1.28E-03	2.41E-02
GWP - Total	kg CO ₂ eq	-1.12E+03	1.32E+02	4.10E+01	2.90E+01	6.06E+00	2.13E+01	-7.77E+02
ODP	kg CFC11 eq	1.16E-03	2.70E-06	2.68E-07	6.31E-07	3.55E-08	3.53E-08	-2.90E-06
AP	mol H+ eq	1.45E+00	1.15E+00	2.86E-01	9.45E-02	2.94E-02	1.17E-02	1.10E-02
EP f	kg P eq	4.64E-02	8.26E-03	4.59E-02	2.03E-03	2.49E-03	4.70E-04	1.79E-02
EP m	kg N eq	4.65E-01	3.20E-01	4.79E-02	3.25E-02	5.99E-03	6.50E-02	3.47E-01
EP t	mol N eq	5.45E+00	3.48E+00	4.31E-01	3.43E-01	6.08E-02	4.36E-02	2.03E-02
POCP	kg NMVOC eq	1.67E+00	1.12E+00	1.26E-01	1.41E-01	1.79E-02	2.00E-02	-2.99E-01
ADPE	kg Sb eq	1.47E-03	3.64E-04	4.29E-05	9.31E-05	5.77E-06	3.57E-06	1.14E-04
ADPF	MJ	4.54E+03	1.82E+03	4.17E+02	4.11E+02	7.23E+01	3.27E+01	-2.64E+03
WDP	m ³ depriv.	2.57E+02	6.82E+00	2.23E+01	1.68E+00	9.59E-01	1.34E+00	-1.34E+00
PM	disease inc.	3.38E-05	9.16E-06	0.00E+00	2.31E-06	2.83E-07	2.31E-07	1.02E-06
IR	kBq U-235 eq	7.32E+00	2.15E+00	3.29E-01	5.50E-01	5.87E-01	5.59E-02	-4.01E-03
ETP - FW	CTUe	4.40E+03	1.80E+03	2.27E+02	4.06E+02	3.09E+01	1.03E+02	8.52E+02
HTTP - C	CTUh	3.04E-07	1.19E-07	1.71E-08	2.63E-08	4.41E-09	2.38E-09	-9.83E-09
HTTP - NC	CTUh	6.69E-06	2.29E-06	6.96E-07	5.79E-07	1.02E-07	8.38E-08	-1.53E-06
SQP	Pt	8.76E+04	9.12E+02	4.11E+01	2.45E+02	1.16E+01	7.17E+01	1.65E+04
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.							
Biogenic Carbon content	Unit	A1 - A3						
Biogenic Carbon Content in Product	kg C	356.27						
Note: 1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂								

***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 or 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 of these results are high or as there is limited experience with the indicator.

LCA Results

Medium Density Fiberboard (MDF)								
Resource Use for 1 m ³ of MDF								
Indicator	Unit	A1 - A3	A4	C1	C2	C3	C4	D
PERE	MJ	2.00E+04	3.74E+01	1.44E+02	9.30E+00	9.85E+00	2.38E+00	7.44E+03
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	2.00E+04	3.74E+01	1.44E+02	9.30E+00	9.85E+00	2.38E+00	7.44E+03
PENRE	MJ	4.80E+03	1.96E+03	4.60E+02	4.41E+02	7.72E+01	3.51E+01	-2.75E+03
PENRM	MJ	0	0	0	0	0	0	0
PENRT	MJ	4.80E+03	1.96E+03	4.60E+02	4.41E+02	7.72E+01	3.51E+01	-2.75E+03
SM	MJ	3.70E-02	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m ³	8.32E-01	2.71E-01	1.69E-01	6.66E-02	2.52E-02	3.48E-02	-4.51E-01
Waste & Output Flows for 1 m ³ of MDF								
Indicator	Unit	A1 - A3	A4	C1	C2	C3	C4	D
HWD	kg	4.30E+00	0	0	0	0	0	0
NHWD	kg	3.51E+01	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0
MFR	kg	0	0	4.55E+02	0	3.85E+02	0	0
MER	kg	0	0	0	0	2.70E+02	0	0
EE e	MJ	0	0	0	0	0	0	0
EE t	MJ	0	0	0	0	0	5.01E+03	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: Nonrenewable 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.

GHG - GWP								
Indicator	Unit	A1 - A3	A4	C1	C2	C3	C4	D
GHG	kg CO ₂ eq	2.31E+02	1.33E+02	4.06E+01	2.91E+01	6.06E+00	1.58E-01	-1.67E+02

GHG - GWP = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology

* 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. EN ISO 9001/ Quality Management Systems - Requirements EN ISO 14001/ Environmental Management Systems - Requirements

EN ISO 50001/ Energy Management Systems - Requirements ISO 14020:2000/ Environmental Labels and Declarations — General principles

EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework

(ISO14040:2006) and Requirements and guidelines (ISO 14044:2006) PCR 2019:14 Construction products (EN 15804:A2) (1.2.5) prepared by IVL Swedish Environmental Research Institute, EPD International Secretariat, date 2022-11-01.

The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

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